4.7 Fuel Handling Building

Building: FUEL HANDLING BUILDING Elev.: 281' through 400'

Length: 70 ft. Width: 168 ft.
Height: 119 ft.
Area: (See Each Zone)

Drawings: 1-FHA-026, 027, 028, 029, 030, 031, 033, 034, 035, 036, 037 and 038.

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

The fuel handling building is used for receiving, storing, preparation, handling and transfer of fuel. Elevation 281 is used as the principle circuit routing to and from containment.

4.7.1 Fire Zone FH-FZ-1

4.7.1.1 Building: FUEL HANDLING BUILDING Elev.: 281'

Fire Zone Name: Fuel Handling Building Basement
Length: 54 ft. Width: 144 ft.
Height: 23 ft.
Area: 6,805 ft^2

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:

Zone boundaries consist of reinforced concrete walls, floor and ceiling. Most of the east boundary is not adjacent to any other plant area except for a three-hour rated fire barrier where adjacent to zone IB-FZ-8 which contains a non-rated steel door, and a non-fire rated boundary where adjacent to FH-FZ-6. A raceway which runs through the east wall to fire area CB-FA-1 in the east boundary of zone FH-FZ-1 is sealed to a three-hour fire rating. The north boundary is adjacent to the Reactor Building which is a three-hour fire 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. The south and west boundary is adjacent to fire zones AIT-FZ-1, AIT-FZ-1a, AB-FZ-3, AB-FZ-4 and AB-FZ-5. An open passage exists between this zone and zone AB-FZ-5 and the boundary between this zone and zone AB-FZ-4 does not consist of wall construction; the boundaries adjacent to AB-FZ-3 and AIT-FZ-1 also contain unprotected openings, however, this zone (FH-FZ-1) is equipped with an automatic wet pipe sprinkler system, therefore the boundaries are each classified as an A2 boundary. The north and south boundary of the ventilating duct chase, which extends vertically, is penetrated where adjacent to FH-FZ-2 on elevation 305' - 2". The south boundary of the ventilating duct chase is penetrated where adjacent to FH-FZ-3 on elevation 329'-0". The boundaries of this ventilation duct where they interface with FH-FZ-2 and FH-FZ-3 are classified as B3 walls. The elevator shaft at the south end is also classified as B3. No additional modifications are required because the required train B cables in FH-FZ-2 are located more than 50 feet from this wall; and MU-V-20 located in FH-FZ-2 is not utilized for shutdown during a fire in FH-FZ-1, while the cables for the redundant equipment in FH-FZ-1, although less than 50 feet away from this wall, are routed through areas equipped with a sprinkler system. Zone FH-FZ-3 contains circuits for IC-P-1B; while zone FH-FZ-1 contains circuits for IC-P-1A. No additional modification is required because the circuits for IC-P-1B are located more than 50 feet from this wall; while cables for IC-P-1A in zone FH-FZ-1 are routed through areas equipped with an automatic sprinkler system.

The west wall of this ventilation duct adjacent to AB-FZ-6 need not be sealed since FH-FZ-1 has an automatic suppression system and there is no continuity of combustibles from FH-FZ-1 to AB-FZ-6. The floor of this zone is not adjacent to any other plant area. The ceiling of this zone is adjacent to zone FH-FZ-2 and FH-FZ-4 Note that FH-FZ-4 is the fuel pool. Its boundary is not fire rated, but due to the nature of this zone, combustible loadings (combustible loading is on the operating floor between FH-FZ-2 and FH-FZ-4) are not compared to each other. Combustible loadings on either side of each zone boundary are identified in Section 4.a for the following fire zones:

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

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:

Walls			Floor	Ceiling	
North	South	East	West		
Rated	*B3/A2	A1/A2/Rated	A2	A1	A2

*B3 classified where duct chase and elevator shaft is adjacent to FH-FZ-2 and FH-FZ-3.

Doors:

Entrance to this fire zone is through an open stairwell in the southeast corner of this zone which provides access from zone FH-FZ-2. The west boundary is open to zones AB-FZ-4 and AB-FZ-5. The wall common to fire zone IB-FZ-8 contains a non-rated steel door.

Barriers Within Zone:

Rated fire barriers are provided for circuits ranging from a rating of 39 minutes (minimum required) to one hour. Rockbestos Fire Zone R cable is installed. See Attachment 3-1 for details.

Safe Shutdown Components:

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

Safe Shutdown Repairs:

4160 volt power cable ME6 for DH-P-1B will be repaired for cold shutdown.

4.7.1.2 Analysis

The combustibles in this zone consist of pump lube oil, transient materials, and cable insulation. The fire loading is low as noted in Section 4.a. Fire protection for this zone consists of an automatic wet pipe sprinkler system which protects the entire floor and cable trays on elevation 281'-0", a fire hose station, ionization smoke detection which actuates alarms in the Control Room. Portable fire extinguishers and additional hose protection is provided in zones AB-FZ-1 and 5 as shown on drawing 1-FHA-026.

Exemptions:

Manual operation in lieu of cable protection; Rockbestos Fire zone R cable in lieu of one hour fire barriers; minimum 39 minute fire barrier rating for cable raceway fire barriers in lieu of a one hour rating; tray and conduit supports not fire proofed; unrated steel door in rated fire barrier; manual operation of valves in lieu of protection of instrument air supply; 20 ft. separation with intervening combustibles. See Section 3.14 for details.

4.7.1.3 Conclusion

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

4.7.2 Fire Zone FH-FZ-2

4.7.2.1 Building: FUEL HANDLING BUILDING Elev.: 305' and 306'

Fire Zone Name: Fuel Handling Building at Elevation 305'

Length: 150 ft Width: 50 ft.
Height: 21 ft.
Area: 6,631 ft^2

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 concrete walls, floor and ceiling. The south boundary of this zone is three-hour fire rated except on the operating floor (348' elevation) which is common between TMI-1 and TMI-2. The rated portion of this boundary includes a class A fire door on elevation 305'. There is no redundant safe shutdown equipment separation provided by this door. The west boundary is adjacent to fire zone AB-FZ-6, with two open passages between the zones. The boundaries between FH-FZ-2 and FH-FZ-4 (fuel pool) are reinforced concrete (no

penetrations) except on the operating floor where no boundaries exist. The boundaries between FH-FZ-2 and FH-FZ-3 are reinforced concrete. These boundaries are not relied upon to separate redundant trains of equipment being relied on for safe shutdown. The east boundary of FH-FZ-2 in the Control Building patio (Hot Machine Shop) is a three-hour fire rated barrier except where adjacent to zone FH-FZ-4 (concrete wall with no penetrations). The north boundary for the Reactor and Turbine Buildings 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 north boundary adjacent to the duct chase (FH-FZ-1) is classified as B3. No additional modifications are required because the train B cables in FH-FZ-2 are located more than 50 feet from this wall; while the cables for the redundant equipment in FH-FZ-1, although less than 50 feet away from this wall, are routed through areas equipped with a sprinkler system.

The floor of this zone is adjacent to zone FH-FZ-1 (protected by an automatic wet pipe sprinkler system) and FH-FZ-2 is sprinklered above FH-FZ-6 and the Air Intake Tunnel. The remainder is not adjacent to any other plant area. The ceiling of this zone is adjacent to zones FH-FZ-3 (which does not contain redundant safe shutdown equipment) and FH-FZ-5. Note that the Control Building patio portion of FH-FZ-2 is provided with an automatic wet pipe sprinkler system where adjacent to FH-FZ-4, FH-FZ-5 and FH-FZ-6. The remainder of the ceiling is not adjacent to any other plant area. Combustible loadings on either side of each non-fire rated zone boundary are identified in Section 4.a for the following fire zones:

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

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:

Walls			Floor	Ceiling	
North	South	East	West		
B3**/Rated B2* B2***	Rated	Rated	A1/B2	A1/A2	A1/A2*/B2

*above 348'-0"

**B3 classified where adjacent to FH-FZ-1.

***where adjacent to FH-FZ-4

Doors:

Entrance to this fire zone is through a class A rated rollup fire door on the north wall of this zone which is adjacent to the Turbine Building. Class A rated fire doors are provided on the east wall of this zone which is adjacent to the Control Tower. A Class A door on the south wall at elevation at 305'-1" of this zone (not maintained) is provided to separate this zone from the Unit 2 Fuel Handling Building. An opening is provided on the west wall of this fire zone which is adjacent to zone AB-FZ-6 and a rolling concrete missile door on the west wall of this zone is provided at the railroad entrance. An open stairwell in the floor of this zone provides access to zone FH-FZ-1. Above elevation 348'-0" this zone is open to the Unit 2 Fuel Handling Building and to zone FH-FZ-4. Access to the air intake tunnel through a steel hatch is provided in the south end of this fire zone.

Barriers Within Zone:

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

Safe Shutdown Components:

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

Safe Shutdown Repairs:

None

4.7.2.2 Analysis

Combustibles in this zone consist of cable insulation and transient materials. The fire loading is low, as noted in Section 4.a. Fire protection in this zone consists of an automatic wet pipe sprinkler system on elev. 306 ft. of this zone adjacent to the Control Tower, and fire extinguishers. Hose protection for the 306 ft. elevation area of this fire zone is available in the Turbine Building outside the north wall of the zone. Additional hose protection is available near the open stairwell in zones FH-FZ-1 (elev. 281'-0") and zone FH-FZ-3 (elev. 329'-0"). Also portable fire extinguishers are available in zone AB-FZ-6 as shown on drawings 1-FHA-027, 1-FHA-026, 1-FHA-028 and 1-FHA-034.

Exemptions.

Detection and suppression does not cover entire fire zone; 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.

4.7.2 3 Conclusion

Due to the limited amounts of combustible material in this zone and the features

described, existing fire protection for this zone is considered adequate.

4.7.3 Fire Zone FH-FZ-3

4.7.3.1 Building: FUEL HANDLING BUILDING Elev.: 329'

Fire Zone Name: Fuel Handling Building at Elevations 329' and 331'
Length: 18 ft. Width: 80 ft.
Height: 19 ft.
Area: 1,221 ft^2

Drawings: 1-FHA-028

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 and a combination of grating and reinforced concrete for floors and ceilings. The west boundary consists of a three-hour rated fire barrier adjacent to AB-FZ-10. The north boundary is adjacent to a ventilating duct chase (FH-FZ-1) and as such, combustible loadings between FH-FZ-3 and FH-FZ-1 will not be compared to each other. This boundary is classified as a B3 wall. Zone FH-FZ-3 contains circuits for IC-P-1B; while zone FH-FZ-1 contains circuits for IC-P-1A. No modification is required because the circuits for IC-P-1B are located more than 50 feet from this wall; while cables for IC-P-1A in zone FH-FZ-1 are routed through areas equipped with an automatic sprinkler system. The east boundary is adjacent to the fuel pool (FH-FZ-4). A portion of the south boundary is adjacent to zone FH-FZ-2; the remainder being adjacent to an elevator shaft which is part of zone FH-FZ-1 (B3). The floor is adjacent to zone FH-FZ-2 and the ceiling is adjacent to zone FH-FZ-4. These boundaries are not relied upon to separate redundant trains of safe shutdown equipment on either side of the boundary.

Combustible loadings on either side of the non-fire rated zone boundaries are identified in Section 4.a for the following fire zones:

FH-FZ-3, FH-FZ-2, FH-FZ-1 and FH-FZ-4

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:

Walls	Floor	Ceiling

North	South	East	West		
B3	B2/B3	B2	Rated	B2	B2

Doors:

Entrance to this fire zone is through a class A rated door on the west wall and through an unrated door on the south wall.

Barriers Within Zone:

None

Safe Shutdown Components:

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

Safe Shutdown Repairs:

None

4.7.3.2 Analysis

Combustibles in this zone consist of cable insulation. The fire loading is low, as noted in Section 4.a. Fire protection for this zone consists of a fire hose station as shown on drawing 1-FHA-028. Additional hose protection as well as portable fire extinguishers are available in AB-FZ-10 as shown on drawing 1-FHA-028.

Exemptions:

Manual operation of valves in lieu of protection of instrument air supply. See Section 3 14 for details.

4.7.3.3 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.

4.7.4 Fire Zone FH-FZ-4

4.7.4.1 Building: FUEL HANDLING BUILDING Elev.: 305' and 348'
Fire Zone Name: Fuel Handling Building at Elevations 329', 331' and 348'
Length: 24 ft. Width: 104 ft.
Height: 95 ft.
Area: 4,855 ft^2

Drawings: 1-FHA-028 and 029

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 and ceiling except on the operating floor where no physical construction exists on the south boundary between this zone and zone FH-FZ-2; however, combustibles in FH-FZ-2 are concentrated on elevation 305, not on the operating floor, and this boundary is not relied upon to separate redundant trains of safe shutdown equipment from each other. Boundary construction and combustible loading is only discussed on the operating floor as the area below the operating floor for this zone is the fuel pool. A portion of the floor over zone FH-FZ-3 consists of reinforced concrete and grating. This boundary is not relied upon to separate redundant trains of safe shutdown equipment from each other. A portion of the south boundary is adjacent to an elevator shaft (FH-FZ-1) and as such, combustible loading comparison between FH-FZ-4 and FH-FZ-1 will not be made. Most of the south boundary on the operating floor is a large high bay area open to the TMI-2 fuel handling building elevation 348'. The east boundary of this zone is adjacent to zone FH-FZ-5 and is a B2 category wall.

The west boundary of this zone is a three hour rated fire barrier. The ceiling and the north boundary are not adjacent to any other plant area. Two ventilation duct penetrations in the north wall at elevation 376' and 380' are provided with 3-hour fire rated fire dampers. Combustible loadings on either side of the non-fire rated zone boundaries are identified in Section 4.a for the following fire zones:

FH-FZ-4, FH-FZ-3, FH-FZ-5, FH-FZ-2 and TMI-2 operating floor.

The principal combustible in this zone is lube oil in negligible quantities. The lack of a fire damper in the east boundary of this zone (B2 Classification) is not considered critical even though the loading in adjacent zone FH-FZ-5 is greater than 40,000 BTU/Ft^2 as combustibles in FH-FZ-5 are concentrated approximately 30 feet below the duct penetration.
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:

Walls			Floor	Ceiling	
North	South	East	West		
A1	B2	B2	Rated	**B2/B1	A1

**Fuel pool where not adjacent to FH-FZ-3.

Doors:

Entrance to this fire zone is via the open stairwell on the south boundary to the zone or via the elevator.

Barriers Within Zone:

None

Safe Shutdown Components:

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

Safe Shutdown Repairs:

None

4.7.4.2 Analysis

The combustibles in this zone consist of transient materials, and lube oil. The fire loading is low, as noted in Section 4.a. Fire protection in this zone consists of portable fire extinguishers and a fire hose station as shown on drawings 1-FHA-029.

Exemptions:

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

4.7.4.3 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.

4.7.5 Fire Zone FH-FZ-5

4.7.5.1 Building: FUEL HANDLING BUILDING Elev.: 322' and 380'

Fire Zone Name: Control Bldg. Patio Area
Length: 121 ft. Width: 20.4 ft.
Height: 80 ft.
Area: 2,468 ft^2

Drawings: 1-FHA-034, 035, and 036

Fire Zone Boundaries:

Fire Zone Boundary Barrier Ratings:
Fire Loading: <2 hours
Design Rating: - hours

The Fire Zone Boundary Components Are Evaluated As Follows:

Note: This fire zone covers four elevations, 322'-0", 338'-6", 355'-0" and 380'-0". Each elevation floor except elevation 322'0" consists of steel grating.

An instrument shop and office facilities are located on the south side of elevations 336'-6" and 355'-0" of this fire zone. Two means of egress are provided consisting of a stair tower and intercommunicating stairway. The north stair tower is a one hour rated enclosure, but is separated from the new facility by full height walls. The construction is non-combustible (structural steel, metal studded walls and partitions with gypsum wall board. Except for the fire rated stairwell, structural steel is not required to be fireproofed as the walls and floors of the facility are not fire barriers.

Zone boundaries consist of reinforced concrete walls, floor and ceiling. The north and south boundaries are three-hour fire rated barriers. The west boundary is adjacent to fire zones FH-FZ-2 and FH-FZ-4 and is a B2 category where adjacent to FH-FZ-4. The east boundary is a three-hour rated fire barrier except on elevation 380' where adjacent to zones CB-FZ-5a and CB-FZ-5b A major portion of the east boundary where adjacent to CB-FZ-5a and 5b consists of reinforced concrete. The wall of CB-FZ-5a and CB-FZ-5b does not separate redundant safe shutdown equipment and is considered a B2 category. This zone boundary analysis is considered valid even though the combustible loading in FH-FZ-5 exceeds 40,000 BTU/sq.ft. because the concentrations of class A combustibles are situated on elevation 355'-0";combustibles in cable tray are situated primarily at elevation 350' and the remainder of combustibles are located below El. 350' (Instrument Shop & Repair Facilities). In addition, the east boundary where adjacent to fire area CB-FA-3d has six ventilated (passive) bus ducts (each 6"x8 1/2") which are externally sealed at the barrier to a three hour rating and are controlled as such. These small openings in the rated barrier supported by the detection and suppression systems in CB-FA-3d, do not degrade the ability of the barrier to confine a fire. Stainless steel tubes which penetrate the east wall of this fire zone (where adjacent to CB-FA-2C & CB-FA-3C) are sealed around the periphery to a three hour fire rating. The tubes are an integral part of the incipient fire detection system for Control Building fire areas CB-FA-2B, CB-FA-2C, CB-FA-2D, CB-FA-2E, CB-FA-2F, CB-FA-2G, CB-FA-3A, CB-FA-3B). They are not sealed internally even though they transition to nylon tubing inside this fire zone. Tubing has been evaluated as acceptable in this configuration. (Ref. FPE-T1-417109-003). The floor is adjacent to zone FH-FZ-2, however, FH-FZ-2 is provided with an automatic wet pipe sprinkler system where adjacent to FH-FZ-5. The ceiling is not adjacent to any other plant areas. Combustible loadings on either side of non-fire rated zone boundaries are identified in Section 4.a for the following fire zones:

FH-FZ-5, FH-FZ-2, FH-FZ-4, CB-FZ-5a, and CB-FZ-5b

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:

Walls			Floor	Ceiling	
North	South	East	West		
Rated	Rated	Rated/B2**	B1/B2	A2	A1

**B2 at FH-FZ-4, CB-FZ-5a, CB-FZ-5b

Doors:

Entrance to this fire zone is as follows:

Elevation 322'-0" - Three class A rated doors on the east wall

Elevation 338'-6" - Two class A rated doors and one class B rated door on the east wall

Elevation 355'-0" - One class A rated door and one class B rated door on the east wall

Elevation 380'-0" - One class B rated door and two open wall sections in the east wall

Barriers Within Zone:

3 hour fire rated barriers are provided for circuits. 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

4.7.5.2 Analysis

The combustibles in this zone consist of cable insulation, transient and stored materials. The fire loading is medium, as noted in Section 4.a due to the office facility.

Fire protection for this zone consists of two fire hose stations on each elevation except elevation 380'-0" which is provided with one fire hose station. Portable fire extinguishers are located on elevations 322'-0", 338'-6, and on elevation 355'-0". Additional portable fire extinguishers are provided inside the stairwell on elevation 380'-0" as shown on drawings 1-FHA-035 and 1-FHA-036. The Instrument Shop and office facilities are provided with a combination of area and HVAC duct smoke detectors.

Exemptions:

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

4.7.5.3 Conclusion

Based on the medium combustible loading in this zone, and the features described, existing fire protection for this zone is considered adequate.

4.7.6 Fire Zone FH-FZ-6

4.7.6.1 Fire Zone Boundary Construction Features

Building: FUEL HANDLING BUILDING Elev.: 285'

Fire Zone Name: Chiller Room
Length: 44.8 ft. Width: 20.4 ft
Height: 20 ft.
Area: 914 ft^2

Drawing: 1-FHA-034

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 east boundary is a three-hour rated fire barrier. The north and south boundaries are not adjacent to any other plant areas. The west boundary is adjacent to fire zone FH-FZ-1 which is provided with an automatic wet pipe sprinkler system. The floor is not adjacent to any other plant areas. The ceiling is adjacent to zone FH-FZ-2 which is provided with an automatic wet pipe sprinkler system. Combustible loadings on either side of each non-fire rated zone boundary are identified in Section 4.a for the following fire zones:

FH-FZ-6, FH-FZ-2 and FH-FZ-1

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:

Walls			Floor	Ceiling	
North	South	East	West		
A1	A1	Rated	A2	A1	A2

Doors:

Entrance to this fire zone is through a class A rated door located on the east wall of this zone via the stairwell.

Barriers Within Zone:

Rated fire barriers are provided for circuits ranging from a rating of 39 minutes (minimum required) to one hour. See Attachment 3-1 for details

Safe Shutdown Components:

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

Safe Shutdown Repairs:

None

4.7.6.2 Analysis

The only combustible in this zone is lube oil and cable insulation and thermolag. The fire loading is low, as noted in Section 4.a Fire protection for this zone consists of ionization smoke detection throughout with alarms to the Control Room, an automatic wetpipe sprinkler system which protects the entire zone and alarms in the Control Room, a portable fire extinguisher located in the stairwell as shown on drawing 1-FHA-034 and the ability to connect a hose to the standpipe in the stairwell.

Exemptions:

Manual operation in lieu of cable protection; minimum 50 minute fire barriers rating for cable raceway fire barrier in lieu of a one hour fire rating. See Section 3.14 for details

4.7.6.3 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

4.8 Turbine Building

NOTE: Fire Area TB-FA-2 is the Operations Office Building. This area is not analyzed under the FHAR and contains no post-fire safe shutdown equipment.

4.8.1 Fire Area, TB-FA-1

FIRE AREA BOUNDARY CONSTRUCTION FEATURES

Building: Turbine Building
Elev.: 305'-0",322'-0" & 355'-0"
Fire Area Name: Turbine Building
Length: 319 ft.
Width: 174.5 ft
Height: 100 ft.
Area: 55,448 ft.^{2}

Drawing: 1-FHA-002-003, 004, 005, 006, 007, 008, 009, 010, 011, 012, 013, 014, 015, 016, 040, 041, 042, 043, and 044.

Fire Area Boundaries

Fire Area Boundary Barrier Ratings:
Fire Loading: <1 hours (load assumed as high for analysis)
Design Rating: 3 hours

The Fire Area Boundary Components Are as Follows:

Walls:

North - Reinforced Concrete and Block, 3 hour rated adjacent to Service Building. The remainder consists of non-fire rated metal siding

South - Reinforced Concrete and metal siding, all of which is non-fire rated - elevation 322' - enclosure of switchgear two hour rated (not maintained). Adjacent Turbine Building Addition TB-FA-2, Operations Office Building, North wall is 3 hour rated.

East - Reinforced Concrete and metal siding, all of which is non-fire rated. A portion of the wall adjacent to the auxiliary and main transformers is considered as fire rated for insurance purposes.

West - Three hour rated barriers consist of: Reinforced Concrete adjacent to Intermediate Building Reinforced Concrete adjacent to Reactor Building
Reinforced Concrete adjacent to Fuel Handling Building
Reinforced Concrete adjacent to Control Building

Roof:

Built-up roofing - non fire rated

Floor:

Reinforced concrete and steel grating - non fire rated - except over IB-FZ-8

Columns:

Exposed Structural Steel

Beams:

Exposed Structural Steel

Doors:

Entrance to the Turbine from the Service, Control and Intermediate Buildings is through three hour rated walls with Class A rated doors except for the personnel access hatch to the Reactor Building. Due to overriding nuclear considerations, this door is not labeled, however its construction is adequate to prevent the spread of fire to the Reactor Building. All other entrances (grade level) through non-fire rated walls in the Turbine Building are unlabeled.

Penetrations:

All penetrations through three hour rated walls and floors are sealed with three hour fire seals. Containment penetrations do not have specific fire ratings due to overriding nuclear considerations, however, their construction is adequate to prevent the spread of fire to the Reactor Building There are several passively ventilated bus ducts which penetrate the west wall (3 hour rated). These bus ducts are sealed around the outside periphery to a 3 hour rating. The internals are sealed to prevent the passage of smoke and hot gases. These penetrations are described in the fire hazards analysis for fire areas CB-FA-2a and 3a. No other penetrations through remaining walls, the floors or the roof of the Turbine Building are fire sealed except for the floor slab over the alligator pit (IB-FZ-8). Some penetrations are sealed (for insurance purposes) in the east wall adjacent to the main and auxiliary transformers.

The Turbine Building houses the turbine generator and its auxiliaries as shown on the following drawings 1-FHA-002, 003, 004, 005, 006, 007, 008, 009, 010, 011, 012, 013, 014, 015, 016, 040, 042, and 043.

For the purposes of analysis, the building is considered to be one fire area.

Barriers Within Area:

None

Safe Shutdown Components:

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

Safe Shutdown Repairs:

None

4.8.2 Analysis

The walls separating the Turbine Building from adjacent buildings have a 3 hour fire barrier rating, with the exception of unlabeled doors, passively ventilated bus ducts and penetrations to the Reactor Building which are of sufficient construction to prevent the spread of fire.

The combustibles in the Turbine Building consists of cable insulation, lube oil and transient materials. The total combustible inventory is to be determined, and is assumed as high for the purposes of conservative analysis. The following fire protection features are provided: Ref. drawings 1-FHA-002, 003, 004, 005, 006, 007, 040, 041, and 042.

A. Fire Suppression Systems

1. Automatic Wet Pipe Sprinklers

   a. Elevation 305'-0" - entire elevation except the area between columns 6-8b and G-H_3

   b. Elevation 322'-0" - entire elevation including Pre-fab outage building except the Switchgear Room, which has ionization detection.

   c. Elevation 355'-0" - extension of el. 322'-0" system to turbine walkway platform enclosure (valves closed, system normally dry, manual actuation by opening valves)

2. Automatic Deluge Water Spray - actuated by a thermal detection system (specific hazard protection within the sprinklered areas)

   a. Elevation 305'-0" - Main turbine oil reservoir and oil conditioner located at the north end of the turbine pedestal.

   b. Elevation 305'-0" - Feedwater pump turbine oil reservoir on west side of the turbine pedestal including the feedwater pump turbines at elevation 322'-0".

   c. Elevation 305'-0" - Generator Hydrogen Seal Oil unit under the east side of the turbine pedestal

3. Manually Actuated Preaction Systems - Thermal detectors indicate fires.

   a. Elevation 322'-0" - Turbine feedwater pump bearings

   b. Elevation 355'-0" - Main turbine bearings

4. Curtain wall and transformer deluge system.

B. Hose Stations

Fixed hose stations are provided on all elevations of the Turbine Building.

C. Portable Fire Extinguishers

Portable fire extinguishers are provided on all elevations of the Turbine Building.

D. Ventilation

880,000 cfm is available for smoke removal capability (unprotected).

Exemptions:

Manual operation in lieu of protection for cables, valves and main feedwater pumps; fire detection and suppression does not cover entire fire area; manual operation of valves in lieu of protection of instrument air supply. See Section 3.14 for details.

4.8.3 Conclusion

The results of the analysis indicate that sufficient barrier protection is provided to prevent fires in the turbine building from spreading to adjacent buildings. Although containment penetrations and passively ventilated bus ducts are not specifically fire rated, and the personnel access hatch to the Reactor Building is unlabeled, their construction is adequate. Due to the fixed fire suppression systems, which protect and mitigate the hazards considered to contribute to the assumed high combustible loading, and the features described, existing fire protection for the area is considered adequate.

4.9 Air Intake Tunnel

An air intake tunnel is provided to admit outside air to TMI-1 and is shown on drawings 1-FHA-025,026,032 and 033. The tunnel is designed to provide adequate separation between TMI-1 and the outside air intake in the event of a hypothetical aircraft incident as described in the FSAR.

The air intake tunnel is constructed of reinforced concrete. It is located southwest of TMI-1 and connects to the auxiliary building and fuel handling building. Except

for the intake structure, the tunnel is located underground.

For purposes of analysis, the air intake tunnel was considered as two fire zones, AIT-FZ-1 and AIT FZ-1a.

4.9.1 Fire Zone AIT-FZ-1

4.9.1.1 FIRE ZONE BOUNDARY CONSTRUCTION FEATURES

Building: AIR INTAKE TUNNEL Floor Elev.: 305' and below

Fire Zone Name: AIR INTAKE TUNNEL (NORTH SIDE)
Area: 4,877 ft^2
Length: 91' Width: Variable
Height: Variable

Drawing: 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:

Zone boundaries consist of reinforced concrete walls, floor, and ceiling The north boundary is adjacent to AB-FZ-5. The east boundary is adjacent to FH-FZ-1. The south boundary is adjacent to AIT-FZ-1a. A portion of the ceiling is adjacent to fire zone FH-FZ-2. Fire zone AIT-FZ-1 is equipped with automatic halon explosion suppression systems actuated by ultraviolet or pressure detectors, and automatic deluge water systems activated by thermal detectors or by actuation of the halon suppression systems. The west boundary and the floor are not adjacent to any other plant area. Combustible loadings on either side of each zone boundary are identified in Section 4.a for the following fire zones:

AIT-FZ-1, AIT-FZ-1a, AB-FZ-5 and FH-FZ-1

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.

Walls			Floor	Ceiling	
North	South	East	West		
Rated*	A3	A2	A1	A1	A2

Doors:

Access to the above ground entrance of this zone is not fire rated. Entrance through the steel plate floor of fire zone FH-FZ-2 is unrated.

*No fire damper in duct through wall common to AB-FZ-5.

Barriers Within Zone:

None

Safe Shutdown Components:

For safe shutdown components located in this zone, see Attachment 3.6.

Safe Shutdown Repairs:

None

4.9.1.2 Analysis

The fire loading is low, as noted in Section 4.a. Although no appreciable amount of combustible material is present in the zone, fire protection is provided to prevent the spread of fire along the air intake tunnel in the event of the hypothetical aircraft incident. This fire protection consists of four automatic Halon explosion suppression systems actuated by ultraviolet or pressure detectors, and three automatic deluge water system activated by thermal detectors or by actuation of the halon suppression systems.

Exemptions:

None

4.9.1.3 Conclusion

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

4.9.2 Fire Zone AIT-FZ-1a

4.9.2.1 FIRE ZONE BOUNDARY CONSTRUCTION FEATURES

Building: AIR INTAKE TUNNEL Floor Elev.: 305' and below

Fire Zone Name: AIR INTAKE TUNNEL (SOUTH SIDE)
Area: 3,272 ft^2
Length: 148' Width: 17'
Height 20'

Drawing: 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:

Zone boundaries consist of reinforced concrete walls, floor, and ceiling. The north boundary is adjacent to AIT-FZ-1 and FH-FZ-1. The east boundary is adjacent to FH-FZ-2. A portion of the ceiling is adjacent to FH-FZ-2. Fire zone AIT-FZ-1a is equipped with automatic halon suppression systems activated by ultraviolet or pressure detectors, and automatic deluge water systems activated by thermal detectors or by actuation of the halon suppression systems. The south and west boundaries as well as the floor and the remainder of the ceiling are not adjacent to any other plant area. Combustible loadings on either side of each zone boundary are identified in Section 4.a for the following fire zones:

AIT-FZ-1a, AIT-FZ-1, FH-FZ-2 and FH-FZ-1

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:

Walls				Floor	Ceiling
North	South	East	West		
A3/A2	A1	A2	A1	A1	*A2/A1

*Where adjacent to FH-FZ-2.

Doors:

Access to the above ground entrance of this zone is not fire rated. Entrance through the steel plate floor of fire zone FH-FZ-2 is unrated.

Barriers Within Zone:

None

Safe Shutdown Components:

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

Safe Shutdown Repairs:

None

4.9.2.2 Analysis

The fire loading is low, as noted in Section 4.a. Although no appreciate amount of combustible material is present in the area, fire protection is provided to prevent the spread of fire along the air intake tunnel in the event of the hypothetical aircraft incident. This fire protection consists of multiple automatic Halon explosion suppression systems actuated by ultraviolet or pressure detectors, and multiple automatic deluge water systems activated by thermal detectors, or by actuation of the Halon suppression systems.

Exemptions:

None

4.9.2.3 Conclusion

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

4.10 Radwaste Storage Facility

A Radwaste Storage Facility is used for staging (storage) of low level solid or solidified radioactive waste packages from TMI. The building is a pre-engineered metal building on a concrete floor slab with shielding partitions of grout-filled and/or solid block concrete masonry units used to satisfy dose rate criteria.

The facility is located southeast of TMI-1 or directly east of TMI-2 cooling tower No. 2. It is not located within 50 feet of any safety related structure.

4.10.1 Fire Area RWSF-FA-1

FIRE AREA BOUNDARY CONSTRUCTION FEATURES

Building: Radwaste Storage Facility Elev: 302'-0"
Fire Area Name: Radwaste Storage Facility
Length: 143 ft. Width: 62 ft.
Height: Approx. 30 ft.
Area: Approx. 8900 $ft.^2$

Drawing: No Fire Area Layout is maintained for this facility. Fire Pre-Plan Drawings are considered adequate.

Fire Area Boundaries:

Fire Area Boundary Barrier Ratings:
Fire Loading: Not tracked
Design Rating: None

The Fire Area Boundary Components Are as Follows:

Walls:

North - Steel Frame Metal Panel Const/Solid Black - non fire rated.
South - Steel Frame Metal Panel Const/Solid Block - non fire rated.
East - Solid Block/Open - non fire rated.
West - Steel Frame Metal Panel Const/Solid Block - non fire rated.

Ceiling:

Steel Frame Metal Deck

Floor:

Concrete Slab

Doors:

Non-rated

Penetrations:

N/A

Barriers Within Area:

None

Safe Shutdown Components:

None

Safe Shutdown Repairs:

None

4.10.2 Analysis

This facility stages/stores low level radwaste for shipment. No forced ventilation is provided as the building is unheated and open to the outside. There are no fire detection/suppression systems within the facility. Hydrants located south and west of the facility are available for fire fighting.

No open combustible storage and no combustible containers are permitted in the facility. Any combustible material is stored in metal containers; therefore there is no effective fire load.

4.10.3 Conclusion

Due to the restrictions on combustible storage, automatic detection and suppression in the facility is not required. Manual fire fighting capability is available from nearby hydrants in the remote event of a fire. This is considered adequate fire protection for the facility.

4.11 Waste Handling and Packaging Facility

A Waste Handling and Packaging Facility is used for preparation of low level radwaste for eventual shipment offsite. The building is a combination solid concrete block/poured concrete structure with a steel frame metal panel roof.

The facility is located south of TMI-1 or directly south of TMI-2 cooling tower No. 2. It is not located within 50 feet of any safety related structure.

4.11.1 Fire Area WHPF-FA-1

4.11.1.1 FIRE AREA BOUNDARY CONSTRUCTION FEATURES

Building: Waste Handling Packaging Facility Elev.: 302'0"

Fire Area Name: Office & Equipment Area
Length: 56 ft. Width: 18 ft.
Height: Approx. 15 ft.
Area: 1000 ft.^{2}

Drawing: No Fire Area Layout is maintained for this facility. Fire Pre-Plan Drawings are considered adequate.

Fire Area Boundaries

Fire Area Boundary Barrier Ratings:
Fire Loading: Not Tracked. Load consists of Class A combustibles (furniture & office supplies), and flammable liquids, and electrical equipment.
Design Rating: 3 Hours (west wall)

The Fire Area Boundary Components are as Follows:

Walls:

North - Solid block - non-fire rated
South - Solid block - non-fire rated
East - Concrete - 3 hr. rated
West - Solid block - non-fire rated

Ceiling:

False ceiling, negligible combustibles above false ceiling. Roof is steel frame metal construction (FM Class 1).

Floor:

Concrete slab.

Doors:

None rated except for Class B labeled door in east wall to WHPH-FA-2

Penetrations:

All penetrations through the east wall of this fire area are sealed with three hour rated seals. Ventilation duct penetrations through this wall are provided with 3 hour rated fire dampers. Remaining boundaries are not maintained as rated boundaries.

Barriers Within Area:

Area is compartmentalized but no interior walls are rated.

Safe Shutdown Components:

None

Safe Shutdown Repairs:

None

4.11.1.2 Analysis:

The combustibles in the area consist primarily of Class A combustibles with minor amounts of flammable liquids. The fire loading is low. Fire protection for this area consists of an area wide automatic pre-action system actuated by an automatic detection system which alarms locally and in the TMI-1 control room. Detection consists of heat and smoke detectors. Hose protection is provided outside this area from nearby yard hydrants. Portable fire extinguishers are provided in this area as well as adjacent area WHPF-FA-2.

4.11.1.3 Conclusion:

The results of the analysis indicate that the boundaries of this fire are adequate to contain a potential fire. The fire protection features for this area are considered adequate.

4.11.2 Fire Area WHPF-FA-2

4.11.2.1 FIRE AREA BOUNDARY CONSTRUCTION FEATURES

Building: Waste Handling Packaging Facility Elev.: 302'-0"

Fire Area Name: Waste Handling Area
Length: 56 ft. Width: 40 ft.
Height. Approx. 15 ft.
Area: 2240 ft^2

Drawing: No Fire Are Layout is maintained for this facility. Fire Pre-Plan Drawings are considered adequate.

Fire Area Boundaries

Fire Area Boundary Barrier Ratings
Fire Loading: Not tracked. Load consists of Class A combustibles and compressed gas cylinders electrical equipment.
Design Rating: 3 Hours (west wall).

The Fire Area Boundary Components are as follows:

Walls:

North - Solid block - non fire rated
South - Solid block - non fire rated
East - Solid block - non-fire rated
West - Concrete - 3 hr. rated

Ceiling:

Steel frame metal construction (FM Class 1)

Floor:

Concrete Slab

Doors:

Non rated except for Class B labeled door in west wall to WSPH-FA-1.

Penetrations:

All penetrations through the west wall of this fire area are sealed with three hour rated seals. Ventilation duct penetrations through this wall are provided with 3 hour rated fire dampers Remaining boundaries are not maintained as rated boundaries.

Barriers Within Area:

Area is compartmentalized but no interior walls are rated.

Safe Shutdown Components:

None

Safe Shutdown Repairs:

None

4.11.2.2 Analysis:

The combustibles in the area consist of primarily of Class A combustibles, compressed gas (oxygen & acetylene) cylinders, and minor amounts of flammable and combustible liquids. The fire loading is low. Fire protection for this are consists of an area wide automatic preaction system actuated by an automatic detection system which alarms locally and in the TMI-1 Security Processing Center. Detection consists of heat and smoke detectors. Hose protection is provided outside this area from nearby yard hydrants. Portable fire extinguishers are provided in this area as well as adjacent area WHPF-FA-1.

4.11.2.3 Conclusion:

The results of this analysis indicate that the boundaries of this fire area are adequate to contain a potential fire. The fire protection features for this area are considered adequate.

4.12 Chemical Cleaning Building

A Chemical Cleaning Building for periodic processing of liquid low level radwaste is located to the east of the TMI-1 fuel handling building. It is not located within 50 feet of any safety related structure.

4.12.1 Fire Zone CCB-FZ-1

4.12.1.1 FIRE AREA BOUNDARY CONSTRUCTION FEATURES

Building: Chemical Cleaning Building Elev.: 304'-0"
Fire Zone Name: Chemical Cleaning Building
Length: 52 ft. Width: 57 ft.
Height: 52 ft.
Area: 2913 ft^2

Drawing: No Fire Area Layout is maintained for this facility. Fire Pre-Plan Drawings are considered adequate.

Fire Zone Boundaries

Fire Zone Boundary Barrier Ratings
Fire Loading: <1 hour
Design Rating: None

The Fire Zone Boundary Components Are as Follows:

Walls:

North - Concrete/steel frame; metal panel - non-fire rated
South - Concrete/steel frame; metal panel - non-fire rated
East - Concrete - non-fire rated
West - Concrete/steel frame; metal panel - non-fire rated

Ceiling:

Steel Frame Metal Deck

Floor:

Concrete Slab

Doors:

Not rated

Penetrations:

N/A

Barriers Within Area:

Zone is compartmentalized but no walls are rated.

Safe Shutdown Components:

None

Safe Shutdown Repairs:

None

4.12.1.2 Analysis:

The combustibles in this zone consist of cable insulation, electrical equipment and minor amounts of Class A combustibles. The fire loading is low as noted in Section 4.a. Fire protection for this zone consists of an area detection system which alarms locally and with TMI-1 security. A hose station is provided on the platform at elevation 317'-6". Additional hose protection is available from a nearby yard hydrant. Portable fire extinguishers are provided in this zone as well as adjacent fire zone CCB-FZ-2.

4.12.1.3 Conclusion:

The boundaries of this fire zone are adequate to contain a postulated fire. Any liquid released due to a fire would be contained within the building. The existing features of construction and fire protection/detection features are considered adequate.

4.12.2. Fire Zone CCB-FZ-2

4.12.2.1. FIRE AREA BOUNDARY CONSTRUCTION FEATURES

Building: Chemical Cleaning Building Elev.: 305'-0"
Fire Zone Name: Air Filtration Room
Length: 57 ft. Width: 22'
Height: 13 ft.
Area: 1193 ft^2

Drawing: No fire area layout is maintained for this facility. Fire Pre-Plan Drawings are considered adequate.

Fire Zone Boundaries

Fire Zone Boundary Barrier Ratings
Fire Loading: ≤1 hour
Design Rating: None

The Fire Zone Boundary Components are as follows:

Walls:

North - Concrete - non-fire rated
South - Concrete - non-fire rated
East - Concrete - non-fire rated
West - Concrete - non-fire rated

Ceiling:

Steel Frame Metal Deck

Floor:

Concrete Slab

Doors:

Not rated

Penetrations:

N/A

Barriers With Area:

None

Safe Shutdown Components:

None

Safe Shutdown Components:

None

4.12.2.2 Analysis:

The combustibles in this zone consist primarily of cable insulation, a hydrigen peroxide liquid bin (about 300 gallons) and charcoal in the filtration unit. The fire loading is low as noted in Section 4.a. Fire Protection for this zone consists of an area detection system which alarms locally and with TMI-1 Security. Thermal detection and a manually actuated deluge system is provided for the charcoal filter. Portable fire extinguishers are provided at the entrances to this room. Adjacent fire zone CCB-FZ-1 is provided with a hose reel and portable extinguishers. Additional hose protection is available from a nearby yard hydrant.

4.12.2.3 Conclusion:

The boundaries of this zone are adequate to contain a postulated fire. The existing features of construction and fire protection/detection features are considered adequate.

4.13 Station Blackout (SBO) Diesel Generator Bldg.

A station blackout diesel generator is located in the former TMI-2 Diesel Generator Building. The primary purpose is to insure that electrical power is available to TMI-1 in the event of a Station Blackout. Note that the fire area for the SBO Diesel Generator encompasses both the SBO Diesel Generator and the unused Diesel Generator.

4.13.1 Fire Area SBO-FA-1

4.13.1.1 FIRE AREA BOUNDARY CONSTRUCTION FEATURES

Building: SBO Diesel Generator Bldg.
Fire Area Name: SBO Diesel Generator
Length: 103 ft Width: 70 ft.
Height: 50 ft.
Area: 7200 ft^2

Drawing: No Fire Area Layout is maintained for this fire area. Fire pre-plan drawings are considered adequate.

Fire Area Boundaries

Fire Area Boundary Barrier Ratings:
Fire Loading: <1 hour
Design Rating: 3 hours

The Fire Area Boundary Components Are as Follows:

Walls: *

North - Reinforced Concrete, non-fire rated*
South - Reinforced Concrete, 3 hour rated
East - Reinforced Concrete, 3 hour rated
West - Reinforced Concrete, non-fire rated*

* Exterior walls are of substantial construction with some openings. Based on the construction and automatic fire suppression systems, these barriers are treated as fire rated for insurance purposes and provide adequate protection during periods when temporary fire exposures may be present in the yard.

Ceiling:

Reinforced Concrete, non-fire rated*

Floor:

Reinforced Concrete, non-fire rated*

* No adjacent fire area or zone.

Doors:

"A" labeled door at entrance in east wall at 305'. "A" labeled door on south wall.

Penetrations:

Penetrations through the east and south walls of this fire area are sealed with three hour fire seals with exception of unsealed openings provided for valve reach rods. Penetrations through the ceiling on elevation 280' where adjacent to the SBO Diesel Fuel Oil Tank Room (SBO-FA-2) are sealed with three hour fire seals. No other penetrations through walls, the floor or ceiling are fire sealed

Barriers Within Area:

Area is compartmentalized to separate electrical equipment and battery rooms but none of these walls is rated or maintained as such.

Safe Shutdown Components:

None

Safe Shutdown Repairs:

None

4.13 1.2 Analysis

The combustibles in the area consist of cable insulation, electrical equipment and fuel oil. The fire loading is low as noted in Section 4.a. The fire barriers adjacent to the TMI-2 Fuel Handling Area and the diesel generator fuel oil tank room (only one tank filled), are adequate to contain a postulated fire in this area. Fire Protection for this area consists of an automatic wet pipe sprinkler system for the diesel generator area on elevation 305 ft, as well as an automatic fire detection system. The air intake is protected by an automatic deluge water system actuated by thermal detectors. Fire detection and system actuation alarms are alarmed locally and in the TMI-1 control room. Portable, fire extinguishers are provided in the area. In addition, protection is provided by a yard hydrant located west of the building.

4.13 1.3 Conclusion

The fire loading in this area is low. Based upon the fire protection features described, existing fire protection for this area is considered adequate

4.13.2 Fire Area SBO-FA-2

4.13.2.1 FIRE AREA BOUNDARY CONSTRUCTION FEATURES

Building: SBO Diesel Generator Bldg.
Fire Area Name: SBO Diesel Fuel Oil Tank Room
Length: 70 ft. Width: 21 ft.
Height: 23 ft.
Area: 1470 ft^2

Drawing: No fire Are Layout is maintained for this fire area. Fire Pre-Plan drawings are considered adequate.

Fire Area Boundaries

Fire Area Boundary Barrier Ratings
Fire Loading: ≥3 hours
Design Rating: 3 hours

The Fire Area Components are as follows:

Walls: *

North - Reinforced Concrete, 3 hour rated
South - Reinforced Concrete, non-fire rated*
East - Reinforced Concrete, 3 hour rated
West - Reinforced Concrete, non-fire rated*

* Exterior walls are of substantial construction with some openings. Based on the construction and automatic fire suppression systems, these barriers are treated as fire rated for insurance purposes and provide adequate protection during periods when temporary fire exposures may be present in the yard.

Ceiling:

Reinforced Concrete, non-fire rated*

Floor:

Reinforced Concrete, 3 hour rated

* No adjacent fire area or zone.

Doors:

Only access is through an unrated exterior wall.

Penetrations:

Penetrations through the north and east walls and the floor are sealed with three hour fire seals. No other penetrations through walls or ceiling are fire sealed.

Barriers Within Area:

None

Safe Shutdown Components:

None

Safe Shutdown Repairs:

None

4.13.2.2 Analysis

The combustible in this area consists of fuel oil. Note that only one of the tanks is filled with 25,000 gal of oil. The fire loading is high as noted in Section 4.a. However, the fire loading is based upon burning all the oil in the area simultaneously without considering that the oil is in a tank or that an automatic deluge system is available in the area. The automatic deluge system is actuated by thermal detectors which alarm locally and in the TMI-1 control room. Portable fire extinguishers are provided in the area. In addition, hose protection is provided by a yard hydrant located west of the building.

4.13.2.3 Conclusion

While the fire loading in this area is high, the presence of an automatic deluge system is sufficient to justify a fire barrier rating of 3 hours. Existing fire protection features as described above are considered adequate.

SECTION 4.a
TMI FIRE LOADING
(by material)

FA/FZ ID		AMOUNT	UNITS	FIRELOAD
0				
118	ZERO COMBUSTIBLES	0		0.00
		0		0.00

Max load = 0 Current load = 0.00 Trans load = 0

FA/FZ ID AB-FA-01

35	OIL - LUBRICATING-MINERALS	2	gal	349.42
37	PAPER	6	lbs	55.17
39	PLASTICS - MIXED	26	lbs	478.16
41	PLASTICS - POLYVINYL CHLORIDE	1	lbs	16.07
47	RUBBER - LATEX FOAM	41	lbs	823.11
56	WOOD-UNTREATED (AVG. FOR ALL SPECIES)	16	lbs	138.48
69	CABLE INSULLATION-GENERAL	206	lbs	2,367.81
103	TRANSIENT COMBUSTIBLES	87	lbs	800.00
118	ZERO COMBUSTIBLES	0		0.00

Max load = 120,000 Current load = 5,028.22 Trans load = 114,971

FA/FZ ID AB-FZ-01

6	CABLE INSULATION - INSTRUMENT	50	ft	3.70
8	CABLE INSULATION - CONTROL	40	ft	17.97
39	PLASTICS - MIXED	2	lbs	4.64
59	CONCRETE COATING	330	lbs	908.70
69	CABLE INSULLATION-GENERAL	658	lbs	954.34
103	TRANSIENT COMBUSTIBLES	200	lbs	231.88
118	ZERO COMBUSTIBLES	0		0.00
119	AMT. ENTERED IS BTU'S-SEE FHAIS FOR DET.	400,000	lbs	57.97

Max load = 40,000 Current load = 2,179.20 Trans load = 37,820

FA/FZ ID AB-FZ-02

35	OIL - LUBRICATING-MINERALS	1	gal	120.83
37	PAPER	4	lbs	25.44
39	PLASTICS - MIXED	16	lbs	203.50
41	PLASTICS - POLYVINYL CHLORIDE	1	lbs	11.11
47	RUBBER - LATEX FOAM	11	lbs	154.11
56	WOOD-UNTREATED (AVG. FOR ALL SPECIES)	116	lbs	694.34
69	CABLE INSULLATION-GENERAL	268	lbs	2,136.72
77	INITIAL LOAD LUBE OIL2	0	gal	67.57
103	TRANSIENT COMBUSTIBLES	47	lbs	298.89
118	ZERO COMBUSTIBLES	0		0.00

Max load = 120,000 Current load = 3,712.51 Trans load = 116,287

FA/FZ ID AB-FZ-02A

41	PLASTICS - POLYVINYL CHLORIDE	0	lbs	2.05
59	CONCRETE COATING	10	lbs	746.33
69	CABLE INSULLATION-GENERAL	387	lbs	14,662.12
78	INITIAL LOAD LUBE OIL3	20	gal	11,516.67
103	TRANSIENT COMBUSTIBLES	3	lbs	90.91
118	ZERO COMBUSTIBLES	0		0.00

Max load = 40,000 Current load = 27,018.08 Trans load = 12,981

FA/FZ ID AB-FZ-02B

41	PLASTICS - POLYVINYL CHLORIDE	0 lbs	2.05
59	CONCRETE COATING	10 lbs	746.33
69	CABLE INSULLATION-GENERAL	10 lbs	409.09
78	INITIAL LOAD LUBE OIL3	20 gal	11,516.67

SECTION 4.a

TMI FIRE LOADING

(by material)

		AMOUNT	UNITS	FIRELOAD
103	TRANSIENT COMBUSTIBLES	4	lbs	121.21
118	ZERO COMBUSTIBLES	0		0.00

Max load = 40,000 Current load = 12,795.35 Trans load = 27,204

FA/FZ ID AB-FZ-02C

41	PLASTICS - POLYVINYL CHLORIDE	0	lbs	2.05
59	CONCRETE COATING	10	lbs	746.33
78	INITIAL LOAD LUBE OIL3	20	gal	11,516.67
103	TRANSIENT COMBUSTIBLES	4	lbs	121.21
118	ZERO COMBUSTIBLES	0		0.00

Max load = 40,000 Current load = 12,386.26 Trans load = 27,613

FA/FZ ID AB-FZ-03

39	PLASTICS - MIXED	1	lbs	53.33
41	PLASTICS - POLYVINYL CHLORIDE	135	lbs	3,474.90
69	CABLE INSULLATION-GENERAL	136	lbs	4,556.33
79	INITIAL LOAD CONCRETE COATING1	15	lbs	896.00
103	TRANSIENT COMBUSTIBLES	6	lbs	160.00
117	THERMOLAG FIRE BARRIER	90	lbs	2,100.00
118	ZERO COMBUSTIBLES	0		0.00

Max load = 40,000 Current load = 11,240.56 Trans load = 28,759

FA/FZ ID AB-FZ-04

8	CABLE INSULATION - CONTROL	197	ft	605.85
39	PLASTICS - MIXED	8	lbs	126.98
41	PLASTICS - POLYVINYL CHLORIDE	19	lbs	151.84
56	WOOD-UNTREATED (AVG. FOR ALL SPECIES)	15	lbs	112.05
59	CONCRETE COATING	35	lbs	666.32
69	CABLE INSULLATION-GENERAL	2,865	lbs	28,427.77
103	TRANSIENT COMBUSTIBLES	12	lbs	95.24
117	THERMOLAG FIRE BARRIER	185	lbs	1,286.11
118	ZERO COMBUSTIBLES	0		0.00
119	AMT. ENTERED IS BTU'S-SEE FHAIS FOR DET.	400,000	lbs	396.83

Max load = 26,000 Current load = 31,868.99 Trans load = -5,868

FA/FZ ID AB-FZ-05

6	CABLE INSULATION - INSTRUMENT	311	ft	11.09
7	CABLE INSULATION - POWER	-40	ft	-8.67
8	CABLE INSULATION - CONTROL	1,458	ft	316.01
35	OIL - LUBRICATING-MINERALS	1	gal	13.28
39	PLASTICS - MIXED	48	lbs	53.82
41	PLASTICS - POLYVINYL CHLORIDE	75	lbs	40.57
44	PLASTICS - POLYURETHANE	32	lbs	23.01
56	WOOD-UNTREATED (AVG. FOR ALL SPECIES)	105	lbs	55.28
59	CONCRETE COATING	660	lbs	877.00
69	CABLE INSULLATION-GENERAL	18,255	lbs	12,763.34
72	INITIAL LOAD OIL2	6	gal	70.44
103	TRANSIENT COMBUSTIBLES	1,000	lbs	559.32
117	THERMOLAG FIRE BARRIER	436	lbs	213.38
118	ZERO COMBUSTIBLES	135		0.00
119	AMT. ENTERED IS BTU'S-SEE FHAIS FOR DET.	4,400,000	lbs	307.63
120	CHEMELEX HEAT TRACE	725	ft	12.68

SECTION 4.a

TMI FIRE LOADING

(by material)

		AMOUNT	UNITS	FIRELOAD
6	CABLE INSULATION - INSTRUMENT	600	ft	80.98
7	CABLE INSULATION - POWER	540	ft	442.97
8	CABLE INSULATION - CONTROL	181	ft	148.47
41	PLASTICS - POLYVINYL CHLORIDE	6	lbs	13.04
59	CONCRETE COATING	212	lbs	1,065.89
69	CABLE INSULLATION-GENERAL	4,083	lbs	10,806.88
103	TRANSIENT COMBUSTIBLES	1,000	lbs	2,116.96
108	CABLE - FIBER OPTIC INSTRUMENT	350	ft	59.27
118	ZERO COMBUSTIBLES	15		0.00
119	AMT. ENTERED IS BTU'S-SEE FHAIS FOR DET.	5,485,100	lbs	1,451.47

Max load = 40,000 Current load = 16,185.93 Trans load = 23,814

FA/FZ ID AB-FZ-06A

8	CABLE INSULATION - CONTROL	100	ft	1,095.41
59	CONCRETE COATING	21	lbs	1,409.89
69	CABLE INSULLATION-GENERAL	2	lbs	77.74
103	TRANSIENT COMBUSTIBLES	0	lbs	0.00
118	ZERO COMBUSTIBLES	0		0.00

Max load = 40,000 Current load = 2,583.04 Trans load = 37,416

FA/FZ ID AB-FZ-07

6	CABLE INSULATION - INSTRUMENT	150	ft	63.96
7	CABLE INSULATION - POWER	500	ft	1,295.99
35	OIL - LUBRICATING-MINERALS	2	gal	285.96
39	PLASTICS - MIXED	4	lbs	53.51
41	PLASTICS - POLYVINYL CHLORIDE	0	lbs	6.13
59	CONCRETE COATING	56	lbs	899.16
69	CABLE INSULLATION-GENERAL	605	lbs	5,063.55
103	TRANSIENT COMBUSTIBLES	4	lbs	26.76
117	THERMOLAG FIRE BARRIER	110	lbs	646.73
118	ZERO COMBUSTIBLES	0		0.00
119	AMT. ENTERED IS BTU'S-SEE FHAIS FOR DET.	400,000	lbs	334.45

Max load = 40,000 Current load = 8,676.20 Trans load = 31,323

FA/FZ ID AB-FZ-08

1	ACETONE	0	lbs	0.00
39	PLASTICS - MIXED	14	lbs	359.55
118	ZERO COMBUSTIBLES	0		0.00

Max load = 40,000 Current load = 359.55 Trans load = 39,640

FA/FZ ID AB-FZ-09

6	CABLE INSULATION - INSTRUMENT	95	ft	5.28
7	CABLE INSULATION - POWER	100	ft	33.81
8	CABLE INSULATION - CONTROL	528	ft	178.53
20	GREASE	0	gal	2.20
26	NEOPRENE FOAM	3	lbs	3.77
36	PAINT	0	gal	1.69
39	PLASTICS - MIXED	109	lbs	190.23
41	PLASTICS - POLYVINYL CHLORIDE	0	lbs	0.72
42	PLASTICS - POLYETHYLENE	3	lbs	6.54
46	RUBBER - ISOPRENE (NATURAL)	3	lbs	6.38
56	WOOD-UNTREATED (AVG. FOR ALL SPECIES)	1,000	lbs	821.34

59	CONCRETE COATING	424 lbs	879.54
66	PHENOL	1 lbs	1.52
69	CABLE INSULLATION-GENERAL	233 lbs	254.59
80	INITIAL LOAD CHARCOAL2	23,601 lbs	20,517.01

SECTION 4.a
TMI FIRE LOADING
(by material)

		AMOUNT	UNITS	FIRELOAD
81	INITIAL LOAD POLYETH1	700	lbs	612.58
82	INITIAL LOAD PVC1	10	lbs	8.84
83	INITIAL LOAD STYRENE1	10	lbs	44.27
118	ZERO COMBUSTIBLES	0		0.00
119	AMT. ENTERED IS BTU'S-SEE FHAIS FOR DET.	5,200,000	lbs	567.19

Max load = 40,000 Current load = 24,136.03 Trans load = 15,863

FA/FZ ID AB-FZ-10

6	CABLE INSULATION - INSTRUMENT	20	ft	1.20
7	CABLE INSULATION - POWER	60	ft	21.93
8	CABLE INSULATION - CONTROL	143	ft	52.27
35	OIL - LUBRICATING-MINERALS	700	gal	12,545.69
55	WOOD-CHEM.TREATED (AVG. FOR ALL SPECIES)	173	lbs	179.41
64	LEXAN (POLYCARBONATE)	1,813	lbs	2,850.01
69	CABLE INSULLATION-GENERAL	1,089	ft	1,071.81
118	ZERO COMBUSTIBLES	0		0.00

Max load = 40,000 Current load = 16,722.32 Trans load = 23,277

FA/FZ ID AB-FZ-11

17	FELPRO (GREASE)	0	gal	62.97
35	OIL - LUBRICATING-MINERALS	2	gal	246.95
39	PLASTICS - MIXED	180	lbs	2,339.56
56	WOOD-UNTREATED (AVG. FOR ALL SPECIES)	20	lbs	122.34
97	INITIAL LOAD CHARCOAL4	2,200	lbs	25,020.31

Max load = 40,000 Current load = 27,792.13 Trans load = 12,207

FA/FZ ID AIT-FZ-01

26	NEOPRENE FOAM	5	lbs	11.82
118	ZERO COMBUSTIBLES	0		0.00

Max load = 120,000 Current load = 11.82 Trans load = 119,988

FA/FZ ID AIT-FZ-01A

1	ACETONE	0	lbs	0.00
118	ZERO COMBUSTIBLES	0		0.00

Max load = 120,000 Current load = 0.00 Trans load = 120,000

FA/FZ ID CB-FA-01

6	CABLE INSULATION - INSTRUMENT	215	ft	18.28
7	CABLE INSULATION - POWER	58	ft	29.96
13	COTTON	80	lbs	117.01
40	PLASTICS - NYLON	5	lbs	11.36
41	PLASTICS - POLYVINYL CHLORIDE	0	lbs	0.19
46	RUBBER - ISOPRENE (NATURAL)	15	lbs	48.72
57	ACRYLIC FIBER	40	lbs	88.33
69	CABLE INSULLATION-GENERAL	1,020	lbs	1,701.56
103	TRANSIENT COMBUSTIBLES	40,000	lbs	53,333.33
108	CABLE - FIBER OPTIC INSTRUMENT	10,500	ft	1,120.00
117	THERMOLAG FIRE BARRIER	8,216	lbs	9,586.15
118	ZERO COMBUSTIBLES	0		0.00

Max load = 26,000 Current load = 66,054.89 Trans load = -40,054

FA/FZ ID CB-FA-02A

6	CABLE INSULATION - INSTRUMENT	251 ft	145.14
7	CABLE INSULATION - POWER	50 ft	175.74

SECTION 4.a

TMI FIRE LOADING

(by material)

		AMOUNT	UNITS	FIRELOAD
8	CABLE INSULATION - CONTROL	560	ft	1,968.24
39	PLASTICS - MIXED	40	lbs	725.62
41	PLASTICS - POLYVINYL CHLORIDE	1	lbs	9.28
55	WOOD-CHEM.TREATED (AVG. FOR ALL SPECIES)	6	lbs	59.83
69	CABLE INSULLATION-GENERAL	3,960	lbs	44,907.92
118	ZERO COMBUSTIBLES	0		0.00

Max load = 120,000 Current load = 47,991.77 Trans load = 72,008

FA/FZ ID CB-FA-02B

6	CABLE INSULATION - INSTRUMENT	135	ft	73.95
7	CABLE INSULATION - POWER	40	ft	133.19
8	CABLE INSULATION - CONTROL	245	ft	815.79
39	PLASTICS - MIXED	100	lbs	1,718.58
40	PLASTICS - NYLON	2	lbs	35.15
44	PLASTICS - POLYURETHANE	20	lbs	223.64
69	CABLE INSULLATION-GENERAL	3,477	lbs	37,357.04
117	THERMOLAG FIRE BARRIER	1,513	lbs	11,377.44
118	ZERO COMBUSTIBLES	0		0.00

Max load = 40,000 Current load = 51,734.78 Trans load = -11,734

FA/FZ ID CB-FA-02C

6	CABLE INSULATION - INSTRUMENT	180	ft	85.15
7	CABLE INSULATION - POWER	10	ft	28.76
8	CABLE INSULATION - CONTROL	350	ft	1,006.50
37	PAPER	2,075	lbs	15,398.89
39	PLASTICS - MIXED	55	lbs	818.25
40	PLASTICS - NYLON	21	lbs	273.25
41	PLASTICS - POLYVINYL CHLORIDE	0	lbs	3.72
47	RUBBER - LATEX FOAM	2	lbs	32.40
49	SILICONE FOAM	0	lbs	1.95
55	WOOD-CHEM.TREATED (AVG. FOR ALL SPECIES)	20	lbs	163.17
56	WOOD-UNTREATED (AVG. FOR ALL SPECIES)	140	lbs	977.92
69	CABLE INSULLATION-GENERAL	1,900	lbs	17,634.14
117	THERMOLAG FIRE BARRIER	326	lbs	2,119.48
118	ZERO COMBUSTIBLES	0		0.00
124	55 GALLON TRASH CAN (FULL)	1	lbs	371.06

Max load = 40,000 Current load = 38,914.64 Trans load = 1,085

FA/FZ ID CB-FA-02D

7	CABLE INSULATION - POWER	18	ft	77.50
8	CABLE INSULATION - CONTROL	131	ft	564.03
40	PLASTICS - NYLON	2	lbs	39.77
69	CABLE INSULLATION-GENERAL	2,484	lbs	34,500.69
117	THERMOLAG FIRE BARRIER	765	lbs	7,441.39
118	ZERO COMBUSTIBLES	0		0.00

Max load = 40,000 Current load = 42,623.38 Trans load = -2,623

FA/FZ ID CB-FA-02E

6	CABLE INSULATION - INSTRUMENT	100	ft	70.84
7	CABLE INSULATION - POWER	12	ft	51.67
8	CABLE INSULATION - CONTROL	211	ft	908.48
40	PLASTICS - NYLON	6	lbs	117.43

69	CABLE INSULLATION-GENERAL	2,808 lbs	39,011.53
103	TRANSIENT COMBUSTIBLES	0 lbs	0.00
117	THERMOLAG FIRE BARRIER	578 lbs	5,624.31
118	ZERO COMBUSTIBLES	0	0.00

SECTION 4.a
TMI FIRE LOADING
(by material)

		AMOUNT	UNITS	FIRELOAD
Max load = 40,000	Current load = 45,784.26	Trans load =		-5,784
FA/FZ ID CB-FA-02F				
8	CABLE INSULATION - CONTROL	45	ft	193.75
21	HYDROGEN	17	cuft	7.71
39	PLASTICS - MIXED	94	lbs	2,088.88
40	PLASTICS - NYLON	3	lbs	60.61
55	WOOD-CHEM.TREATED (AVG. FOR ALL SPECIES)	279	lbs	3,415.39
69	CABLE INSULLATION-GENERAL	1,331	lbs	18,499.59
84	INITIAL LOAD BATTERY CASES1	600	lbs	6,666.67
117	THERMOLAG FIRE BARRIER	56	lbs	544.44
118	ZERO COMBUSTIBLES	0		0.00
Max load = 40,000	Current load = 31,477.04	Trans load =		8,522
FA/FZ ID CB-FA-02G				
21	HYDROGEN	17	cuft	7.71
39	PLASTICS - MIXED	94	lbs	2,088.88
40	PLASTICS - NYLON	1	lbs	28.41
55	WOOD-CHEM.TREATED (AVG. FOR ALL SPECIES)	279	lbs	3,415.39
69	CABLE INSULLATION-GENERAL	926	lbs	12,873.60
84	INITIAL LOAD BATTERY CASES1	600	lbs	6,666.67
117	THERMOLAG FIRE BARRIER	330	lbs	3,213.19
118	ZERO COMBUSTIBLES	0		0.00
Max load = 40,000	Current load = 28,293.85	Trans load =		11,706
FA/FZ ID CB-FA-03A				
8	CABLE INSULATION - CONTROL	80	ft	281.18
40	PLASTICS - NYLON	1	lbs	26.75
69	CABLE INSULLATION-GENERAL	4,113	lbs	46,642.86
117	THERMOLAG FIRE BARRIER	490	lbs	3,891.27
118	ZERO COMBUSTIBLES	0		0.00
Max load = 40,000	Current load = 50,842.06	Trans load =		-10,842
FA/FZ ID CB-FA-03B				
8	CABLE INSULATION - CONTROL	5	ft	17.57
39	PLASTICS - MIXED	7	lbs	126.98
40	PLASTICS - NYLON	2	lbs	43.29
41	PLASTICS - POLYVINYL CHLORIDE	0	lbs	0.26
46	RUBBER - ISOPRENE (NATURAL)	2	lbs	55.24
69	CABLE INSULLATION-GENERAL	4,015	lbs	45,528.80
117	THERMOLAG FIRE BARRIER	926	lbs	7,353.17
118	ZERO COMBUSTIBLES	0		0.00
Max load = 40,000	Current load = 53,125.31	Trans load =		-13,125
FA/FZ ID CB-FA-03C				
8	CABLE INSULATION - CONTROL	79	ft	208.24
40	PLASTICS - NYLON	4	lbs	47.54
41	PLASTICS - POLYVINYL CHLORIDE	0	lbs	1.38
69	CABLE INSULLATION-GENERAL	4,680	lbs	39,802.46
118	ZERO COMBUSTIBLES	0		0.00

Max load = 120,000 Current load = 40,059.62 Trans load = 79,940

FA/FZ ID CB-FA-03D

6	CABLE INSULATION - INSTRUMENT	4,911 ft	982.80

SECTION 4.a

TMI FIRE LOADING

(by material)

		AMOUNT	UNITS	FIRELOAD
7	CABLE INSULATION - POWER	570	ft	613.55
8	CABLE INSULATION - CONTROL	1,545	ft	1,663.03
37	PAPER	750	lbs	2,083.33
39	PLASTICS - MIXED	10	lbs	55.56
47	RUBBER - LATEX FOAM	12	lbs	72.78
56	WOOD-UNTREATED (AVG. FOR ALL SPECIES)	20	lbs	52.29
69	CABLE INSULLATION-GENERAL	48,579	lbs	168,679.24
108	CABLE - FIBER OPTIC INSTRUMENT	860	ft	191.11
118	ZERO COMBUSTIBLES	0		0.00
119	AMT. ENTERED IS BTU'S-SEE FHAIS FOR DET.	800,000	lbs	277.78

Max load = 120,000 Current load = 174,671.47 Trans load = -54,671

FA/FZ ID CB-FA-04A

6	CABLE INSULATION - INSTRUMENT	1,610	ft	282.55
7	CABLE INSULATION - POWER	80	ft	85.34
8	CABLE INSULATION - CONTROL	75	ft	80.01
13	COTTON	720	lbs	2,174.37
37	PAPER	1,565	lbs	4,308.33
39	PLASTICS - MIXED	73	lbs	401.93
41	PLASTICS - POLYVINYL CHLORIDE	0	lbs	0.27
47	RUBBER - LATEX FOAM	48	lbs	288.50
48	RUBBER - TIRE	20	lbs	96.52
56	WOOD-UNTREATED (AVG. FOR ALL SPECIES)	180	lbs	466.42
69	CABLE INSULLATION-GENERAL	27	lbs	93.90
118	ZERO COMBUSTIBLES	0		0.00

Max load = 120,000 Current load = 8,278.14 Trans load = 111,721

FA/FZ ID CB-FA-04B

6	CABLE INSULATION - INSTRUMENT	2,176	ft	371.28
8	CABLE INSULATION - CONTROL	180	ft	186.68
39	PLASTICS - MIXED	230	lbs	1,231.18
42	PLASTICS - POLYETHYLENE	27	lbs	180.66
55	WOOD-CHEM.TREATED (AVG. FOR ALL SPECIES)	10	lbs	29.42
56	WOOD-UNTREATED (AVG. FOR ALL SPECIES)	11	lbs	27.72
69	CABLE INSULLATION-GENERAL	48	lbs	161.99
85	INITIAL LOAD PANELS1	6,666	lbs	22,303.45
103	TRANSIENT COMBUSTIBLES	12,787	lbs	34,224.16
109	PLEXIGLASS/ACRYLIC/POLYMETHYL METHACRYLA	4	lbs	15.34
118	ZERO COMBUSTIBLES	3		0.00

Max load = 120,000 Current load = 58,731.88 Trans load = 61,268

FA/FZ ID CB-FZ-05A

37	PAPER	4	lbs	10.71
47	RUBBER - LATEX FOAM	2	lbs	11.69
69	CABLE INSULLATION-GENERAL	93	lbs	312.82
86	INITIAL LOAD CHARCOAL3	5,040	lbs	13,489.46
118	ZERO COMBUSTIBLES	0		0.00

Max load = 40,000 Current load = 13,824.68 Trans load = 26,175

FA/FZ ID CB-FZ-05B

69	CABLE INSULLATION-GENERAL	148	lbs	497.49
86	INITIAL LOAD CHARCOAL3	5,040	lbs	13,489.46

103	TRANSIENT COMBUSTIBLES	0 lbs	0.00
118	ZERO COMBUSTIBLES	0	0.00

SECTION 4.a
TMI FIRE LOADING
(by material)

		AMOUNT	UNITS	FIRELOAD
Max load = 40,000	Current load = 13,986.95	Trans load =		26,013
FA/FZ ID CCB-FZ-1				
6	CABLE INSULATION - INSTRUMENT	50	ft	8.75
9	CLOTH (RAG, ETC.)	100	lbs	269.28
35	OIL - LUBRICATING-MINERALS	3	gal	172.71
39	PLASTICS - MIXED	102	lbs	560.25
56	WOOD-UNTREATED (AVG. FOR ALL SPECIES)	15	lbs	38.77
69	CABLE INSULLATION-GENERAL	6,379	ft	2,217.66
Max load = 240,000	Current load = 3,267.42	Trans load =		236,732
FA/FZ ID CCB-FZ-2				
8	CABLE INSULATION - CONTROL	10	ft	25.98
35	OIL - LUBRICATING-MINERALS	0	gal	31.85
39	PLASTICS - MIXED	100	lbs	1,341.16
42	PLASTICS - POLYETHYLENE	200	lbs	3,352.89
69	CABLE INSULLATION-GENERAL	711	ft	630.34
112	CHARCOAL	400	lbs	5,005.20
Max load = 240,000	Current load = 10,387.42	Trans load =		229,612
FA/FZ ID DG-FA-01				
8	CABLE INSULATION - CONTROL	140	ft	106.37
41	PLASTICS - POLYVINYL CHLORIDE	1	lbs	2.73
47	RUBBER - LATEX FOAM	5	lbs	21.40
56	WOOD-UNTREATED (AVG. FOR ALL SPECIES)	87	lbs	160.57
87	INITIAL LOAD LUBE OIL4	376	gal	14,128.94
88	INITIAL LOAD FUEL OIL1	555	gal	21,313.98
118	ZERO COMBUSTIBLES	0		0.00
Max load = 120,000	Current load = 35,733.99	Trans load =		84,266
FA/FZ ID DG-FA-02				
7	CABLE INSULATION - POWER	20	ft	15.20
8	CABLE INSULATION - CONTROL	225	ft	170.95
35	OIL - LUBRICATING-MINERALS	0	gal	18.63
39	PLASTICS - MIXED	10	lbs	39.22
41	PLASTICS - POLYVINYL CHLORIDE	7	lbs	14.00
46	RUBBER - ISOPRENE (NATURAL)	20	lbs	95.53
47	RUBBER - LATEX FOAM	11	lbs	47.52
56	WOOD-UNTREATED (AVG. FOR ALL SPECIES)	50	lbs	92.28
87	INITIAL LOAD LUBE OIL4	376	gal	14,128.94
88	INITIAL LOAD FUEL OIL1	555	gal	21,313.98
89	INITIAL LOAD SYNTHETIC RUBBER1	0	lbs	0.00
112	CHARCOAL	33	lbs	120.74
118	ZERO COMBUSTIBLES	0		0.00
Max load = 120,000	Current load = 36,056.99	Trans load =		83,943
FA/FZ ID FH-FZ-01				
6	CABLE INSULATION - INSTRUMENT	62	ft	4.57
8	CABLE INSULATION - CONTROL	330	ft	148.06
13	COTTON	100	lbs	127.02
39	PLASTICS - MIXED	300	lbs	694.74

41	PLASTICS - POLYVINYL CHLORIDE	9 lbs	10.09
46	RUBBER - ISOPRENE (NATURAL)	51 lbs	145.74
56	WOOD-UNTREATED (AVG. FOR ALL SPECIES)	60 lbs	65.39
69	CABLE INSULLATION-GENERAL	19,362 lbs	28,024.42

SECTION 4.a

TMI FIRE LOADING

(by material)

		AMOUNT	UNITS	FIRELOAD
92	INITIAL LOAD LUBE OIL7	1	gal	21.79
103	TRANSIENT COMBUSTIBLES	1,000	lbs	1,157.91
117	THERMOLAG FIRE BARRIER	763	lbs	773.86
118	ZERO COMBUSTIBLES	40		0.00
119	AMT. ENTERED IS BTU'S-SEE FHAIS FOR DET.	6,685,100	lbs	967.60

Max load = 26,000 Current load = 32,141.19 Trans load = -6,141

FA/FZ ID FH-FZ-02

6	CABLE INSULATION - INSTRUMENT	295	ft	22.68
7	CABLE INSULATION - POWER	225	ft	105.19
8	CABLE INSULATION - CONTROL	350	ft	163.63
35	OIL - LUBRICATING-MINERALS	3	gal	68.77
41	PLASTICS - POLYVINYL CHLORIDE	4	lbs	5.60
69	CABLE INSULLATION-GENERAL	9,723	lbs	14,664.31
93	INITIAL LOAD LUBE OIL8	6	gal	155.51
103	TRANSIENT COMBUSTIBLES	1,100	lbs	1,327.10
108	CABLE - FIBER OPTIC INSTRUMENT	224	ft	21.62
117	THERMOLAG FIRE BARRIER	25	lbs	26.39
118	ZERO COMBUSTIBLES	50		0.00
119	AMT. ENTERED IS BTU'S-SEE FHAIS FOR DET.	13,200,000	lbs	1,990.65

Max load = 40,000 Current load = 18,551.45 Trans load = 21,448

FA/FZ ID FH-FZ-03

13	COTTON	200	lbs	1,437.51
69	CABLE INSULLATION-GENERAL	575	lbs	4,715.65
118	ZERO COMBUSTIBLES	0		0.00

Max load = 40,000 Current load = 6,153.16 Trans load = 33,846

FA/FZ ID FH-FZ-04

8	CABLE INSULATION - CONTROL	90	ft	57.47
13	COTTON	50	lbs	90.38
39	PLASTICS - MIXED	60	lbs	197.73
41	PLASTICS - POLYVINYL CHLORIDE	4	lbs	6.39
47	RUBBER - LATEX FOAM	10	lbs	35.98
64	LEXAN (POLYCARBONATE)	480	lbs	1,318.10
69	CABLE INSULLATION-GENERAL	-12	lbs	-25.54
94	INITIAL LOAD LUBE OIL9	2	gal	60.28
103	TRANSIENT COMBUSTIBLES	100	lbs	164.78
118	ZERO COMBUSTIBLES	0		0.00
119	AMT. ENTERED IS BTU'S-SEE FHAIS FOR DET.	800,000	lbs	164.78

Max load = 40,000 Current load = 2,070.35 Trans load = 37,929

FA/FZ ID FH-FZ-05

6	CABLE INSULATION - INSTRUMENT	1,495	ft	308.94
7	CABLE INSULATION - POWER	118	ft	148.22
8	CABLE INSULATION - CONTROL	1,545	ft	1,940.65
39	PLASTICS - MIXED	-1	lbs	-6.48
40	PLASTICS - NYLON	17	lbs	97.25
41	PLASTICS - POLYVINYL CHLORIDE	44	lbs	138.23
55	WOOD-CHEM.TREATED (AVG. FOR ALL SPECIES)	2	cuft	352.35
69	CABLE INSULLATION-GENERAL	16,219	lbs	65,719.12
95	INITIAL LOAD LUBE OIL10	0	gal	15.53

103	TRANSIENT COMBUSTIBLES	-498 lbs	-1,614.26
108	CABLE - FIBER OPTIC INSTRUMENT	2,000 ft	518.64
117	THERMOLAG FIRE BARRIER	110 lbs	312.85
118	ZERO COMBUSTIBLES	0	0.00

SECTION 4.a

TMI FIRE LOADING

(by material)

		AMOUNT	UNITS	FIRELOAD
119	AMT. ENTERED IS BTU'S-SEE FHAIS FOR DET.	262,802,000	lbs	106,483.79
122	RUBBER, 1 5/8" ARMSTRONG ARM-A-FLEX	2	lbs	15.40

Max load = 40,000 Current load = 174,430.23 Trans load = -134,430

FA/FZ ID FH-FZ-06

39	PLASTICS - MIXED	30	lbs	525.16
41	PLASTICS - POLYVINYL CHLORIDE	0	lbs	0.68
47	RUBBER - LATEX FOAM	4	lbs	76.44
56	WOOD-UNTREATED (AVG. FOR ALL SPECIES)	1	lbs	8.24
69	CABLE INSULLATION-GENERAL	0	lbs	1.64
96	INITIAL LOAD LUBE OIL11	20	gal	3,430.63
117	THERMOLAG FIRE BARRIER	724	lbs	5,550.98
118	ZERO COMBUSTIBLES	0		0.00

Max load = 33,333 Current load = 9,593.77 Trans load = 23,739

FA/FZ ID IB-FZ-01

69	CABLE INSULLATION-GENERAL	271	lbs	5,501.02
118	ZERO COMBUSTIBLES	0	lbs	0.00

Max load = 40,000 Current load = 5,501.02 Trans load = 34,498

FA/FZ ID IB-FZ-02

35	OIL - LUBRICATING-MINERALS	5	gal	1,109.49
41	PLASTICS - POLYVINYL CHLORIDE	0	lbs	2.59
55	WOOD-CHEM.TREATED (AVG. FOR ALL SPECIES)	8	cuft	4,184.60
69	CABLE INSULLATION-GENERAL	447	lbs	6,537.23
103	TRANSIENT COMBUSTIBLES	5	lbs	58.39
118	ZERO COMBUSTIBLES	0		0.00

Max load = 40,000 Current load = 11,892.30 Trans load = 28,107

FA/FZ ID IB-FZ-03

6	CABLE INSULATION - INSTRUMENT	40	ft	8.76
8	CABLE INSULATION - CONTROL	30	ft	39.95
35	OIL - LUBRICATING-MINERALS	7	gal	457.70
41	PLASTICS - POLYVINYL CHLORIDE	2	lbs	7.46
55	WOOD-CHEM.TREATED (AVG. FOR ALL SPECIES)	17	cuft	2,434.92
56	WOOD-UNTREATED (AVG. FOR ALL SPECIES)	80	lbs	258.76
69	CABLE INSULLATION-GENERAL	1,122	lbs	4,823.66
118	ZERO COMBUSTIBLES	0		0.00

Max load = 40,000 Current load = 8,031.21 Trans load = 31,968

FA/FZ ID IB-FZ-04

6	CABLE INSULATION - INSTRUMENT	15	ft	3.86
8	CABLE INSULATION - CONTROL	50	ft	78.24
13	COTTON	5	lbs	22.15
39	PLASTICS - MIXED	41	lbs	331.15
56	WOOD-UNTREATED (AVG. FOR ALL SPECIES)	40	lbs	152.04
69	CABLE INSULLATION-GENERAL	44	lbs	224.73
118	ZERO COMBUSTIBLES	0		0.00
119	AMT. ENTERED IS BTU'S-SEE FHAIS FOR DET.	400,000	lbs	201.92

Max load = 40,000 Current load = 1,014.09 Trans load = 38,985

FA/FZ ID IB-FZ-05

6	CABLE INSULATION - INSTRUMENT	40 ft	10.30
8	CABLE INSULATION - CONTROL	105 ft	164.31

SECTION 4.a

TMI FIRE LOADING

(by material)

		AMOUNT	UNITS	FIRELOAD
13	COTTON	5	lbs	22.15
39	PLASTICS - MIXED	2	lbs	16.15
40	PLASTICS - NYLON	20	lbs	137.68
41	PLASTICS - POLYVINYL CHLORIDE	0	lbs	0.12
56	WOOD-UNTREATED (AVG. FOR ALL SPECIES)	20	lbs	76.02
69	CABLE INSULLATION-GENERAL	41	lbs	208.48
118	ZERO COMBUSTIBLES	0		0.00
119	AMT. ENTERED IS BTU'S-SEE FHAIS FOR DET.	400,000	lbs	201.92
120	CHEMELEX HEAT TRACE	500	ft	63.10

Max load = 40,000 Current load = 900.23 Trans load = 39,099

FA/FZ ID IB-FZ-06

6	CABLE INSULATION - INSTRUMENT	10	ft	0.93
7	CABLE INSULATION - POWER	100	ft	56.49
8	CABLE INSULATION - CONTROL	655	ft	369.99
41	PLASTICS - POLYVINYL CHLORIDE	1	lbs	2.67
56	WOOD-UNTREATED (AVG. FOR ALL SPECIES)	100	lbs	137.21
69	CABLE INSULLATION-GENERAL	2,300	lbs	4,192.70
103	TRANSIENT COMBUSTIBLES	5	lbs	7.29
118	ZERO COMBUSTIBLES	0		0.00
119	AMT. ENTERED IS BTU'S-SEE FHAIS FOR DET.	400,000	lbs	72.89

Max load = 40,000 Current load = 4,840.17 Trans load = 35,159

FA/FZ ID IB-FZ-07

8	CABLE INSULATION - CONTROL	90	ft	74.98
41	PLASTICS - POLYVINYL CHLORIDE	2	lbs	4.30
69	CABLE INSULLATION-GENERAL	282	lbs	758.13
118	ZERO COMBUSTIBLES	0	lbs	0.00

Max load = 40,000 Current load = 837.41 Trans load = 39,162

FA/FZ ID IB-FZ-08

8	CABLE INSULATION - CONTROL	115	ft	214.63
13	COTTON	5	lbs	26.42
37	PAPER	15	lbs	72.25
40	PLASTICS - NYLON	15	lbs	123.15
56	WOOD-UNTREATED (AVG. FOR ALL SPECIES)	40	lbs	181.34
69	CABLE INSULLATION-GENERAL	429	lbs	2,584.59
118	ZERO COMBUSTIBLES	0		0.00

Max load = 40,000 Current load = 3,202.38 Trans load = 36,797

FA/FZ ID ISPH-FA-02

39	PLASTICS - MIXED	1	lbs	38.83
41	PLASTICS - POLYVINYL CHLORIDE	0	lbs	2.06
55	WOOD-CHEM.TREATED (AVG. FOR ALL SPECIES)	15	lbs	320.21
91	INITIAL LOAD LUBE OIL6	353	gal	124,271.42
118	ZERO COMBUSTIBLES	0		0.00
119	AMT. ENTERED IS BTU'S-SEE FHAIS FOR DET.	400,000	lbs	970.87

Max load = 120,000 Current load = 125,603.39 Trans load = -5,603

FA/FZ ID ISPH-FZ-01

6	CABLE INSULATION - INSTRUMENT	80	ft	20.24

8	CABLE INSULATION - CONTROL	80 ft	123.02
39	PLASTICS - MIXED	20 lbs	160.16
41	PLASTICS - POLYVINYL CHLORIDE	6 lbs	24.51
47	RUBBER - LATEX FOAM	10 lbs	86.64

SECTION 4.a
TMI FIRE LOADING
(by material)

		AMOUNT	UNITS	FIRELOAD
55	WOOD-CHEM.TREATED (AVG. FOR ALL SPECIES)	20	lbs	87.25
56	WOOD-UNTREATED (AVG. FOR ALL SPECIES)	50	lbs	186.76
69	CABLE INSULLATION-GENERAL	2,236	lbs	11,093.56
108	CABLE - FIBER OPTIC INSTRUMENT	20	ft	6.35
117	THERMOLAG FIRE BARRIER	699	lbs	2,429.52
118	ZERO COMBUSTIBLES	0		0.00
119	AMT. ENTERED IS BTU'S-SEE FHAIS FOR DET.	2,285,100	lbs	1,133.48
122	RUBBER, 1 5/8" ARMSTRONG ARM-A-FLEX	50	ft	44.17
123	RUBBER, 2 5/8" ARMSTRONG ARM-A-FLEX	150	ft	294.49

Max load = 26,000 Current load = 15,690.15 Trans load = 10,309

FA/FZ ID ISPH-FZ-02

6	CABLE INSULATION - INSTRUMENT	40	ft	10.12
20	GREASE	2	lbs	19.23
39	PLASTICS - MIXED	17	lbs	142.06
40	PLASTICS - NYLON	10	lbs	67.64
41	PLASTICS - POLYVINYL CHLORIDE	0	lbs	1.34
55	WOOD-CHEM.TREATED (AVG. FOR ALL SPECIES)	40	lbs	174.50
56	WOOD-UNTREATED (AVG. FOR ALL SPECIES)	60	lbs	224.11
69	CABLE INSULLATION-GENERAL	2,005	lbs	9,945.79
117	THERMOLAG FIRE BARRIER	832	lbs	2,888.88
118	ZERO COMBUSTIBLES	0		0.00
119	AMT. ENTERED IS BTU'S-SEE FHAIS FOR DET.	400,000	lbs	198.41
122	RUBBER, 1 5/8" ARMSTRONG ARM-A-FLEX	50	ft	44.17
123	RUBBER, 2 5/8" ARMSTRONG ARM-A-FLEX	150	ft	294.49

Max load = 26,000 Current load = 14,010.74 Trans load = 11,989

FA/FZ ID ISPH-FZ-03

1	ACETONE	6	lbs	12.95
2	ACETYLENE	16	lbs	57.40
6	CABLE INSULATION - INSTRUMENT	65	ft	5.41
8	CABLE INSULATION - CONTROL	5	ft	2.53
9	CLOTH (RAG, ETC.)	150	lbs	191.88
20	GREASE	2	lbs	6.32
35	OIL - LUBRICATING-MINERALS	427	lbs	1,973.91
37	PAPER	265	lbs	345.73
39	PLASTICS - MIXED	100	lbs	260.93
41	PLASTICS - POLYVINYL CHLORIDE	0	lbs	0.06
56	WOOD-UNTREATED (AVG. FOR ALL SPECIES)	140	lbs	171.92
69	CABLE INSULLATION-GENERAL	374	lbs	611.06
90	INITIAL LOAD LUBE OIL5	6	gal	150.29
118	ZERO COMBUSTIBLES	0		0.00
119	AMT. ENTERED IS BTU'S-SEE FHAIS FOR DET.	400,000	lbs	65.23
123	RUBBER, 2 5/8" ARMSTRONG ARM-A-FLEX	20	ft	12.91

Max load = 40,000 Current load = 3,868.53 Trans load = 36,131

FA/FZ ID RB-FZ-01A

6	CABLE INSULATION - INSTRUMENT	443	ft	39.93
8	CABLE INSULATION - CONTROL	50	ft	27.39
55	WOOD-CHEM.TREATED (AVG. FOR ALL SPECIES)	345	cuft	19,638.60
59	CONCRETE COATING	512	lbs	1,719.34
69	CABLE INSULLATION-GENERAL	2,599	lbs	4,594.20
70	INITIAL LOAD OIL1	2	gal	54.44

118 ZERO COMBUSTIBLES		0	0.00

Max load = 40,000 Current load = 26,073.90 Trans load = 13,926

SECTION 4.a
TMI FIRE LOADING
(by material)

		AMOUNT	UNITS	FIRELOAD
FA/FZ ID RB-FZ-01B				
6	CABLE INSULATION - INSTRUMENT	470	ft	355.64
42	PLASTICS - POLYETHYLENE	4	lbs	118.69
59	CONCRETE COATING	49	lbs	1,382.72
117	THERMOLAG FIRE BARRIER	0	lbs	0.00
118	ZERO COMBUSTIBLES	0	lbs	0.00
Max load = 40,000	Current load = 1,857.05	Trans load =		38,142
FA/FZ ID RB-FZ-01C				
6	CABLE INSULATION - INSTRUMENT	940	ft	228.83
8	CABLE INSULATION - CONTROL	60	ft	88.78
42	PLASTICS - POLYETHYLENE	4	lbs	38.19
59	CONCRETE COATING	217	lbs	1,971.65
69	CABLE INSULLATION-GENERAL	1,867	lbs	8,915.32
114	PLASTICS - POLYESTER UNSATURATED	215	lbs	1,315.66
117	THERMOLAG FIRE BARRIER	0	lbs	0.00
118	ZERO COMBUSTIBLES	0		0.00
Max load = 40,000	Current load = 12,558.43	Trans load =		27,441
FA/FZ ID RB-FZ-01D				
6	CABLE INSULATION - INSTRUMENT	210	ft	67.27
42	PLASTICS - POLYETHYLENE	8	lbs	111.81
69	CABLE INSULLATION-GENERAL	847	lbs	5,321.73
71	INITIAL LOAD LUBE OIL1	276	gal	27,638.14
72	INITIAL LOAD OIL2	69	gal	6,814.35
73	INITIAL LOAD PLASTIC1	218	lbs	2,612.97
118	ZERO COMBUSTIBLES	0		0.00
Max load = 40,000	Current load = 42,566.27	Trans load =		-2,566
FA/FZ ID RB-FZ-01E				
6	CABLE INSULATION - INSTRUMENT	649	ft	237.44
69	CABLE INSULLATION-GENERAL	495	lbs	3,557.39
71	INITIAL LOAD LUBE OIL1	276	gal	31,563.79
72	INITIAL LOAD OIL2	70	gal	7,783.36
73	INITIAL LOAD PLASTIC1	0	lbs	0.00
117	THERMOLAG FIRE BARRIER	0	lbs	0.00
118	ZERO COMBUSTIBLES	0		0.00
Max load = 40,000	Current load = 43,141.98	Trans load =		-3,141
FA/FZ ID RB-FZ-02				
6	CABLE INSULATION - INSTRUMENT	675	ft	44.27
8	CABLE INSULATION - CONTROL	450	ft	179.37
42	PLASTICS - POLYETHYLENE	16	lbs	42.69
55	WOOD-CHEM.TREATED (AVG. FOR ALL SPECIES)	240	lbs	271.42
56	WOOD-UNTREATED (AVG. FOR ALL SPECIES)	118	lbs	114.25
59	CONCRETE COATING	514	lbs	1,255.75
69	CABLE INSULLATION-GENERAL	17,812	lbs	22,904.50
74	INITIAL LOAD PAINT/CUT OIL 1	6	gal	39.27
75	INITIAL LOAD CHARCOAL1	2,322	lbs	2,349.17
117	THERMOLAG FIRE BARRIER	0	lbs	0.00
118	ZERO COMBUSTIBLES	0		0.00

Max load = 40,000 Current load = 27,200.69 Trans load = 12,799

FA/FZ ID RB-FZ-03

6 CABLE INSULATION - INSTRUMENT 240 ft 12.14

SECTION 4.a

TMI FIRE LOADING

(by material)

		AMOUNT	UNITS	FIRELOAD
7	CABLE INSULATION - POWER	100	ft	30.75
8	CABLE INSULATION - CONTROL	950	ft	292.10
39	PLASTICS - MIXED	-57	lbs	-90.46
41	PLASTICS - POLYVINYL CHLORIDE	12	lbs	9.19
42	PLASTICS - POLYETHYLENE	8	lbs	17.66
46	RUBBER - ISOPRENE (NATURAL)	184	lbs	356.63
69	CABLE INSULLATION-GENERAL	1,644	lbs	1,631.03
73	INITIAL LOAD PLASTIC1	-93	lbs	-175.26
76	INITIAL LOAD PLASTIC2	169	lbs	297.17
112	CHARCOAL	180	lbs	266.52
117	THERMOLAG FIRE BARRIER	0	lbs	0.00
118	ZERO COMBUSTIBLES	0		0.00

Max load = 40,000 Current load = 2,647.47 Trans load = 37,352

FA/FZ ID SB-FA-01

6	CABLE INSULATION - INSTRUMENT	310	ft	0.00
108	CABLE - FIBER OPTIC INSTRUMENT	15,000	ft	0.00
118	ZERO COMBUSTIBLES	0		0.00

Max load = 0 Current load = 0.00 Trans load = 0

FA/FZ ID SB0-FA-1

31	OIL - FUEL #2 DIESEL	580	gal	11,680.55
35	OIL - LUBRICATING-MINERALS	159	gal	3,362.14
39	PLASTICS - MIXED	10	lbs	22.22
42	PLASTICS - POLYETHYLENE	22	lbs	61.11
56	WOOD-UNTREATED (AVG. FOR ALL SPECIES)	32	lbs	33.47
69	CABLE INSULLATION-GENERAL	14,148	lbs	3,086.65
84	INITIAL LOAD BATTERY CASES1	1,000	lbs	1,111.11
103	TRANSIENT COMBUSTIBLES	75	lbs	83.33
118	ZERO COMBUSTIBLES	0		0.00
119	AMT. ENTERED IS BTU'S-SEE FHAIS FOR DET.	518,000	lbs	71.95

Max load = 240,000 Current load = 19,512.53 Trans load = 220,487

FA/FZ ID SB0-FA-2

31	OIL - FUEL #2 DIESEL	25,000	gal	2,465,986.39
35	OIL - LUBRICATING-MINERALS	276	gal	28,538.77
69	CABLE INSULLATION-GENERAL	1	lbs	6.80
118	ZERO COMBUSTIBLES	0	lbs	0.00

Max load = 240,000 Current load = 2,494,531.96 Trans load = -2,254,531

FA/FZ ID TB-FA-01

6	CABLE INSULATION - INSTRUMENT	6,169	ft	204.97
7	CABLE INSULATION - POWER	4,377	ft	244.72
8	CABLE INSULATION - CONTROL	7,025	ft	392.75
35	OIL - LUBRICATING-MINERALS	7,935	gal	21,752.28
40	PLASTICS - NYLON	1	lbs	0.42
41	PLASTICS - POLYVINYL CHLORIDE	960	lbs	133.83
43	PLASTICS - POLYSTYRENE	96	lbs	31.95
44	PLASTICS - POLYURETHANE	50	lbs	9.27
46	RUBBER - ISOPRENE (NATURAL)	37	lbs	13.07
55	WOOD-CHEM.TREATED (AVG. FOR ALL SPECIES)	4,886	cuft	2,345.69
56	WOOD-UNTREATED (AVG. FOR ALL SPECIES)	400	lbs	54.32

64	LEXAN (POLYCARBONATE)	1 cuft	0.00
69	CABLE INSULLATION-GENERAL	97,541 lbs	17,591.49
73	INITIAL LOAD PLASTIC1	135 lbs	46.26
98	CLASS A COMBUSTIBLE SOLIDS	1,680 lbs	242.39

SECTION 4.a

TMI FIRE LOADING

(by material)

		AMOUNT	UNITS	FIRELOAD
108	CABLE - FIBER OPTIC INSTRUMENT	9,596	ft	125.95
118	ZERO COMBUSTIBLES	4		0.00
123	RUBBER, 2 5/8" ARMSTRONG ARM-A-FLEX	25	ft	1.78

Max load = 240,000 Current load = 43,191.14 Trans load = 196,808

5.0 TMI-1 COMPARISON TO THE REQUIREMENTS OF NRC BRANCH TECHNICAL POSITION APCSB 9.5-1

A. Overall Requirements of Nuclear Plant Fire Protection Program

1. Personnel

APPENDIX A POSITION

A.1 Responsibility for the overall fire protection program should be assigned to a designated person in the upper level of management. This person should retain ultimate responsibility even though formulation and assurance of program implementation is delegated. Such delegation authority should be to staff personnel prepared by training and experience in fire protection and nuclear plant safety to provide a balanced approach in direction of the fire protection program for nuclear power plants. The qualifications requirements for the fire protection engineer or consultant who will assist in the design and selection of equipment, inspect and test the completed physical aspects of the system, develop the fire protection program, and assist in the fire-fighting training for the operating plant should be stated. Subsequently, the FSAR should discuss the training and the updating provisions such as fire drills provided for maintaining the competence of the station fire-fighting and operating crew, including personnel responsible for maintaining and inspecting the fire protection equipment.

The fire protection staff should be responsible for:

(a) coordination of building layout and systems design with fire area requirements, including consideration of potential hazards associated with postulated design basis fires,

(b) design and maintenance of fire detection, suppression, and extinguishing systems,

(c) fire prevention activities,

(d) training and manual fire-fighting activities of plant personnel and the fire brigade.

NOTE: (NFPA 6 - Recommendations for Organization of Industrial Fire Loss Prevention, contains useful guidance for organization and operation of the entire fire loss prevention program).

TMI-1 CONFORMANCE

A.1 The overall fire protection program for TMI-1 is described in Three Mile Island Unit No. 1 administrative procedure AP-1038 entitled "Administrative Controls - Fire Protection Program.

a. AP-1035 "Control of Transient Combustible Materials"

b. OP-MA-201-004 "Fire Prevention for Hot Work"

c. OP-AA-201-006 "Control of Temporary Heat Sources"

d. MP 1420-FB-1 "Fire Barrier Penetration Seal Repair/ Installation"

e. AP 1004 "Emergency Plan"

f. EP-013T "Fire Protection Evaluation"

g. MP 1410-Y-71 "Structural Steel and Metal Deck Fire Proofing Repairs"

h. MP 1440-Y-14 "Repair/Installation of Fire Barrier Envelopes and REHS"

i. MP 1440-Y-15 "Repair/Installation of 3M Heat Shields"

2. Design Bases

APPENDIX A POSITION

A.2 The overall fire protection program should be based upon evaluation of potential fire hazards throughout the plant and the effect of postulated design basis fires relative to maintaining ability to perform safety shutdown functions and minimize radioactive releases to the environment.

TMI-1 CONFORMANCE

A.2 The Fire Hazards Analysis Report provides an evaluation of potential fire hazards and the effect of postulated fires through the plant on the ability to retain safe shutdown capability of the reactor.

3. Backup

APPENDIX A POSITION

A.3 Total reliance should not be placed on a single automatic fire suppression system. Appropriate backup fire suppression capability should be provided.

TMI-1 CONFORMANCE

A.3 In all areas where automatic suppression systems are provided, adequate manual suppression equipment including fire hose stations and/or portable fire extinguishers are available as discussed in Section 4.0.

4. Single Failure Criterion

APPENDIX A POSITION

A.4 A single failure in the fire suppression system should not impair both the primary and backup fire suppression capability. For example, redundant fire water pumps with independent power supplies and controls should be provided. Postulated fire or fire protection system failures need not be considered concurrent with other plant accidents or the most severe natural phenomena. The effects of lightning strikes should be included in the overall plant fire protection program.

TMI-1 CONFORMANCE

A.4 Redundant fire water pumps with independent power supplies and controls are provided as described in "TMI-1 Conformance" Section E.2c of this section.

In areas where both primary and backup fire suppression can be impaired by a single failure in the fire main header, back-up suppression will be routed to the area from an unaffected location.

The effects of lightning strikes are included in the overall plant fire protection program.

5. Fire Suppression Systems

APPENDIX A POSITION

A.5 Failure or inadvertent operation of the fire suppression system should not incapacitate safety related systems or components Fire suppression systems that are pressurized during normal plant operation should meet the guidelines specified in APCSB Branch Technical Position 3-1, "Protection Against Postulated Piping Failures in Fluid Systems Outside Containment."

TMI-1 CONFORMANCE

A.5 Fire suppression systems that are pressurized during normal operation meet the guidelines specified in APCSB Branch Technical Position 3-1.

6. Fuel Storage Areas

APPENDIX A POSITION

A.6 Schedule for implementation of modifications, if any, will be established on a case-by-case basis.

TMI-1 CONFORMANCE

A.6 This requirement is no longer applicable to TMI-1.

7. Fuel Loading

APPENDIX A POSITION

A.7 Schedule for implementation of modifications, if any, will be established on a case-by-case basis.

TMI-1 CONFORMANCE

A.7 This requirement is no longer applicable to TMI-1.

8. Multiple-Reactor Sites

APPENDIX A POSITION

A.8 On multiple-reactor sites where there are operating reactors and construction of remaining units is being completed, the fire protection program should provide continuing evaluation and include additional fire barriers, fire protection capability, and administrative controls necessary to protect the operating units from construction fire hazards. The superintendent of the operating plant should have the lead responsibility for site fire protection.

TMI-1 CONFORMANCE

A.8 TMI-1 is completely isolated from TMI-2 except for the common connection between the fuel handling buildings. An environmental barrier between the fuel handling buildings, except for the operating floors prevents communication between TMI-2 and TMI-1. The fire protection provided in the TMI-1 fuel handling building provides adequate protection. Also, the spatial separation, in conjunction with three hour fire barriers between structures housing equipment required for hot and cold shutdown of TMI-1 precludes the need for any additional evaluation for potential fire hazards. Administrative controls are described in AP1038 and apply to both TMI-1 and ZMTI-2.

9. Simultaneous Fires

APPENDIX A POSITION

A.9 Simultaneous fires in more than one reactor need not be postulated, where separation requirements are met. A fire involving more than one reactor unit need not be postulated except for facilities shared between units.

TMI-1 CONFORMANCE

A.9 As discussed in "TMI-1 CONFORMANCE" Section A 8, fires occurring in the common areas of the fuel handling facilities shared between TMI-1 and TMI-2 are adequately addressed.

B. Administrative Procedures, Controls and Fire Brigade

APPENDIX A POSITION

B.1 Administrative procedures consistent with the need for maintaining the performance of the fire protection system and personnel in nuclear power plants should be provided.

Guidance is contained in the following publications:

NFPA 4 - Organization for Fire Services
NFPA 4A - Organization for Fire Department
NFPA 6 - Industrial Fire Loss Prevention
NFPA 7 - Management Responsibility for Effects of Fire on Operations
NFPA 27 - Private Fire Brigades

TMI-1 CONFORMANCE

B.1 Procedures governing these subjects are in effect as defined by Procedure 1038. NFPA-600 of 1996 applies to control of fire brigade training.

APPENDIX A POSITION

B.2 Effective administrative measures should be implemented to prohibit bulk storage of combustible materials inside or adjacent to safety related buildings or systems during operation or maintenance periods. Regulatory Guide 1.39, "Housekeeping Requirements for Water-Cooled Nuclear Power Plants", provides guidance on housekeeping, including the disposal of combustible materials.

TMI-1 CONFORMANCE

B.2 See "TMI-1 CONFORMANCE" Section B.1

APPENDIX A POSITION

B.3 Normal and abnormal conditions or other anticipated operations such as modifications (e.g., breaking fire stops, impairment of fire detection and suppression systems) and refueling activities should be reviewed by appropriate levels of management and appropriate special actions and procedures such as fire watches or temporary fire barriers implemented to assure adequate fire protection and reactor safety. In particular.

TMI-1 CONFORMANCE

B.3 See "TMI-1 CONFORMANCE" Section B.1

APPENDIX A POSITION

B.3(a) Work involving ignition sources such as welding and flame cutting should be done under closely controlled conditions. Procedures governing such work should be reviewed and approved by persons trained and experienced in fire protection. Persons performing and directly assisting in such work should be trained and equipped to prevent and combat fires. If this is not possible, a person qualified in fire protection should directly monitor the work and function as a fire watch.

TMI-1 CONFORMANCE

B.3(a) See "TMI-1 CONFORMANCE" Section B.1

APPENDIX A POSITION

B.3(b) Leak testing and similar procedures such as air flow determination, should use one of the commercially available aerosol techniques. Open flames or combustion generated smoke should not be permitted.

TMI-1 CONFORMANCE

B.3(b) TMI-1 complies with this requirement

APPENDIX A POSITION

B.3(c) Use of combustible material, e.g., HEPA and charcoal filters, dry ion exchange resins or other combustible supplies, in safety related areas should be controlled. Use of wood inside buildings containing safety related systems or equipment should be permitted only when suitable non-combustible substitutes are not available. If wood must be used, only fire retardant treated wood (scaffolding, lay down blocks) should be permitted.

Such materials should be allowed into safety related areas only when they are to be used immediately. Their possible and probable use should be considered in the fire hazard analysis to determine the adequacy of the installed fire protection systems.

TMI-1 CONFORMANCE

B.3(c) See "TMI-1 CONFORMANCE Section B.1

APPENDIX A POSITION

B.4 Nuclear power plants are frequently located in remote areas, at some distance from public fire departments. Also, first response fire departments are often volunteer. Public fire department response should be considered in the overall fire protection program. However, the plant should be designed to be self-sufficient with respect to fire fighting activities and rely on the public response only for supplemental or backup capability.

TMI-1 CONFORMANCE

B.4 TMI-1 is self-sufficient with respect to fire fighting activities but does have a working arrangement with local fire departments. Reference "TMI-1 CONFORMANCE" Section B.1

APPENDIX A POSITION

B.5 The need for good organization, training and equipping of fire brigades at nuclear power plant sites requires effective measures be implemented to assure proper discharge of these functions. The guidance in Regulatory Guide 1.101, "Emergency Planning for Nuclear Power Plants", should be followed as applicable.

TMI-1 CONFORMANCE

B.5 See "TMI-1 CONFORMANCE" Section B.1

APPENDIX A POSITION

B.5(a) Successful fire fighting requires testing and maintenance of the fire protection equipment, emergency lighting and communication, as well as practice as brigades for the people who must utilize the equipment. A test plan that lists the individuals and their responsibilities in connection with routine tests and inspections of the fire detection and protection systems should be developed. The test plan should contain the types, frequency and detailed procedures for testing. Procedures should also contain instructions on maintaining fire protection during those periods when the fire protection system is impaired or during periods of plant maintenance, e.g., fire watches or temporary hose connections to water systems.

TMI-1 CONFORMANCE

B.5(a) SeeTMI-1 CONFORMANCE" Section B.1

APPENDIX A POSITION

B.5(b) Basic training is a necessary element in effective fire fighting operation. In order for a fire brigade to operate effectively, it must operate as team. All members must know what their individual duties are. They must be familiar with the layout of the plant and equipment location and operation in order to permit effective fire-fighting operations during times when a particular area is filled with smoke or is insufficiently lighted. Such training can only be accomplished by conducting drills several times a year (at least quarterly) so that all members of the fire brigade have had the opportunity to train as a team, testing itself in the major areas of the plant. The drills should include the simulated use of equipment in each area and should be pre-planned and post-critiqued to establish the training objective of the drills and determine how well these objectives have been met. These drills should periodically (at least annually) include local fire department participation where possible. Such drills also permit supervising personnel to evaluate the effectiveness of communications within the fire brigade and with on scene fire team leader, the reactor operator in the Control Room, and the off-site command post.

TMI-1 CONFORMANCE

B.5(b) See "TMI-1 CONFORMANCE" Section B.1

APPENDIX A POSITION

B.5(c) To have proper coverage during all phases of operation, members of each shift crew should be trained in fire protection. Training of the plant fire brigade should be coordinated with the local fire department so the responsibilities and duties are delineated in advance. This coordination should be part of a training course and implemented into the training of the local fire department staff. Local fire departments should be educated in the operational precautions when fighting fires on nuclear power plant sites. Local fire departments should be made aware of the need for radioactive protection of personnel and the special hazards associated with a nuclear power plant site.

TMI-1 CONFORMANCE

B.5(c) See "TMI-1 CONFORMANCE" Section B.1

APPENDIX A POSITION

B.5(d) NFPA 27, "Private Fire Brigade" should be followed in organization, training, and fire drills. This standard also is applicable for the inspection and maintenance of fire fighting equipment. Among the standards referenced in this document, the following should be utilized: NFPA 194, "Standard for Screw Threads and Gaskets for Fire Hose Couplings", NFPA 196, "Standard for Fire Hose," NFPA 197, "Training Standard on Initial Fire Attacks", NFPA 601, "Recommended Manual of Instructions and Duties for the Plant Watchman on Guard." NFPA booklets and pamphlets listed on page 27-11 of Volume 8, 1971-72 are also applicable for good training references. In addition, courses in fire protection and fire suppression which are recognized and/or sponsored by the fire protection industry should be utilized.

TMI-1 CONFORMANCE

B.5(d) See "TMI-1 CONFORMANCE" Section B.1. Note that the TMI Site fire brigade organization, training, fire drills and inspection and maintenance of fire fighting equipment meets or exceeds NFPA 600-1976 requirements which supercedes the cancelled NFPA-27.

C. Quality Assurance Program

APPENDIX A POSITION

Quality Assurance (QA) programs of applicants and contractors should be developed and implemented to assure that the requirements for design, procurement, installation, and testing and administrative controls for the fire protection program for safety related areas as defined in this Branch Position are satisfied. The program should be under the management control of the QA organization. The QA program criteria that apply to the fire protection program should include the following:

1. Design Control and Procurement Document Control

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

2. Instructions, Procedures and Drawings

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

3. Control of Purchased Material, Equipment and Services

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

4. Inspection

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

5. Test and Test Control

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

6. Inspection, Test and Operating Status

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

7. Non-Conforming Items

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

8. Corrective Action

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

9. Records

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

10. Audits

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

TMI-1 CONFORMANCE

C. The fire protection program (system) for TMI-1 is under the scope of the TMI-1 Operational Quality Assurance Plan. Those items of the fire protection program (system) which are considered necessary in the fire hazards analysis have been entered on the TMI-1 PIMS Component Record List (CRL).

The Operational Quality Assurance Program for fire protection is under the management control of the Nuclear Safety Assessment organization. The TMI-1 Operational Quality Assurance plan covers the ten criteria under Appendix A Position C.

D. General Guidelines for Plant Protection

1. Building Design

D.1(a) APPENDIX A POSITION

(a) Plant Layouts should be arranged to:

(1) Isolated safety related systems from unacceptable fire hazards, and

TMI-1 CONFORMANCE

D.1(a)(1) The Fire Hazards Analysis Report identifies the fire zones construction features, fire hazards and fire protection systems in the fire areas and fire zones as well as the equipment required to bring the reactor to hot shutdown and cold shutdown in each fire area and fire zone.

APPENDIX A POSITION

D.1(a)(2) Alternatives:

(a) Redundant safety related systems that are subject to damage from a single fire hazard should be protected by a combination of fire retardant coatings and fire detection and suppression systems, or

TMI-1 CONFORMANCE

D.1(a)(2) Locations where redundant systems required to bring the reactor to hot shutdown and cold shutdown and are subject to damage from a single fire hazard are described in the Fire Hazards Analysis Report. Passive and active fire protection features available in each fire area and/or fire zone are discussed.

APPENDIX A POSITION

D.1(a)(2) Alternatives:

(b) A separate system to perform the safety function should be provided.

D.1(a)(2) (b) An alternative shutdown system is provided to insure that the reactor can be brought to hot and cold shutdown from outside the Control Room should a fire occur in either the Control Room or the cable and relay room. See Section 3.12 of Fire Hazards Analysis Report.

APPENDIX A POSITION

D.1(b) In order to accomplish 1. (a) above, safety related systems and fire hazards should be identified throughout the plant. Therefore, a detailed fire hazards analysis should be made. The fire hazards analysis should be reviewed and updated as necessary. Additional fire hazards analysis should be done after any plant modification

TMI-1 CONFORMANCE

D.1(b) An updated plant Fire Hazards Analysis Report includes plant modifications which have been performed since the initial analysis was completed. All plant modifications are reviewed for their fire hazards impact on the plant per procedure EP-013T entitled "Fire Protection Evaluation." Individual analyses for each plant modification are logged and are included in overall periodic updates of the Plant Fire Hazards Analysis Report.

APPENDIX A POSITION

D.1(c) Alternative guidance for constructed plants is shown in Section E.3, "Cable Spreading Room." Note incorrect reference to Section E.3 should be F.3.

TMI-1 CONFORMANCE

D.1(c) See "TMI-1 CONFORMANCE" for Section F.3.

APPENDIX A POSITION

D.1(d) Interior wall and structural components, thermal insulation materials and radiation shielding materials and sound-proofing should be non-combustible. Interior finishes should be non-combustible or listed by a nationally recognized testing laboratory, such as Factory Mutual or Underwriter's Laboratory, Inc. for flame spread, smoke and fuel contribution of 25 or less in its use configuration (ASTM-E84 Test), "Surface Burning Characteristics of Building Materials").

TMI-1 CONFORMANCE

D.1(d) Interior wall and structural components, thermal insulation materials, radiation shielding materials, and sound proofing are non-combustible. Interior finishes are non-combustible or listed by a nationally recognized testing laboratory such as Factory Mutual or Underwriter's Laboratory, Inc. for:

(a) Surface flamespread of 50 or less when tested under ASTM E-84, and

(b) Potential heat release of 3500 BTU/lb. or less when tested under ASTM D-3286 or NFPA 259.

(The concept of using a 3500 BTU/lb. potential heat release limitation is similar to the "limited combustible" concept with its like

limit, as set forth in NFPA 220).

Materials which may be used as interior finish without evidence of test and listing by a nationally recognized laboratory are the following:

- Plaster, acoustic plaster
- Gypsum plasterboard (gypsum wallboard)
- Any of the above plain, wallpapered, or painted with oil or water base paint
- Ceramic tile, ceramic panels
- Glass, glass blocks
- Brick, stone, concrete blocks, plain, or painted
- Steel and aluminum panels, plain, painted, or enameled
- Vinyl tile, vinyl-asbestos tile, linoleum or asphalt tile on concrete floors.

APPENDIX A POSITION

D.1(e) Metal deck roof construction should be non-combustible (see the building materials directory of the Underwriter's Laboratory, Inc.) or listed as Class 1 by Factory Mutual System Approval Guide. Where combustible material is used in metal deck roofing design, acceptable alternatives are (i) replace combustibles with non-combustible materials, (ii) provide an automatic sprinkler system, or (iii) provide ability to cover roof exterior and interior with adequate water volume and pressure.

TMI-1 CONFORMANCE

D.1(e) Roof construction on structures housing equipment required for hot and cold shutdown is of reinforced concrete to give a non-combustible rating, with the exception of auxiliary building area AB-FZ-10 and the Turbine Building which have an FM Class 1 roof.

APPENDIX A POSITION

D.1(f) Suspended ceilings and their supports should be of non-combustible construction. Concealed spaces should be devoid of combustibles. Adequate fire detection and suppression systems should be provided where full implementation is not practicable.

TMI-1 CONFORMANCE

D.1(f) Cable circuits required for insuring operation of equipment required for hot shutdown are located above the suspended non-combustible ceiling on elevation 306' - 0" of the Control Building. However, one train of redundant circuits is protected by one hour fire barrier and an automatic wet pipe sprinkler system protects the area below the suspended ceiling All other areas containing equipment required for hot and cold shutdown meet Appendix A criteria. A fire detection system is available above the suspended ceiling on elevation 306' - 0" of the Control Building (CB-FA-1). This area also is provided with an acetylene leak detection system which provides local alarms.

APPENDIX A POSITION

D.1(g) High voltage - high amperage transformers installed inside buildings containing safety related systems should be of the dry type or insulated and cooled with non-combustible liquid. Safety related systems that are exposed to flammable oil filled transformers should be protected from the effects of fire by:

(i) replacing with dry transformers or transformers that are insulated and cooled with non-combustible liquid; or

(ii) enclosing the transformer with a three hour barrier and installing automatic water spray protection

TMI-1 CONFORMANCE

D.1(g) All inside transformers are of the dry type.

APPENDIX A POSITION

D.1(h) Buildings containing safety related systems, having openings in exterior walls closer than 50 feet to flammable oil filled transformers should be protected from the effects of a fire by:

(i) closing of the opening to have fire resistance equal to three

hours,

(ii) constructing a three hour fire barrier between the transformers and the wall openings; or

(iii) closing the opening and providing the capability to maintain a water curtain in case of a fire.

TMI-1 CONFORMANCE

D.1(h) Outdoor transformers are within 50 feet of openings in the East Turbine building wall. Transformers are adequately protected by fixed automatic deluge water spray systems. The East Turbine Building wall is protected by a water curtain which operates with the water spray systems. No safety related systems are exposed to the transformers. A 1500 KVA oil filled transformer is within 50 ft. of the Diesel Generator Building west wall. Transformer fire barrier wall provides adequate exposure protection.

APPENDIX A POSITION

D 1(i) Floor drains, sized to remove expected fire fighting water flow should be provided in those areas where fixed water fire suppression systems are installed. Drains should also be provided in other areas where hand hose lines may be used if such fire fighting water could cause unacceptable damage to equipment in the area. Equipment should be installed on pedestals, or curbs should be provided as required to contain water and direct it to floor drains. (See NFPA 92M, "Waterproofing and Draining of Floors.") Drains in areas containing combustible liquids should have provisions for preventing the spread of fire throughout the drain system. Water drainage from areas which may contain radioactivity should be sampled and analyzed before discharge to the environment. In operating plants or plants under construction, if accumulation of water from the operation of new fire suppression systems does not create unacceptable consequences, drains need not be installed.

TMI-1 CONFORMANCE

D.1(i) Floor drains are designed to remove the expected fire fighting water flow from areas where fixed water fire suppression systems are installed or where fire hose may be used. Equipment is installed on pedestals. Protection of exposed equipment from water damage is addressed in Section 6.0 of the Fire Hazards Analysis Report.

Drains in areas containing combustible liquids are designed to prevent the spread of fire throughout the drain system.

Water drainage is pumped from areas which may contain radioactivity to the miscellaneous waste storage tank in the auxiliary building for normal liquid waste processing.

APPENDIX A POSITION

D.1(j) Floors, walls and ceilings enclosing separate fire areas should have minimum fire rating of three hours. Penetrations in these fire barriers, including conduits and piping, should be sealed or closed to provide a fire resistance rating at least equal to that of the fire barrier itself. Door openings should be protected with equivalent rated doors, frames and hardware that have been tested and approved by a nationally recognized laboratory. Such doors should be normally closed and locked or alarmed with alarm and annunciation in the Control Room. Penetrations for ventilation system should be protected by a standard "fire door damper" where required. (Refer to NFPA 80, "Fire Doors and Windows.") The fire hazard in each area should be evaluated to determine barrier requirements. If barrier fire resistance cannot be made adequate, fire detection and suppression should be provided, such as:

(i) water curtain in case of fire,

(ii) flame retardant coatings,

(iii) additional fire barriers.

TMI-1 CONFORMANCE

D.1(j) The Fire Hazards Analysis Report identifies the construction features of each fire area and fire zone and indicates which walls, floors and ceilings are designated as fire barriers.

All penetrations through designated fire barriers are sealed to provide a fire resistance rating equal to that of the fire barrier except containment penetrations. TMI Report 990-3018, "Fire Barrier Penetration Seal Evaluation Report" contains all fire seal information including qualification tests and evaluations. Due to overriding nuclear considerations, containment penetrations do not have specific fire ratings, however, their construction is considered adequate to prevent fire from spreading from one side of the penetration to the other.

Doors through designated fire barriers are provided with rated doors as indicated in the Fire Hazards Analysis Report. Such doors are normally closed and are posted with signs saying "Keep Closed". Unlocked doors are inspected daily to ensure that they are closed, not blocked and supervised. Only some selected fire doors are locked when they also serve as security doors. No fire doors are provided with limit switches for remote annunciation unless they also serve as a security door.

Duct penetrations through designated fire barriers are provided with fire dampers as indicated in the Fire Hazards Analysis Report.

Some exterior walls have unprotected openings or barriers provided by non-rated doors. These areas either are provided with automatic suppression or substantial construction or both to ensure protection from temporary fire hazards in the adjacent yard areas. These features are discussed in Chapter 4.

The fire hazard in each fire area and fire zone has been evaluated to determine if designated fire barriers are adequate to prevent the spread of fire from one side of the barrier to the other. Fire protection and detection features provided for each fire area and fire zone are discussed in the Fire Hazards Analysis Report.

D.2 Control of Combustibles

APPENDIX A POSITION

D.2(a) Safety related systems should be isolated or separated from combustible materials. When this is not possible because of the nature of the safety system or the combustible material, special protection should be provided to prevent a fire from defeating the safety system function. Such protection may involve a combination of automatic fire suppression, and construction capable of withstanding and containing a fire that consumes all combustibles present. Examples of such combustible materials that may not be separable from the remainder of

its system are:

(1) Emergency diesel generator fuel oil day tanks

(2) Turbine-generator oil and hydraulic control fluid systems

(3) Reactor coolant pump lube oil system

TMI-1 CONFORMANCE

D.2(a) The Fire Hazards Analysis Report identifies redundant safety related systems located in the same fire area and fire zone. It describes both the fire protection features used to protect at least one redundant train of safe shutdown equipment and the combustible materials which present a fire hazard to that equipment.

APPENDIX A POSITION

D.2(b) Bulk gas storage (either compressed or cryogenic), should not be permitted inside structures housing safety-related equipment. Storage of flammable gas such as hydrogen, should be located outdoors or in separate detached buildings so that a fire or explosion will not adversely affect any safety related systems or equipment. (Refer to NFPA 50A, "Gaseous Hydrogen Systems.") care should be taken to locate high pressure gas storage containers with the long axis parallel to building walls. This will minimize the possibility of wall penetration in the event of a container failure. Use of compressed gases (especially flammable and fuel gases) inside buildings should be controlled. (Refer to NFPA 6, "Industrial Fire Loss Prevention.")

TMI-1 CONFORMANCE

D.2(b) Bulk gas is stored in outside areas in accordance with OSHA 1910.101. A fire or explosion will not adversely affect any safety related systems or equipment.

The hydrogen storage containers have their long axis perpendicular to the East wall of the turbine building. The hydrogen is stored to the northeast of the transformer area, 138 feet from the East turbine building wall. This is acceptable because there is no safety related equipment located in this area. The permanent nitrogen cylinder banks NI-T-1A and NI-T-1B long axis is perpendicular to the Auxiliary Building Wall Cylinders are located approximately 150 feet west of the Auxiliary Building. Nitrogen is not flammable. These buildings are all craft hardened buildings. The cylinder's long axis is parallel to the air intake

and Pretreatment Building.

Administrative procedures to control the use of compressed gases inside buildings are in effect. (AP-1035-Control of Transient Combustibles).

APPENDIX A POSITION

D.2(c) The use of plastic materials should be minimized. In particular, haloginated plastics such as polyvinyl chloride (PVC) and neoprene should be used only when substitute non-combustible materials are not available. All plastic materials, including flame and fire retardant materials, will burn with an intensity and BTU production in a range similar to that of ordinary hydrocarbons. When burning, they produce heavy smoke that obscures visibility and can plug air filters, especially charcoal and HEPA. The haloginated plastics also release free chlorine and hydrogen chloride when burning which are toxic to humans and corrosive to equipment.

TMI-1 CONFORMANCE

D.2(c) The quantity of plastic material throughout is negligible. Polyvinyl chloride (PVC) and neoprene are not used unless substitute, non-combustible materials are not available. In such cases the fire hazards analysis which reviews the modification will document the acceptability of the use of these materials

Griffolyn Type 55, 75 or 95 Fire Retardant plastic sheeting (PVC) is used when necessary to support maintenance activities. Griffolyn Type 55 FR sheeting is classified by Underwriter's Laboratories Test No. 723 as follows:

Flame Spread	10
Fuel Contribution	Not Available
Smoke Developed	45

Type 75 and 95 FR have similar fire retardent characteristics. The three types have been tested in accordance with NFPA 701-1977, large scale test, and are approved for use by American Nuclear Insurers on the basis of the NFPA 701 test performance.

APPENDIX A POSITION

D.2(d) Storage of flammable liquids should, as a minimum, comply with the requirements of NFPA 30, "Flammable and Combustible Liquids Code."

TMI-1 CONFORMANCE

D.2(d) Flammable liquids are stored in accordance with the requirements of NFPA 30 and OSHA 1910-106.

D.3 Electric Cable Construction, Cable Trays and Cable Penetrations

APPENDIX A POSITION

D.3(a) Only non-combustible materials should be used for cable tray construction.

TMI-1 CONFORMANCE

D.3(a) Cable trays are of non-combustible metal construction.

APPENDIX A POSITION

D.3(b) See Section E.3 for Fire Protection Guidelines for Cable Spreading Rooms. Note reference to Section E.3 should be F.3.

TMI-1 CONFORMANCE

D.3(b) See "TMI-1 Conformance" for Section F.3.

APPENDIX A POSITION

D.3(c) Automatic water sprinkler systems should be provided for cable trays outside the Cable Spreading Room. Cables should be designed to allow wetting down with deluge water without electrical faulting. Manual hose stations and portable hand extinguishers should be provided as backup. Safety related equipment in the vicinity of such cable trays, that does not itself require water fire protection, but is subject to unacceptable damage from sprinkler water discharge, should be protected from sprinkler system operation or malfunction. When safety related cables do not satisfy the provisions of Regulatory Guide 1.75, all exposed cables should be covered with an approved fire retardant coating and a fixed automatic water fire suppression system should be provided.

TMI-1 CONFORMANCE

D.3(c) Automatic water sprinkler or water systems are provided outside the cable and relay room as indicated in the Fire Hazards Analysis Report. The extent of sprinkler or spray coverage is illustrated on the fire area drawings. Cables are designed to be wetted down without electrical faulting. Manual hose stations and portable extinguishers are available to fight fires in any fire area and fire zone of the plant which contain equipment required to bring the reactor to hot and cold shutdown.

Provisions for protecting equipment, required to bring the reactor to hot and cold shutdown, which do not require fire protection but which are subject to unacceptable damage from sprinkler water discharge are described in Section 6.0 of the updated Fire Hazards Analysis Report.

When redundant cable trays or conduits in the same fire area or fire zone contain electrical circuits connected to equipment which is required to bring the plant to hot and cold shutdown, one redundant tray or conduit is protected by a fire rated barrier unless other mitigating features are provided. This criteria is consistent with the separation criteria and fire barrier requirements of Appendix R to 10CFR50 Section III.G. Previous commitments in the plant Safety Evaluation Report required that marinite boards be interposed between redundant safety related trays which do not meet the separation requirements of Regulatory Guide 1.75. These barriers as well as wraps and rockbestos cable identified on Drawing No. 1D-775-57-1000 will remain in place unless they interfere with the installation of one hour fire barriers on cable tray and conduit as described above.

APPENDIX A POSITION

D.3(d) Cable and cable tray penetration of fire barriers (vertical and horizontal) should be sealed to give protection at least equivalent to that fire barrier. The design of fire barriers for horizontal and vertical cable trays should, as a minimum, meet the requirements of ASTM E-119, "Fire Test of Building Construction and Materials," including the hose stream test. Where installed penetration seals are deficient with respect to fire resistance, these seals may be protected by covering both sides with an approved fire retardant material. The adequacy of using such material should be demonstrated by suitable testing.

TMI-1 CONFORMANCE

D.3(d) Cable and cable tray penetrations of designated fire barriers (vertical and horizontal) are sealed to give protection equivalent to that of the fire barrier. The design of these seals meets the requirements of the

ASTM E-119 fire test including the hose stream test. Repairs to existing penetration seals and installation of new seals are made in accordance with Maintenance Procedure 1420-FB-1. This procedure insures the penetration seals maintain the ASTM-E-19 tested configurations.

APPENDIX A POSITION

D.3(e) Fire breaks should be provided as deemed necessary by the fire hazards analysis. Flame or flame retardant coatings may be used as a fire break for grouped electrical cables to limit spread of fire in cable ventings. (Possible cable derating owing to use of such coating materials must be considered during design.)

TMI-1 CONFORMANCE

D.3(e) Fire breaks using an ASTM E-119 tested design were installed in the communication cable trays inside containment where the same group passes below electrical penetrations carrying redundant safety related circuits. This was the only plant area where fire breaks were deemed necessary. No derating of the cabling (non-NSR) will occur as a result of this installation, which consists of short 9 inch sections of foam. The need for these fire breaks has been superseded by implementation of 10CFR50 Appendix R.

APPENDIX A POSITION

D.3(f) Electric cable constructions should, as a minimum, pass the current IEEE No. 383 flame test. (This does not imply that cables passing this test will not require additional fire protection.) For cable installation in operating plants and plants under construction that do not meet the IEEE No. 383 flame test requirements, all cables must be covered with an approval flame retardant coating and properly derated.

TMI-1 CONFORMANCE

D.3(f) Electrical cable construction meets the current IEEE 383 flame test.

APPENDIX A POSITION

D.3(g) Applicable to new cable installations.

TMI-1 CONFORMANCE

D.3(g) All new cable will meet the requirements of the IEEE 383 flame test

except as follows. Cable run in conduit or enclosed panels is considered non-combustible with respect to the fire hazard it poses and therefore need not meet the IEEE 383 flame test requirements. Some applications utilize cable construction which is not tested to the IEEE 383 flame test. It may not be practical or possible to require conformance to IEEE 383. In such cases, the fire hazards analysis which reviews the modification will document the acceptability of the deviation.

APPENDIX A POSITION

D.3(h) Cable trays, raceways, conduit, trenches, or culverts should be used only for cables. Miscellaneous storage should not be permitted, nor should piping for flammable or combustible liquids or gases be installed in these areas. Installed equipment in cable tunnels or culverts, need not be removed if they present no hazard to the cable runs as determined by the fire hazards analysis.

TMI-1 CONFORMANCE

D.3(h) This criteria is met.

APPENDIX A POSITION

D.3(i) The design of cable tunnels, culverts and spreading rooms should provide for automatic or manual smoke venting as required to facilitate manual fire fighting capability.

TMI-1 CONFORMANCE

D.3(i) The cable trench is not provided with automatic or manual smoke venting. The Relay Room does have provisions for manual smoke venting. A gaseous suppression system is installed in the Relay Room to provide extinguishment prior to the generation of any appreciable amount of smoke. Portable fans will exhaust any smoke from the Control Building through doors to the Fuel Handling Building, and then exhaust the smoke to the outside through overhead doors.

APPENDIX A POSITION

D.3(j) Cables in the Control Room should be kept to the minimum necessary for operation of the Control Room. All cables entering the Control Room should terminate there. Cables should not be installed in floor trenches or culverts in the Control Room. Existing cabling installed in concealed floor and ceiling spaces should be protected with an

automatic total flooding halon system.

TMI-1 CONFORMANCE

D.3(j) Cables in the Control Room come primarily through the floor from the Relay Room and terminate in control panels, consoles or equipment. Some cables are contained in cable tray and open top annunciator boxes above the suspended ceiling in the Control Room. The cables terminate in the subject annunciator boxes. The quantity of cables located in this space above the ceiling is low and presents a very low fire loading.

D.4 Ventilation

APPENDIX A POSITION

D.4(a) The products of combustion that need to be removed from a specific fire area should be evaluated to determine how they will be controlled. Smoke and corrosive gases should generally be automatically discharged directly outside to a safe location. Smoke and gases containing radioactive materials should be monitored in the fire area to determine if release to the environment is within the permissible limits of the Plant Technical Specifications. The products of combustion which need to be removed from a specific fire area should be evaluated to determine how they will be controlled.

TMI-1 CONFORMANCE

D.4(a) Ventilation for critical areas is evaluated in Sections 2.0 and 4.0 of this report. Areas containing radioactive material release potentials are also outlined. Monitoring of radioactive contamination is discussed in Chapter 11 of the FSAR and the environmental technical specifications. Monitoring of specific areas will be accomplished in accordance with existing TMI-1 procedures when necessary.

APPENDIX A POSITION

D.4(b) Any ventilation system designed to exhaust smoke or corrosive gases should be evaluated to ensure that inadvertent operation or single failures will not violate the controlled areas of the plant design. This requirement includes containment functions for protection of the public and maintaining habitability for operations personnel.

TMI-1 CONFORMANCE

D.4(b) No systems are designed solely for smoke removal. Existing ventilation systems which would be used for smoke removal meet these criteria.

APPENDIX A POSITION

D.4(c) The power supply and controls for mechanical ventilation systems should be run outside the fire area served by the system.

TMI-1 CONFORMANCE

D.4(c) The power supply and controls for the mechanical ventilation systems used to cool redundant safe shutdown equipment have been run in the same area as the applicable equipment. These controls meet the separation requirements outlined in Chapter 8 of the FSAR. Those ventilation systems which are necessary to support safe shutdown activities have been reviewed for Appendix R. Non-compliances and their resolutions are covered by exemption requests as discussed in Section 3.14 of this report.

APPENDIX A POSITION

D.4(d) Fire suppression systems should be installed to protect charcoal filters in accordance with Regulatory Guide 1.52, "Design Testing and Maintenance Criteria for Atmospheric Cleanup Air Filtration."

TMI-1 CONFORMANCE

D.4(d) All charcoal filters including the charcoal filter for the kidney system inside the Reactor Building are provided with manually actuated deluge water spray systems. All charcoal filters are provided with thermal detection systems to alarm in the event of a rise in temperature in the charcoal. The charcoal filters associated with the kidney system in the Reactor Building are protected by automatic deluge water spray.

The single exception is the charcoal filter in the ESF Ventilation Room (AB-FZ-11) on the roof of the Auxiliary Building. This is an outdoor enclosure separated from the Auxiliary Building by 3 hour fire rated barriers. As such, the room does not present an exposure to any plant areas containing safety related or safe shutdown required equipment, components, or cables. These filters are provided with thermal detection.

APPENDIX A POSITION

D.4(e) The fresh air supply intakes to areas containing safety related equipment or systems should be located remote from the exhaust air outlets and smoke vents of other fire areas to minimize the possibility of contaminating the intake air with the products of combustion.

TMI-1 CONFORMANCE

D.4(e) Fresh air supply intakes are remotely located with respect to exhaust air outlets, thus minimizing the possibility of contaminating the intake air with the products of combustion.

APPENDIX A POSITION

D.4(f) Stairwells should be designed to minimize smoke infiltration during a fire. Staircases should serve as escape routes and access routes for fire fighting. Fire exit routes should be clearly marked. Stairwells, elevators and chutes should be enclosed in masonry towers with minimum fire rating of three hours and automatic fire doors at least equal to the enclosure construction, at each opening into the building. Elevators should not be used during fire emergencies. Where stairwells or elevators cannot be enclosed in three hour fire rated barrier with equivalent fire doors, escape and access routes should be established by pre-fire plan and practiced in drills by operating and fire brigade personnel.

TMI-1 CONFORMANCE

D.4(f) The Control Building stairwell is enclosed as indicated on the layout drawings attached to this report. All other stairways are open between floors. Elevators are not used during fire emergencies. Escape and access routes have been established by pre-fire plan and are practiced in drills by operating and fire brigade personnel. All fire exit routes are clearly posted throughout TMI-1.

APPENDIX A POSITION

D.4(g) Smoke and heat vents may be useful in specific areas such as cable spreading rooms and diesel fuel oil storage areas and switchgear rooms When natural-convection ventilation is used, a minimum ratio of 1 sq. foot of venting area per 200 sq. feet of floor area should be provided. If forced convection ventilation is used, 300 cfm should be provided for every 200 sq. feet of floor area. See NFPA No 204 for additional guidance on smoke control

TMI-1 CONFORMANCE

D.4(g) Forced convection ventilation is provided throughout TMI-1 and is in excess of 300 cfm for each 200 ft^2 of floor area.

APPENDIX A POSITION

D.4(h) Self-contained breathing apparatus, using full face positive pressure masks, approved by NIOSH (National Institute for Occupational Safety and Health - approval formerly given by the U. S. Bureau of Mines) should be provided for fire brigade, damage control and control room personnel. Control room personnel may be furnished breathing air by a manifold system piped from a storage reservoir if practical. Service or operating life should be a minimum of one half hour for the self-contained units.

At least two extra air bottles should be located onsite for each self-contained breathing unit. In addition, an onsite 6-hour supply of reserve air should be provided and arranged to permit quick and complete replenishment of exhausted supply air bottles as they are returned. If compressors are used as a source of breathing air, only units approved for breathing air should be used. Special care must be taken to locate the compressor in areas free of dust and contaminates.

TMI-1 CONFORMANCE

D.4(h) Self-contained breathing apparatus using full face positive pressure masks approved by NIOSH, are provided for the fire brigade, damage control and control room personnel. Each self-contained breathing apparatus has a 60 minute air supply with a 60 minute backup. Also, there is an air compressor and cascade system at TMI-1 for unlimited air supply. Precautions have been taken to locate the compressor in areas free of dust and contaminants

APPENDIX A POSITION

D.4(i) Where total flooding gas extinguishing systems are used, area intake and exhaust ventilation dampers should close upon initiation of gas flow to maintain necessary gas concentration. (See NFPA 12, "Carbon Dioxide Systems," and 12A, "Halon 1301 Systems.")

TMI-1 CONFORMANCE

D.4(i) Where required, ventilation dampers close automatically on actuation of a gaseous extinguishing system.

D.5 Lighting and Communication

APPENDIX A POSITION

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

TMI-1 CONFORMANCE

Emergency lighting at TMI-1 meets these requirements. This has been resolved with the NRC per R. Reid letter of November 19, 1980, item 3.2.12 "Emergency Lighting."

APPENDIX A POSITION

D.5(a) Fixed emergency lighting should consist of sealed beam units with individual 8-hour minimum battery power supplies.

TMI-1 CONFORMANCE

D.5(a) All areas needed for safe shutdown and access/egress routes to safety related areas are provided with fixed 8 hour sealed beam emergency lighting units. Exemption from this requirement is identified in Section 3.14 for the Control Room. At least one lighting system for the control room is available for all fire scenarios.

In addition, emergency lighting for means of egress lighting is provided throughout TMI-1 and is powered from emergency AC safety related switchgear. The emergency AC power is more reliable and does not present the maintenance problems associated with sealed beam units.

APPENDIX A POSITION

D.5(b) Suitable sealed beam battery powered portable hand lights should be provided for emergency use.

TMI-1 CONFORMANCE

D.5(b) Sealed beam battery powered portable hand lights are provided for emergency use. Portable sealed beam 8 hour emergency lights are provided for Reactor Building access and are stored at the Remote Shutdown Panel Area for operator use. Additional portable lights are available in the Service Building.

APPENDIX A POSITION

D.5(c) Fixed emergency communication should use voice powered head sets at pre-selected stations.

TMI-1 CONFORMANCE

D.5(c) Headsets, powered by 110V safety related switchgear can be plugged into jacks throughout TMI-1. Voice powered headsets are available for emergency feedwater use.

APPENDIX A POSITION

D.5(d) Fixed repeaters installed to permit use of portable radio communications units should be protected from exposure fire damage.

TMI-1 CONFORMANCE

D.5(d) At TMI-1, two fixed repeaters are housed in a radio room located in the Turbine Building, Elevation 322 ft. These two units are the (1) Security and (2) Operations fixed radios, which are connected to a plant-wide antenna network and enables portable radio communication throughout the station. A back-up Operations fixed radio is located in the Pretreatment Building. This unit is widely separated from the Turbine Building units and can provide portable radio communication to the exteriors of the main plant in the event of a fire or water damage to the Turbine Building units, at a minimum. The radios carried by operations personnel and security have both channels. If necessary, communication availability can be enhanced through the use of the Red and Grey Page Phone Systems, the Maintenance and Instrumentation System, line-of-sight two way radios and runners.

For alternate shutdown, the Grey Page Phone System and the Maintenance and Instrumentation System are available for fires in the Control and Relay Room. The Red Page Phone System is available for fires in the ESAS area. For fire in the Health Physics and Lab area, the voice powered headsets for emergency feedwater noted in D.5(c) above are available for Control Room/Remote Shutdown Panel communication.

These systems are available with or without off-site power available.

E. Fire Detection and Suppression

1. Fire Detection

APPENDIX A POSITION

E.1(a) Fire detection systems should, as a minimum, comply with NFPA 72D, "Standard for the Installation Maintenance and Use of Proprietary Protective Signaling Systems". Deviations from the requirements of NFPA 72D should be identified and justified.

TMI-1 CONFORMANCE

E.1(a) Fire detection systems are designed in conformance with NFPA 72D when used in safety related areas of the Reactor, Intermediate, Auxiliary, Control and Fuel Handling Buildings, except that no recorder is provided. The design of the fire detection systems has been accepted by the NRC as detailed in the R. Reid letter of November 19, 1980, item 3.2.4 "Adequacy of Detection System Design." The incipient fire detection system installed in the Control Building consists of detectors and air lines which provide actuation and supervisory signals through existing panels in the Control Building designed as described above.

APPENDIX A POSITION

E.1(b) Fire detection system should give audible and visual alarm and annunciation in the Control Room. Local audible alarms should also sound at the location of the fire.

TMI-1 CONFORMANCE

E.1(b) Fire detection systems give audible and visual alarm through the TMI-1 annunciation system in the control room. Local alarms do not sound at all locations.

APPENDIX A POSITION

E.1(c) Fire alarms should be distinctive and unique. They should not be capable of being confused with any other plant system alarms.

TMI-1 CONFORMANCE

E.1(c) Fire alarms have standard annunciator tone. However, engraved flashing windows are provided for the fire alarm in the Control Room. The plant fire emergency alarm is distinctive and unique from all other alarms.

APPENDIX A POSITION

E.1(d) Fire detection and actuation systems should be connected to the plant emergency power supply.

TMI-1 CONFORMANCE

E.1(d) The fire detection and deluge actuation systems are connected to TMI-1 emergency power supply.

2. Fire Protection Water Supply Systems

APPENDIX A POSITION

E.2(a) An underground yard fire main loop should be installed to furnish anticipated fire water requirements. NFPA 24 - Standard for Outside Protection - gives necessary guidance for such installation. It references other design codes and standards developed by such organizations as the American National Standards Institute (ANSI) and the American Water Works Association (AWWA). Lined steel or cast iron pipe should be used to reduce internal tuberculation. Such tuberculation deposits in an unlined pipe over a period of years can significantly reduce water flow through the combination of increased friction and reduced pipe diameter. Means for treating and flushing the systems should be provided. Approved visually indicating sectional control valves, such as Post Indicator Valves, should be provided to isolate portions of the main for maintenance or repair without shutting off the entire system. Visible location marking signs for underground valves is acceptable. Alternative valve position indicators should also be provided.

The fire main system piping should be separate from service or sanitary water system piping. For operating plants, fire main system piping that can be isolated from service or sanitary water system piping is acceptable.

TMI-1 CONFORMANCE

E.2(a) The underground yard fire main loop is installed in accordance with NFPA 24 with the exception that the pipe is unlined. Underground pipe is carbon steel(ASTM A-53 Gr. B, or ASTM A 134 or API 5L, Gr. B), shop coated for underground service with hot coal tar enamel and asbestos felt per AWWA Spec. C-203.

The underground yard fire main comprises two 12 inch pipe loops. One loop surrounds the plant (see E.2(b) for interface with Unit 2 loop), and the other loop surrounds the Unit 1 natural draft cooling towers. The two loops are connected by a 16 inch tie line equipped with a check valve which lets water flow only toward the cooling tower loop. A normally open, hand operated bypass valve around the check valve permits reverse flow. Post indicator valves (PIV's) are provided to permit isolating sections of the main in the event of a break, and for repairs and extensions.

Flushing is accomplished by using fire hydrants. No means for treatment is available.

The fire main piping is separate from the domestic and sanitary water service piping except for the fire/cooling water feed to the Station Blackout Diesel Generator. This feed can be isolated by manually closing yard post indicator valves.

APPENDIX A POSITION

E.2(b) A common yard fire main loop may serve multi-unit nuclear power plant sites, if cross-connected between units. Sectional control valves should permit maintaining independence of the individual loop around each unit. For such installations, common water supplies may also be utilized. The water supply should be sized for the largest single expected flow. For multiple reactor sites with widely separated plants (approaching 1 mile or more), separate yard fire main loops should be used. Sectionalized systems are acceptable.

TMI-1 CONFORMANCE

E.2(b) A common yard fire main loop serves TMI-1 and TMI-2. Sectional control valves (post indicator valves) are provided to permit independence of the individual loop around each unit. The water supply is sized for the largest single expected flow.

APPENDIX A POSITION

E.2(c) If pumps are required to meet system pressure or flow requirements, a sufficient number of pumps should be provided so that 100% capacity will be available with one pump inactive (e.g., pumps). The connection to the yard fire main loop from each fire pump should be widely separated, preferably located on opposite sides of the plant. Each pump should have its own driver with independent power supplies and control. At least one pump (if not powered from the emergency diesels) should be driven by non-electrical means, preferably diesel engine. Pumps and drivers should be located in rooms separated from the remaining pumps and equipment by a minimum three-hour fire wall. Alarms indicating pump running, driver availability, or failure to start should be provided in the Control Room.

Details of the fire pump installation should, as a minimum, conform to NFPA 20, "Standard for the Installation of Centrifugal Fire Pumps."

TMI-1 CONFORMANCE

E.2(c) Three automatic starting fire pumps (2500 gpm @ 125 psig; two diesel driven and one electrically motor driven) are provided for TMI-1, thereby meeting this requirement. There is sufficient capacity with one of these pumps inactive to insure 2575 gpm to the most remote deluge system plus 1000 gpm for hoses.

Connectors to the underground yard fire main loop are at least 50 feet apart. Two of the fire pumps in the Unit 1 Intake Screen and Pumphouse are separated by a 3 hour fire wall. The other fire pump is spatially separated, in the Unit 1 circulating water pumphouse.

Alarms indicating pump running, driver availability and failure to start for the three pumps are provided in the Unit 1 Control Room. The fire pump installation conforms to NFPA 20, with the exception of a remote stop button in the Unit 1 Control Room for the electric motor driven pump.

APPENDIX A POSITION

E.2(d) Two separate reliable water supplies should be provided. If tanks are used, two 100% (minimum of 300,000 gallons each) system capacity tanks should be installed. They should be so interconnected that pumps can take suction from either or both. However, a leak in one tank or its piping should not cause both tanks to drain. The main plant

fire water supply capacity should be capable of refilling either tank in a minimum of eight hours.

Common tanks are permitted from fire and sanitary or service water storage. When this is done, however, minimum fire water storage requirements should be dedicated by means of a vertical standpipe for other water services.

TMI-1 CONFORMANCE

E.2(d) Water supply is from the Susquehanna River and the circulating water flume.

A 100,000 gallon filtered water (preferred make-up is from Pretreatment wells) altitude tank is connected into the fire main piping. For fire protection, 90,000 gallons are held in reserve. Internal piping permits 10,000 gallons to flow to the makeup demineralizers.

APPENDIX A POSITION

E.2(e) The fire water supply (total capacity and flow rate) should be calculated on the basis of the largest expected flow rate for a period of two hours, but not less than 300,000 gallons. This flow rate should be based (conservatively) on 1,000 gpm for manual hose streams plus the greater of:

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

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

TMI-1 CONFORMANCE

E.2(e) The maximum flow demand is 2575 gpm to the most remote deluge system, plus 1000 gpm for manual hose streams.

A single pump is designed to run at 150 percent of rated capacity and provided 3750 gpm at 80 psig.

APPENDIX A POSITION

E.2(f) Lakes or fresh water ponds of sufficient size may qualify as sole source of water for fire protection, but require at least two intakes to the pump supply. When a common water supply is permitted for fire protection and the ultimate heat sink, the following conditions should also be satisfied:

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

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

TMI-1 CONFORMANCE

E.2(f) This condition does not apply to TMI-1.

APPENDIX A POSITION

E.2(g) Outside manual hose installation should be sufficient to reach any location with an effective hose stream. To accomplish this, hydrants should be installed approximately every 250 feet on the yard main system. The lateral to each hydrant from the yard main should be controlled by a visually indicating or key operated (curb) valve. A hose house, equipped with hose and combination nozzle and other auxiliary equipment recommended in NFPA 24, "Outside Protection," should be provided as needed but at least every 1,000 feet. Threads compatible with those used by local fire departments should be provided on all hydrants, hose couplings and standpipe risers.

TMI-1 CONFORMANCE

E.2(g) Fire hydrants are located approximately 250 feet apart around the perimeter of TMI-1 and TMI-2. An exception to this is on the east side of TMI-2 where a hydrant was removed due to obstruction. The lateral to each fire hydrant is controlled by a key operated (curb) valve. Hydrants inside the protected area are provided with a hose house containing 250 feet of 2 1/2 inch hose, combination fog nozzle, and auxiliary equipment. The hydrant south of Warehouse 1 is similarly equipped as is the hydrant at the fire training area.

The inventory requirements of NFPA 24 were used as guidance in establishing equipment inventory. The TMI fire brigade van carries a similar inventory of equipment.

Threads are compatible with those used by most local fire departments; however, adapters are carried by one second alarm company which has some older, non-standard thread equipment. The other volunteer fire companies (hose standard thread) which operate with this second alarm company also carry adapters.

3. Water Sprinklers and Hose Standpipe Systems

APPENDIX A POSITION

5.3(a) Each automatic sprinkler system and manual hose station standpipe should have an independent connection to the plant underground water main. Headers fed from each end are permitted inside buildings to supply multiple sprinkler and standpipe systems. When provided, such headers are considered an extension of the yard main system. The header arrangement should be such that no single failure can impair both the primary and backup fire protection systems.

Each sprinkler and standpipe system should be equipped with OS&Y (outside screw and yoke) gate valve, or other approved shut off valve, and water flow alarm. Safety related equipment that does not itself require sprinkler water fire protection, but is subject to unacceptable damage if wetted by sprinkler water discharge should be protected by water shields or baffles.

TMI-1 CONFORMANCE

E.3(a) Headers for each building containing safe shutdown equipment are fed from each end. The single exception: The Reactor Building Header has a single feed. The automatic sprinkler systems and manual hose station standpipe are fed from headers. These headers are arranged such that each is isolable, thereby ensuring that no single failure can impair the header function. In areas where both primary and back-up suppression can be impaired by a single failure in the header, backup suppression will be routed to the area from an unaffected location.

Each sprinkler and standpipe system is equipped with an OS&Y gate valve. Each sprinkler system except condenser pit in Turbine Building is equipped with a water flow alarm. Standpipe systems are not equipped with a water flow alarm. Protection of exposed equipment from water damage is addressed in Section 6.0 of the Fire Hazards Analysis Report.

APPENDIX A POSITION

E.3(b) All valves in the fire water systems should be electrically supervised. The electrical supervision signal should indicate in the Control Room and other appropriate command locations in the plant (See NFPA 26, "Supervision of Valves"). When electrical supervision of fire protection valves is not practicable, an adequate management supervision program should be provided. Such a program should include locking valves open with strict key control; tamper proof seals; and periodic, visual check of all valves.

TMI-1 CONFORMANCE

E.3(b) Shutoff valves controlling sprinkler and deluge systems are electrically supervised and alarm in the Control Room.

Valves which are not electrically supervised are supplied with tamper proof seals. Additionally, a management supervision program exists that requires visual valve position inspection in accordance with AP1038.

APPENDIX A POSITION

E.3(c) Automatic sprinkler systems should, as a minimum, conform to requirements of appropriate standards such as NFPA 13, "Standard for the Installation of Sprinkler Systems" and NFPA 15, "Standard for Water Spray Fixed Systems."

TMI-1 CONFORMANCE

Valves which are not electrically supervised are supplied with tamper proof seals. Additionally, a management supervision program exists that requires visual valve position inspection in accordance with Technical Specification Surveillance Requirements.

APPENDIX A POSITION

E.3(c) Automatic sprinkler systems should, as a minimum, conform to requirements of appropriate standards such as NFPA 13, "Standard for the Installation of Sprinkler Systems" and NFPA 15, "Standard for Water Spray Fixed Systems."

TMI-1 CONFORMANCE

E.3(c) Sprinkler systems throughout TMI-1 meet the design and installation requirements of NFPA 13 and/or NFPA 15. Note that the manually actuated preaction systems protecting the ESF Relay Cabinets in the Control Building and the decay heat valves in the Reactor Building are not provided with approved spray valves as required by NFPA 15. Water is introduced to the system by manually operated gate valves. Note that the water supply for the systems protecting the decay heat valves is from the Reactor Building hose standpipe system.

APPENDIX A POSITION

E.3(d) Interior manual hose installation should be able to reach any location with at least one effective hose steam. To accomplish this, standpipes with hose connections equipped with a maximum of 75 feet of 1 1/2 inch woven jacket lined fire hose and suitable nozzles should be provided in all buildings, including containment, on all floors and should be spaced at not more than 100-foot intervals.

Individual standpipes should be at least 4-inch diameter for multiple hose connections and 2 1/2-inch diameter for single hose connections. These systems should follow the requirements of NFPA No. 14 for sizing, spacing and pipe support requirements (NELPIA).

Hose stations should be located outside entrances to normally unoccupied areas and inside normally occupied areas. Standpipes serving hose stations in areas housing safety related equipment should have shut off valves and pressure reducing devices (if applicable) outside the area.

Hose stations are mainly located outside entrances to normally un-occupied areas. Shutoff valves and pressure reducing devices are provided at each hose station and in the main feed to the standpipe.

APPENDIX A POSITION

E.3(e) The proper type of hose nozzles to be supplied to each area should be based on the fire hazard analysis. The usual combination spray/ straight-stream nozzle may cause unacceptable mechanical damage (for example, the delicate electronic equipment in the Control Room) and be unsuitable. Electrically safe nozzles should be provided at locations where electrical equipment or cabling is located.

TMI-1 CONFORMANCE

E.3(e) All areas are provided with combination fog-straight stream nozzles. Personnel are adequately trained to make proper use of hose stations.

APPENDIX A POSITION

E.3(f) Certain fire such as those involving flammable liquids respond well to foam suppression. Consideration should be given to use of any of the available foams for such specialized protection application. These include the more common chemical and mechanical low expansion foams, high expansion foam and the relatively new aqueous film forming foam (AFFF).

TMI-1 CONFORMANCE

E.3(f) There are no major flammable liquid hazards in TMI-1. Areas involving combustible liquids are adequately diked and separated from the plant. Therefore foam suppression is not utilized as a fire protection feature. Note that offsite assistance with foam suppression capability is available.

4. Halon Suppression Systems

APPENDIX A POSITION

E.4 The use of Halon fire extinguishing agents should as a minimum comply with the requirements of NFPA 12A and 12B, "Halogenated Fire Extinguishing Agent Systems - Halon 1301 and Halon 1211." Only UL or FM approved agents should be used.

In addition to the guidelines of NFPA 12A and 12B, preventative maintenance and testing of the systems, including check weighing of the Halon cylinders should be done at least quarterly.

Particular consideration should also be given to:

(a) minimum required Halon concentration and soak time

(b) toxicity of Halon

(c) toxicity and corrosive characteristics of thermal decomposition products of Halon.

TMI-1 CONFORMANCE

E.4 Four (4) Halon 1301 systems are provided in the Air Intake Tunnel which comply with NFPA standards.

Regular quarterly inspections of Halon systems include visual inspection by qualified personnel. The quarterly inspection involves checking for leaks by measuring the internal pressure of the extinguisher which would indicate any mass loss. Weight checks are performed semi-annually.

Consideration has been given to items (a), (b), and (c) in the design of the systems. Note that soak time is not a required consideration for the design of the Air Intake Tunnel Halon Systems.

5. Carbon Dioxide Suppression Systems

APPENDIX A POSITION

B.5 The use of carbon dioxide extinguishing systems should as a minimum comply with the requirements of NFPA 12, "Carbon Dioxide Extinguishing Systems."

Particular consideration should also be given to:

(a) minimum required CO_2 concentration and soak time;

(b) toxicity of CO_2;

(c) possibility of secondary thermal shock (cooling) damage;

(d) offsetting requirements for venting during CO_2 injection to prevent over pressurization versus sealing to prevent loss of agent;

(e) design requirements from over-pressurization; and

(f) possibility and probability of CO_2 systems being out-of-service because of personnel safety consideration. CO_2 systems are disarmed whenever people are present in an area so protected. Areas entered frequently (even though duration time for any visit is short) have often been found with CO_2 systems shut off.

TMI-1 CONFORMANCE

E.5 A carbon dioxide system is provided for the protection of the relay room at elevation 338' of the Control Building.

The carbon dioxide system is designed in accordance with NFPA 12 to deliver a concentration of 50 percent by volume. The quality of carbon dioxide gas purchased to recharge the storage tank should meet NFPA 12 requirements. Gas certified to have purity of 99.5% with a dew point of -30°F or below, that has not been manufactured by conversion of dry ice is acceptable.

Consideration has been given to items (a) through (f).

6. Portable Extinguishers

APPENDIX A POSITION

E.6 Fire extinguishers should be provided in accordance with guidelines of NFPA 10 and 10A, "Portable Fire Extinguishers, Installation, Maintenance and Use." Dry chemical extinguishers should be installed with due consideration given to cleanup problems after use and possible adverse effects on equipment installed in the area.

TMI-1 CONFORMANCE

E.6 Portable fire extinguishers are located as indicated on the fire area drawings attached with the fire hazards analysis. The extinguishers are designed, maintained and used in accordance with the requirements of NFPA 10.

F. Guidelines for Specific Plant Areas

1. Primary and Secondary Containment

APPENDIX A POSITION

Normal Operation

F.1(a) Fire protection requirements for the primary and secondary containment areas should be provided on the basis of specific identified hazards. For example:

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

- Charcoal filters

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

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

An enclosure may be required to confine the agent if a gas system is used. Such enclosures should not adversely affect safe shutdown, or other operating equipment in containment.

Automatic fire suppression capability need not be provided in the primary containment atmospheres that are inerted during normal operation. However, special fire protection requirements during refueling and maintenance operations should be satisfied as provided below.

TMI-1 CONFORMANCE

F.1(a) The Fire Hazards Analysis Report outlines the protection for containment areas. Note that the installation of the oil collection system has been accepted by the NRC with respect to the requirements of Appendix R to 10CFR50 Section III.0 which pertain to the oil collection system for the Reactor Coolant Pumps. Reference letter LIL 077 dated March 19, 1981, H.D. Hukill to D.G. Eisenhut and follow-up letter LIL 142 dated May 15, 1981, H.D.Hukill to D.G. Eisenhut. The 1989 Reactor Coolant Pump Motor Lube Oil System upgrade including sight glass relocation and remote fill stations for RCP Lube Oil Reservoirs has been evaluated and determined to have no adverse impact on safe shutdown by GPUN. Although not in strict accordance with Appendix R, Section III.O, an exemption request has been submitted to NRC via Letter C311-89-2120. The exemption was granted by NRC as documented in paragraph 3.14.13.

APPENDIX A POSITION

Refueling and Maintenance

F.1(b) Refueling and maintenance operations in containment may introduce additional hazards such as contamination control materials, decontamination supplies, wood planking, temporary wiring, welding

and flame cutting (with portable compressed fuel gas supply). Possible fires would not necessarily be in the vicinity of fixed detection and suppression systems.

Management procedures and controls necessary to assure adequate fire protection are discussed in Section 3.

Equivalent protection from portable systems should be provided if it is impractical to install standpipes with hose stations.

TMI-1 CONFORMANCE

F.1(b) Procedures OP-MA-201-004, OP-AA-201-006 and AP-1035 provide control for additional hazards during refueling and maintenance operation. Work involving ignition sources such as welding and flame cutting shall be done under closely controlled conditions governed by procedures. These procedures are enforced during all phases of plant operation, refueling and maintenance. A hose reel standpipe system is installed inside the containment for use during refueling and maintenance outages as well as shutdown.

2. Control Room

APPENDIX A POSITION

F.2 The Control Room is essential to safe reactor operation. It must be protected against disabling fire damage and should be separated from other areas of the plant by floors, walls and roofs having minimum fire resistance ratings of three hours.

Control room cabinets and consoles are subject to damage from two distinct fire hazards:

a) Fire originating within a cabinet or console; and

b) Exposure fire involving combustibles in the general room area.

Hose stations adjacent to the Control Room with portable extinguishers in the Control Room are acceptable.

Nozzles that are compatible with the hazards and equipment is the Control Room should be provided for the manual hose station. The nozzles chosen should satisfy actual fire fighting needs, satisfy electrical safety and minimize physical damage to electrical equipment from hose stream impingement.

Fire detection in the control room cabinets, and consoles should be provided by smoke and heat detectors in each fire area. Alarm and annunciation should be provided in the Control Room. Fire alarms in other parts of the plant should also be alarmed and annunciated in the Control Room.

Breathing apparatus for control room operators should be readily available. Control room floors, ceiling, supporting structures, and walls, including penetrations and doors, should be designed to a minimum fire rating of three hours. All penetration seals should be air tight. Manually operated ventilation systems are acceptable.

If such concealed spaces are used, however, they should have fixed automatic total flooding Halon protection.

TMI-1 CONFORMANCE

F.2 The Control Room is separated from the Fuel Handling Building and Turbine Building by 3 hour fire resistance rated walls, and from the Control Building as described in Section 4 of the Fire Hazards Analysis Report. Section 4 also discusses these ratings and outlines the protection for the Control Room.

Hose stations are provided adjacent to the Control Room. Portable extinguishers are provided both inside and outside the Control Room in accessible areas.

Multi-purpose combination fog-straight stream nozzles are provided on the hose stations. Personnel are trained in their safe use.

Smoke detectors are provided in the ceiling of the room, in the ventilation exhaust duct for the building and inside or above the exhaust air flow path of consoles as described in Section 4 of the Fire Hazards Analysis Report. Additional protection is outlined in the Fire Hazard Analysis Report.

Breathing apparatuses for control room operators are readily available.

3. Cable Spreading Room

APPENDIX A POSITION

F.3(a)(1) The preferred acceptable methods are:

Automatic water system such as closed head sprinklers, open head deluge, or open directional spray nozzles. Deluge and open spray systems should have provisions for manual operation at a remote station; however, there should also be provisions to preclude inadvertent operation. Location of sprinkler heads or spray nozzles should consider cable tray sizing and arrangements to assure adequate water coverage. Cables should be designed to allow wetting down with deluge water without electrical faulting. Open head deluge and open directional spray systems should be zoned so that a single failure will not deprive the entire area of automatic fire suppression capability. The use of foam is acceptable, provided it is of a type capable of being delivered by a sprinkler or deluge system, such as an Aqueous Film Forming Foam (AFFF).

TMI-1 CONFORMANCE

F.3(a)(1) The relay room or cable spreading room (elevation 338') is protected by an automatic low pressure CO_2 system. The room is completely sealed to give a 3 hour fire resistance rating, with the exception of the CRDM bus duct which has a louvered enclosure and penetrates the west wall. Relief dampers are provided in accordance with NFPA 12 to prevent a pressure build-up.

Water spray is not advocated because of the potential damage to relay cabinets in the relay room/cable spread areas although hose protection is available.

APPENDIX A POSITION

F.3(a)(2) Manual hoses and portable extinguishers should be provided as backup.

TMI-1 CONFORMANCE

F.3(a)(2) Portable fire extinguishers are provided. Hose reels are installed as described in Section 4 of the Fire Hazards Analysis Report.

APPENDIX A POSITION

F.3(a)(3) Each cable spreading room of each unit should have divisional cable separation, and be separated from the other and the rest of the plant by a minimum three-hours rated fire wall (Refer to NFPA 251 or ASTM E-119 for fire test resistance rating).

TMI-1 CONFORMANCE

F.3(a)(3) Divisional cable separation for TMI-1 is in accordance with Regulatory Guide 1.75. The cable spreading room is separated from the rest of TMI-1 by a 3 hour fire resistance rating, and is widely separated from the TMI-2 cable spreading room. However, the CRDM bus duct has a louvered enclosure and penetrates the west wall.

APPENDIX A POSITION

F.3(a)(4) At least two remote and separate entrances are provided to the room for access by fire brigade personnel; and

TMI-1 CONFORMANCE

F.3(a)(4) Three remote entrances are provided to the room. Reference Section 4 of the Fire Hazards Analysis Report.

APPENDIX A POSITION

F.3(a)(5) Aisle separation provided between tray stacks should be at least three feet wide and eight feet high.

TMI-1 CONFORMANCE

F.3(a)(5) Cable trays are installed well above floor level. Access for manual fire suppression activities is adequate.

APPENDIX A POSITION

F.3(b)(1-4) For cable spreading rooms that do not provide divisional cable separation of a(3), in addition to meeting a(1), (2), (4), and (5) above, the following should also be provided:

(1) Divisional cable separation should meet the guidelines of Regulatory Guide 1.75, "Physical Independence of Electrical Systems."

(2) All cabling should be covered with a suitable fire retardant coating.

(3) As an alternative to a(1) above, automatically initiated gas systems (Halon or CO_2) may be used for primary fire suppression, provided a fixed water system is used as a backup.

(4) Plants that cannot meet the guidelines of Regulatory Guide 1.75, in addition to meeting a(1), (2), (4), and (5) above, an auxiliary shutdown system with all cabling independent of the cable spreading room should be provided.

TMI-1 CONFORMANCE

F.3(b)(1) Divisional cable separation in the TMI-1 cable spreading room is in accordance with Regulatory Guide 1.75 as stated in "TMI-1 CONFORMANCE" section F.3(a)(3).

F.3(b)(2) Cabling is not covered with fire retardant coating.

F.3(b)(3) As stated in "TMI-1 CONFORMANCE" section F.3(a)(1), an automatically initiated CO_2 suppression system is provided for primary fire suppression; however, a fixed water system is not provided as a back-up because of the potential damage to relay cabinets in the area.

F.3(b)(4) An alternative shutdown system is provided to insure that the reactor can be brought to hot and cold shutdown from outside the Control Room should a fire occur in either the Control Room or the cable and relay room. See Section 3.12 of Fire Hazards Analysis Report.

4. Computer Room

APPENDIX A POSITION

F.4 Safety related computers should be separated from other areas of the plant by barriers having a minimum three-hours fire resistant rating. Automatic fire detection should be provided to alarm and annunciate in the Control Room and alarm locally. Manual hose stations and portable water and Halon fire extinguishers should be provided.

TMI-1 CONFORMANCE

F.4 TMI-1 computers are not safety related.

5. Switchgear Rooms

APPENDIX A POSITION

F.5 Switchgear rooms should be separated from the remainder of the plant by minimum three-hours rated fire barriers to the extent practicable. Automatic fire detection should alarm and annunciate in the control room and alarm locally. Fire hose stations and portable extinguishers should be readily available.

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

TMI-1 CONFORMANCE

F.5 Safety related switchgear rooms are separated from the remainder of TMI-1 by 3 hour fire resistance rated walls, floors and ceiling. In the Intake Screen and Pump House, redundant switchgear is separated from each other by a three hour fire barrier wall. The Fire Hazards Analysis Report outlines the protection requirements for these areas. Portable fire extinguishers are readily available. Fire hose stations are available as discussed in the fire hazards analysis.

Water or gas suppression systems are not provided where cables pass through the switchgear room. However, fire seals are provided where these cables penetrate the fire barriers.

6. Remote Safety Related Panels

APPENDIX A POSITION

F.6 The general area housing remote safety related panels should be provided with automatic fire detectors that alarm locally and alarm and annunciate in the Control Room. Combustible materials should be controlled and limited to those required for operation. Portable extinguishers and manual hose stations should be provided.

TMI-1 CONFORMANCE

F.6 Combustible materials are controlled in these areas. HVAC duct smoke detectors or area fire detectors are provided which alarm in the Control Room only. Fire suppression equipment is provided for these areas as detailed in the Fire Hazards Analysis Report.

7. Station Battery Rooms

APPENDIX A POSITION

F.7 Battery rooms should be protected against fire explosions. Battery rooms should be separated from each other and other areas of the plant by barriers having a minimum fire rating of three-hours inclusive of all penetrations and openings. (See NFPA 69, "Standard on Explosion Prevention Systems.") Ventilation systems in the battery rooms should be capable of maintaining the hydrogen concentration well below 2% by volume hydrogen concentration. Standpipe and hose and portable extinguishers should be provided.

Alternatives·

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

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

OR

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

TMI-1 CONFORMANCE

F.7 The battery rooms are separated from other areas by 3 hour fire resistance rated walls, floors and ceiling. The Fire Hazards Analysis Report outlines the protection requirements for these areas.

The ventilation system will maintain the hydrogen concentration well below 2 percent by volume. Portable fire extinguishers are provided and a hose reel is available. Loss of ventilation flow alarms in the Control Room. Combustible gas monitors are located in the exhaust ventilation ducts.

8. Turbine Lubrication and Control Oil Storage and Use Areas

APPENDIX A POSITION

F.8 A blank fire wall having minimum resistance rating of three hours should separate all areas containing safety related systems and equipment from the turbine oil system. When a blank wall is not present, open head deluge

protection should be provided for the turbine oil hazards and automatic open head water curtain protection should be provided for wall openings.

TMI-1 CONFORMANCE

F.8 Open head automatic deluge water spray systems are provided on all turbine oil hazards and an automatic wet pipe sprinkler system is provided for all areas underneath the operating floor of the Turbine Building. This system extends to above the 355'-0" elevation where protection is provided for the space enclosed by the turbine walkway platform (elev. 355' is normally dry, with closed control valves). A manual preaction system is provided for the main turbine bearing and the steam generator feed pump turbine bearings. The Turbine Building is separated from the Control, Fuel Handling, Intermediate and Service Buildings by three hour fire barriers. All penetrations through these barriers are fire sealed except for containment penetrations which do not have specific fire ratings due to overriding nuclear considerations but their construction is adequate to prevent the spread of fire to the Reactor Building.

Presently there is equipment required to bring the reactor to hot shutdown on elevation 322'-0" of the Turbine Building. Alternate equipment in a separate fire area is available. Reference the Fire Hazards Analysis Report for the discussion on this item.

9. Diesel Generator Areas

APPENDIX A POSITION

F.9 Diesel generators should be separated from each other and other areas of the plant by fire barriers having a minimum fire resistance rating of three hours.

When day tanks cannot be separated from the diesel-generator one of the following should be provided for the diesel generator are:

(a) Automatic open head deluge or open head spray nozzle system(s)

(b) Automatic closed head sprinklers

(c) Automatic AFFF that is delivered by a sprinkler deluge or spray system

(d) Automatic gas system (Halon or CO_2) may be used in lieu of foam or sprinklers to combat diesel generator and/or lubricating oil fires.

TMI-1 CONFORMANCE

F.9 Diesel Generators are separated from each other and other areas of the plant by three hour fire barriers. As described in the Fire Hazards Analysis Report (Section 4) each diesel generator area is protected by an automatic wet pipe sprinkler system.

10. Diesel Fuel Oil Storage Areas

APPENDIX A POSITION

F.10 Diesel fuel oil tanks with a capacity greater than 1100 gallons should not be located inside the buildings containing safety related equipment. They should be located at least 50 feet from any building containing safety related equipment, or if located within 50 feet, they should be housed in a separate building with construction having a minimum fire resistance rating of three hours. Buried tanks are considered as meeting the three hour fire resistance requirements. See NFPA 30, "Flammable and Combustible Liquids Code," for additional guidance.

When located in a separate building, the tank should be protected by an automatic fire suppression system such as AFFF or sprinklers.

In operating plants where tanks are located directly above or below the

diesel generators and cannot reasonably be moved, separating floors and main structural members should, as a minimum, have fire resistance rating of three hours. Floors should be liquid tight to prevent leaking of possible oil spills from one level to another. Drains should be provided to remove possible oil spills and fire fighting water to a safe location.

One of the following acceptable methods of fire protection should also be provided:

a) Automatic open head deluge or open head spray nozzle system(s)

b) Automatic closed head sprinklers; or

c) Automatic AFFF that is delivered by a sprinkler system or spray system

TMI-1 CONFORMANCE

F.10 Diesel fuel for the emergency generators is stored in a 30,000 gallon underground tank.

11. Safety Related Pumps

APPENDIX A POSITION

F.11 Pump houses and rooms housing safety related pumps should be protected by automatic sprinkler protection unless a fire hazards analysis can demonstrate that a fire will not endanger other safety related equipment required for safe plant shutdown Early warning fire detection should be installed with alarm and annunciation locally and in the Control Room. Local hose stations and portable extinguishers should also be provided

Equipment pedestals or curbs and drains should be provided to remove and direct water away from safety related equipment

Provisions should be made for manual control of the ventilation system to facilitate smoke removal if required for manual fire fighting operation.

TMI-1 CONFORMANCE

F.11 The screen house containing the service water pumps is protected with a wet pipe, sprinkler system (which alarms in the Control Room only). Portable fire extinguishers are provided. The Fire Hazard Analysis Report identifies other safety related pumps and protection.

Equipment is installed on concrete pads. Adequate drainage for water is provided.

Smoke removal will be provided by portable fans, if required.

12. New Fuel Area

APPENDIX A POSITION

F.12 Hand portable extinguishers should be located within this area. Also, local hose stations should be located outside but within hose reach of this area. Automatic fire detection should alarm and annunciate in the Control Room and alarm locally. Combustibles should be limited to a minimum in the new fuel area. The storage area should be provided with a drainage system to preclude accumulation of water.

The storage configuration of new fuel should always be so maintained as to preclude criticality for any water density that might occur during fire water application.

TMI-1 CONFORMANCE

F.12 Manual suppression equipment such as hose stations and portable fire extinguishers are provided as indicated in the fire hazards analysis. Automatic detection is provided in the exhaust ventilation ducts. No local alarms are provided.

The fuel assemblies are stored as per paragraph 9.7.1.2 of the TMI-1 updated FSAR.

13. Spent Fuel Pool Area

APPENDIX A POSITION

F.13 Protection for the spent fuel pool area should be provided by local hose stations and portable extinguishers. Automatic fire detection should be provided to alarm and annunciate in the Control Room and to alarm locally.

TMI-1 CONFORMANCE

F.13 Manual suppression equipment such as hose stations and portable extinguishers are provided. Automatic detection is provided in the exhaust ventilation duct. No local alarms are provided.

14. Radwaste Building

APPENDIX A POSITION

F.14 The Radwaste Building should be separated from other areas of the plant by fire barriers having at least three-hour ratings. Automatic sprinklers should be used in all areas where combustible materials are located. Automatic fire detection should be provided to annunciate and alarm in the Control Room and alarm locally. During a fire, the ventilation systems in these areas should be capable of being isolated. Water should drain to liquid radwaste building sumps.

Acceptable alternative fire protection is automatic fire detection to alarm and annunciate in the Control Room, in addition to manual hose stations and portable extinguishers consisting of hand held and large wheeled units.

TMI-1 CONFORMANCE

F.14 The plant has no Radwaste Building per se. These facilities are provided in the Auxiliary Building. Automatic detection is provided in the main exhaust ventilation duct which is automatically isolated upon detection of smoke. No local alarms are provided. See the Fire Hazards Analysis Report for the Auxiliary Building.

15. Decontamination Areas

APPENDIX A POSITION

F.15 The decontamination areas should be protected by automatic sprinklers if flammable liquids are stored. Automatic fire detection should be provided to annunciate and alarm in the Control Room and alarm locally. The ventilation system should be capable of being isolated. Local hose stations and hand portable extinguishers should e provided as backup to the sprinkler system.

TMI-1 CONFORMANCE

F.15 The personnel decontamination area is located in the Control Building at elevation 306'. The equipment decontamination area is located in the Waste Packaging and Handling facility. The Fire Hazard Analysis Report outlines the protection for these areas.

16. Safety Related Water Tanks

APPENDIX A POSITION

F.16 Storage tanks that supply water for safe shutdown should be protected from the effects of fire. Local hose stations and portable extinguishers should be provided. Portable extinguishers should be located in nearby hose houses. Combustible materials should not be stored next to outdoor tanks. A minimum of 50 feet of separation should be provided between outdoor tanks and combustible materials where feasible.

TMI-1 CONFORMANCE

F.16 Condensate Storage tanks located in the yard are separated from each other by more than 400 feet with the service and diesel generator buildings located between them. Yard hydrants are provided in the area of the tanks.

The Borated Water Storage Tank is located outside the Auxiliary Building on the northwest corner. There is no significant amount of combustible material in the area adjacent to the tank. Yard fire hydrants are provided in the area of the tanks.

17. Cooling Towers

APPENDIX A POSITION

F.17 Cooling towers should be of non-combustible construction or so located that a fire will not adversely affect any safety related systems or equipment. Cooling towers should be of non-combustible construction when the basins are used for the ultimate heat sink or for the fire protection water supply. Cooling towers of combustible construction, so located that a fire in them could adversely affect safety related systems or equipment should be protected with an open head deluge system installation with hydrants and hose houses strategically located.

TMI-1 CONFORMANCE

F.17 Cooling towers are not required for safe shutdown. Combustible portions of the cooling towers, however, are protected by dry pipe pilot actuated deluge water spray systems. The basins for the cooling towers are not used for the ultimate heat sink or as the sole source of fire protection water supply.

18. Miscellaneous Areas

APPENDIX A POSITION

F.18 Miscellaneous areas such as records storage areas, shops, warehouses, and auxiliary boiler rooms should be so located that a fire or effects of a fire, including smoke, will not adversely affect any safety related systems or equipment. Fuel oil tanks for auxiliary boilers should be buried or provided with dikes to contain the entire tank contents.

TMI-1 CONFORMANCE

F.18 The shops, warehouses and auxiliary boiler room are protected by automatic sprinklers, and are separated from safety related systems or equipment by fire barriers. Therefore, fire or smoke would not affect safety related systems or equipment. The fuel oil tank for the auxiliary boiler is provided with a dike. Record storage vaults are located in a separate building and are provided with rated walls, doors and total flooding Halon systems

G. Special Protection Guidelines

1. Welding and Cutting, Acetylene - Oxygen Fuel Gas Systems

APPENDIX A POSITION

G.1 This equipment is used in various areas throughout the plant. Storage locations should be chosen to permit fire protection by automatic sprinkler systems. Local hose stations and portable equipment should be provided as backup. The requirements of NFPA 51 and 51B are applicable to these hazards. A permit system should be required to utilize this equipment. (Also refer to 2f herein.)

TMI-1 CONFORMANCE

G.1 Storage of all oxygen/acetylene is maintained out-of-doors. Tanks in use by maintenance and/or contractor personnel are closely supervised and are covered by procedure 1410-Y-26 which incorporates a permit system. No automatic fire suppression systems are provided. Local hose stations are provided throughout the plant as described in the fire hazards analysis.

APPENDIX A POSITION

G.2 Dry ion exchange resins should not be stored near essential safety related systems. Dry unused resins should be protected by automatic wet pipe sprinkler installations. Detection by smoke and heat detectors should alarm and annunciate in the Control Room and alarm locally. Local hose stations and portable extinguishers should provide backup for these areas. Storage areas of dry resin should have curbs and drains. (Refer to 92M, "Waterproofing and Draining of Floors.")

TMI-1 CONFORMANCE

G.2 Powdered resins (Powdex) are utilized in the Condensate Demineralizers and in the cycle makeup pretreatment demineralizers all of which are located in the Turbine Building which is protected by an automatic wet pipe sprinkler system in the area of the demineralizers. Local hose stations and portable extinguishers are provided as back-up to the sprinkler system. Unused resins are stored in the area of the demineralizers and are thus protected by wet pipe sprinklers, hose stations and portable extinguishers. No smoke and heat detection is provided in these areas. The resins are not stored near essential safety related systems.

3. Hazardous Chemicals

APPENDIX A POSITION

G.3 Hazardous chemicals should be stored and protected in accordance with the recommendations of NFPA 49, "Hazardous Chemicals Data." Chemicals storage areas should be well ventilated and protected against flooding conditions since some chemicals may react with water to produce ignition.

TMI-1 CONFORMANCE

G.3 The hazardous chemicals at TMI-1, as defined in NFPA 49, are sodium hydroxide, sulfuric acid and chlorine gas, and are presently stored and protected in accordance with the recommendations of NFPA 49. Chemical storage areas are well ventilated and protected against flooding.

4. Materials Containing Radioactivity

APPENDIX A POSITION

G.4 Materials that collect and contain radioactivity such as spent ion exchange resins, charcoal filters, and HEPA filters should be stored in closed metal tanks or containers that are located in areas free from ignition sources or combustibles. These materials should be protected from exposure to fires in adjacent areas as well. Consideration should be given to requirements for removal of isotopic decay heat from entrained radioactive materials.

TMI-1 CONFORMANCE

G.4 Spent ion exchange resins will always be completely contained and will, therefore, never be exposed to ignition sources or combustibles. Spent charcoal filters and HEPA filters will be exposed only during their removal from service. After removal, they will be stored in metal drums that will completely contain them from any ignition sources or combustibles.

For discussion of fire protection for these materials refer to Sections 2 and 4 of the Fire Hazards Analysis Report.

Filtering systems (charcoal) are protected by deluge fire protection systems as discussed in the applicable sections of the Fire Hazards Analysis Report.

Reference AP 1035 - for removal of resins and charcoal.

6.0 PROTECTION AGAINST WATER SPRAY TO CONFORM WITH 10CFR50 APPENDIX R

The Appendix R evaluation provides a reasonable assurance that at least one safe shutdown division is free of fire damage after a postulated fire in any fire area/zone. A safe shutdown component is free of fire damage if it can perform its intended functions before, during, and after the postulated fire without repair. Since the fire has to be extinguished by a fire fighting suppressant, the equipment located in the fire area/zone must be protected against not only the fire but also the fire suppressant if that equipment is required for the shutdown. The fire suppressant damage should not prevent the operation of the equipment for shutdown. The required equipment, located in the adjacent fire zones which do not have physical boundaries with the fire area/zones in question, must also be checked for possible fire suppressant damage.

A review of potential water damage was made to assure that the water damage to the shutdown system would not jeopardize the safe shutdown.

Mechanical components such as pipes and valves are not subject to fire suppressant damage. Electrical and electronic components are susceptible to water damage. Some electric cables which are only suitable for use in dry locations are prone to insulation failure under wet conditions. To guard against the water damage, all electrical and electronic equipment used outdoors are enclosed in some type of water (rain) proof enclosure (NEMA 3, 4, and 6 enclosure). Indoor electrical equipment in nonhazardous areas are normally provided with a NEMA 12 enclosure which protects the enclosed equipment against dust and light-splashing seepage or dripping liquid. The types of industrial enclosures provided for the electrical equipment at TMI-1 were reviewed and the extent of water damage was established for the redundant equipment located in the same fire area/zone. The building discussion provides a description of drainage capability and a listing of equipment reviewed for water damage. Vulnerability of shutdown equipment to water damage and the disposition to limit the water damage is discussed in detail. The following general discussion is for other electrical components and cables which are not listed in the building discussion.

a. Pumps

Water damage to the makeup pumps, decay heat removal pumps, nuclear service river water pumps, and decay heat river water pumps, would not prevent safe shutdown because redundant pumps are located in the different fire zones. The physical boundaries existing between the adjacent fire zones provide reasonable assurance that the limit of fire damage will be contained to one train only. A discussion of other pumps is contained in Table 6-1.

b. Motor Operated Valves and Solenoid Valves

Water damage to electrical operation of the valves is no concern because valves will be manually operated. Moreover, the motor is totally enclosed and is unaffected by water spray.

c. Electrical Cables

All electrical cables used at TMI-1 are moisture and heat resistant cables suitable for use in dry and wet locations.

Moreover, the required cables in the fire area/zone will be either protected with fire barrier wraps or will be replaced with fire-rated Rockbestos Firezone R cables. Both the fire barrier wraps and Rockbestos Firezone R cables pass water hose stream tests and will withstand the water damage. The fire barrier material will be applied in such a manner to provide sealing of any paths which could allow water to enter electrical termination areas, such as conduits-to-tray interfaces and conduit or interlocked armored cable interface with electrical equipment. Splicings of the Rockbestos Firezone R cables will be made outside the fire area/zone where they are needed. Splicing made within the firezone will be enclosed in the watertight fire barrier.

d. Terminal Boxes

The terminal boxes which enclose the protected cables will also be protected with fire barrier wraps. No fire damage to the terminal boxes is expected.

e. Electrical Distribution Equipment

Electrical distribution equipment is located in different fire areas/zones. Fire suppressant damage to both trains of redundant electrical switchgears, control centers, and distribution panels is not expected.

f. Control Panels, Relay Cabinets, and ES Cabinets

Water damage to control panels, relay cabinets, ES actuation cabinets and HSPS cabinets is expected. No modification is required because the remote shutdown system is available for shutdown.

Auxiliary Building

This building covers elevations 261'-0", 271'-0", 281'-0", and 305'-0". All equipment is located in open areas or cubicles with open doorways. All areas have floor drains with backwater valves to prevent cross flooding of adjacent compartments and equipment pads higher than door thresholds to prevent the accumulation of standing water and prevent flooding of any floor mounted safety related equipment.

Fire protection for all areas consists of hose reels at accessible locations with adequate hose length to reach the equipment to be protected for each area. One location, AB-FZ-4 (penetration area-elev. 281'-0") is protected by an automatic preaction sprinkler system and AB-FZ-7 (cooling pump area-elev. 305'-0") is protected by an automatic preaction sprinkler system which forms a water curtain for the open passageway to adjacent zone AB-FZ-6. Water from the floor drain syst1em flows by gravity to the Auxiliary Building Sump located at elevation 261'-0" where it is pumped to holding tanks. The expected water to be discharged from simultaneous operation of two (2) fire hoses is 250 gpm. The maximum expected flow from either of the two automatic preaction sprinkler systems is about 400gpm. With an average of 30 floor drains available on each Auxiliary Building elevation and assuming the drain system is running full, 1600 gpm can be removed to the sump.

Charcoal filter plenums in the Aux and Fuel Handling Ventilation and Reactor Purge Systems (elev. 305'-0") contain deluge systems, the largest of which could discharge a total of 408 gpm. This water remains contained within each filter housing and is allowed to drain at a combined flow rate of 130 gpm through 55 separate 1" diameter check valves to open area floor drains adjacent to each filter housing. The main filter room contains 3 separate floor drains with a combined capacity of 160 gpm flowing full.

The following lists major safety related components in the Auxiliary Building with a discussion of water damage prevention features:

AUXILIARY BUILDING
WATER DAMAGE STUDY

EQUIPMENT	FIRE AREA/ZONE	TYPE OF FIRE SUPPRESSION	DISCUSSION
AUXILIARY BUILDING			
1A & 1B Eng. Safeguards Valves and Heating Control Center	AB-FZ-6 AB-FZ-6a	Manual Hose	Drip shields have been installed on the MCC's to protect against water spray. More substantial protection has been provided by a fire barrier constructed between the two MCC's, thus prevent- ing fire suppression activities at one MCC from affecting the redundant train MCC.

AUXILIARY BUILDING (Cont'd)
WATER DAMAGE STUDY

EQUIPMENT	FIRE AREA/ZONE	TYPE OF FIRE SUPPRESSION	DISCUSSION
Nuclear Service Closed Cycle Cooling Water Pumps NS-P-1A NS-P-1B	AB-FZ-7	Manual Hose	One pump is required during hot shutdown to provide cooling water to makeup pump MU-P-1B during a fire in AB-FZ-7. Circuit protection is provided for NS-P-1A and NS-P-1C. The existing concrete dividers between the pumps provide protection against possible water damage to more than two pumps from a single hose stream spray directed to one area. Pre-fire plan for AB-FZ-7 advises caution.
Decay Heat Closed Cycle Cooling Water Pumps DC-P-1A DC-P-1B	AB-FZ-7	Manual Hose	DC pump is not required for hot shutdown. One pump is required to provide cooling water to the decay heat removal coolers during cold shutdown. No circuit protection is proposed. Cable for one pump will be repaired. The existing concrete divider between the two pumps provides protection against possible water damage to more than one pump from a single hose stream spray. Pre-fire plan for AB-FZ-7 advises caution.
Intermediate Cooling Water Pumps IC-P-1A IC-P-1B	AB-FZ-7	Manual Hose Automatic Preaction Type Water Curtain	These two pumps are subject to fire damage and water damage in the event of a fire in AB-FZ-7. Safe shutdown will be achieved without IC pumps for a fire in AB-FZ-7. The intermediate cooling pump motors, IC-P-1A and IC-P-1B, could be degraded by contact with water from the automatic preaction type water curtain located in this area. A fire occurring in AB-FZ-6 or FH-FZ-2 could damage IC-P-1B circuits in AB-FZ-6 and actuate the water curtain. Circuits for IC-P-1A are not located in either FH-FZ-2 or AB-FZ-6. A water shield (to protect the pump motor from water damage) is provided for the IC-P-1A pump motor which is required for safe shutdown in the event of a fire occurring in either AB-FZ-6 or FH-FZ-2.

The areas where the safety related equipment is located will not flood with standing water. Excess water in any isolated cubicle will flow through doorways to adjacent drains with the overall drains system on each elevation able to remove all water that can be expected to be discharged through the use of fire fighting equipment. Water flowing from the charcoal filter plenums will be removed by the floor drain systems with no possibility of standing water in the filter rooms.

Air Intake Tunnel

This area consists of a 210 foot long underground outside air entrance to the plant that is equipped with sensors to detect the presence of combustible gas or liquids. The entire length of the tunnel is covered with Halon 1301 and 3 deluge systems with drainage provided by nine 6" drains that flow to a sump located at the tunnel entrance. The sump is provided with sump pumps.

Assuming all three deluge systems were actuated simultaneously, about 1720 gpm of water would be discharged. The floor drains systems running full will remove about 157 gpm to the sump, while the remainder would flow to the sump over the floor. The sump pumps will remove 240 gpm. However, with a sump storage capacity of 40,000 gpm and the sump pumps running, the sump will become flooded in about 27 minutes and the tunnel will have about 6" of standing water within 46 minutes. There is no equipment located in this area that is required for safe shutdown.

Control Building

This building covers elevations 306'-0", 322'-0", 338'-6", 355'-0" and 380'-0" and includes the following safety related equipment: charcoal filter plenums, batteries, A.C./D.C. distribution panels, inverters, 480V switchgear, engineered safeguard cabinets, motor control centers, DC transfer switch panels, relay cabinets 4160V switchgear, actuation cabinets, safeguard relay cabinets, control consoles, nuclear reactor panels, remote shutdown panels, normal, emergency and return air fans and electrical cable trays. All safety related electrical equipment in this building is on raised pedestals.

CB-FA-1 (elev.-306'-0") –This floor is protected by a sprinkler system and has no open area floor drains except in the locker and toilet facilities. A charcoal filter plenum has an internal deluge system that discharges about 33 gpm, is contained in the unit and is piped to the radioactive drain collection system.

CB-FA-2a-2g (elev.-322'-0") – This floor is protected by two manual hose stations and has no floor drain system.

CB-FA-3a-3d (elev. 338'-6") - This floor is protected by two manual hose stations and has no floor drain system. The relay room is protected by an automatic total flooding CO2 System. The ESAS room is protected by a manually actuated dry sprinkler system equipped with fusible head nozzles. Drip shields are provided for ES Actuation cabinets A & B and ES Relay cabinets 1, 2 & 3 to protect them from the water spray.

CB-FA-4a-4b (elev. 355'-0") - This floor is protected by two manual hose stations and has no floor drain system.

CB-FZ-5a-5b (elev. 380'-0") - This floor is protected by two manual hose stations and has two open area floor drain systems for each fire zone. One drain system adjacent to the charcoal filter plenum is for the collection of the 150 gpm discharge from the charcoal filter deluge system. While the discharge rate of

the deluge system is more than the capacity of the 4" drain, the plenum contains the excess water to meter its flow to the drain system. The other open area floor drain is connected to the sanitary system. It will remove wash and drain water from the air conditoning cooling coils.

With flat floors and the lack of open floor drainage, the possible use of water will make it necessary to let water run out doorways, down stairwells and open hatchways to the lower floors. This water would drain to the Turbine Building or the Fuel Handling Bldg. with no standing water in the Control Building.

Tests of the automatic CO2 System have demonstrated that the concentration after initiation of the system results in a concentration of approximately 50% within 3-4 minutes and has no effect upon the performance of instrumentation. (Ref. Report 0003 attached to GEM 3531 dated 12/3/76)

Diesel Generator Building

This building has a floor elevation of 305'-0" and houses the following safety related equipment. DG-FA-1 houses an emergency diesel generator and ventilation system. DG-FA-2 houses an emergency diesel generator , fuel and ventilation system. Both areas are protected by automatic area wet pipe sprinklers and deluge systems at the air intakes as well as manual hose stations.

The floor drain systems in both areas are physically isolated. Since the drain system is isolated, all water discharged by sprinkler or deluge systems would accumulate in sumps, and overflow through the doorway to the yard adjacent to the building. As the depth of standing water would not exceed the difference between the door threshold and the top of the sump, no safety related equipment will be in standing water.

Fuel Handling Building

This building covers elevation 281'-0", 305'-0", 329'-0" and 348'-0". The only safety related components in this building are the nuclear service cooling surge tanks on elev. 329'-0". Fire protection consists of manual hose stations at all elevations.

Floor drains located on elevation 281'-0" would collect water drainage down floor openings, hatches and stairwells from above. However, there is no safety related equipment on that could be damaged by standing water.

Intermediate Building

This building covers elevation 281'-0", 305'-0", 329'-0" and 348'-0" and includes the following safety related equipment: emergency feedwater pumps and valves, and Reactor Building cooling unit water isolation valves. Fire protection Consists of manual hose stations. All components are located in cubicles with drain sumps interconnected with 6" drain piping.

The following lists major safety related components in the Intermediate Building with a discussion of water damage prevention features:

INTERMEDIATE BUILDING
WATER DAMAGE STUDY

EQUIPMENT	FIRE AREA/ZONE	TYPE OF FIRE SUPPRESSION	DISCUSSION
INTERMEDIATE BUILDING			
Motor-Driven Emergency Feedwater Pumps EF-P-2A EF-P-2B	IB-FZ-3	Manual Hose	During a fire in IB-FZ-3, both EF-P-2A and -2B may be damaged. EFW valves may spuriously operate. It is planned to utilize high pressure injection cooling in lieu of the normal decay heat removal by the EFW system. After the fire, the EFW flow path is manually reestablished using the turbine- driven EFW pump. The motor-driven EFW pumps will not be used. Hence, additional damage due to fire suppressant has no consequence to safe shutdown.

The areas at elevation 295'-0" where the safety related equipment is located are in small cubicles that have drain sumps which can remove water at about 157 gpm. Hose discharge at about 125 gpm could not flood the area above equipment pads. All other elevations in this building have adequate drainage.

Intake Screen and Pump House

This building covers elevation 308'-0" and includes the following safety related components: ventilation units, control centers, nuclear service, decay heat river water and Reactor Building emergency cooling pumps. Fire protection consists of automatic area wet pipe sprinklers and manual hose protection. Floor drains flow directly (straight down) to the intake below elevation 308'-0". Each drain has a backwater valve to prevent reverse flow through the floor drain system.

The capacity of a vertical drain is 2.4 times that of a sloped horizontal drain. There is no possibility of standing water near any safety related equipment.

Reactor Building

This building covers elevations 281'-0", 308'-0" and 346'-0" and includes the following safety related components: steam generators, isolation valves, cooling units, pressurizer, air filter unit, switches and pressure detectors. All equipment is located in open areas that are equipped with floor drains. Fire protection in the reactor building consists of manual hose stations and a deluge spray system in the kidney charcoal filter. The spray water is collected and sent to a holding tank and continues to be pumped through the spray system. This water does not flow to an open drain system.

The following lists major safety related components in the Auxiliary Building with a discussion of water damage prevention features:

REACTOR BUILDING
WATER DAMAGE STUDY

EQUIPMENT	FIRE AREA/ZONE	TYPE OF FIRE SUPPRESSION	DISCUSSION
REACTOR BUILDING			
Pressurizer Heater RC-G-8 RC-G-9	RB-FZ-1d	Manual Hose	Pressurizer heaters will be used for the reactor coolant pressure control only if they are available. The electric cables are not protected. If the redundant pressurizer heaters are lost due to a fire, the RC pressure will be controlled by the makeup and letdown systems. Hence, water damage to heater terminals and cables has no real consequences.
Event Monitoring Instrumentation		Manual Hose	One instrument is required for each process monitoring function. Cables and transmitters for the following instruments are protected in the reactor building:
Reactivity NI-11, NI-12	RB-FZ-3		NI-12
RC Outlet Temperature RC4A-TE1, RC4A-TE4, TE-958, RC4B-TE1 RC4B-TE4, TE-960	RB-FZ-1d RB-FZ-1e		TE-960 TE-961 PT-949 RC1-LT3 with RC2-TE1* LT-775 LT-776
RC Inlet Temperature RC5A-TE2, RC5A-TE4 TE-959, RC5B-TE2 RC5B-TE4, TE-961	RB-FZ-1d RB-FZ-1e		PT-950 PT-951

* See Attachment 3-3 S.D.2

REACTOR BUILDING (Cont'd)
WATER DAMAGE STUDY

EQUIPMENT	FIRE AREA/ZONE	TYPE OF FIRE SUPPRESSION	DISCUSSION
RC Pressure RC3A-PT3, PT-963, PT-949	RB-FZ-3		The protected circuits and instruments have either fire barrier wraps or fire rated Rockbestos Firezone R cables which will withstand hose stream sprays. All wiring is terminated using butt splices which are sealed against the water heat shrink tubing. At the instruments, CONAX connectors are used to seal the instrument body terminations against the water. The fire rated cable and fire barrier wraps on the circuits will withstand significant damage from fire hose streams based on previous fire tests. The radiant energy heat shields on the protected instruments are not completely enclosed, but the instruments have been qualified for a LOCA.
RC Level RC1-LT1 RC1-LT3,LT-777 RC2-TE1, RC1-TE2	 RB-FZ-1b RB-FZ-1a RB-FZ-1d		
SG-A Level LT-775 LT-789	 RB-FZ-1b		
SG-B Level LT-788 LT-776	 RB-FZ-1c		
SG-A Pressure SP6A-PT1, SP6A-PT2 PT-950	RB-FZ-2		
SG-B Pressure SP6B-PT1, SP6B-PT2 PT-951			

The floor drain system is adequate for local cleanup and spills. There is no possibility for any safety-related equipment to be in standing water.