Applicants' Exhibit 7
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Docket No. 50-400 OL

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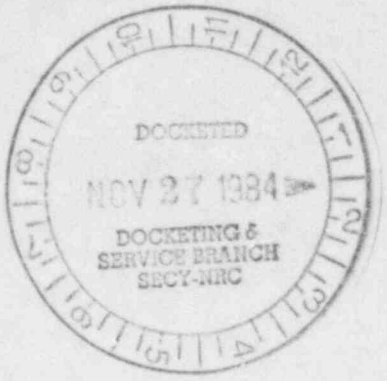

Safe Shutdown Analysis
Summary and Description
Fire Protection System

NUCLEAR REGULATORY COMMISSION

Docket No. 50-400 Official Exh. No. 7
In the matter of Sheron Harris

Staff	IDENTIFIED ✓
Applicant ✓	RECEIVED ✓
Intervenor	REJECTED
Cont'g Off'r	
Contractor	DATE 10-17-84
Other	Witness
Reporter URB	

Safe Shutdown Analysis Summary

(originally submitted to H.R. Denton, Director, NRR, by letter
from A.B. Cutter, Vice President, Nuclear Engineering & Licensing,
CP&L, dated June 12, 1984 (Serial NLS-84-245))

SAFE SHUTDOWN ANALYSIS SUMMARY

Enclosed is a clarification to CP&L's Shearon Harris Nuclear Power Plant's previous submittals. This submittal provides a summary of information contained in our Safe Shutdown Analysis in Case of Fire. The summary is provided by fire area, with the exception of the plant area designated as 1-A-BAL. Due to the size of this area, the summary information is provided on a plant elevation basis for this fire area (i.e., floor by floor). It should be noted, however, that analysis of this area was done on an area basis (see CP&L's 2/24/84 submittal, Attachment 1, Pages 12 and 13), not by "floors". The following format was used to present the summary information:

FIRE AREA: FSAR 9.5 Designation

SSA AREA: Safe Shutdown Analysis Area

FIRE ZONES: FSAR 9.5 Fire Zones (SSA Zones)

PLANT LOCATION: General description of the plant location (i.e., Reactor Auxiliary Building, Elevation 305, etc.).

DESCRIPTION OF EQUIPMENT NEEDED FOR SAFE SHUTDOWN IN THE AREA: General description of the equipment in the fire area, along with a list of cable by system located within the area.

EQUIPMENT IN THE AREA: Describes what Safety Train "A" and "B" equipment and cable are located within the fire or SSA area. Asterisk indicates redundant safe shutdown equipment located in the fire or SSA area.

COMPLIANCE: States which section of appendix applies to the fire area.

DEVIATION REQUEST: Provides a general list of deviations and references the page(s) of the Safe Shutdown Analysis in Case of Fire in which more details can be found.

CONCLUSION: Summarizes the type of protection provided within the fire area and states compliance or equivalent protection which was provided.

The following fire areas do not contain safe shutdown equipment or cable and are therefore not addressed in this summary:

FSAR Fire Area	SSA Area	Building
1-G	FATTGB	Turbine
5-F-BAL	FPFBAL	Fuel Handling
5-F-CHF	FPFCHF	Fuel Handling
5-F-FPP	FPFFPP	Fuel Handling
5-W-BAL	FPWBAL	Waste Processing

LEGEND OF ABBREVIATIONS

ACP	Auxiliary Control Panel
AF	Auxiliary Feedwater
AH	Air Handler Number
AH Number (Local)	Air Handler provides local cooling
CCW	Component Cooling Water
COND	Condensate
CH/CX	Chilled Water Supply & Return
DG	Diesel Generator
E	Exhaust Fan Number
FO	Fuel Oil
FP	Fire Protection
FW	Feed Water
MCB	Main Control Board
MCC	Motor Control Center
MS	Main Steam
RCS	Reactor Coolant System
RHR	Residual Heat Removal
S	Supply Fan Number
SA	Service Air
SGR	Steam Generator
SIS	Safety Injection System
SSA	Safe Shutdown Analysis
SW	Service Water
WC/WC-2	Water Chiller
CVCS	Chemical & Volume Control System

Asterisk (*) indicates redundant safe shutdown equipment located in the fire or SSA area.

FIRE AREA: 1-A-ACP

FIRE ZONES: None

SSA AREA: FAAACP

DRAWING: CAR-SH-SK-668S17

PLANT LOCATION: Reactor Auxiliary Building, El. 286'
(Auxiliary Control Panel Room)

DESCRIPTION OF EQUIPMENT NEEDED FOR SAFE SHUTDOWN IN THE FIRE AREA:

1. Auxiliary Control Panel containing the following controls for systems:

MS *	AH-2 & 4 *
SW *	CVCS *
DG *	RHR *
AF *	SIS *
AH-1 & 3 *	RCS
AH-15 *	

2. Cables for the following systems:

AH-1 & 3 *	AH-92
AH-10 *	AH-93
AH-11 *	AH-23 & 29 *
AH-12	AH-24 & 25 *
AH-13 *	CCW *
AH-15 *	COND
AH-16 *	CVCS *
AH-19 *	DG *
AH-2 & 4 *	E-85 *
AH-20	AF *
AH-28 *	MS *
AH-5 *	RCS
AH-6 *	RHR *
AH-7 *	S-64 *
AH-85 *	S-65 *
AH-86 *	SIS *
AH-9 *	SW *
	WC-2 *

EQUIPMENT IN THE AREA: Redundant safety equipment is located within the Auxiliary Control Panel, which is separated by metal plate in accordance with Regulatory Guide 1.75. However, the redundant Safe Shutdown System Controls are located in the Main Control Room, which is a different fire area. Safety Train "A" cables outside the panel are separated from "B" cables by three-hour fire-rated, full-height enclosure. (For details, refer to CP&L submittal of 2/24/84, Attachment 1, Page 55, "Fire Area Passive Protection".)

COMPLIANCE: The design is in compliance with III.G.2.a.

DEVIATION REQUESTED: None

CONCLUSION: No deviation is required because in case of fire in this area, the plant shutdown can be achieved from another fire area, the Main Control Room. Also, the Auxiliary Control Panel is electrically isolated from the Control Room Board(s) by qualified disconnect switches or analog isolators. Also, this area is protected by an early warning ionization detection system throughout the fire area. Based on the above, the requirements of 10CFR50, Appendix R, Section III.G.2.a have been met.

FIRE AREA: 1-A-BAL

FIRE ZONES: 1-A-1-PA (FAABL1-1-PA)
1-A-1-FD (FAABL1-1-FD)
1-A-1-ED (FAABL1-1-ED)
1-A-1-PB (FAABL1-1-PB)

SSA AREA: FAABL1

DRAWING: CAR-SH-SK-668S06

PLANT LOCATION: Reactor Auxiliary Building, El. 190'

DESCRIPTION OF EQUIPMENT NEEDED FOR SAFE SHUTDOWN IN THE SSA AREA:

1. Air Handler AH-5 (local)*

2. RHR Pump 1A-SA & 1B-SB

3. Valves for the following system: CX*

   (See Safe Shutdown Analysis in case of fire Table 9.5B-4c for a list of support equipment for major components listed above.)

4. Cables for the following systems:

   *AH-28 *SW
   *AH-5 *WC
   *RHR

EQUIPMENT IN THE AREA: This area does contain redundant safe shutdown systems; however, they are located more than 20 feet apart and have multi-cycle sprinkler system actuated by thermal detectors located above the equipment and cables.

COMPLIANCE: This design is in compliance with III.G.2.b except as noted in the deviation request below.

DEVIATION REQUESTED:

1. Partial suppression and detection within the fire area.

(For details of the deviation, refer to CP&L submittal dated 2/24/84, Attachment 1, Page 20.)

CONCLUSION: This fire analysis area provides sufficient separation between redundant trains of SSA equipment (approximately 100 feet of horizontal distance). Additionally, multi-cycle sprinklers actuated by thermal detection is provided to protect redundant safety shutdown equipment.

FIRE AREA: 1-A-BAL

FIRE ZONES: 1-A-2-COR (FAABL2-A-COR)
1-A-2-MP (FAABL2-2-MP)

SSA AREA: FAABL2

DRAWING: CAR-SH-SK-668S07

PLANT LOCATION: Reactor Auxiliary Building, El. 216'

DESCRIPTION OF EQUIPMENT NEEDED FOR SAFE SHUTDOWN IN THE SSA AREA:

1. Air Handler AH-28*

2. Motor Control Center 1D22

   (See Safe Shutdown Analysis in case of fire Table 9.5B-4c for a list of support equipment for the major components listed above.)

3. Valves for the following systems:

   CX*
   SW*

4. Cable for the following systems:

AH-10	AH-9
AH-11	RHR*
AH-28*	SW*
AH-5*	WC-2*

EQUIPMENT IN THE AREA: This area does contain redundant safe shutdown equipment and cable; however, they are separated by more than 20 feet and have multi-cycle sprinkler system actuated by thermal detectors located above the equipment.

COMPLIANCE: This design is in compliance with III.G.2.b except as noted in the deviation request below.

DEVIATION REQUESTED:

1. Partial suppression throughout the fire area.

(For details of the deviation, refer to CP&L's 2/24/84 submittal, Attachment 1, Pages 20 and 21.)

CONCLUSION: This fire analysis area provides sufficient separation between redundant trains of SSA equipment (approximately 60 ft. of horizontal distance with no intervening combustibles) in addition to multi-cycle sprinklers actuated by thermal detectors, along with ionization detectors and is provided to protect redundant SSA equipment.

FIRE AREA: 1-A-BAL

FIRE ZONES: 1-A-3-COR (FAABL3-3-COR)
1-A-34-RHXA (FAA-BL3-34-RHXA)
1-A-3-MP (FAABL3-3-MP)
1-A-34-RHXB (FAA-BL3-34-RHXB)
1-A-3-PB (FAABLB-3-PB)
1-A-3-COMB (FAABL3-3-COMB)
1-A-3-COME (FAABL3-3-COME)
1-A-3-COMI (FAABL3-3-COMI)
1-A-3-TA (FAABL3-3-TA)

SSA AREA: FAABL3

DRAWINGS: CAR-SH-K-668S05
CAR-SH-SK-668S08
CAR-SH-SK-668S09
CAR-SH-SK-668S10
CAR-SH-SK-668S11
CAR-SH-SK-668S22

PLANT LOCATION: Reactor Auxiliary Building, El. 236'

DESCRIPTION OF EQUIPMENT NEEDED FOR SAFE SHUTDOWN IN THE SSA AREA:

1. Air Handler AH-29 *
2. Motor Control Centers 1B22 and 1A22 *
3. SW Booster Pumps *
4. Air Handler AH-9 *
5. Air Handler AH-6 (local) *
6. Air Handler AH-7 (local) *
7. RHR Heat Exchangers *
8. CCW Heat Exchangers *
9. CCW Pumps *
10. CVCS Charging Pumps *
11. Air Handler AH-10 *
12. Air Handler AH-11 (local) *
13. Auxiliary Feedwater Pumps *

(See Safe Shutdown Analysis in case of fire Table 9.5B-4c for a list of support equipment for the major components listed above.)

14. Valves for the following systems:

CVCS * CX *
RHR * SI *
AF * CH *
CCW *

15. Cable for the following systems:

AH-1&3 *	AH-6 *	E-85 *
AH-10 *	AH-7 *	FO *
AH-11 *	AH-85 *	AF *
AH-12 *	AH-86 *	MS *
AH-13 *	AH-9 *	RCS *
AH-15 *	AH-92 *	RHR *
AH-16 *	AH-93	S-64 *
AH-19 *	AH-23 *	S-65 *
AH-2&4 *	AH-29 *	SGR *
AH-20 *	AH-24 *	SIS *
AH-28 *	AH-25 *	SW *
AH-5 *	CCW *	WC-2 *
	COND *	
	CVCS *	
	DG *	

EQUIPMENT IN THE FIRE AREA: This area does contain redundant safe shutdown equipment and cable; however, protection exists or was provided to meet III.G.2.b and III.G.2.c and/or a deviation request was provided.

COMPLIANCE: This design is in compliance with II.G.2.b and III.G.2.c except as noted in the deviation request below.

DEVIATIONS REQUESTED:

1. Partial suppression and detection with the fire area.

2. Deviation from providing one-hour rated enclosures.

3. Deviation from considering IEEE-383 cable as an intervening combustible.

4. Deviation from considering pump oil as an intervening combustible.

5. Deviation from providing 20-ft. separation.

(For details of the deviations, refer to CP&L's 2/24/84 submittal, Attachment 1, Pages 20, 21, 22, 23, 24, & 25 except for Item 4 which is described below).

Below is a summary of some of the major deviations:

1. Deviation from providing one-hour rated enclosure:

   Charging/SI Pumps 1A-SA, 1B-SB, and 1C-SAB which are located in Fire Zone 1-A-3-PB (FAABL3-3-PB). The pumps are located approximately 17 feet apart with a three-hour rated, 11-foot high concrete wall between them. The pumps have a concrete ceiling at Elevation 247. Multi-cycle sprinklers actuated by thermal detection is provided in each pump room and at Elevation 247. Ionization smoke detection is provided throughout the entire fire zone. Hose stations, portable extinguishers, and manual alarm stations are available in and adjacent to the fire zone. Fire loading in the fire zone is low at 12,500 BTU/SF. Access into the charging pump rooms is through seismically-designed air-tight doors which have a four-to-six-inch high step-up. Also, access to Elevation 247 is limited to only a permanent ladder.

2. Deviation from providing 20 ft. separation:

   Component Cooling Water Pump 1ASA and the pump housing of Component Cooling Water Pump 1CSAB during maintenance outage of Pump 1BSB. There is a 21-foot separation from the motor of each pump. The separation between the motor of Pump 1A-SA and the pump housing of Pump 1C-SAB is 15 feet with no intervening combustibles.

   Multi-cycle sprinklers actuated by the thermal detectors are installed in almost the entire fire zone. Ionization smoke detection is provided throughout the fire zone. Hose stations, portable extinguishers, and manual alarm stations are available in and adjacent to the fire zone. Fire loading in the fire zone is low at 12,500 BTU/SF.

   Floor drains are installed. A fire watch will be provided if Pump 1B-SB is out of service for more than seven days.

3. Deviation from considering IEEE-383 cable and pump lubricating oil as an intervening combustible:

Auxiliary Feedwater Pumps P1A-SA and P1X-SAB. The cable trays run in excess of 14 feet vertical distance from the pumps. The pumps are located approximately 30 feet apart and are separated by 10-foot high walls. These walls extend 16'-3" and 18'-3" perpendicular from the west wall at Column B (see Modification 14a for description of location of fire breaks in cable trays). Multi-cycle sprinklers actuated by thermal detectors are installed in the fire zone over all safety-related equipment. Ionization detection is provided throughout the fire zone. Hose stations, portable extinguishers, and manual alarm stations are available in and adjacent to the fire zone. Fire loading in the fire zone is low at 16,150 ~~12,500~~ BTU/sq. ft. Floor drains are installed.

Auxiliary Feedwater Pump 1B-SB is located approximately 15 feet between Pumps 1A and 1C. This pump contains eight pints of Mobil lube oil with a flash point of 400°F. This oil is contained within the pump and motor housing. If a spill did occur, adequate floor drains have been provided. The same protection and detection as stated above is also provided above this pump.

CONCLUSION: Except for the areas noted in the deviations requested above, this fire area is provided with sufficient horizontal separation or one-hour rated enclosures, along with multi-cycle sprinklers actuated by thermal detectors above the redundant safe shutdown equipment. Also, ionization detectors are placed in areas where early warning detection is needed. In those areas where deviations are requested, equivalent protection is provided as detailed in CP&L's 2/24/84 submittal, Attachment 1, Pages 20, 21, 22, 23, 24, and 25.

FIRE AREA: 1-A-BAL

SSA AREA: FAABL4

DRAWINGS: CAR-SH-SK-668S05
CAR-SH-SK-668S12
CAR-SH-SK-668S13
CAR-SH-SK-668S14
CAR-SH-SK-668S15
CAR-SH-SK-668S23

FIRE ZONES: 1-A-4-COR
1-A-34-RHXA
1-A-34-RHXB
1-A-4-CHLR
1-A-4-COMB
1-A-4-COME
1-A-4-COMI (FAABL4-4-COM)
1-A-4-CHFA (FAABL4-4-CHFA)
1-A-4-CHFB (FAABL4-4-CHFB)
1-A-3-TA (FAABL4-4-TA)

PLANT LOCATION: Reactor Auxiliary Building El. 261'

DESCRIPTION OF EQUIPMENT NEEDED FOR SAFE SHUTDOWN WITHIN THE SSA AREA:

1. Chilled Water Pumps*
2. Condenser Water Circ. Pumps (Chilled Water System)*
3. Closed Exp. Tanks (Chilled Water System)*
4. HVAC Chillers*
5. AH-19 (local)*
6. AH-20 (local)*
7. MCC-1B35*

   (See Safe Shutdown Analysis in case of fire, Table 9.5B-4c for a list of support equipment for the major components listed above.)

8. Valves for the following systems:

MS *	FP *
AF *	SA *
CVCS *	SW *

10. Cable for all safe shutdown systems (systems listed in the Safe Shutdown Analysis in Case of Fire, Table 9.5B-4f) both SA and SB trains are located within this SSA area.

EQUIPMENT IN THE AREA: This area does contain redundant safe shutdown SA and SB cable and equipment. However, protection exists or was provided to meet III.G.2.a, III.G.2.b and III.G.2.c and/or a deviation request was provided.

COMPLIANCE: This design is in compliance with Appendix R, Section III.G.2.a, 2.b, and 2.c except as noted in the deviation request below.

DEVIATIONS REQUESTED:

1. Partial suppression and detection within the fire area.
2. Deviation from providing three-hour rated enclosures.
3. Deviation from providing one-hour rated enclosures.
4. Deviation from considering IEEE 383 cable as an intervening combustible.

(For details of the deviations, see CP&L's 2/24/84 submittal, Attachment 1, Pages 20, 21, 22, 29, 30, 31, and 32.)

CONCLUSION: Except for the areas noted in the deviations requested above, this fire area is provided with sufficient horizontal separation or one-hour rated enclosures along with multi-cycle sprinklers actuated by thermal detectors above the redundant safe shutdown equipment. Also, ionization detectors are placed in areas where early warning detection is needed. In those areas where deviations are requested, equivalent protection has been provided as detailed in CP&L's 2/24/84 submittal, Attachment 1, Pages 20, 21, 22, 29, 30, 31, and 32.

FIRE AREA: 1-A-BAL

FIRE ZONES: 1-A-5-CER
1-A-5-HVA (FAABL5-5-HVA)
1-A-5-HVB (FAABL5-5-HV3)
1-A-46-ST (FAABL5-5-ST)

SSA AREA: FAABL5

DRAWINGS: CAR-SH-SK-668S16
CAR-SH-SK-668S17

PLANT LOCATION: Reactor Auxiliary Building, El. 286'

DESCRIPTION OF EQUIPMENT NEEDED FOR SAFE SHUTDOWN IN THE SSA AREA:

1. Air Handler AH-12*
2. Air Handler AH-13*
3. Motor Control Centers 1A21-SA and 1B21-SB
4. Motor Control Center 1A31-SA
5. Cable for all safe shutdown systems (systems listed in the Safe Shutdown Analysis in Case of Fire, Table 9.5B-4f) both SA and SB trains are located within this SSA area.

EQUIPMENT IN THE AREA: This area does contain redundant safe shutdown equipment and cable; however, protection was provided to meet 10CFR50, Appenidx R, Section III.G.2.a or a deviation request was provided.

COMPLIANCE: This design is in compliance with Appendix R, Section III.G.2.a except as noted in the deviation request below.

DEVIATION REQUEST:

1. Partial suppression and detection within the fire area.
2. Deviation from providing three-hour rated enclosures.

(For details of the deviation, refer to CP&L's submittal dated 2/24/84, Attachment 1, Pages 29, 30, 31, and 34.)

CONCLUSION: The redundant safe shutdown equipment, except for the steam tunnel (1AA-46-ST) located in this analysis area, is separated by three-hour rated enclosures. This analysis area, except for the steam tunnel, is also protected by an early warning ionization detection system. In those cases where deviations exist, equivalent protection has been provided as detailed in CP&L's 2/24/84, Attachment 1, Pages 29, 30, 31, and 34.

FIRE AREA: 1-A-BATA FIRE ZONES: None

SSA AREA: FAABTA

DRAWING: CAR-SH-SK-668S17

PLANT LOCATION: Reactor Auxiliary Building, El. 286'
(Battery Room Train "A")

DESCRIPTION OF EQUIPMENT NEEDED FOR SAFE SHUTDOWN IN THE FIRE AREA:

1. Battery 1A-SA

2. Exhaust Fan E28 (1B-SA)

3. Flow Switch FS-1AV-6635-SA

4. Cables for the following systems:

DG	AH-7
SW	AH-85
AF	AH-86
MS	AH-9
FO	AH-92
AH-11	CVCS
AH-10	COND
AH-16	RHR
AH-19	SGR
AH-1&3	SIS
AH-15	RCS
AH-12	CCW
AH-13	AH-23
AH-20	AH-29
AH-2&4	AH-24
AH-28	AH-25
WC-2	S-64
AH-5	S-65
AH-6	E-85

EQUIPMENT AND CABLES IN AREA: All equipment and cables required for safe shutdown in this fire area are Safety Train "A". The redundant safe shutdown equipment is located in a different fire area.

COMPLIANCE: This design is in compliance with Appendix R, Section III.G.2.a.

DEVIATION REQUESTED: None

CONCLUSION: All redundant equipment and cables are located in a separate fire area. This area is also protected by an early warning ionization detection system. Therefore, the requirements of Appendix R, Section III.G.2.a have been met.

FIRE AREA: 1-A-BATB FIRE ZONES: None

SSA AREA: FAABTB

DRAWING: CAR-SH-SK-668S17

PLANT LOCATION: Reactor Auxiliary Building, El. 286'
(Battery Room Train "B")

DESCRIPTION OF EQUIPMENT NEEDED FOR SAFE SHUTDOWN IN THE FIRE AREA:

1. Battery 1B-SB

2. Exhaust Fan E29 (1A-SB)

3. Flow Switch FS-1AV-6645-SB

4. Cables for the following systems:

DG	AH-7
SW	AH-85
AF	AH-86
MS	AH-9
FO	AH-92
AH-11	CVCS
AH-10	COND
AH-16	RHR
AH-19	SGR
AH-1&3	SIS
AH-15	RCS
AH-12	CCW
AH-13	AH-23
AH-20	AH-29
AH-2&4	AH-24
AH-28	AH-25
WC-2	S-64
AH-5	S-65
AH-6	E-85

EQUIPMENT AND CABLES IN AREA: All equipment and cables required for safe shutdown in this fire area are Safety Train B. The redundant safe shutdown equipment is located in a different fire area.

COMPLIANCE: This design is in compliance with Appendix R, Section III.G.2.a.

DEVIATION REQUESTED: None

CONCLUSION: All redundant equipment and cables are located in a separate fire area. This area is also protected by an early warning ionization detection system. Therefore, the requirements of Appendix R, Section III.G.2.a have been met.

FIRE AREA: 1-A-CSRA FIRE ZONES: None

SSA AREA: FAACSA

DRAWING: CAR-SH-SK-668S18

PLANT LOCATION: Reactor Auxiliary Building El. 286'
(Cable Spread Room Train "A")

DESCRIPTION OF EQUIPMENT NEEDED FOR SAFE SHUTDOWN IN THE FIRE AREA:

1. Cables for the following systems:

AH-1&3 *	CCW *
AH-10 *	COND *
AH-11 *	CVCS *
AH-12	DG *
AH-13 *	E-85 *
AH-15 *	MS
AH-16 *	RCS *
AH-19 *	RHR *
AH-2&4	S-64 *
AH-20 *	S-65 *
AH-28 *	SGR
AH-5 *	SIS
AH-6 *	SW *
AH-7 *	WC *
AH-85 *	AF
AH-86 *	
AH-9 *	
AH-92 *	
AH-93	
AH-23	
AH-29	
AH-24	
AH-25	

EQUIPMENT AND CABLES IN AREA: This area contains redundant safe shutdown systems. All Safety Train "B" cables which pass through this area are protected in accordance with III.G.2.c of Appendix R. Redundant ductwork serving Fire Areas 1-A-CSRA and 1-A-CSRB is located in this area. No ductwork modifications are required since a loss of ventilation to these areas will not impair safe shutdown. For details, refer to CP&L submittal dated 2/24/84, Page 43, "General Comments".

COMPLIANCE: This design is in compliance with Appendix R, Section III.G.2.c.

DEVIATION REQUESTED: None

CONCLUSION: Safety Train B conduits, junction boxes, and cable tray located within the fire area were enclosed in one-hour fire-rated enclosures, along with an automatic preaction sprinkler system actuated by thermal detectors and an early warning ionization detection is also provided throughout the fire area. (For details, refer to CP&L submittal dated 2/24/84, Page 43, "Modifications"). Therefore, the requirements of Appendix R, Section III.G.2.a or III.G.2.c have been met.

FIRE AREA: 1-A-CSRB

FIRE ZONES: None

SSA AREA: FAACSB

DRAWING: CAR-SH-SK-668S18

PLANT LOCATION: Reactor Auxiliary Building, El. 286'
(Cable Spread Room Train "B")

DESCRIPTION OF EQUIPMENT NEEDED FOR SAFE SHUTDOWN IN THE FIRE AREA:

1. Cables for the following systems:

AH-1&3	MS
AH-10	RCS
AH-11	RHS
AH-13	SIS
AH-15	SW
AH-16	WC
AH-19	AF
AH-2&4	
AH-20	
AH-28	
AH-5	
AH-6	
AH-7	
AH-85	
AH-86	
AH-9	
AH-92	
AH-2329	
AH-2425	
CCW	
COND	
CVCS	
DG	
E-85	
FO	

EQUIPMENT AND CABLE IN AREA: Only Train "B" safe shutdown equipment and cables are located in this area. Redundant Train "A" safe shutdown cables are located in Fire Area 1-A-CSRA (FAACSA), separated from this fire area by three-hour fire barriers.

COMPLIANCE: This design is in compliance with Appendix R, Section III.G.2.a.

DEVIATIONS REQUESTED: None

CONCLUSION: All redundant equipment and cables are located in a separate fire area. This fire area is protected by an automatic preaction sprinkler system throughout the fire area actuated by thermal detectors. Early warning ionization detection is installed also throughout the fire area. Therefore, the requirements of Appendix R, Section III.G.2.a have been met.

FIRE AREA: 1-A-EPA

FIRE ZONES: None

SSA AREA: FAAEPA

DRAWING: CAR-SH-SK-668S12

PLANT LOCATION: Reactor Auxiliary Building, El. 261'
(Electrical Penetration Area)

DESCRIPTION OF EQUIPMENT NEEDED FOR SAFE SHUTDOWN WITHIN THE FIRE AREA:

1. Air Handler AH-24 (1X-SA)

2. Press. Heater Backup Group "A"
Distribution Panel 1A-SN

(See Safe Shutdown Analysis in Case of Fire, Table 9.5B-4c for a list of support equipment for the major components listed above.)

3. Valves for the following system: CX

4. Cables for the following systems:

AH-1&3	AH-23
AH-10	AH-24
AH-11	AH-25
AH-12	AH-29
AH-13	CCW
AH-15	COND
AH-16	CVCS
AH-19	DG
AH-2&4	E-85
AH-20	AF
AH-28	MS
AH-5	RCS
AH-6	RHR
AH-7	S-64
AH-85	S-65
AH-86	SIS
AH-9	SW
AH-92	WC
AH-93	

EQUIPMENT IN THE AREA: Only SA cable and equipment are located within this fire area.

COMPLIANCE: This design is in compliance with Appendix R, Section III.G.2.a.

DEVIATION REQUESTED: None

CONCLUSION: All redundant equipment and cables are located in a separate fire area. This fire area is also protected by a multi-cycle sprinkler system actuated by thermal detectors and early warning ionization detection are provided throughout the fire area. Therefore, the requirements of Appendix R, Section III.G.2.a have been met.

FIRE AREA: 1-A-EPB

FIRE ZONES: None

SSA AREA: FAAEPB

DRAWING: CAR-SH-SK-668S12

PLANT LOCATION: Reactor Auxiliary Building, El. 261'
(Electrical Penetration Area)

DESCRIPTION OF EQUIPMENT NEEDED FOR SAFE SHUTDOWN IN THE FIRE AREA:

1. Air Handler AH-25 (1X-SB)

2. Pressure Heater Backup Group "B"
Distribution Panel 1B-SN

(See Safe Shutdown Analysis in Case of Fire, Table 9.5B-4c for a list of support equipment for the major components listed above.)

3. Valves for the following systems: CX

4. Cables for the following systems:

AH-1&3	AH-24
AH-10	AH-25
AH-11	CCW
AH-12	CVCS
AH-13	DG
AH-15	E-85
AH-16	AF
AH-2&4	MS
AH-28	RCS
AH-5	RHR
AH-6	S-64
AH-85	S-65
AH-86	SCR
AH-9	SIS
AH-23	SW
AH-29	WC

EQUIPMENT IN AREA: Safe shutdown "B" train cable and equipment are located within this fire area. Two Train "A" cables pass through the area; however, they are considered to be not required for safe shutdown.

COMPLIANCE: This design is in compliance with Appendix R, Section III.G.2.a.

DEVIATION REQUESTED: None

CONCLUSION: All redundant equipment and cables are located in a separate fire area. This fire area is also protected by a multi-cycle sprinkler system actuated by thermal detectors and an early warning ionization detection system is provided throughout the fire area. Therefore, the requirements of Appendix R, Section III.G.2.a have been met.

FIRE AREA: 1-A-SWGRA FIRE ZONES: None

SSA AREA: FAASGA

DRAWING: CAR-SH-SK-668S17

PLANT LOCATION: Reactor Auxiliary Building, 286'
(Switchgear Room Train "A")

DESCRIPTION OF EQUIPMENT NEEDED FOR SAFE SHUTDOWN IN THE FIRE AREA:

1. Battery Charger 1A-SA
2. Battery Charger 1B-SA
3. Distribution Panel 1A-SA 125V DC R
4. Distribution Panel 1A 125V DC
5. ESS Sequence Panel 1A-SA
6. Transfer Panel A
7. 6.9kV Emergency Switchgear 1A-SA
8. 480V Emergency Switchgear 1A2-SA
9. 480V Emergency Switchgear 1A3-SA

(See Safe Shutdown Analysis in Case of Fire Table 9.5B-4c for a list of support equipment for the major components listed above.)

10. Cables for the following systems:

MS	AH-6
SW	AH-7
FO	AH-86
AF	AH-85
DG	AH-93
AH-10	AH-9
AH-11	AH-92
AH-15	CVCS
AH-16	COND
AH-1	RHR
AH-3	SGR
AH-19	RCS
AH-12	SIS
AH-13	CCW
AH-20	AH-23
AH-2	AH-29
AH-4	AH-24
WC-2	AH-25
AH-28	S-64
AH-5	S-65
	E-85

FIRE AREA 1-A-SWGRA, Cont.

EQUIPMENT IN AREA: Only Train "A" safe shutdown equipment and cable are located in this area. Redundant Train "B" safe shutdown equipment is located in Fire Area 1-A-SWGRB (FAASGB), separated from this fire area by a three-hour fire-rated barrier.

COMPLIANCE: This design is in compliance with Appendix R, Section III.G.2.a.

DEVIATIONS REQUESTED: None

CONCLUSION: All redundant equipment and cables are located in a separate fire area. This area is also protected by an early warning ionization detection system throughout the fire area. Therefore, the requirements of Appendix R, Section III.G.2.a have been met.

FIRE AREA: 1-A-SWGRB FIRE ZONES: None

SSA AREA: FAASGB

DRAWING: CAR-SH-SK-668S17

PLANT LOCATION: Reactor Auxiliary Building, El. 286'
(Switchgear Room Train "B")

DESCRIPTION OF EQUIPMENT NEEDED FOR SAFE SHUTDOWN IN THE FIRE AREA:

1. Battery Charger 1A-SB
2. Battery Charger 1B-SB
3. Distribution Panel 1B-SB 125VDCR
4. ESS Sequence Panel (B)
5. Exhaust Fan E-29 1B-SB Battery Room B
6. Transfer Panel B
7. 6.9kV Emergency Switchgear 1B-SB
8. 480V Emergency Switchgear 1B2-SB
9. 480V Emergency Switchgear 1B3-SB

(See Safe Shutdown Analysis in Case of Fire, Table 9.5B-4c for a list of support equipment for the major components listed above.)

10. Cables for the following systems:

MS	AH-4
DG	WC-2
AF	AH-20
FO	AH-6
SW	AH-7
AH-11	AH-85
AH-10	AH-86
AH-1	AH-9
AH-3	AH-92
AH-16	CVCS
AH-19	COND
AH-15	RHR
AH-12	SGR
AH-13	SIS
AH-28	RCS
AH-2	CCW
AH-23	
AH-29	
AH-24	
AH-25	
S-64	
S-65	
E-85	
AH-5	

FIRE AREA 1-A-SWGRB, Cont.

EQUIPMENT IN AREA: Redundant ductwork and HVAC dampers serving Fire Area 1-A-ACP are located in the area. However, loss of ventilation to the ACP area will not impair safe shutdown, which would be conducted from the Main Control Room. Safety Train "A" cable to a distribution panel is located in this fire area; however, it is the alternate supply, and the main feed is located within another fire area. For clarification, see CP&L submittal dated 2/24/84, Page 61.

COMPLIANCE: This design is in compliance with Appendix R, Section III.G.2.a.

DEVIATIONS REQUESTED: None

CONCLUSION: All redundant equipment and cables are located in separate fire areas. This fire area is also protected by an early warning ionization detection system throughout the fire area. Therefore, the requirements of Appendix R, Section III.G.2.a have been met.

FIRE AREA: 1-C

FIRE ZONES: 1-C-1-BAL (FACRCB-1-BL)
1-C-1-RCP1A (FACRC1RCP-1A)
1-C-1-RCP1B (FACRC1RCP-1B)
1-C-1-RCP1C (FACRC1RCP-1C)
1-C-1-CHFA (FACRCB-1CHFA)
1-C-1-CHFB (FACRCB-1CHFB)
1-C-3-EPA (FACRCB-3-EPA)
1-C-3-EPB (FACRCB-3-EPB)

SSA AREA: FACRCB

DRAWINGS: CAR-SH-SK-668S01 thru
CAR-SH-SK-668S04

PLANT LOCATION: Containment Building

DESCRIPTION OF EQUIPMENT NEEDED FOR SAFE SHUTDOWN IN THE FIRE AREA:

1. Air Handler AH-2 1A-SA RCB Fan *
2. Air Handler AH-2-1B-SA RCB Fan *
3. Air Handler AH-3 1A-SA RCB Fan *
4. Air Handler AH-3 1B-SA RCB Fan *
5. Air Handler AH-1 1A-SB RCB Fan *
6. Air Handler AH-1 1B-SB RCB Fan *
7. Air Handler AH-4 1A-SB RCB Fan *
8. Air Handler AH-4 1B-SB RCB Fan *

(See Safe Shutdown Analysis Table 9.5B-4c, for a list of support equipment for the major components listed above.)

9. Cables for the following systems:

AH-1&3 *	RCS *
AH-2&4 *	RHR *
AF	SIS *
MS	SW *

EQUIPMENT IN AREA: This area contains redundant safe shutdown cable and equipment. Provisions have been made through separation and suppression and detection systems to meet the requirements of Section III.G.2.d. See compliance and deviation request below.

COMPLIANCE: This design is in compliance with Appendix R Paragraph III.G.2.d except as noted in Deviation Request below.

DEVIATION REQUESTED:

1. Partial suppression and detection within the fire area.
(For details of the deviation, refer to CP&L's 2/24/84 submittal, Attachment 1, Page 68.)

CONCLUSION: Within the fire area, redundant equipment and cables required for safe shutdown are located and protection has been provided such that the requirements of Appendix R, Section III.G.2.d have been met except for the deviation listed above.

FIRE AREA: 1-D-DGA

SSA AREA: FADDGA

DRAWINGS: CAR-SH-SK-668S24
CAR-SH-SK-668S25

PLANT LOCATION: Diesel Generator Building, El. 261', 280', and 292'

FIRE ZONES: 1-D-1-DGA-RM (FADDGA-1-RM)
1-D-1-DGA-ASU (FADDGD-1-DSU)
1-D-1-DGA-ER (FADDGA-1-ER)
1-D-2-DGA-HVD (FADDGD-2-HVD)
1-D-3-DGA-ES (FADDGA-3-ES)
1-D-3-DGA-HVR (FADDGA-3-HVR)

DESCRIPTION OF EQUIPMENT NEEDED FOR SAFE SHUTDOWN IN THE FIRE AREA:

1. Air Handler AH-85 (1D-DD)
2. Air Handler AH-85 (1B-SD)
3. Diesel Generator Control Panel CP-1D
4. Diesel Generator Engine Control Panel CP-1D-SD
5. DC Leads DG (1D-SD)
6. Power Panel PP-1D231
7. Motor Control Center 480V MCC 1D23-SD
8. Emergency Diesel Generator 1A-SA

   (See Safe Shutdown Analysis in Case of Fire, Table 9.5B-4c for a list of support equipment for the major components listed above.)

9. Cables for the following systems:

AH-1 & 3	AH-23
AH-10	AH-29
AH-11	AH-24
AH-12	AH-25
AH-13	CCW
AH-15	COND
AH-16	CVCS
AH-19	DG
AH-2 & 4	E-85
AH-20	FO
AH-28	AF
AH-5	MS
AH-6	RCS
AH-7	RHR
AH-85	S-64
AH-9	S-65
AH-92	SGR
AH-93	SIS
	WC-2

EQUIPMENT IN AREA: This area contains only Safety Train "A" safe shutdown equipment and cables.

COMPLIANCE: This design is in compliance with Appendix R, Section III.G.2.a.

DEVIATION REQUESTED: None

CONCLUSION: All redundant equipment and cables are located in a separate fire area. Fire zones within this area are also protected by some of the following methods: Multi-cycle suppression system, thermal ionization, and ultra-violet detection system (see CP&L's 2/24/84 submittal, Attachment 1, Page 62 for more details). Therefore, the requirements of Appendix R, Section III.G.2.a have been met.

FIRE AREA: 1-D-DGB

SSA AREA: FADDGB

DRAWINGS: CAR-SH-SK-668S24
CAR-SH-SK-668S25

FIRE ZONES: 1-D-1-DGB-RM (FADDGB-1-RM)
1-D-1-DGB-ASU (FADDGB-1-ASU)
1-D-1-DGB-ER (FADDGB-1-ER)
1-D-2-DGB-HVD (FADDGB-2-HVD)
1-D-3-DGB-ES (FADDGB-3-ES)

PLANT LOCATION: Diesel Generator Building,
El. 261', 280', and 292'

DESCRIPTION OF EQUIPMENT NEEDED FOR SAFE SHUTDOWN IN THE FIRE AREA:

1. Air Handler AH-85 (1A-SB)
2. Air Handler AH-85 (1B-SB)
3. Diesel Generator Control Panel CP-1B-SB
4. Diesel Generator Engine Control Panel CP-1B-SB
5. DC Leads DG (1B-SB)
6. Emergency Diesel Generator 1B-SB
7. Power Panel PP-1B231
8. Motor Control Center 480V MCC 1B23-SB

(See Safe Shutdown Analysis in Case of Fire, Table 9.5B-4c for a list of support equipment for the major components listed above.)

9. Cables for the following systems:

AH-1&3	AH-23
AH-10	AH-29
AH-11	AH-24
AH-12	AH-25
AH-13	CCW
AH-15	COND
AH-16	CVCS
AH-19	DG
AH-2&4	E-85
AH-20	FO
AH-28	AF
AH-5	MS
AH-6	RCS
AH-7	RHR
AH-85	S-64
AH-86	S-65
AH-9	SGR
AH-92	SIS
	SW
	WC-2

EQUIPMENT AND CABLES IN AREA: This fire area contains only Safety Train "B" safe shutdown equipment and cables.

COMPLIANCE: This design is in compliance with Appendix R, Section III.G.2.a.

DEVIATION REQUESTED: None

CONCLUSION: All redundant equipment and cables are located in a separate fire area. Fire zones within this area are also protected by some of the following methods: multi-cycle suppression system, thermal ionization and ultraviolet detection system. (See CP&L's submittal, 2/24/84, Attachment 1, Page 63, for more details.) Therefore, the requirements of Appendix R, Section III.G.2.a have been met.

FIRE AREA: 1-D-DTA FIRE ZONES: None

SSA AREA: FADDTA

DRAWINGS: CAR-SH-SK-668S24
CAR-SH-SK-668S25

PLANT LOCATION: Diesel Generator Building

DESCRIPTION OF EQUIPMENT NEEDED FOR SAFE SHUTDOWN IN THE FIRE AREA:

1. Fuel Oil Day Tank 1A-SA

   (See Safe Shutdown Analysis in Case of Fire, Table 9.5B-4c for a list of support equipment for the major equipment listed above.)

2. Cable for the following systems:

   DG
   FO

EQUIPMENT IN AREA: Only Safe Shutdown Train "A" cable and equipment are located within the fire area.

COMPLIANCE: This design is in compliance with Appendix R, Section III.G.2.a.

DEVIATION REQUESTED: None

CONCLUSION: All redundant equipment and cables are located in a separate fire area. This area is also protected by a multi-cycle sprinkler system actuated by thermal detection system. Therefore, the requirements of Appendix R, Section III.G.2.a have been met.

FIRE AREA: 1-D-DTB FIRE ZONES: None

SSA AREA: FADDTB

DRAWING: CAR-SH-SK-668S24
CAR-SH-SK-668S25

PLANT LOCATION: Diesel Generator Building

DESCRIPTION OF EQUIPMENT NEEDED FOR SAFE SHUTDOWN IN THE FIRE AREA:

1. Fuel Oil Day Tank 1B-SB

   (Safe Shutdown Analysis in Case of Fire, Table 9.5B-4c for a list of support equipment for the major components listed above.)

2. Cable for the following systems:

   DG
   FO

EQUIPMENT IN AREA: Only Safe Shutdown Train "B" cable and equipment are located within the fire area.

COMPLIANCE: This design is in compliance with Appendix R, Section III.G.2.a.

DEVIATION REQUESTED: None

CONCLUSION: All redundant equipment and cables are located in a separate fire area. This area is also protected by a multi-cycle sprinkler system actuated by thermal detection system. Therefore, the requirements of Appendix R, Section III.G.2.a have been met.

FIRE AREA: 1-0-PA FIRE ZONES: None

SSA AREA: FA0PA

DRAWING: CAR-SH-SK-668S26

PLANT LOCATION: Diesel Fuel Oil Storage Tank Area

DESCRIPTION OF EQUIPMENT NEEDED FOR SAFE SHUTDOWN IN THE FIRE AREA:

1. Diesel Oil Storage Transfer Pump (1A-SA)

2. Diesel Oil Storage Exhaust Fan E-85 (1A-SA)

   (See Safe Shutdown Analysis in Case of Fire, Table 9.5B-4c for a list of support equipment for the major components listed above.)

3. Cables for the following systems:

   E-85
   DG
   FO

EQUIPMENT IN AREA: Only Train "A" safe shutdown equipment and cable are located in this area. Redundant Train "B" safe shutdown equipment is located in a separate fire area.

COMPLIANCE: This design is in compliance with III.G.2.a.

DEVIATIONS REQUESTED: None

CONCLUSION: All redundant safe shutdown equipment and cable are located in a separate fire area. This area is also protected by a multi-cycle sprinkler system actuated by thermal detectors. Therefore, the requirements of Appendix R, Section III.G.2.a have been met.

FIRE AREA: 1-0-PB FIRE ZONES: None

SSA AREA: FAOPB

DRAWING: CAR-SH-SK-668S26

PLANT LOCATION: Diesel Fuel Oil Storage Tank Area

DESCRIPTION OF EQUIPMENT NEEDED FOR SAFE SHUTDOWN IN THE FIRE AREA:

1. Diesel Oil Storage Transfer Pump (1B-SB)

2. Diesel Oil Storage Exhaust Fan E-85 (1B-SB)

   (See Safe Shutdown Analysis in Case of Fire, Table 9.5B-4c for a list of support equipment for the major components listed above.)

3. Cables for the following systems:

   E-85
   DG
   FO

EQUIPMENT IN AREA: Only Train "B" safe shutdown equipment and cable are located in this area. Redundant Train A safe shutdown equipment is located in a separate fire area.

COMPLIANCE: This design is in compliance with III.G.2.a.

DEVIATIONS REQUESTED: None

CONCLUSION: All redundant safe shutdown equipment and cable are located in a separate fire area. This area is also protected by a multi-cycle sprinkler system actuated by thermal detectors. This fire aea meets the requirements of Appendix R, Section III.G.2.a.

FIRE AREA: 12-A-BAL FIRE ZONES: 12-A-5-DIH (FCABL1-5-DIH)

SSA AREA: FCABAL

DRAWING: CAR-SH-SK-668S19

PLANT LOCATION: Reactor Auxiliary Building, El. 286'

DESCRIPTION OF EQUIPMENT NEEDED FOR SAFE SHUTDOWN IN THE FIRE AREA:

1. Air Handler AH-92 (1A-SA)

2. Air Handler AH-92 (1B-SB)

   (See Safe Shutdown Analysis in Case of Fire, Table 9.5B-4c for a list of support equipment for the major components listed above.)

3. Cables for the following systems:

   AH-12
   AH-13
   AH-15 *
   AH-16 *
   SCR
   WC-2

4. Valves for the following system: CX *

EQUIPMENT IN AREA: This area contains redundant safe shutdown equipment and cable; however, their functions are duplicated by other equipment and cables located in separate fire areas. CP&L's 2/24/84 submittal, Attachment 1, Page 36, provides a description of the function of this equipment.

COMPLIANCE: This design is in compliance with Appendix R, Section III.G.2.a

DEVIATION REQUESTED: None

CONCLUSION: The equipment with duplicate functions are located in a separate fire area and an early warning ionization detection system has been provided in Zone 12-A-5-DIH. Therefore, the requirements of Appendix R, Section III.G.2.a have been met.

FIRE AREA: 12-A-CRC1

FIRE ZONES: 12-A-6-RCC1 (FCACRC-6RCC1)
12-A-6-PICR1 (FCACRC-6PICR1)
12-A-6-ARP1 (FCACRC-6ARP1)
12-A-6-CR (FCACRC-6-CR)

SSA AREA: FCACRC

DRAWING: CAR-SH-SK-668S20

PLANT LOCATION: Reactor Auxiliary Building El. 305'
(Control Room Complex)

DESCRIPTION OF EQUIPMENT NEEDED FOR SAFE SHUTDOWN IN THE FIRE AREA:

1. Auxiliary Relay Panels *

2. Isolation Cabinets *

3. Main Termination Cabinets *

4. Process and Instrument Control Cabinets *

5. Solid State Protection *

(See Safe Shutdown Analysis in Case of Fire, Table 9.5B-4c for a list of support equipment for the list of major components listed above.)

6. Cables for the following systems:

AH-1&3 *	AH-93 *
AH-10 *	AH-23 *
AH-11 *	AH-29 *
AH-12 *	AH-24 *
AH-13 *	AH-25 *
AH-15 *	COND *
AH-16 *	CCW *
AH-19 *	CVCS *
AH-2&4 *	DC *
AH-20 *	E-85 *
AH-28 *	AF *
AH-5 *	MS *
AH-6 *	RCS *
AH-7 *	RHR *
AH-85 *	S-64 *
AH-86 *	S-65 *
AH-9 *	SGR *
	SIS *
	SW *
	WC-2 *

EQUIPMENT AND CABLES IN AREA: Safety Train "A" and "B" cable and equipment are located within this fire area. However, the plant design allows for shutdown of the plant from the Auxiliary Control Panel with controls which are electrically isolated from systems on Elevation 305.

COMPLIANCE: The design is in compliance with Appendix R, Section III.G.2.a.

DEVIATION REQUESTED: None

CONCLUSION: Safety Train "A" and "B" equipment and cable are located in the same area. However, redundant components are provided in a separate fire area which would allow the capability of safe shutdown from the auxiliary control panel. This area is also protected by an early warning ionization detection system. Therefore, the requirements of Appendix R, Section III.G.2.a have been met.

FIRE AREA: 12-A-CR

FIRE ZONES: 12-A-6-CR1 (FCACRM-6-CR1)
12-A-6-RT1 (FCACRM-6-RT1)

SSA AREA: FCACRM

DRAWING: CAR-SH-SK-668S20

PLANT LOCATION: Reactor Auxiliary Building, El. 305'
(Control Room)

DESCRIPTION OF EQUIPMENT NEEDED FOR SAFE SHUTDOWN IN THE FIRE AREA:

1. Auxiliary Equipment Panel 1NS *
2. Main Control Board *
3. Main Termination Cabinets *
4. Intermediate Distribution Panel *

(See Safe Shutdown Analysis in Case of Fire, Table 9.5B-4c for a list of support equipment for the major equipment listed above.)

5. Cables for the following systems:

AH-1&3 *	AH-24 *
AH-10 *	AH-25 *
AH-11 *	CCW *
AH-12 *	COND *
AH-13 *	CVCS *
AH-15 *	DG *
AH-16 *	E-85 *
AH-19 *	AF *
AH-2&4 *	MS *
AH-20 *	RCS *
AH-28 *	RHR *
AH-5 *	S-64 *
AH-6 *	S-65 *
AH-7 *	SGR *
AH-85 *	SIS *
AH-86 *	SW *
AH-9 *	WC-2 *
AH-92 *	AH-93 *
	AH-23 *
	AH-29 *

EQUIPMENT AND CABLE IN THE AREA: Equipment and cable for both Safety Train "A" and "B" are located within this area. However, shutdown can be achieved from the Auxiliary Control Panel which is in a different fire area (for details, refer to CP&L submittal dated 2/24/84, Attachment 1, Pages 46 and 47).

COMPLIANCE: This design is in compliance with Appendix R, Section III.G.2.a.

DEVIATIONS REQUESTED: None

CONCLUSION: A fire resulting in the loss of all equipment in this fire area could not adversely affect safe shutdown (for details, refer to CP&L's 2/24/84 submittal, Attachment 1, Pages 46 and 47). This area is also protected by an early warning ionization detection system. Therefore, Appendix R, Section III.G.2.a has been met.

FIRE AREA: 12-A-HVIR

FIRE ZONES: 12-A-6-HV7
12-A-6-IRR

SSA AREA: FCAHVI

DRAWING: CAR-SH-SK-668S21

PLANT LOCATION: Reactor Auxiliary Building, El. 305'
(Heating & Ventilation Room)

DESCRIPTION OF EQUIPMENT NEEDED FOR SAFE SHUTDOWN IN THE FIRE AREA:

1. Air Handler AH-15 1A-SA RAB Fan *
2. Air Handler AH-16 1A-SA RAB Fan *
3. Control Panel EHC24 1X-SA & EHC26 1X-SB
4. Motor Control Center 1A36*

(See Safe Shutdown Analysis in Case of Fire, Table 9.5B-4c for a list of support equipment for the major components listed above.)

5. Cables for the following systems:

AH-15 *
AH-16 *
WC-2 *
SGR *

EQUIPMENT IN AREA: This fire area contains redundant Safe Shutdown Train "A" and "B" safe shutdown equipment. This equipment provides cooling for the Main Control Room fire area. Nonsafety backup cooling systems are available upon loss of cooling due to a fire in Fire Area 12-A-HVIR. Shutdown can also be achieved and maintained from Fire Area 1-A-ACP (FAAACP) upon evacuation of the Main Control Room. Refer to CP&L's 2/24/84 submittal, Attachment 1, Pages 48 and 49 for more details.

COMPLIANCE: The design complies with Appendix R, Section III.G.2.a because capability to shutdown the plant may be achieved from an alternate location to the Control Room. For details, refer to CP&L's 2/24/84 submittal, Attachment 1, Pages 48 and 49.

DEVIATION REQUESTED: None

CONCLUSION: Capability to shutdown the plant is not affected by loss of equipment by fire in this fire area. This fire area is also protected by an early warning ionization detection system. Therefore, the requirements of Appendix R, Section III.G.2.a have been met.

FIRE AREA: 12-I-ESWPA FIRE ZONES: None

SSA AREA: FCIESA

DRAWING: CAR-SH-SK-668S27

PLANT LOCATION: Emergency Service Water Intake Structure (main reservoir)

DESCRIPTION OF EQUIPMENT NEEDED FOR SAFE SHUTDOWN IN THE FIRE AREA:

1. Air Handler AH-86
2. Electric Heating Coil 120 SA
3. Exhaust Fan 88
4. Emergency Service Water Pump P1A-SA
5. Motor Control Center 480V MCC# 1A32-SA

   (See Safe Shutdown Analysis in Case of Fire, Table 9.5B-4c for a list of support equipment for the major coponents listed above.)

6. Cable for the following systems:

   AH-86
   SW

EQUIPMENT IN THE AREA: Safe shutdown SA train cable and equipment are located within the fire area. No SB train equipment and cable is located within the fire area.

COMPLIANCE: This design is in compliance with Appendix R, Section III.G.2.a (see CP&L's 2/24/84 submittal, Attachment 1, General Comments, Page 69).

DEVIATIONS REQUESTED:

1. Provision of fire-rated door in the exterior wall.

(For details, refer to CP&L's 2/24/84 submittal, Attachment 1, Page 69)

CONCLUSION: Only safe shutdown equipment and cable of the Train "A" are located within the area. This area is also protected by ultraviolet flame detection provided over the emergency service water pumps and ionization smoke detection in the electrical equipment room. Therefore, the requirements of Appendix R, Section III.G.2.a have been met.

FIRE AREA: 12-I-ESWPB FIRE ZONES: None

SSA AREA: FCIESB

DRAWING: CAR-SH-SK-668S27

PLANT LOCATION: Emergency Service Water Intake Structure (Main Reservoir)

DESCRIPTION OF EQUIPMENT NEEDED FOR SAFE SHUTDOWN IN THE FIRE AREA:

1. Air Handler AH-86
2. Electric Heating Coil EHC 120
3. Exhaust Fan E88 1B-SB
4. Emergency Service Water Pump P1B-SB
5. Motor Control Center 480V MCC 1A32-SA

   (See Safe Shutdown Analysis in Case of Fire, Table 9.5B-4c for a list of support equipment for the major component listed above.)
6. Cable for the following systems:

   AH-86
   SW

EQUIPMENT IN THE AREA: Safe shutdown SB train cable and equipment are located within the fire area. No SA train equipment and cable is located within the fire area.

COMPLIANCE: This design is in compliance with Appendix R, Section III.G.2.a (see CP&L's 2/24/84 submittal, Attachment 1, General Comments, Page 71).

DEVIATIONS REQUESTED:

1. Provision of fire-rated door in the exterior wall.

(For details, refer to CP&L's 2/24/84 submittal, Attachment 1, Page 71.)

CONCLUSION: Only safe shutdown equipment and cable of the SB train are located within the area. This area is also protected by ultraviolet flame detection provided over the emergency service water pumps and ionization smoke detection in the electrical equipment room. Therefore, the requirements of Appendix R, Section III.G.2.a have been met.

FIRE AREA: 12-0-TA FIRE ZONES: None

SSA AREA: FCOTKA

DRAWING: CAR-SH-SK-668S26

PLANT LOCATION: Diesel Fuel Oil Storage Tank Area

DESCRIPTION OF EQUIPMENT NEEDED FOR SAFE SHUTDOWN IN THE FIRE AREA:

1. Diesel Fuel Oil Storage Tank 1A

EQUIPMENT IN AREA: The fire area is a steel-lined concrete room containing diesel fuel oil. No additional equipment is located in the fire area. The redundant B fuel oil storage tank is separated from this fire area by a three-hour fire-rated barrier.

COMPLIANCE: This design is in compliance with III.G.2.a.

DEVIATION REQUESTED: None

CONCLUSION: This fire area meets the requirements of Appendix R Part III.G.2.a.

FIRE AREA: 12-0-TB FIRE ZONES: None

SSA AREA: FC0TXB

DRAWING: CAR-SH-SK-668S26

PLANT LOCATION: Diesel Fuel Oil Storage Tank Area

DESCRIPTION OF EQUIPMENT NEEDED FOR SAFE SHUTDOWN IN THE FIRE AREA:

1. Diesel Fuel Oil Storage Tank 1B

EQUIPMENT IN AREA: The fire area is a steel-lined concrete room containing diesel fuel oil. No additional equipment is located in the fire area. The redundant A fuel oil storage tank is separated from this fire area by a three-hour fire-rated barrier.

COMPLIANCE: Redundant equipment is located in a separate fire area.

DEVIATION REQUESTED: None

CONCLUSION: This fire area meets the requirements of Appendix R, Part III.G.2.a.

FIRE AREA: 5-0-BAL FIRE ZONES: None

SSA AREA: FPOBAL

DRAWING: CAR-SH-SK-668S26

PLANT LOCATION: Diesel Fuel Oil Storage Tank Area El. 242.25'

DESCRIPTION OF EQUIPMENT NEEDED FOR SAFE SHUTDOWN IN THE FIRE AREA:

Cables for the following systems:

DG *
E-85 *
FO *

EQUIPMENT IN AREA: Redundant cables in conduit and electrical junction boxes in this area were located in close proximity.

COMPLIANCE: Safety Train B cable and junction boxes were enclosed in three-hour fire rated enclosure (for details, refer to CP&L's 2/24/84 submittal, Attachment 1, Page 54, "Modifications"); therefore, the design is in compliance with Appendix R, Section III.G.2.a.

DEVIATION REQUESTED:

1. Three-hour fire-rated doors at the access stairways into the building (for details, refer to CP&L's 2/24/84 submittal, Attachment 1, Page 54, "Exempt Request and Justification").

CONCLUSION: The Safety Train B conduit and junction boxes were enclosed within a three-hour enclosure and a early warning ionization detection is also provided. Therefore, the requirements of Appendix R, Section III.G.2.a have been met.

FIRE AREA: 5-S-BAL

FIRE ZONES: None

SSA AREA: FPSASW

DRAWING: CAR-SH-SK-668S28

PLANT LOCATION: Emergency Service Water Screening Structure (Auxiliary Reservoir)

DESCRIPTION OF EQUIPMENT NEEDED FOR SAFE SHUTDOWN IN THE FIRE AREA: None

EQUIPMENT IN AREA: Screenwash pumps, nonsafety related, service water valves: MOV-3SW-B1SA-1, 3SW-B2SB-1, associated cables in conduit and junction boxes.

DEVIATIONS REQUESTED: For details, refer to CP&L 2/24/84 submittal, Attachment 1, Page 37.

1. Provision of detection in the fire area.
2. Provision of fire-rated door in the exterior wall.

COMPLIANCE: Not required for Section III.G.2. No safe shutdown equipment is contained within this fire area.

CONCLUSION: The above-listed service water valves are required only during an accident condition to isolate the Auxiliary Reservoir from the Main Reservoir. In the very unlikely event of a fire in this area, should the valves be destroyed by fire, the service water system is supplied with water from the main reservoir.

Safe Shutdown Analysis Description

(originally submitted to H.R. Denton, Director, NRR, by letter from M.A. McDuffie, Senior Vice President, Nuclear Generation, CP&L, dated February 24, 1984 (Serial: NLS-84-090))

(with revisions of 10/10/84)

Preface

This narrative has been written to address informal comments made by the NRC Auxiliary Systems Branch (ASB) reviewer during a Fire Protection meeting held on December 15, 1983 in Bethesda, Maryland.

Introduction

In the preparation of the SHNPP Safe Shutdown Analysis in Case of Fire plant functions were reviewed and certain systems, functions and components needed to assure plant capability to achieve and maintain safe plant shutdown identified.

The following narrative describes those systems and functions which require protection and components which formulate the basis of the safe shutdown analysis.

Safe Shutdown Systems Identification

Design Basis Event -

For the purpose of this review and submittal on the safe shutdown capability of SHNPP, the spectrum of the postulated exposure fires in a given plant area will involve either in situ or transient combustibles located in or adjacent to that area. The effects of such fires are analyzed to determine if they may adversely impact systems, structures or components essential to safe plant shutdown. No other design basis event is assumed to occur concurrent with the postulated fire.

In general, recognizing the confined physical location of such fires and the operational flexibility and physical diversity of systems available to achieve safe shutdown, one can assume that the plant's defense in depth fire protection features will limit fire damage to the extent that unaffected plant systems will be able to attain safe shutdown. An extensive effort would be required to identify the effects of postulated fires in all potential plant locations on all the plant systems which are normally available to support safe shutdown. As a conservative alternative to this approach, a minimum set of plant systems (safe shutdown systems) and components is identified in response to the requirements of 10CFR50 Appendix R. The identified systems and components can achieve and maintain safe shutdown regardless of the location of the fire and the loss of offsite power. Demonstration of adequate protection of this minimum set of systems from the effects of postulated fires constitutes an adequate and conservative demonstration of the ability to achieve and maintain safe shutdown for the purposes of fire protection.

The safe shutdown systems selected for SHNPP will be capable of achieving and maintaining subcritical conditions in the reactor, maintaining reactor coolant inventory, maintaining reactor coolant pressure control, removing decay heat, achieving cold shutdown conditions within 72 hours and maintaining cold shutdown conditions thereafter.

Assumptions and Definitions

The following are the initial assumptions used in this review:

- The unit is operating at 100% power upon the occurrence of a fire and postulated concurrent loss of offsite power.
- The reactor is tripped either manually or automatically.
- The only failures considered are the postulated loss of offsite power and those directly attributable to the fire.
- No piece of equipment required for safe shutdown is assumed to be out-of-service for maintenance except as allowed by technical specifications

Definitions for the various modes of operation:

HOT STANDBY - Reactor at 0% thermal rated power excluding decay heat, k_{eff} less than 0.99 and RCS average temperature greater than or equal to 350°F.

HOT SHUTDOWN - Reactor at 0% rated thermal power excluding decay heat, K_{eff} less than 0.99 and RCS average temperature less than 350°F but greater than 200°F.

COLD SHUTDOWN - Reactor at 0% rated thermal power excluding decay heat, K_{eff} less than 0.99 and RCS average temperature less than or equal to 200°F.

Safety Functions

The following is a list and description of the specific shutdown functions necessary to satisfy Appendix R acceptance criteria:

(1) Reactor Reactivity Control

(2) Reactor Coolant System Inventory Control

(3) Reactor Coolant Pressure Control

(4) Reactor Heat Removal

(5) Process Monitoring

(6) Miscellaneous Supporting Functions

Reactivity Control

In accordance with the technical specifications, the reactor reactivity control function will provide sufficient shutdown margin to ensure that (1) the reactor can be made subcritical from all operating conditions, (2) the reactivity transients associated with postulated accident conditions are controllable within acceptable limits, and (3) the reactor will be maintained sufficiently subcritical to preclude inadvertent criticality in the shutdown condition.

The two means of reactivity control are control rods, which provide the immediate shutdown reactivity, if required to trip the reactor from power, and soluble boron addition from the boric acid tank by the normal charging path, which will maintain adequate shutdown margin for the transition from HOT STANDBY to COLD SHUTDOWN.

No postulated fire will prevent the initiation of a reactor trip either by means of an automatic or a manual actuation. No postulated fire will prevent the addition of soluble boron necessary to maintain required shutdown margin throughout the shutdown period.

Reactor Coolant System Inventory Control

The reactor coolant system inventory control function will ensure sufficient make-up inventory is provided for:

- Reactor coolant system fluid losses due to reactor coolant system leakage as allowed by the technical specifications, and
- Shrinkage of the reactor coolant system water volume during cool-down from HOT STANDBY to COLD SHUTDOWN conditions.

Adequate performance of this function is demonstrated by maintaining reactor coolant level within the pressurizer.

For the assumed fires, reactor coolant make-up is achieved by operation of the charging of the chemical and volume control system. A Boron Injection Tank (BIT) injection path may also be used for added operational flexibility.

For the assumed fires in this analysis, inventory make-up to the RCS will be from the Boric Acid Tank by the normal charging path. The negative reactivity inserted by the control rods and boron addition will maintain the reactor core subcritical by the required SHUTDOWN MARGIN while cooling down the RCS.

Reactor Coolant Pressure Control

Reactor coolant pressure control ensures that (1) reactor coolant system integrity is maintained by providing overpressure protection, (2) fuel cladding integrity is protected by restricting power operation to within the nucleate boiling region by maintaining reactor coolant system (RCS) pressure and temperature within Technical Specification limits, and (3) sufficient sub-cooling margin is provided to minimize void formation within the reactor vessel. RCS pressure can be maintained by energization of the pressurizer

heaters. Overpressure protection of the RCS is provided for in HOT STANDBY (prior to cooldown and depressurization) by the pressurizer safety valves. Added flexibility is provided by the pressurizer power operated relief valves (PORVs) and pressurizer auxiliary spray valves. After depressurization, when the RCS is aligned with the Residual Heat Removal System (RHR) overpressure protection is provided by RHR suction relief valves or by activating the pressurizer PORV low pressure setpoint capability. RCS pressure-temperature will be maintained within Technical Specification limits by controlling cooldown.

Thus, for the assumed fires, adequate subcooled margin is achieved and maintained by operator action using pressure and temperature information received from the RCS pressure and temperature instrumentation.

Reactor Heat Removal

The reactor heat removal function is capable of transferring fission product decay heat from the reactor core at a rate such that specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded. Following a reactor trip with an assumed loss of offsite power, decay heat is initially removed by natural circulation of the RCS, heat transfer to the main steam system through the steam generators, and operation of main steam PORVs. Decay heat removal requires that sufficient feedwater be supplied to the steam generators to make up for the inventory discharged as steam by the main steam power operated relief valves. The auxiliary feedwater system (AFW) will supply sufficient feedwater to make up for inventory losses during initial maintenance of HOT STANDBY and subsequent cooldown. Feedwater is available from the condensate storage tank, and alternatively from the emergency service water system. Feedwater may be supplied to the steam generators by the motor-driven auxiliary feed pump or by the steam turbine-driven auxiliary feed pump.

After reduction of reactor coolant system temperature below 350°F, the RHR system is used to establish long term core cooling through the removal of decay heat from the RCS to the environment through the component cooling water (CCW) system and the emergency service water system.

Process Monitoring

The process monitoring function is capable of providing direct readings of those plant process variables necessary for plant operators to perform and/or control the previously identified functions.

Various process monitoring functions must be available to achieve and maintain the reactor coolant make-up, pressure control and decay heat removal functions adequately. For the assumed fires, maintenance of HOT STANDBY requires that pressurizer level and RCS pressure instrumentation be available. RCS temperature is maintained during HOT STANDBY by proper decay heat removal via steam generators and main steam PORVs. In the natural circulation mode of operation, the difference between the hot-leg and cold-leg wide range temperatures (T_h-T_c) provides a direct indication of the existence of a natural circulation condition.

Operating personnel, by monitoring RCS pressure and hot-leg temperature (T_h) instrumentation and by manual control of the pressurizer heaters, will maintain RCS pressure to ensure that adequate sub-cooled margin is achieved for the RCS temperature which existed during this period. Maintenance of pressurizer level control is achieved by monitoring pressurizer level instrumentation and manual control of CVCS charging flow.

Maintenance of HOT STANDBY also requires the control of the secondary system to the compensate for variations in the primary system performance. Steam generator level and pressure are available to ensure adequate monitoring of controlled decay heat removal. Steam generator level control is achieved by manipulation of AFW system flow, based on steam generator level indication.

Steam generator pressure is monitored for controlled manipulation of secondary system pressure.

The transition from HOT STANDBY to HOT SHUTDOWN will use the instrumentation discussed above to monitor the natural circulation conditions, subcooling margin, heat removal and compliance with the plant pressure/temperature limits as they pertain to the low temperature overpressure protection of the RCS (cold leg temperature is conjunction with RCS Pressure).

Miscellaneous Support Functions

The systems and equipment used to perform the previous functions may require miscellaneous supporting functions such as process cooling and ac/dc power. These supporting functions will be available and capable of providing the support necessary to ensure acceptable performance of the previously identified safe shutdown functions. For the purpose of the fire scenarios, the various systems required to provide support to safe shutdown equipment or systems are the emergency power systems, Emergency Service Water System, HVAC and the CCW system.

Description of Safe Shutdown Systems

The following is a description of systems and components required to attain safe shutdown in response to the requirements of Appendix R. Redundancy of equipment is specified for each component. In some cases, supporting or backup equipment which may be available to provide operator flexibility is listed also.

Emergency Power Supply (6.9KV, 480Vac, 120Vac, 125Vdc).

Emergency power supply for safe shutdown equipment and instrumentation is required since loss of offsite power is postulated. The required emergency power equipment includes the emergency diesel generators (2) and their

respective support equipment, associated AC power from electrical distribution equipment, the Class 1E batteries, battery chargers, inverters, and the power cabling between this equipment and the vital switchgear or equipment to be supported. Diesel generator can be monitored from the ACP and controlled locally as required. Either of the two emergency AC power supply buses and associated powertrains are adequate for safe shutdown.

Auxiliary Feedwater System

One of three AFW pumps (two motor driven, one turbine driven) and associated valves are required for safe shutdown. These components are controllable from the Auxiliary Control Panel, if the Control Room becomes uninhabitable.

The normal AFW system water supply is the condensate storage tank with emergency service water available for use as a back-up water supply.

Residual Heat Removal System

One of two residual heat removal flow paths is required to reach COLD SHUTDOWN. This requires an RHR pump, heat exchanger, and valves in the flow path to be available. If the control room is uninhabitable, the required equipment can be operated from the Auxiliary Control Panel.

Charging and Boration

One of three centrifugal charging pumps is required for safe shutdown. The centrifugal pumps and the boric acid transfer pumps and necessary valves are controllable from the Auxiliary Control Panel, if the Control Room becomes uninhabitable.

Two separate and independent charging and boration flow paths have been identified, any one of which is adequate for safe shutdown. The Boric Acid Tank has sufficient boric acid solution to achieve cold shutdown from worst

initial core condition and to provide make-up for reactor coolant system inventory control. As a backup to the normal boric acid supply-boric acid tank-the operator can align the charging pump suction to the refueling water storage tank.

Component Cooling Water System

The CCW system is required to provide cooling for the RHR system. One of the three CCW pumps and one of two CCW heat exchangers is required for safe shutdown. The CCW pumps are controllable from the Auxiliary Control Panel, if the Control Room becomes uninhabitable.

Emergency Service Water System

The ESW system provides cooling water at a maximum temperature of 95°F to remove essential plant heat loads by utilizing the Auxiliary Reservoir or its backup, the Main Reservoir. One of two ESW pumps (controllable at the Auxiliary Control Panel) is required for safe shutdown.

Main Steam System

Portions of the main steam system are required for safe shutdown to maintain water inventory and to provide steam generator pressure relief and heat removal. The active components in this system consist of the main steam isolation valves, the main steam power operated relief valves, isolation valves to auxiliary feedwater turbine and the main steam safety valves. Steam generator pressure relief and heat removal can be accomplished with the main steam power operated relief valves.

Ventilation

All pumps and electrical equipment of the systems that are required for safe shutdown are located in area or rooms provided with redundant safety related HVAC Systems.

Control Room environment is also maintained by redundant HVAC Systems.

Instrumentation

Instrumentation required for safe shutdown consist of indication for steam generator level and pressure, RCS pressure and hot and cold leg temperature pressurizer level and pressure, condensate storage tank level and boric acid tank level. Cooldown can be accomplished using a single reactor coolant loop and steam generator; instrumentation would be required for that loop and steam generator. Four instrument ac channels provide power for the instrumentation. Channels I and III are powered from either the 125Vdc SA battery or the 480Vac safety related system (SA). Channels II and IV are powered from either the 125Vdc SB battery or the 480Vac safety related systems (SB). The batteries are normally supplied by the chargers.

Sufficient instrumentation is available assuming one of the safety buses is available.

TABLE 9.5B-3 REVISION 2

SAFE SHUTDOWN ANALYSIS IN CASE OF FIRE

Fire Area: 1-A-BAL, CARS Area Identifier FAABAL
Reactor Auxiliary Building, Balance of Building EL 190.00, 216.00, 261.00, 286.00

Fire Area Passive Protection

Fire area 1-A-BAL is enclosed by 3-hour fire rated barriers. Openings through the fire area boundaries are protected with 3-hour rated fire doors, 3-hour fire dampers, mechanical, electrical and HVAC penetrations are sealed with 3-hour fire resistance rating material. Stairways are enclosed by 2-hour rated enclosures provided with 1-1/2-hour fire rated doors and 1-1/2-hour fire dampers.

General Comments

Fire Area 1-A BAL is the largest fire area in the plant. It occupies five elevations in the Reactor Auxiliary Building; 190, 216, 236, 261 and 286. For the Safe Shutdown Analysis this fire area was divided into three, as shown in the attached isometric. To justify this approach certain floors and walls within the fire area were upgraded to 3-hour fire resistance barriers with exemptions requested from provision of fire dampers as detailed in the fire damper exemption request. In such cases all mechanical, electrical and HVAC penetrations are sealed with 3 hour fire resistive material.

Safe Shutdown Analysis Area A consists of the following fire zones:

Elevation 190

1-A-1-PA	(FAABL1-1-PA)	12,800 BTU/SF
1-A-1-PB	(FAABL1-1-PB)	(12,500) BTU/SF — 14,679
1-A-1-ED	(FAABL1-1-ED)	Negligible
1-A-1-FD	(FAABL1-1-FD)	Negligible

Elevation 216

1-A-2-COR	(FAABL2-2-COR)	Negligible
1-A-2-MP	(FAABL2-2-MP)	(3,800) BTU/SF — 7,339
1-A-2-PT	(None)	Negligible

Elevation 236

1-A-3-COR	(FAABL3-3-COR)	7,000 BTU/SF
1-A-3-MP	(FAABL3-3-MP)	(2,500) BTU/SF — 4,335
1-A-3-PB	(FAABL3-3-PB)	(12,500) BTU/SF — 16,190
1-A-3-COMI	(FAABL3-3-COMI)	(26,900) BTU/SF — 43,633
1-A-3-COME	(FAABL3-3-COME)	(39,000) BTU/SF — 53,092
1-A-3-COMB	(FAABL3-3-COMB)	(36,600) BTU/SF — 63,753
1-A-3-TA	(FAABL3-3-TA)	Negligible
1-A-34-RHXA	(FAABL3-3-RHXA)	(8,000) BTU/SF — 15,495
1-A-34-RHXB	(FAABL3-3-RHXB)	Negligible

Elevation 261

1-A-4-CHFA (FAABL4-4-CHFA) 68,500 BTU/SF — 114,699
1-A-4-CHFB (FAABL4-4-CHFB) 59,200 BTU/SF — 95,053
1-A-4-COMI (FAABL4-4-COMI) 36,000 BTU/SF — 61,392
1-A-4-TA (FAABL4-4-TA) Negligible

Safe Shutdown Analysis Area B consists of the following fire zones:

Elevation 261
1-A-4-COR (FAABL4-4-COR) 83,600 BTU/SF — 141,445
1-A-46-ST (FAABL4-4-ST) Negligible
1-A-4-COMB (FAABL4-4-COMB) 49,000 BTU/SF — 89,258
1-A-4-COME (FAABL4-4-COMB) 21,400 BTU/SF — 38,514
1-A-4-CHLR (FAABL4-4-CHLR) 155,296 BTU/SF
Elevation 286
1-A-5-CEH (FAABL5-5-CEH) Negligible
1-A-5-HVA (FAABL5-5-HVA) 24,500 BTU/SF
~~1-A-5-HVB (FAABL5-5-HVB) 61,700 BTU/SF~~
1-A-5-HV3 (FAABL5-5-HV3) Negligible
1-A-5-BATN (FAABL5-5-BATN) 51,000 BTU/SF — 263,405

Safe Shutdown Analysis Area C consists of the fire zone:

1-A-5-HVB (FAABL5-5-HVB) 61,700 BTU/SF — 114,638

The fire damper exemption request with the detailed table at the end of this report lists the penetrations involved, their size, location and fire loadings in the immediate vicinity on both sides of the penetration. Since the fire loadings listed in the above mentioned table are low or moderate, the exemption from provision of fire dampers in these floors is justified.

Area: 1-A-BAL A

c) Between Service Water Booster Pumps 1A-SA and 1B-SB. Pump 1B-SB is located in Fire Zone 1-A-3-COMB (FAABL3-3-COR).
P1300, C1303, L1303, P1305, C1304, L1401, X1500, P1217, C1208
Trays P1217 and C1208 pass within 20 ft of booster pump 1A-SA in the North-South and East-West directions. Since they cannot convey a fire between the redundant units, they are not provided with fire breaks.

d) Between CVCS charge pumps 1A-SA, 1B-SB, 1C-SAB
P1300, C1303, L1303, X1300

15. In Fire Zones 1-A-4-COMI (FAABL4-4-COMI) and 1-A-4-CHFA (FAABL4-4-CHFA), remove essential cables 12550A, 13285A, and 13286A from cable tray P1808 and reroute cable in separate protected conduit. Extend multicycle sprinklers, actuated by thermal detection, to protect new conduits. Reroute cable in separate protected conduit.

16. In Fire Zones 1-A-4-COMI (FAABL4-4-COMI) and 1-A-4-CHFA (FAABL4-4-CHFA), remove essential cable 13285E from cable tray C1810 and reroute cable in separate protected conduit. Extend multicycle sprinklers, actuated by thermal detection, to protect the new conduit. Reroute cable in separate protected conduit.

Exemption Requests and Justifications

1. Request exemption from installation of fire detection and automatic sprinkler systems throughout the entire Fire Area 1-A-BAL A. Justifications for each fire zone are listed below.

- 1-A-1-PA (FAABL1-1-PA) and 1-A-1-PB (FAABL1-1-PB) - A multi-cycle sprinkler system actuated by thermal detectors is provided throughout the entire fire zone. Manual alarm stations are located inside the fire zone. Hose stations, portable extinguishers are available in and adjacent to the fire zone. The fire loading in 1A-1-PA (FAABL1-1-PA) is low at the 12,800 BTU/SF and in 1-A-1-PB (FAABL1-1-PB) is low at 12,500 BTU/SF. 14,630 14,679

- 1-A-1-FD (FAABL1-1-FD) and 1-A-1-ED (FAABL1-1-ED) - Ionization detections provided throughtout the entire fire zone. Manual alarm stations, portable extinguishers and hose stations are available adjacent to the fire zone. The fire loadings in each zone are negligible.

- 1-A-2-COR (FAABL2-2-COR) - A manual alarm station and hose station arte provided inside the fire zone. The fire loading is negligible (1,000 BTU/SF).

- 1-A-3-TA (FAABL3-3-TA) - No automatic suppression or detection is provided based on negligible combustible loading, less than 1,000 BTU/SF. ft of fire area, low transient combustible loading and cables in conduit. Manual alarm stations are provided in stairways and hoseline backup from RAB stations or yard hydrants is available.

Area: 1-A-BAL A

- 1-A-2-MP (FAABL2-2-MP) - A mutli cycle sprinklers system actuated by thermal detectors is provided in most of the fire zone over safety related equipment. Hose stations, portable extinguishers and manual alarm stations are provided in the fire zone. The fire loading is low at 3,800 BTU/SF. 7,339

- 1-A-2-PT - Hose stations, portable extinguishers and manual alarm stations are available adjacent to the fire zone. The fire loading is negligible (1,000 BTU/SF).

- 1-A-3-MP (FAABL3-3-MP) - A multi-cycle sprinkler system actuated by thermal detectors is installed in almost the entire fire zone over safety related equipment. Hose stations, portable extinguishers and manual alarm stations are available in and adjacent to the fire zone. The fire loading in this zone is low at 2,500 BTU/SF. 4,335

- 1-A-3-COR (FAABL3-3-COR) - Approximately half the corridor is provided with multi-cycle sprinklers actuated by thermal detectors to protect safety related equipment. Hose stations, portable extinguishers and manual alarm stations are available in and adjacent to the fire zone. The fire loading in this zone is low at 7,000 BTU/SF.

- 1-A-3-PB (FAABL3-3-PB) - A multi-cycle sprinkler system actuated by thermal detectors is provided throughout most of the fire zone except for two small rooms along the west wall and a platform at elevation 247.00. Ionization detection is provided throughout the entire fire zone. Hose stations, portable extinguishers and manual alarm stations are available in and adjacent to the fire zone. The fire loading in the fire zone is low at 12,500 BTU/SF. 16,190

- 1-A-34-RHXA (FAABL3-34-RHxA) and 1-A-34-RHXB (FAABL3-34-RHxB) - Hose stations, portable extinguishers and manual alarm stations are available adjacent to the fire zone. The fire loadings in both fire zones are low at 8,000 BTU/SF. ft and negligible at less than 1,000 BTU/SF, respectively. 15,995

- 1-A-3-COME (FAABL3-3-COME) - A multi-cycle sprinkler system, actuated by thermal detection is installed over cable trays in the corridor, covering approximately 35 percent of the fire zone. Ionization detection is provided over the entire fire zone. Manual alarms stations are available in and adjacent to the fire zone. Hose stations and portable extinguishers are available and adjacent to the fire zone. ARE LOW AT 53,092

- 1-A-3-COMI (FAABL3-3-COMI) - A multi-cycle sprinkler system actuated by thermal detectors is provided over cable tray runs in the corridor. Early warning ionization smoke detection is provided throughout the fire zone except over the boron recycle holdup tank cubicle at the southern end of the fire zone, column line 24Z to 18Z. Hose stations, portable extinguishers and manual alarm stations are available in and adjacent to the fire zone.

ARE LOW AT 93,633

Area: [illegible]

- 1-A-3-COMB (FAABL3-3-COMB) - Multi-cycle sprinklers actuated by thermal detectors are provided over safety train A and B cable trays and most of the fire zone. A section between columns 41 to 43, D to E. Early warning ionization detection is provided throughout the fire zone. Manual alarm stations are available in and adjacent to the fire zone. Hose stations and portable extinguishers are available adjacent to the fire zone. The fire loading is low at 36,600 BTU/SF. 63,753

- 1-A-34-RHXA (FAABL3-34-RXHA) - Hose stations, portable extinguishers and manual alarm stations are available adjacent to the fire zone. The fire loading is low at 8,000 BTU/SF. 15,995

- 1-A-34-RHXB (FAABL3-34-RXHB) - Hose stations, portable extinguishers and manual alarm stations are available adjacent to the fire zone. The fire loading is neglibible (less than 1,000 BTU/SF).

- 1-A-4-CHFA (FAABL4-4-CHFA) and 1-A-4-CHFB (FAABL4-4-CHFB)- Early warning ionization detection is provided throughtout the entire fire zone. Multicycle sprinklers actuated by thermal detection are provided over the charcoal filter unit and safety related cable trays. The combustible loading in this fire zone is low ~~(68,5000~~ BTU/SF). Manual alarm stations, portable fire extinguishers, and hose stations are available in, and adjacent to the fire zone. MODERATE AT 114,699

- 1-A-4-COMI (FAABLY-4-COMI) - Early warning ionization detection is provided throughtout the entire fire zone. Multicycle sprinklers actuated by thermal detection are provided over the cooridor and safety related cable trays. The combustible loading in this fire zone is low (36,000 BTU/SF). Manual alarm stations, portable fire extinguishers, and hose stations are available in, and adjacent to the fire zone. 61,392

- 1-A-4-TA (FAABLY-4-TA) - No automatic fire detection or suppression is provided based on negligible combustible loading (less than 1,000 BTU/SF). A manual alarm station is provided in this fire zone and portable fire exrtinguishers and hose stations are available in adjacent fire zones.

2. Request exemption from providing 1 hour fire rated barriers in the following fire zones:

- 1-A-3-MP (FAABL3-3-MP) - Exemption is requested from 1 hour separation of air handlers AH-11(1B-SB) and AH-11(1A-SA) based on negligible combustible load. The redundant counterparts are 9 feet apart and a 6 inch curb is provided to prevent oil spills. Multi-cycle sprinklers, actuated by thermal detection were added in the zone because of other redundant air handling units more than 20 feet apart. Manual alarm stations, hose stations and portable extinguishers are available in and adjacent to the fire zone. Fireloading in the fire zone is low at 2,500 BTU/SF. 4,335

Area: 1-A-BAL A

- 1-A-3-PB (FAABL3-3-PB) - Exemption from separation by 1 hour rated enclosure is requested of air handling units AH-6-(1B-SB) and AH-7(1B-SB) from AH-6(1A-SA) and AH-7(1A-SA) located too close to meet separation criteria in sprinklered areas. These units are located approximately 10 feet apart from their redundant counterparts. There are intervening combustibles. Multi-cycle sprinklers, actuated by thermal detectors are provided in almost the entire fire zone. Early warning ionization smoke detection is provided throughout the entire fire zone. Hose stations, portable extinguishers and manual alarm stations are available in and adjacent to the fire zone. Fire loading in the fire zone is low at (12,500 < 16,190 BTU/SF. Floor drains will drain any oil spill from the units.

3. Exemptions are requested from consideration of intervening combustibles in the case of IEEE-383 qualified cable insulation running in ladder type open cable trays near ceiling level between the following pieces of equipment listed by fire zone below:

- 1-A-3-PB- Auxiliary Feedwater Pumps P1A-SA, and P1X-SAB. The cable trays run in excess of 14 feet vertical distance from the pumps. The pumps are located approximately 30 feet apart and are separated by 10 foot high walls. These walls extend 16'-3" and 18'-3 perpendicular from the west wall at column B. See modification 14a) for description of location of fire breaks in cable trays. Multi-cycle sprinklers, actuated by thermal detectors are installed in the fire zone over all safety related equipment. Ionization detection is provided throughout the fire zone. Hose stations, portable extinguishers and manual alarm stations are available in and adjacent to the fire zone. Fire loading in the fire zone is low at (12,500 < 16,190 BTU/SF. ft. Floor drains are installed.

- Component cooling water pumps 1B-SB and 1C-SAB. The cable trays run in excess of 14 feet vertical distance from the pumps. Pump 1C-SAB is required to operate during maintenance outage of pump 1A-SA. These pumps are located more than 100 feet apart horizontally. Train B cable trays K1808, P1803, C1808 and L1801 are located approximately 10 feet horizontally to the west and over 20 feet above CCW pump 1C-SAB. All other cables are run in conduit. See modification 14.b) for description of location of fire breaks in cable trays.

  Mult-cycle sprinklers, actuated by thermal detectors are installed in the fire zone over all safety related equipment. Ionization detection is provided throughout the fire zone. Hose stations portable extinguishers and manual alarm stations are available in and adjacent to the fire zone. Fire loading in the fire zone is (12,500 < 16,190 BTU/SF. Floor drains are installed.

- Component cooling water heat exchanger 1A-SA and 1B-SB. The cable tray described in the CCW pump exemption above are also between the CCW heat exchangers. The heat exchangers are also over 100 feet apart.

Area: 1-A-BAL A

- Service Water Booster Pumps 1A-SA and 1B-SB, the latter pump is located in Fire Zone 1-A-3-COMB (FAABL3-3-COMB).

  The cable trays run in excess of 14 feet vertical distance from the pumps. These pumps are located about 180 feet apart but each has less than 20 feet horizontal distance from cable trays running in the area. See modification 14.c) for description of location of fire breaks in cable trays.

  Multi-cycle sprinklers actuated by thermal detectors are installed over safety-related equipment in Fire Zone 1-A-3-PB (FAABL3-3-PB), where Pump 1A-SA is located and Fire Zone 1-A-3-COMB (FAABL3-3-PB), where Pump 1B-SB is located. Ionization smoke detection is provided throughout both fire zones.

  Fire loading in Fire Zone 1-A-3-PB (FAABL3-3-PB) is low at 12,500 BTU/SF and in Fire Zone 1-A-3-COMB (FAABL3-3-COMB), it is low at 16,600 BTU/SF. Hose stations, portable extinguishers, and manual alarm stations are available in and adjacent to the fire zones. Floor drains are installed.

  16,190

  63,753

- Charging Pumps 1A-SA, 1B-SB, and 1C-SAB. The cable trays run in excess of 14 feet vertical distance from the pumps and are located approximately 17 feet to the east. These trays are also located outside the pump rooms. See Modification 14a for a description of the location of fire breaks in the cable trays.

  Multi-cycle sprinklers actuated by the thermal detectors are installed in almost the entire fire zone. Ionization smoke detection is provided throughout the fire zone. Hose stations, portable extinguishers, and manual alarm stations are available in and adjacent to the fire zone. Fire loading in the fire zone is low at 12,500 BTU/SF.

  16,190

4. Exemptions are requested from providing 20-foot separation between redundant equipment located in the fire zones below:

- 1-A-3-PB (FAABL3-3-PB) - Component Cooling Water Pump 1A-SA and the pump housing of Component Cooling Water Pump 1C-SAB during maintenance outage of Pump 1B-SB. There is a 21-foot separation from the the motor of each pump. The separation between the motor of Pump 1A-SA and the pump housing of Pump 1C-SAB is 15 feet with no intervening combustibles.

  Multi-cycle sprinklers actuated by the thermal detectors are installed in almost the entire fire zone. Ionization smoke detection is provided throughout the fire zone. Hose stations, portable extinguishers, and manual alarm stations are available in and adjacent to the fire zone. Fire loading in the fire zone is low at 12,500 BTU/SF.

  16,190

  Floor drains are installed. A fire watch will be provided if Pump 1B-SB is out of service for more than seven days.

..... cycle sprinklers actuated by the thermal detectors are installed in almost the entire fire zone. Ionization smoke detection is provided throughout the fire zone. Hose stations, portable extinguishers, and manual alarm stations are available in and adjacent to the fire zone. Fire loading in the fire zone is low at 12,500 16,190 BTU/SF.

5. Exemption to requested from providing a one-hour rated enclosure of the CVCS Charging Pumps 1A-SA, 1B-SB, and 1C-SAB located in Fire Zone 1-A-3-PB (FAABL3-3-PB). The pumps are located approximately 17 feet apart with a three-hour rated 11 foot concrete wall between them. The pumps have a concrete ceiling at Elevation 247. Multi-cycle sprinklers actuated by thermal detection is provided in each pump room and at Elevation 247. Ionization smoke detection is provided throughout the entire fire zone. Hose stations, portable extinguishers, and manual alarm stations are available in and adjacent to the fire zone. 16,190 Fire loading in the fire zone is low at 12,500 BTU/SF. Access into the charging pump rooms is through seismically-designed air-tight doors which have a four to six-inch high step-up. Also, access to Elevation 247 is limited to only a permanent ladder.

Area: 1-A-BAL B. EL. 261.00' and 286.00'
Reactor Auxiliary Building

Safe Shutdown Analysis Drawings CAR-SH-SK-668S12, CAR-SH-SK-668S13, CAR-SH-SK-668S14, CAR-SH-SK-688S15, CAR-SH-SK-668S16, CAR-SH-SK-668S17

Elevation: 261.00' and 286.00' in Reactor Auxiliary Building

See Fire Zones			
	1-A-46-ST	CARS Zone	FAABL4-46-ST
	1-A-4-CHLR	CARS Zone	FAABL4-4-CHLR
	1-A-4-COMB	CARS Zone	FAABL4-4-COMB
	1-A-4-COME	CARS Zone	FAABL4-4-COME
	1-A-4-COR	CARS Zone	FAABL4-4-COR
	1-A-5-CEH	CARS Zone	NONE
	1-A-5-HVA	CARS Zone	FAABL5-5-HVA
	1-A-5-HV3	CARS Zone	FAABL5-5-HVA
	1-A-5-BATN	CARS Zone	FAABL5-5-BATN

Area Passive Protection

Area passive protection consists of 3 hour fire rated barriers, 3 hour fire rated doors, 3 hour fire rated dampers in ducts passing through fire area boundary, and penetration fire stops. 2 hour fire rated walls with 1 1/2 hour fire rated doors enclose stairwells. Smoke removal is accomplished by normal ventilation.

Area Active Protection

Area active protection is listed by fire zone below:

1-A-46-ST (FAABL4-46-ST) Hose stations, portable fire extinguishers, and manual alarm stations are available adjacent to the fire zone.

1-A-4-CHLR (FAABL4-4-CHLR) Multi-cycle sprinklers actuated by thermal detection are provided throughout the fire zone. Ionization type smoke detection is provided throughout the fire zone. Hose stations, portable fire extinguishers, and manual alarm stations are provided in, and adjacent to the fire zone.

1-A-4-COMB (FAABL4-4-COMB) Early warning ionization detection is provided throughout the fire zone. Multi-cycle sprinklers actuated by thermal detection are provided throughout the fire zone except between column lines D to E, 41 to 10 ft south of 43. Hose stations, fire extinguishers, and manual alarm stations are provided in and adjacent to the fire zone.

Area: 1-A-BAL B

1-A-4-COME (FAABL4-4-COME) Multicycle sprinklers actuated by thermal detection are provided throughout the fire zone except in an area bounded by column lines E, H, 41, and a line parallel to and 10 ft south of column line 43. Early warning ionization detection is provided throughout the fire zone. A manual alarm station is provided in the fire zone. Hose stations, portable fire extinguishers, and manual alarm stations are provided adjacent to the fire zone.

1-A-4-COR (FAABL4-4-COR) Early warning ionization detection is provided throughout the fire zone. A manual alarm station is provided in the fire zone. Hose stations, portable fire extinguishers, and manual alarm stations are provided adjacent to the fire zone.

1-A-5-CEH A portable extinguisher and hose stations are available adjacent to the fire zone. A manual alarm station is provided in the fire zone.

1-A-5-HVA (FAABL5-5-HVA) Early warning ionization detection is provided throughout the fire zone. A hose station, portable extinguisher and manual alarm station are provided in the fire zone.

1-A-5-HV3 (FAABL5-5-HV3) A hose station and manual alarm station are provided in the fire zone. Portable extinguishers are available adjacent to the fire zone.

1-A-5-BATN (FAABL5-5-BATN) Early warning ionization smoke detection is provided throughout the fire zone. Hose stations, portable extinguishers and manual alarm stations are available adjacent to the fire zone.

General Comments

1. Valves MOV2AF-V116SA and MOV2AF-V10SB are the isolation valves for Steam Generator No. 1. Valves MOV2AF-V117SA and MOV2AF-V19SB are the isolation valves for STeam Generator No. 2. Valves MOV2AF-V118SA and MOV2AF-V23SB are the isolation valves for Steam Generator No. 3. All six valves are located in Fire Zone 1-A-46-ST (FAABL4-46-ST). All six valves are normally open and are not required to close during shutdown. Each valve is designed to fail as is, and will therefore fail in a safe position. Therefore, we conclude that no further analysis of these valves is required.

2. Valves AOV-2MS-V1SAB-1, AOV-2MS-V2SAB-1, and AOV-2MS-V2SAB-1 are the main steam isolation valves and are located in Fire Zone 1-A-46-ST (FAABL4-46-ST). All three valves are normally open and are required to close during shutdown. Each valve is designed to fail closed, and will therefore fail in a safe position. Therefore, we conclude that no further analysis of these valves is required.

Area: 1-A-BAL B

3. Valves AOV-3SA-V302SB and AOV-3SA-V307SA are the service air valves for the HVAC Essential Service Chilled Water System Expansion Tanks 1A-SA and 1B-SB respectively, and are located in Fire Zone 1-A-4-CHLR (FAABL4-4-CHLR). These two valves are normally open and are required to close during shutdown. Each valve is designed to fail closed, and will therefore fail in a safe position. Therefore, we conclude that no further analysis of these valves is required.

4. Valves AOV-3FP-V120SB and AOV-3FP-V133SA are the make-up water isolation valves for the Chilled Water Systems Train A and Train B respectively, and are located in Fire Zone 1-A-4-CHLR (FAALB4-4-CHLR). These two valves are normally closed and are required to remain closed during shutdown. Each valve is designed to fail closed. Therefore, we conclude that no further analysis of these valves is required.

Modifications

1. Provide 1 hour fire rated enclosure for the following junction boxes, conduits, and cable trays located in Fire Zone 1-A-4-CHLR (FAABL4-4-COME): junction box B1614-SR3; conduits (protect for entire run or as indicated) 15418Q-SB-2, 17015H-SR3-2 (from floor to box B1614-SR3), 17014N-SR3-2 (from floor to box B1614-SR3), 15437V-SA-1 1/2 (from AH-20 (1A-SA) to column line 28); cable trays X1806-SB, P1816-SB, C1812-SB.

2. Provide 1 hour fire rated enclosure for the following junction boxes, conduits, and cable trays located in Fire Zone 1-A-4-COME (FAABL4-4-COME): junction boxes B1624-SR4, B1746-SB; conduits 16034U-SB-4, 16034V-SB-4, 17012P-SB-4 (from floor to box B1746-SB), 16034Q-SB-4, 16034R-SB-4, 17012R-SB-4 (from box B1746-SB to cable tray), 17022V-SR4-3, 17012P-SB-4; cable trays P1808, C1810 (partial length of run) and conduits 17022V-SR4-3 and 17022S-SR4-3 from floor to box B1624-SR4.

3. Provide 1 hour fire rated barrier, with Class B label fire door, across east-west corridor to separate MCC-1B35-SB from MCC-1A35-SA in Fire Zone 1-A-4-COME (FAABL4-4-COME).

4. Extend existing fire suppression system (multicycle sprinklers actuated by thermal detection) to cover junction box B1624-SR4 located in Fire Zone 1-A-4-COME (FAABL4-4-COME).

5. In Fire Zone 1-A-4-COME (FAABL4-4-COME), remove essential cables 12550A, 13285A, and 13286A from cable tray P1808 and reroute cables in separate conduit protected with 1 hour fire rated enclosure.

6. In Fire Zone 1-A-4-COME (FAABL4-4-COME), remove essential cable 13285E from cable tray C1810 and reroute cable in separate conduit protected with 1 hour fire rated enclosure.

7. Provide 1 hour fire rated enclosure for cable trays P1305-SA, C1300-SA, and L1300-SA from column line H to column line F in Fire Zone 1-A-4-COME (FAABL4-4-COME).

Area: 1-A-BAL B

8. Provide 1 hour fire rated enclosure for the following conduits and cable trays located in Fire Zone 1-A-4-COMB (FAABL4-COMB): conduits 16034P-SB-4, 16034N-SB-4, 16076W-SB-4, 16090G-SB-4, 16074V-SB-4, 15449L-SB-4, 16056S-SB-4, 16088M-SB-4, 16074S-SB-4, 16078F-SB-4, 16078E-SB-4, 17042X-SB-4, 15432V-SB-4; cable trays P1808, C1810, L1810, X1806, P1816, C1812.

9. Extended early warning ionization detection to include the area bounded by column lines 13, 15, B, E in Fire Zone 1-A-5-HV3 (FAABL5-5-HV3).

10. Provide 3 hour fire rated enclosure for the following junction boxes: B1658-SB, located in Fire Zone 1-A-5-HVA(FAABL5-5-HVA); B1648-SB, B1649-SB, B1650-SB, located in Fire Zone 1-A-5-HV3(FAABL5-5-HV3).

11. Cable trays acting as a source of intervening combustibles between redundant safety related equipment will be provided with fire breaks.* The cable trays so equipped are listed below for Fire Zone 1-A-4-CHLR 9FAABL4-4-CHLR).

    a) Between the following redundant safety related equipment:

    HVAC chillers WC-2 (1A-SA) and WC-2 (1B-SB); Chilled Water Pumps P4 (1A-SA) and P4 (1B-SB); Condenser Water Circulating Pumps P7 (1A-SA) and P7 (1B-SB);

    provide cable tray fire breaks in cable trays X1300, C1300, C1311, P1304, P1305, L1301, C1310, C1301, C1309, C1302, C1400, C1200, C1205, P1208, C1201, C1206, L1200, C1213, C1214, L1202, X1202, C1205, C1200, X1204, X1102, C1200, L1202.

Exemption Requests and Justifications

1. Request exemption from provision of automatic fire detection and suppression system throughout the entire Area 1-A-BAL B. Justification, by fire zone, is listed below:

1-A-46-ST (FAABL4-46-ST)	No automatic fire detection or suppression is provided based on negligible combustible loading (1,000 BTU/SF). Manual alarm stations, portable fire extinguishers, and hose stations are available in adjacent fire zones.
1-A-4-CHLR (FAABL4-4-CHLR)	Early warning ionization detection is provided throughout the fire zone. Multicycle sprinklers actuated by thermal detection are provided throughout the fire zone, except in the Volume Control Tank 1X-SN and Chemical Mixing Tank 1X (NNS) areas. The combustible loading in this fire zone is moderate (38,000 BTU/SF). Hose stations, portable fire extinguishers, and manual alarm stations are provided in, and adjacent to, the fire zone. 165,296

* Fire breaks are provided as described in the FSAR Section 9.5-1. As a minimu, at least one fire break will be provided between the redundant safety-related equipment.

Area: 1-A-BAL B

1-A-4-COMB (FAABL4-4-COMB) Early warning ionization detection is provided throughout the fire zone except in the boric acid tank cubicle. Multicycle sprinklers actuated by thermal detection are provided over the corridor and hazardous areas, both areas together comprising about 80 per cent of the fire zone. The combustible loading in this fire zone is low (48,900 BTU/SF). A manual alarm station is provided in this fire zone, and portable fire extinguishers, and hose stations are available in adjacent fire zones. MODERATE (89,768)

1-A-4-COME (FAABL4-4-COME) Early warning ionization detection is provided throughout the entire fire zone. Multicycle sprinklers actuated by thermal detection are provided over the cable tray runs located in the corridor. The combustible loading in this fire zone is low (21,400 BTU/SF). A manual alarm stations is provided in this fire zone, and portable fire extinguishers, and hose stations are available in adjacent fire zones. 38,514

1-A-4-COR (FAABL4-4-COR) Early warning ionization detection is provided throughout the entire fire zone. The combustible loading in the fire zone is moderate (88,600 BTU/SF). A manual alarm station is located in the fire zone, and portable fire extinguishers, and hose stations are available in adjacent fire zones. 141,445

1-A-5-CEH No automatic fire detection or suppression is provided based on negligible combustible loading (1,000 BTU/SF). A manual alarm station is provided in this fire zone. Hose stations, portable fire extinguishers, and manual alarm stations are available in the adjacent fire zone.

1-A-5-HVA (FAABL5-5-HVA) Early warning ionization detection is provided throughout the fire zone. The combustible loading in this area is low (20,400 BTU/SF). Hose stations, portable fire extinguishers, and manual alarm stations are available in, and adjacent to, the fire zone. 24,500

1-A-5-HV3 (FAABL5-5HV3) No automatic fire detection or suppression is provided based on negligible combustible loading (1,000 BTU/SF). Hose stations, portable fire extinguishers, and manual alarm stations are available in, and adjacent to, the fire zone.

1-A-5-BATN (FAABL5-5-BATN) Early warning ionization detection is provided in this fire zone. The fire zone is enclosed with 3 hour fire rated barriers, and the combustible loading is low (51,000 BTU/SF). Hose stations, portable fire extinguishers, and manual alarm stations are available in the adjacent fire zone. HIGH 263,905

2. Request exemption from providing 3 hour fire rated enclosure for the following equipment in the Main Steam Tunnel, Fire Zone 1-A-46-ST (FAABL4-46-ST):

Area: 1-A-BAL B

Valves AOV-2MS-P18SA-1, AOV-2MS-P19SB-1, AOV-2MS-P20SA-1, MOV-2MS-V8SB-1;

Conduits 16058F-SB-1, 15440A-SB-1, 16052T-SB-3, 15436T-SB-3;

Junction Boxes B1573-SB, B1568-SA.

The exemption request is based on negligible in-situ and transient combustibles in the Main Steam Tunnel, Fire Zone 1-A-46-ST (FAABL4-46-ST). The Steam Tunnel is open to the atmosphere, and the heat from a postulated fire would dissipate into the atmosphere. In addition, access to the Main Steam and Feedwater Pipe Tunnels is by stairs which makes introduction of additional transient combustibles, such as a drum of oil, very unlikely.

3. Request exemption from providing 1 hour fire rated enclosures for one train, either SA or SB, of the following HVAC equipment located in Fire Zone 1-A-4-CHLR (FAABL4-4-CHLR): air handling units AH-19 (1A-SA); AH-19 (1B-SB); AH-20 (1A-SA); AH-20 (1B-SB). These air handling units provide local cooling to Fire Zone 1-A-4-CHLR.

The exemption request is based on moderate combustible loading (88,000 ~~155,296~~ BTU/SF) for Fire Zone 1-A-4-CHLR (FAABL4-4-CHLR) as well as provision of many active fire protection features. Active fire protection features in Fire Zone 1-A-4-CHLR (FAABL4-4-CHLR) include early warning ionization detection throughout the entire fire zone, multicycle sprinklers actuated by thermal detection throughout almost the entire fire zone, and provision of hose stations, portable fire extinguishers, and manual alarm station in, and adjacent to the fire zone. Also, the floor drainage system layout would prevent the spread of combustible liquid resulting from an oil spill.

4. Request exemption from providing 1 hour fire rated enclosures for one train, either SA or SB, of the following equipment located in Fire Zone 1-A-4-CHLR (FAABL4-4-CHLR):

HVAC Chillers WC-2 (1A-SA) and WC-2 (1B-SB)
Chilled Water Pumps P4 (1A-SA) and P4 (1B-SB)
Condenser Water Circ Pumps P7 (1A-SA) and P7 (1B-SB)

In each case, Safety Train SA equipment is separated from the redundant Safety Train SB equipment by at least 135 ft.

The exemption request is based on moderate combustible loading (88,000 ~~155,296~~ BTU/SF) for Fire Zone 1-A-4-CHLR (FAABL4-4-CHLR) as well as provision of many active fire protection features. Active fire protection features in Fire Zone 1-A-4-CHLR (FAABL4-4-CHLR) include early warning ionization detection throughout the entire fire zone, multicycle sprinklers actuated by thermal detection throughout almost the entire fire zone, and provision of hose stations, portable fire extinguishers, and manual alarm stations in, and adjacent to the fire zone. Also, the floor drainage system layout would prevent the spread of combustible liquid resulting from an oil spill.

Area: 1-A-BAL B

5. Exemption is requested from consideration of intervening combustibles in the case of IEEE-383 qualified cable insulation running in ladder type open cable trays near ceiling level. The cable trays involved are located between the following safety-related equipment:

HVAC Chiller WC-2 (1A-SA) and WC-2 (1B-SB)
Chilled Water Pump P4 (1A-SA) and P4 (1B-SB)
Condenser Water Circulation Pump (1A-SA) and (1B-SB)

See modification 11a for a description of the locations of fire breaks in cable trays.

Area: 1-A-BAL C, EL. 286.00'
Reactor Auxiliary Building

Safe Shutdown Analysis Drawing CAR-SH-SK-668S16

Elevation: 286.00' Reactor Auxiliary Building

See Fire Zone 1-A-5-HVB CARS Zone FAABL5-5-HVB

Area Passive Protection

Area C is enclosed by 3 hour fire rated barriers, 3 hour rated fire doors, 3 hour rated fire dampers in ducts passing through the area boundary and penetration fire stops. Smoke is removed by normal ventilation.

Area Active Protection

Early warning ionization detection is provided throughout the area. Hose stations, portable fire extinguishers and manual alarm stations are provided in, and adjacent to, the area.

Equipment Exposed to a Common Fire

No redundant safety related equipment would be exposed to a common fire in this area.

General Comments

1. Conduits 15429Q-SA-4, 15429R-SA-4, 15465R-SA-4 and junction box B5099-SA, located in Fire Zone 1-A-5-HVB (FAABL5-5-HVB), contain power cables which feed 480V emergency MCC 1A36-SA. This MCC supplies equipment associated with air handlers AH-15 and AH-16. No modification is required for the conduits and junction boxes because two dedicated air handlers, AH-97 and AH-98, are available as back-up to AH-15 and AH-16. AH-97 and AH-98 are NNS back-up connectable to the diesel generators. Therefore, we conclude that no further analysis of the conduits or junction boxes is required.

2. The function of valve AOV-3CX-W16-SA-1, located in Fire Zone 1-A-5-HVB (FAABL5-5-HVB), provides chilled water to AH-13(1A-SB) and AH-13(1B-SB) from the SA chiller. The postulated fire may result in loss of entire safety train SB including the SA valve. However, redundant system Air Handling Units AH-12(1A-SA) and AH-12(1B-SA), located in ARea 1-A-BAL B, would be functional and capable of safe shutdown. Therefore, we conclude that no further analysis of the valve is required.

3. A postulated fire may affect redundant ductwork originating from the air handler 1-A-5-HVB (FAABL5-5-HVB) and serving Cable Vault B. Loss of ventilation to Cable Vault B will not impair safe shutdown capability. See Fire Area 1-A-5-CSRB (FAABL5-5-CSRB) comment number 2. Therefore, we conclude that no further analysis of the air handlers and ductworks is required.

Area: 1-A-BAL C

Modifications

1. Designate the wall at column line 29 from column line E to containment as 3 hour fire rated since it qualifies by construction. This will provide 3 hour fire rated barrier separation between redundant equipment.

Exemption Request and Justification

1. An exemption is requested from providing fire suppression throughout the entire area. Automatic ionization smoke detection and a manual alarm station are provided in the area. The walls, floor and ceiling enclosing this area are 3 hour fire rated, and the fire loading is ~~Low~~ (61,700 BTU/SF).

MODERATE 114,638

TABLE 9.5B-3 REVISION 2
SAFE SHUTDOWN ANALYSIS IN CASE OF FIRE

Fire Area: 12-A-BAL, CARS Area Identifier FCABAL, Reactor Auxiliary Building

Safe Shutdown Analysis Drawing CAR-SH-SK-668S19

Elevation: 286, 305, and 324 in Reactor Auxiliary Building, Unit 1-2

SHNPP Fire Hazard Analysis, Fire Area 12-A-BAL,
See Fire Zones 12-A-5-DIH CARS Zone FCABL1-5-DIH
12-A-5-CHF CARS Zone (none)
12-A-6-CHF1 CARS Zone (none)
12-A-6-CHF2 CARS Zone (none)
12-A-7-HV CARS Zone (none)

Fire Area Passive Protection

Fire area passive protection consists of 3 hour fire rated barriers enclosing Fire Area 12-A-BAL(FCABAL), 3 hour fire rated doors, 3 hour fire rated dampers in ducts passing through fire area boundary walls and floors, and penetration fire stops. 2 hour fire rated walls with 1 1/2 hour fire rated doors enclose stairwells. Smoke removal is accomplished by normal ventilation.

Fire Area Active Protection

Fire area active protection is listed by fire zone below:

12-A-5-DIH (FCABL1-5-DIH) (El. 286.00') Hose stations, portable fire extinguishers, and manual alarm stations are provided in, and adjacent to the fire zone. Early warning ionization detection is provided throughout the fire zone.

12-A-5-CHF (El. 286.00') Pre-action sprinklers, actuated by thermal detection, are provided over HVAC charcoal filter units E-17 (1X & 2X-NNS), E-18 (1X & 2X-NNS), covering approximately 75 percent of the fire zone area. Hose stations, portable fire extinguishers, and manual alarm stations are provided in, and adjacent to the fire zone. Early warning ionization detection is provided throughout the fire zone.

12-A-6-CHF1 (El. 305.00') Pre-action sprinklers, actuated by thermal detection, are provided over HVAC charcoal filter units E-19 (1X-NNS) and E-20 (1X-NNS), covering approximately 75 percent of the fire zone area. Hose stations, portable fire extinguishers, and manual alarm stations are provided in, and adjacent to the fire zone. Early warning ionization detection is provided throughout the fire zone.

12-A-6-CHF2 (El. 305.00') Pre-action sprinklers, actuated by thermal detection, are provided over HVAC charcoal filter units E-19 (2X-NNS) and E-20 (2X-NNS), covering approximately 75 percent of the

fire zone area. Hose stations, portable fire extinguishers, and manual alarm stations are provided in, and adjacent to the fire zone. Early warning ionization detection is provided throughout the fire zone.

12-A-7-HV (El. 324) Hose stations, portable fire extinguishers, and manual alarm stations are provided in, and adjacent to, the fire zone. Early warning ionization detection is provided throughout the fire zone.

Equipment Exposed to a Common Fire

Various SA and SB cables and equipment in Fire Zone 12-A-5-DIH (FCABL1-5-DIH) could be exposed to a common fire; however, for a fire on this elevation, the function of these units is duplicated by other HVAC equipment located in other fire areas.

General Comments

1. Safe Shutdown Analysis Drawing CAR-SH-SK-668S19 shows only the portion of Fire Area 12-A-BAL (FCABAL) which contains safety-related equipment.

2. Valves SV-3CX-W32-SA-1 and SV-3CX-W33-SB-1 are the chilled water distribution valves for air handling units AH-92 (1A-SA) and AH-92 (1B-SB) respectively. Both valves are the 3 way type, and are designed to fail such that chilled water flow is maintained in the unit. A fire in Fire Zone 12-A-5-DIH (FCABAL1-5-DIH) will not cause either valve to fail in an unsafe position. Therefore, we conclude that no further analysis of these valves is required.

3. The function of the indicated cables, conduit, instrumentation and equipment located on this floor (CAR-SH-SK-668S19) is to support air handling units AH-92 (1A-SA) and AH-92 (1B-SB). These units provide cooling for Motor Control Centers located on elevation 261'. Loss of cooling to these units will not adversely affect shutdown since sufficient cooling can be provided by HVAC units located in other fire areas.

TABLE 9.5B-3 REVISION 2
SAFE SHUTDOWN ANALYSIS IN CASE OF FIRE

Fire Area: 5-S-BAL, CARS Area Identifier FPSASW
Screening Structure

Safe Shutdown Analysis Drawing: CAR-SH-SK-668S28

Elevation: 262 in Auxiliary Reservoir Screening Structure

SHNPP Fire Hazard Analysis, Fire Area 5-S-BAL lists combustible load and detailed information

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Fire Area Passive Protection

Fire area passive protection consists of 3 hour rated fire barriers enclosing the fire area.

Equipment Exposed to a Common Fire

Safety Train A and B equipment and cables in conduit could be exposed to a fire within this fire area. However, the set of equipment exposed to a fire is not required for shutdown.

Exemption Requests and Justification

1. Request exemption from providing detection for Fire Area 5-S-BAL (FPSASW). Combustible loading in the fire area is negligible (less than 1,000 BTU/SF).

2. Request exemption from providing 3 hour rated doors in the exterior wall of the ESW screening structure.

   This exemption is based on negligible combustible loading in the area.

TABLE 9.5B-3 REVISION 2
SAFE SHUTDOWN ANALYSIS IN CASE OF FIRE

Fire Area: S-W-BAL, CARS Area Identifier FPWBAL
All Areas

Safe Shutdown Analysis Drawing (None)

Elevation: 236 in Waste Processing Building

SHNPP Fire Hazard Analysis, Fire Area S-W-BAL lists combustible load and detailed information.

Fire Area Passive Protection

Fire area passive protection consists of 3 hour rated fire barriers enclosing the fire area, 3 hour and 1-1/2 hour rated fire doors, 3 hour rated fire dampers installed inside ducts passing through fire barriers penetration fire stops and redundant train partial separation barriers. Smoke removal is by use of the dedicated HVAC system in the Waste Processing Building Control Room and Cable Vault and of the normal ventilation systems in other portions of the building.

Fire Area Active Protection

Fire area active protection consists of automatic pre-action sprinkler system in portions of the fire area and thermal fire detection for actuation of automatic fire suppression system. Fire extinguishers and manual alarm stations are located in and adjacent to the fire area. Hose stations are located in and adjacent to the fire area and hose streams are available from nearby yard hydrants. Early warning ionization detection is provided in some portions of the fire area.

Equipment Exposed to a Common Fire

Only nonsafety cable could be exposed to a fire within this fire area.

Modifications

No modifications are required.

General Comments

No sketch is required for this fire area.

1. Mechanical valves 3CS-G5SN and 3CS-G6SN, located on elevation 261 between COL 41-42 and 3-F, (part of Fire Area S-W-BAL) are air operated valves required for safe shutdown. They are boric acid filter isolation valves. These valves are normally open and designed to fail in the safe position.

2. Analysis is not required for:

   Power and control cables (no safety train designation) associated with the above valves, ARP-122 backflush control panel, and auxiliary control panel located in the WPB control room.

TABLE 9.5B-3 REVISION 2
SAFE SHUTDOWN ANALYSIS IN CASE OF FIRE

Fire Area: 5-F-BAL, CARS Area Identifier FPFBAL
Balance of Areas

Safe Shutdown Analysis Drawing (None)

Elevation: 261 in Fuel Handling Building

SHNPP Fire Hazard Analysis, Fire Area 5-F-BAL lists combustible load and detailed information.

Comments

Analysis indicates that no equipment in this area is required for safe shutdown.

No sketch is required for this area.

No fire in this area will adversely affect shutdown.

TABLE 9.5B-3 REVISION 2
SAFE SHUTDOWN ANALYSIS IN CASE OF FIRE

Fire Area: 5-F-CHF, CARS Area Identifier FPFCHF
Charcoal Filter Areas

Safe Shutdown Analysis Drawing: (None)

Elevation: 261 in Fuel Handling Building

SHNPP Fire Hazard Analysis, Fire Area 5-F-BAL lists combustible load and detailed information.

Comments

Analysis indicates that no equipment in this area is required for safe shutdown.

No sketch is required for this area.

No fire in this area will adversely affect shutdown.

TABLE 9.5B-3 REVISION 2
SAFE SHUTDOWN ANALYSIS IN CASE OF FIRE

Fire Area: 5-F-FPP, CARS Area Identifier FPFFPP
Fuel Pool Pump Area

Safe Shutdown Analysis Drawing: (None)

Elevation: 261 in Fuel Handling Building, All Units

SHNPP Fire Hazard Analysis, Fire Area 5-F-FPP lists combustible load and detailed information.

Comments

Analysis indicates that no equipment in this area is required for safe shutdown.

No sketch is required for this area.

No fire in this area will adversely affect shutdown.

TABLE 9.5B-3 REVISION 2
SAFE SHUTDOWN ANALYSIS IN CASE OF FIRE

Fire Area: 1-A-CSRB, CARS Area Identifier FAACSB
Cable Spreading Room B

Safe Shutdown Analysis Drawing: CAR-SH-SK-668S18

Elevation: 286 in Reactor Auxiliary Building, Unit 1

SHNPP Fire Hazard Analysis, Fire Area 1-A-CSRB lists combustible load and detailed information.

Fire Area Passive Protection

Fire area passive protection consists of 3 hour rated fire barriers enclosing the fire area, 3 hour rated doors, 3 hour rated fire dampers installed inside ducts passing through fire barriers penetration fire stops, and separation barriers isolating redundant cable trays. Smoke removal is by use of the normal and dedicated HVAC systems.

Fire Area Active Protection

Fire area active protection consists of automatic pre-action sprinkler system, throughout the fire area and thermal fire detection for actuation of automatic fire suppression systems. Fire extinguishers are located adjacent to the fire area. Hose stations are located in areas adjacent to the fire area. Early warning ionization detection is installed throughout the fire area.

Equipment Exposed to a Common Fire

Only safety train B equipment or cables could be exposed to a fire within this area.

Modifications

No modifications are required. See General Comments below.

General Comments

1. Redundant cable trays and conduits in this area are separated by a three hour fire barrier.

2. Postulated fire may affect redundant ductwork serving Fire Area 1-A-CSRA (FAACSA) and 1-A-CSRB (FAACSB). No ductwork modifications are required since a loss of ventilation of these areas will not impair safe shutdown capability due to the low heat loads generated by the energized cables. Fire dampers are provided in all ductwork serving Fire Area 1-A-CSRB (FAACSB).

TABLE 9.5B-3 REVISION 2
SAFE SHUTDOWN ANALYSIS IN CASE OF FIRE

Fire Area: 1-A-CSRA, CARS Area Identifier FAACSA
Cable Spreading Room A

Safe Shutdown Analysis Drawing CAR-SH-SK-668S18

Elevation: 286 in Reactor Auxiliary Building, Unit 1

SHNPP Fire Hazard Analysis, Fire Area 1-A-CSRA lists combustible load and detailed information.

Fire Area Passive Protection

Fire area passive protection consists of 3 hour rated fire barriers enclosing the fire area, 3 hour rated doors, 3 hour rated fire dampers installed inside ducts passing through fire barriers, penetration fire stops, and separation barriers isolating redundant cable trays. Smoke removal is by use of the normal and dedicated HVAC systems.

Fire Area Active Protection

Fire area active protection consists of automatic pre-action sprinkler system, throughout the fire area, thermal fire detection for actuation of automatic pre-action sprinkler systems and early warning ionization detection throughout the fire area. Fire extinguishers are located adjacent to the fire area. Hose stations are located in areas adjacent to the fire area.

Equipment Exposed to a Common Fire

Safety Train A equipment and cables will be exposed to a fire within this fire area. All B Cable required for shutdown passing through this area is protected.

Modifications

1 hour rated enclosure for the conduits over their entire exposed lengths in the area is provided:

16020Q-SR2-2, 16020T-SR4-2, 16020R-SR2-1 1/2
16020S-SR2-1 1/2, 16206E-SR4-1 1/2, 16106D-SR4-1,
10632E-SR4-1, 10988B-SR4-2.

1 hour rated enclosure over the following junction boxes is provided:
B1702-SR2, B5071-SR4, B5245-SR4.

1 hour rated enclosure for cable tray C0078-SB for the entire length of the tray is provided.

General Comments

1. Redundant cable trays and conduits in this area are separated by a fire barrier.

2. Postulated fire may affect redundant ductwork serving Fire Area 1-A-CSRA (FAACSA) and 1-A-CSRB (FAACSB). No ductwork modifications are required since a loss of ventilation to these areas will not impair safe shutdown capability due to the low heat loads generated by the energized cables. Fire dampers are provided in all ductwork serving Fire Area 1-A-CSR (FAACSA).

Fire Area: 12-A-CRC, E. 305, CARS Area Identifier FCACRC, Reactor Auxiliary Building

Safe Shutdown Analysis Drawing CAR-SH-SK-668S20

Elevation: 305 Control Room Complex (excluding Control Room which is in a separate fire area - 12-A-CR)

SHNPP Fire Hazard Analysis, Fire Area 12-A-CRC1, See
Fire Zones 12-A-6-PICR1 CARS Zone FCACRC-6-PICR1
12-A-6-CR CARS Zone FCACRC-6-CR
12-A-6-RCC1 CARS Zone FCACRC-6-RCC1
12-A-6-ARP1 CARS Zone FCACRC-6-ARP1.

Fire Area Passive Protection

Fire area passive protection consists of 3 hour fire rated barriers enclosing this fire area, 3 hour fire rated doors, 3 hour fire rated dampers in ducts passing through fire area boundary walls, and penetration fire stops. Smoke removal is accomplished by normal ventilation.

Fire Area Active Protection

Fire area active protection is listed by fire zone below:

12-A-6-PICR1 (FCACRC-6-PICR1)	Hose stations and manual alarm stations are provided in adjacent fire zones. Early moving ionization detection is provided throughout the fire zone. Portable fire extinguishers are provided in, and adjacent to the fire zone.
12-A-6-CR (FCACRC-6-CR)	Hose stations, portable fire extinguishers, and manual alarm stations are available in adjacent fire zones. Early warning ionization detection is provided throughout the fire zone.
12-A-6-RCC1 (FCACRC-6-CR)	Hose stations, portable fire extinguishers and manual alarm stations are available in adjacent fire zones. Early warning ionization detection is provided throughout the fire zone.
12-A-6-ARP1 (FCA-CRC-6-ARP1)	Hose stations and manual alarm stations are available in adjacent fire zones. Early warning ionization detection is provided throughout the fire zone. Portable fire extinguishers are provided in, and adjacent to, the fire zone.

Equipment Exposed to a Common Fire

A review of the drawings associated with this fire area indicates that various SA and SB electrical cabinets, cable tray, conduit, and duct could be exposed to a fire. However, the plant design allows for shutdown of the plant from the Auxiliary Control Panel with controls which are electrically isolated from systems on elevation 305. No fire on elevation 305 would prevent plant shutdown.

Fire Area: 12-A-CRC1

General Comments

1. The common ductwork serving the Control Room passes through Fire Area 12-A-CRC1 (FCACRC). A fire could cause a loss of ventilation and cooling to the Control Room. However, if such an instance necessitates Control Room evacuation, the operator could establish and maintain shutdown from the Auxiliary Control Panel located in Fire Area 1-A-ACP (FAAACP) on El. 286.00' in the Reactor Auxiliary Building. The HVAC systems serving the ACP are totally independent of any system on elevation 305'. Therefore, we conclude that no further analysis of the common ductwork serving the Control Room is required.

2. For a discussion of circuit design see General Comment for the Control Room fire area (12-A-CR).

Fire Area: 12-A-CR, El. 305, CARS Area Identifier FCACRM, Reactor Auxiliary Building.

Safe Shutdown Analysis Drawing CAR-SH-SK-668520.

Elevation: Control Room

SHNPP Fire Hazard Analysis, Fire Area 12-A-CR, See
Fire Zones 12-A-6-CR1 CARS
12-A-6-RT1 CARS
for combustibles loading and other details

Fire Area Passive Protection

Fire area passive protection consists of 3 hour fire rated barriers enclosing this fire area, 3 hour fire rated doors, 3 hour fire rated dampers in ducts passing through fire area boundary walls, and penetration fire stops. 2 hour fire rated walls with 1 1/2 hour fire doors enclose the stairwell. Smoke removal is accomplished by normal ventilation and a dedicated smoke purge system.

Fire Area Active Protection

Fire area active protection is listed by fire zone below:

12-A-6-CR1 (FCACRM-6-CR1) Early warning ionization detection is provided throughout the fire zone including inside the Main Control Board. Hose stations, portable fire extinguishers, and manual alarm stations are provided in adjacent Fire Zone 12-A-6-RT1 (FCACRM-6-RT1) Portable fire extinguishers are also located in the Control Room.

12-A-6-RT1 (FCACRM-6-RT1) Early warning ionization is provided throughout the fire zone. A hose station, manual alarm station and portable fire extinguisher is provided in the fire zone.

Equipment Exposed to a Common Fire

A review of the drawings associated with this fire area indicates that various electrical cabinets, conduit, duct and the control board could be exposed to a fire. However, the plant design allows for shutdown of the plant from the auxiliary control panel with controls which are electrically isolated from systems on elevation 305. No fire on elevation 305 including the loss of all equipment within this fire area would prevent plant shutdown.

General Comments

1. In the event of a major fire on Elevation 305 (either control room or electric equipment rooms), the operator may abandon the control room and proceed to the Auxiliary Control Panel (ACP).

2. The Plant design has been reviewed to assure that control and instrumentation is available for the operator to shutdown the plant from the ACP.

3. The controls are independent of equipment on Elevation 305.

4. Associated circuits which could affect shutdown upon fault were identified and corrected.

   a. The faults were postulated per NRC criteria: Hot Shorts, Shorts to ground and open circuits.

   b. Also considered were erroneous analog signals due to effect of heat on equipment.

Conclusion

No fire on Elevation 305 could adversely affect shutdown.

Fire Area: [illegible] 305, CARS Area Identifier FCAHVI, Reactor Auxiliary Building

Safe Shutdown Analysis Drawing CAR-SH-SK-668321.

Elevation: Elevation 305 in Reactor Auxiliary Building - HVAC Area

SHNPP Fire Hazard Analysis, Fire Area 12-A-HV&IR, see
Fire Zones 12-A-6-HV7 CARS
12-A-6-IRR CARS
for combustibles loading and other detailed information

Fire Area Passive Protection

Fire area passive protection consists of 3 hour fire rated barriers enclosing this fire area, 3 hour fire rated doors, 3 hour fire dampers in ducts passing through fire area boundary walls, and penetration fire stops. Smoke removal is accomplished by normal ventilation.

Fire Area Active Protection

Fire Area active protection is listed by fire zone below:

12-A-6-HV7 (FCAHVI-6-HV7)	Pre-action sprinklers actuated by thermal detection are provided over the charcoal filter air cleaning unit. Hose stations, portable fire extinguishers, and manual alarm stations are provided in, and adjacent to, the fire zone. Early warning ionization detection is provided throughout the fire zone.
12-A-6-IRR (FCAHVI-6-IRR)	Hose stations, portable fire extinguishers, and alarm stations are provided in, and adjacent to, the fire zone. Early warning ionization detection is provided throughout the fire zone.

Equipment Exposed to a Common Fire

This area includes various SA and SB components, equipment, cable in conduit and duct which could be affected by a fire in this area.

No fire in this area would prevent the shutdown of the plant.

General Comments

1. During normal operation, AH-15 (1A-SA) and AH-15 (1B-SB) provide cooling for the Control Room Fire Area 12-A-CR (FCACRM) which consists of the Control Room, Fire Zone 12-A-6-CR1 (FCACRM-6-CR1), and Terminal Cabinet Room, Fire Zone 12-A-6-RT1 (FCACRM-6-RT1). During normal operation, AH-16 (1A-SA) and AH-16 (1B-SB) provide cooling for the Process Instrument Control Rack Room, Fire Zone 12-A-6-PICR1, (FCACRC-6-PICR1) the Computer Room, Fire Zone 12-A-6-CR (FCACRM), and the Auxiliary Relay Panel Room, Fire Zone 12-A-6-ARP1 (FCACRC-6-ARP1), all part of the Control Room Complex, Fire Area: 12-A-HV&IR

Fire Area 12-A-6-CRC1 (FCACRM-7-CRC1). In case of fire in Fire Zone 12-A-6-HV7, (FCAHVI-6-HV7) HVAC units AH-15 (1A-SA), AH-15 (1B-SB), AH-16 (1A-SA), and AH-16 (1B-SB) may cease to function and cooling to the Control Room Fire Area 12-A-CR and the Control Room Complex fire zones listed above may be lost. If such a fire occurs, non-safety back-up systems AH-97 (1A & 2A - NNS), AH-97 (1B & 2B-NNS), AH-98 (1A & 2A-NNS) and AH-98 (1B & 2B-NNS) which can be manually aligned to the Emergency Diesel Generator, will start and will provide cooling for the Terminal Cabinet Room, Fire Zone 12-A-6-RT1 (FCACRM-6-RT1), the Process Instrument Control Rack Room, Fire Zone 12-A-6-PICR1 (FCACRC-6-PICR1), and the Auxiliary Relay Panel Room Fire Zone 12-A-6-ARP1 (FCACRC-6-ARP1), respectively. The Control Room may also be evacuated and shutdown can be achieved and maintained from the Auxiliary Control Panel, Fire Area 1-A-ACP (FAAACP). Cooling for the Auxiliary Control Panel Room is provided by AH-13 (1A-SB) and AH-13 (1B-SB) located in Fire Area 1-A-BAL (FAABAL), elevation 286.

TABLE 9.5B-3 REVISION 2
SAFE SHUTDOWN ANALYSIS IN CASE OF FIRE

Fire Area 1-O-PA, CARS Area Identifier FAOPA
Diesel Oil Pump A Room

Safe Shutdown Analysis Drawing: CAR-SH-SK-668S26

Elevation: 242 in Diesel Oil Storage Area, Unit 1

SHNPP Fire Hazard Analysis Fire Area 1-O-PA lists combustible load and detailed information.

Fire Area Passive Protection

Fire area passive protection consists of 3-hour rated fire barriers enclosing the fire area, 3-hour rated fire doors, 3-hour rated fire dampers, penetration fire stops and spill retention curbs provided at the doorways. Liquid waste is removed by sump pumps. Smoke removal is by use of normal ventilation.

Fire Area Active Protection

Fire area active protection consists of automatic multi-cycle sprinkler system, thermal fire detection for actuation of automatic fire suppression system, and ultra-violet fire detection throughout the fire area. Fire extinguishers and manual alarm stations are located outside the fire area. Hose streams are available from nearby yard hydrants.

Equipment Exposed to a Common Fire

Only Safety Train A equipment and cables are exposed to a fire within this fire area.

Modifications

No modifications are required because this fire area contains only Safety Train A equipment and cables. Redundant equipment and cables are located in Fire Area 1-O-PB.

General Comments

Analysis indicates that no redundant systems required for safe shutdown are located within this area.

TABLE 9.5B-3 REVISION 2
SAFE SHUTDOWN ANALYSIS IN CASE OF FIRE

Fire Area: 1-O-PB CARS Area Identifier FAOPB
Diesel Oil Pump B Room

Safe Shutdown Analysis Drawing: CAR-SH-SK-668S26

Elevation: 242 in Diesel Oil Storage Area, Unit 1

SHNPP Fire Hazard Analysis Fire Area 1-O-PA lists combustible load and detailed information.

Fire Area Passive Protection

Fire area passive protection consists of 3-hour rated fire barriers enclosing the fire area, 3-hour rated fire doors, 3-hour rated fire dampers, penetration fire stops, spill retention curbs provided at the doorways. Liquid waste is removed by sump pumps. Smoke removal is by use of normal ventilation.

Fire Area Active Protection

Fire area active protection consists of automatic multi-cycle sprinkler system, thermal fire detection for actuation of automatic fire suppression system, and ultra-violet fire detection throughout the fire area, fire extinguishers and manual alarm stations are located outside the fire area, and hose streams are available from nearby yard hydrants.

Equipment Exposed to a Common Fire

Only Safety Train B equipment and cables are exposed to a fire within this fire area.

Modifications

No modifications are required because this fire area contains only Safety Train B equipment and cables. Redundant equipment and cables are located in Fire Area 1-O-PA.

General Comments

Analysis indicates that no redundant systems required for safe shutdown are located within this area.

TABLE 9.5B-3 REVISION 2
SAFE SHUTDOWN ANALYSIS IN CASE OF FIRE

Fire Area: 12-O-TA, CARS Area Identifier FCOTKA
Diesel Fuel Oil Storage Tank A

Safe Shutdown Analysis Drawing CAR-SH-SK-668S26.

Elevation 242 in Diesel Fuel Oil Storage Tank Building, Unit 1

SHNPP Fire Hazards Analysis, Fire Area 12-O-TA lists combustible load and detailed information.

Fire Area Passive Protection

Fire area passive protection consists of 3 hour rated fire barriers enclosing the fire area.

Fire Area Active Protection

Fire area active protection consists of fire extinguishers located adjacent to the fire area and hose streams from yard hydrants adjacent to the fire area.

Equipment Exposed to a Common Fire

Only Safety Train A facilities are exposed to a fire within this fire area.

Modifications

No modifications are required because this fire area contains only Safety Train A equipment. Redundant equipment and cables are located in Fire Area 12-O-TB (FCOTKB).

General Comments

1. Analysis indicates that no redunant systems required for safe shutdown are located within this area.

2. The Diesel Fuel Oil Storage Tank is buried underground and is of Seismic Category I construction.

TABLE 9.5B-3 REVISION 2
SAFE SHUTDOWN ANALYSIS IN CASE OF FIRE

Fire Area: 12-O-TB, CARS Area Identifier FCOTKB
Diesel Fuel Oil Storage Tank B

Safe Shutdown Analysis Drawing: CAR-SH-SK-668S26.

Elevation: 242 in Diesel Fuel Oil Storage Tank Building, Unit 1

SHNPP Fire Hazards Analysis, Fire Area 12-O-TA lists combustible load and detailed information.

Fire Area Passive Protection

Fire area passive protection consists of 3-hour rated fire barriers enclosing the fire area.

Fire Area Active Protection

Fire area active protection consists of fire extinguishers located adjacent to the fire area and hose streams from yard hydrants adjacent to the fire area.

Equipment Exposed to a Common Fire

Only Safety Train B facilities are be exposed to a fire within this fire area.

Modifications

No modifications are required because this fire area contains only Safety Train B equipment. Redundant equipment is located in Fire Area 12-O-TA (FCOTKA).

General Comments

1. Analysis indicates that no redunant systems required for safe shutdown are located within this area.

2. The Diesel Fuel Oil Storage Tank is buried underground and is of Seismic Category I construction.

TABLE 9.5B-3 REVISION 2
SAFE SHUTDOWN ANALYSIS IN CASE OF FIRE

Fire Area: 5-0-BAL, CARS Area Identifier FPOBAL
Piping Corridor

Safe Shutdown Analysis Drawing: CAR-SH-SK-668S26.

Elevation: 242 In Diesel Oil Storage Area, Unit 1

SHNPP Fire Hazards Analysis, Fire Area 5-0-BAL lists combustible load and detailed information.

Fire Area Passive Protection

Fire area passive protection consists of 3 hour fire rated barriers enclosing the fire area, 3-hour rated fire dampers and penetration fire stops. Spill retention curbs are provided at the doorways in the adjoining diesel oil transfer pump fire areas. Liquid waste is removed by sump pumps. Smoke removal is by the normal ventilation system.

Fire Area Active Protection

Fire extinguishers are located in the fire area; manual alarm stations are located in the fire area; hose stations are located in the area and hose streams are available for use from nearby yard hydrants. Fire area active protection consists of early warning ionization detection provided throughout the fire area.

Equipment Exposed to a Common Fire

Safety Train A and B equipment and cables could be exposed to a fire within this fire area. This includes cables in conduits and junction boxes.

Modifications

Modifications are required because this fire area contains Safety Train A and B equipment and cables.

Provide three hour rated enclosure to the following:
Conduits 16004S-SB-4, 13286A-SB-1 1/2, 15438H-SB-4,
15438G-SB-3, 13285E-SB-1.
Junction box B-216-SB, B9130-SB.

General Comments

This analysis indicated the need to designate the corridor adjacent to the fuel oil transfer pump rooms as a new fire area, 5-0-BAL (FPOBAL). The SHNPP FSAR Appendix 9.5A (Fire Hazard Analysis) will include this fire area.

Exempt Request and Justification

1. Request exemption from providing 3-hour rated fire doors at the stairways in the Diesel Oil Storage Building, Fire Area 5-0-BAL (FPOBAL). The stairways are underground and exit to the outdoors. The combustible load in the adjacent fire area is negligible.

TABLE 9.5B-3 REVISION 2
SAFE SHUTDOWN ANALYSIS IN CASE OF FIRE

Fire Area: 1-A-ACP, CARS Area Identifier FAAACP, Auxiliary Control (Panel) Room

Safe Shutdown Analysis Drawing: CAR-SH-SK-668S17.

Elevation: 286 in Reactor Auxiliary Building.

SHNPP Fire Hazards Analysis, Fire Area 1-A-ACP lists the combustible load and detailed information.

Fire Area Passive Protection

Fire area passive protection consists of 3 hour fire rated enclosure, a 3 hour fire rated door, 3-hour rated fire dampers installed inside ducts passing through fire barriers and penetration fire stops. Safety Train B cable trays are separated from Safety Train A cable trays within the fire area by full height 3-hour fire rated enclosures. Safety Train B cables enter the Auxiliary Control Panel from above and Safety Train A cables enter through the floor below. They are physically separated within the panel by metal plate and/or conduit as required by Reg. Guide 1.75.

Fire Area Active Protection

Fire area active protection consists of early warning ionization detection provided throughout the fire area. Hose stations, portable extinguishers and manual alarm stations are available in adjacent fire areas.

Equipment Exposed to a Common Fire

A fire in this fire area could expose Safety Train B equipment and cables and Safety Train A conduit 16159X-SA-2. Safety Train A and B cables within the Auxiliary Control Panel could also be exposed to a fire.

Modifications

No modifications are required because in case of a fire in the Auxiliary Control (Panel) Room, plant shutdown is achieved from the Main Control Room, Fire Area 12-A-CR (FCACRM).

General Comments

A fire in this area will not affect any Safe Shutdown equipment. Shutdown of the plant can be achieved from the Main Control Room. The safe shutdown equipment on the ACP is electrically isolated from the main control board by qualified disconnect switches or analog isolators.

Conduit 16159X-SA-2 passes from the Safety Train A cable tray through the area where B Train equipment and cable trays are located. This conduit contains power and control cable for HVAC dampers AC-D21A and AC-D22A which are located in ductwork providing cooling to the Auxiliary Control (Panel) Room. The circuits are fused. These dampers are designed to fail closed.

TABLE 9.5B-3 REVISIONS 2
SAFE SHUTDOWN ANALYSIS IN CASE OF FIRE

Fire Area: 1-A-BATA, CARS Area Identifier FAABTA, Battery Room A

Safe Shutdown Analysis Drawing: CAR-SH-SK-668517.

Elevation: 286 in Reactor Auxiliary Building

SHNPP Fire Hazard Analysis, Fire Area 1-A-BATA lists fire loading and detailed information.

Fire Area Passive Protection

Fire area passive protection consists of 3-hour fire rated barriers enclosing the fire area, a 3-hour fire rated door, 3-hour fire rated dampers inside ducts passing through fire barriers and penetration fire stops. A spill retention curb is also provided. Smoke removal is through the normal ventilation.

Fire Area Active Protection

Fire area active protection consists of early warning ionization detection provided throughout the fire area. Hose stations, fire extinguishers and manual alarm stations are available from adjacent fire areas.

Equipment Exposed to a Common Fire

Only Safety Train A equipment and cables would be exposed to a fire within this fire area.

Modifications

No modifications are required because this fire area contains only Safety Train A equipment. Redundant equipment is located in Fire Area 1-A-BATB (FAABTB) which is enclosed in fire barriers and is unaffected by a fire in Fire Area 1-A-BATA (FAABTA).

TABLE 9.5B-3 REVISIONS 2
SAFE SHUTDOWN ANALYSIS IN CASE OF FIRE

Fire Area: 1-A-BATB, CARS Area Identifier FAABTB, Battery Room B.

Safe Shutdown Analysis Drawing: CAR-SH-SK-668S17.

Elevation: 286 in Reactor Auxiliary Building

SHNPP Fire Hazard Analysis, Fire Area 1-A-BATA lists fire loading and detailed information

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Fire Area Passive Protection

Fire area passive protection consists of 3-hour fire rated barriers enclosing the fire area, a 3-hour fire rated door, 3-hour fire rated dampers inside ducts passing through fire barriers and penetration fire stops. A spill retention curb is also provided. Smoke removal is through the normal ventilation.

Fire Area Active Protection

Fire area active protection consists of early warning ionization detection provided throughout the fire area. Hose stations, fire extinguishers and manual alarm stations are available from adjacent fire areas.

Equipment Exposed to a Common Fire

Only safety train B equipment and cables could be exposed to a fire within this fire area.

Modifications

No modifications are required because this fire area contains only Safety Train B equipment. Redundant equipment is located in Fire Area 1-A-BATA (FAABTA) which is enclosed in fire barriers and is unaffected by a fire in Fire Area 1-A-BATB (FAABTB).

TABLE 9.5B-3 REVISION 2
SAFE SHUTDOWN ANALYSIS IN CASE OF FIRE

Fire Area: 1-A-EPA, CARS Area Identifier FAAEPA, Electrical Penetration Area A

Safe Shutdown Analysis Drawing: CAR-SH-SK-668S12.

Elevation: 261 in Reactor Auxiliary Building.

SHNPP Fire Hazards Analysis, Fire Area 1-A-EPA lists the combustible load and detailed information.

Fire Area Passive Protection

Fire area passive protection consists of 3 hour fire rated barriers enclosing the fire area, 3-hour fire rated doors, 1-1/2 hour fire rated door through the 2-hour fire rated barrier around the stairway, 3-hour rated fire dampers installed inside ducts passing through fire barriers and penetration fire stops. A spill retention curb is provided at the doorway between fire areas 1-A-EPA (FAAEPA) and 1-A-BAL (FAABAL). Smoke removal is through the normal ventilation.

Fire Area Active Protection

Multi-cycle sprinklers actuated by thermal detectors and early warning ionization detection are provided throughout the fire area. Fire extinguishers and manual alarm stations are located in and adjacent to the fire area. Hose stations are located adjacent to the fire area.

Equipment Exposed to a Common Fire

Only Safety Train A equipment and cables could be exposed to a fire within this fire area.

Modifications

No modifications are required because this fire area contains only Safety Train A equipment and cables. Redundant equipment and cables are located in Fire Area 1-A-EPB (FAAEPB)

TABLE 9.5B-3 REVISION 2
SAFE SHUTDOWN ANALYSIS IN CASE OF FIRE

Fire Area: 1-A-EPB, CARS Area Identifier FAAEPB, Electrical Penetration Area B

Safe Shutdown Analysis Drawing: CAR-SH-SR-668S12.

Elevation: 261 in Reactor Auxiliary Building.

SHNPP Fire Hazards Analysis, Fire Area 1-A-EPB lists the combustible load and detailed information.

Fire Area Passive Protection

Fire area passive protection consists of 3-hour fire rated barriers enclosing the fire area, 3-hour fire rated doors, 1-1/2 hour fire rated door through the 2-hour fire rated barrier around the stairway, 3-hour rated fire dampers installed inside ducts passing through fire barriers and penetration fire stops. A spill retention curb is provided at the doorway between fire areas 1-A-EPB (FAAEPB) and 1-A-BAL (FAABAL). Smoke removal is through the normal ventilation.

Fire Area Active Protection

Multi-cycle sprinklers actuated by thermal detectors and early warning ionization detection are provided throughout the fire area. Fire extinguishers and manual alarm stations are located in and adjacent to the fire area. Hose stations are located adjacent to the fire area.

Equipment Exposed to a Common Fire

Only safety Train B equipment and cables could be exposed to a fire within this area.

Modifications

No modifications are required because this fire area contains only Safety Train B equipment and cables. Redundant equipment and cables are located in Fire Area 1-A-EPA (FAAEPA)

TABLE 9.5B-3 REVISION 2
SAFE SHUTDOWN ANALYSIS IN CASE OF FIRE

Fire Area 1-A-SWGRA, CARS Area Identifier FAASGA, Switchgear Room A

Safe Shutdown Analysis Drawing: CAR-SH-SK-668S17

Elevation: 286 in Reactor Auxiliary Building

SHNPP Fire Hazard Analysis Fire Area 1-A-SWGRA lists combustible load and detailed information

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Fire Area Passive Protection

Fire area passive protection consists of 3-hour fire rated barriers enclosing the fire area, 3-hour fire rated doors, 3-hour rated fire dampers installed inside ducts passing through fire barriers, and penetration fire stops. Spill retention curbs are provided at the doorways between this fire area and Fire Zones 1-A-5-HVA (FAABL5-5-HVA) 1-A-5-BATN (FAABL5-BATN) and Fire Area 1-A-BATA (FAABTA). Smoke removal is by the normal ventilation.

Fire Area Active Protection

Fire area active protection consists of early warning ionization detection throughout the fire area. Fire extinguishers are located in and adjacent to the fire area. Fire extinguishers and manual alarm stations are located in and adjacent to the fire area. Hose stations are located adjacent to the fire area.

Equipment Exposed to a Common Fire

Only Safety Train A equipment and cables could be exposed to a fire within this fire area.

Modifications

No modifications are required because this fire area contains only Safety Train A equipment and cables. Redundant equipment and cables are located in Fire Area 1-A-SWGRB (FAASGB).

TABLE 9.5B-3 REVISION 2
SAFE SHUTDOWN ANALYSIS IN CASE OF FIRE

Fire Area 1-A-SWGRB, CARS Area Identifier FAASGB, Switchgear Room B

Safe Shutdown Analysis Drawing: CAR-SH- SK-668S17

Elevation: 286 in Reactor Auxiliary Building

SHNPP Fire Hazard Analysis Fire Area 1-A-SWGRB lists combustible load and detailed information.

Fire Area Passive Protection

Fire area passive protection consists of 3-hour fire rated barriers enclosing the fire area, 3-hour fire rated doors, 3-hour rated fire dampers installed inside ducts passing through fire barriers and penetration fire stops. Spill retention curbs are provided at the doorways between this fire area and Fire Zone 1-A-5-HVB (FAABL5-5-HVB) and Fire Area 1-A-BATB (FAABTB). Smoke removal is by the normal ventilation.

Fire Area Active Protection

Fire area active protection consists of early warning ionization detection throughout the fire area. Fire extinguishers are located in and adjacent to the fire area. Fire extinguishers and manual alarm stations are located in and adjacent to the fire area. Hose stations are located adjacent to the fire area.

Equipment Exposed to a Common Fire

Redundant ductwork serving Fire Area 1-A-ACP (FAAACP) could be affected by a common fire. However, loss of ventilation in that fire area will not impair safe shutdown which is conducted from the Main Control Room.

Conduit 16159N-SA-1 1/2 is the alternate power feed to instrument distribution panel IDP-1A-SA. The circuit is protected. Main power feed is from inverters via conduit 16043H-SA located on elevation 305.00'.

General Comments

Conduit 16159X-SA-2 passes from the Safety Train A cable tray through the area where B Train equipment and cable trays are located. This conduit contains power and control cable for HVAC dampers AC-D21A and AC-D22A which are located in ductwork providing cooling to the Auxiliary Control (Panel) Room. The circuits are fused. These dampers are designed to fail closed.

Modifications

No modifications are required because redundant cabling and equipment are located in Fire Area 1-A-SWGRA (FAAASGA).

Loss of ventilation to Fire Area 1-A-ACP (FAAACP) due to failure of ductwork located in Fire Area 1-A-SWGRB (FAAASGB) will not prevent shutdown of the plant.

TABLE 9.5B-3 REVISION 2
SAFE SHUTDOWN ANALYSIS IN CASE OF FIRE

Fire Area: 1-D-DGA, CARS Area Identifier FADDGA, Diesel Generator 1A

Safe Shutdown Analysis Drawings: CAR-SH-SK-668S24, CAR-SH-SK-668S25

Elevation: 261 in Diesel Generator Building

SHNPP Fire Hazard Analysis Fire Area 1-D-DGA.
See Fire Zones 1-D-1-DGA-ER CARS Zone FADDGA-1-ER
1-D-1-DGA-ASU CARS Zone FADDGA-1-ASU
1-D-1-DGA-RM CARS Zone FADDGA-1-RM
1-D-1-DGA-HVD CARS Zone FADDGA-1-HVD
1-D-1-DGA-HVR CARS Zone FADDGA-1-HVR
1-D-1-DGA-ES CARS Zone FADDGA-1-ES
for combustible loads and detailed information.

Fire Area Passive Protection:

Fire area passive protection consists of 3-hour fire rated barriers, 3-hour fire rated doors, and penetration fire stops. Smoke removal for the above fire zones is achieved by normal ventilation.

Fire Area Active Protection:

Fire area active protection is listed by fire zone below:

1-D-DGA-RM - Flame scanning (ultra-violet) type detection is provided for early warning over diesel generators. Automatic multi-cycle suppression system actuated automatically by the thermal detection is provided in the entire fire zone. Portable extinguishers, hose stations and manual alarm stations are available in areas adjacent to the fire zone.

1-D-1-DGA-ASU - Thermal detection system is provided in the fire zone. Portable extinguishers, hose stations and manual alarm stations are provided in areas adjacent to the fire zone.

1-D-1-DGA-ES - Ultra violet (flame) detection system and a portable extinguisher are provided in the fire zone. Hose stations, fire extinguishers and manual alarm stations are available adjacent to the fire zone.

1-D-DGA-ER - Early warning ionization detection is provided throughout the fire zone. A protable extinguisher is located in the fire zone. Hose stations, fire extinguishers and manual alarm station are available adjacent to the fire zone.

Equipment Exposed to a Common Fire

Only Safety Train A equipment and cables would be exposed to a fire within this fire area.

Modifications

No modifications are required because this fire area contains only Safety Train A equipment and cables. Redundant equipment and cables are located in Fire Area 1-A-DGB (FADDGB).

TABLE 9.5B-3 REVISION 2
SAFE SHUTDOWN ANALYSIS IN CASE OF FIRE

Fire Area 1-D-DGB, CARS Area Identifier FADDGB, Diesel Generator 1B

Safe Shutdown Analysis Drawing: CAR-SH-SK-668S24, CAR-SH-SK-668S25

Elevation: 261 in Diesel Generator Building

SHNPP Fire Hazard Analysis Fire Area 1-D-DGB.
See Fire Zones 1-D-1-DGB-ER, CARS Zone FADDGB-1-ER
1-D-1-DGB-ASU CARS Zone FADDGB-1-ASU
1-D-1-DGB-RM CARS Zone FADDGB-1-RM
1-D-1-DEB-HVD CARS Zone FADDGB-1-HVD
1-D-1-DGB-HVR CARS Zone FADDGB-1-HVR
1-D-1-DGB-ES CARS Zone FADDGB-1-ES
for combustible loads and detailed information.

Fire Area Passive Protection:

Fire area passive protection consists of 3-hour fire rated barriers, 3-hour fire rated doors and penetration fire stops. Smoke removal for the above fire zones is achieved by normal ventilation.

Fire Area Active Protection:

Fire area active protection is listed by fire zone below:

1-D-DGA-RM- Flame scanning (ultra-violet) type detection is provided for early warning over diesel generators. Automatic multi-cycle suppression system actuated automatically by the thermal detection is provided in the entire fire zone. Portable extinguishers, hose stations and manual alarm stations are available adjacent to the fire zone.

1-D-1-DGA-ASU- thermal detection system and a portable extinguisher are provided in the fire zone. Portable extinguishers, hose stations and manual alarm stations are provided adjacent to the fire zone.

1-D-1-DGA-ES- Ultra violet (flame) detection system is provided in the fire zone. Hose stations, fire extinguishers and manual alarm stations are available adjacent to the fire zone.

1-D-DGA-ER- Early warning ionization detection is provided throughout the fire zone. A portable extinguisher is located in the fire zone. Hose stations, fire extinguishers and manual alarm station are available adjacent to the fire zone.

Equipment Exposed to a Common Fire

Only Safety Train B equipment and cables could be exposed to a fire within this fire area.

Modifications

No modifications are required because this fire area contains only Safety Train B equipment and cables. Redundant equipment and cables are located in Fire Area 1-A-DGA (FADDGA).

TABLE 9.5B-3 REVISION 2
SAFE SHUTDOWN ANALYSIS IN CASE OF FIRE

Fire Area: 1-D-DTA, CARS Area Identifier FADDTA
Diesel Generator Fuel Oil Day Tank 1A

Safe Shutdown Analysis Drawing: CAR-SH-SK-668S24, CAR-SH-SK-S25

Elevation: 262 in Diesel Generator Building.

SHNPP Fire Hazards Analysis, Fire Area 1-D-DTA lists combustible load and detailed information.

Fire Area Passive Protection

Fire area passive protection consists of 3-hour rated fire barriers enclosing the fire area, 3-hour fire rated door, 3-hour rated fire dampers and penetration fire stops. Spill retention curbs are provided at the doorway. Smoke removal is by use of the normal HVAC system.

Fire Area Active Protection

Multi-cycle sprinkler system actuated by thermal detection system is installed throughout the fire area. Fire extinguishers, hose stations and manual alarm stations are located adjacent to the fire area.

Equipment Exposed to a Common Fire

Only Safety Train A equipment and cables could be exposed to a fire within this fire area.

Modifications

No modifications are required because this fire area contains only Safety Train A equipment and cables. Redundant equipment and cables are located in Fire Area 1-D-DTB (FADDTB).

General Comments

Analysis indicates that no redundant systems required for safe shutdown are located within this area.

TABLE 9.5B-3 REVISION 2
SAFE SHUTDOWN ANALYSIS IN CASE OF FIRE

Fire Area: 1-D-DTB, CARS Area Identifier FADDTB
Diesel Generator Fuel Oil Day Tank 1B

Safe Shutdown Analysis Drawing: CAR-SH-SK-668S24, CAR-SH-SK-668S25

Elevation: 262 in Diesel Generator Building.

SHNPP Fire Hazards Analysis, Fire Area 1-D-DTB lists combustible load and detailed information.

Fire Area Passive Protection

Fire area passive protection consists of 3-hour rated fire barriers enclosing the fire area, 3-hour fire rated door 3-hour rated fire dampers and penetration fire stops. Spill retention curbs are provided at the doorways. Smoke removal is by use of the normal HVAC system.

Fire Area Active Protection

Multi-cycle sprinkler system actuated by thermal detection is installed throughout the fire area. Fire extinguishers hose stations and manual alarm stations are located adjacent to the fire area.

Equipment Exposed to a Common Fire

Only Safety Train B equipment and cables could be exposed to a fire within this fire area.

Modifications

No modifications are required because this fire area contains only Safety Train B equipment and cables. Redundant equipment and cables are located in Fire Area 1-D-DTA.

General Comments

Analysis indicates that no redundant systems required for safe shutdown are located within this area.

TABLE 9.5B-3 REVISION 2
SAFE SHUTDOWN ANALYSIS IN CASE OF FIRE

Fire Area: 1-C, CARS Area Identifier FACRCB, Containment Building, All Levels

Safe Shutdown Analysis Drawings: CAR-SH-SK-688S01 through S04

Elevation: Various

SHNPP Fire Hazards Analysis, Fire Area 1-C
See Fire Zones 1-C-1-RCP-1A CARS Zone FACRCB RCP-1A
1-C-1-RCP-1B CARS Zone FACRCB RCP-1B
1-C-1-RCP-1C CARS Zone FACRCB RCP-1C
1-C-1-CHFA CARS Zone FACRCB-1-CHFA
1-C-1-CHFB CARS Zone FACRCB-1-CHFB
1-C-3-EPA CARS Zone FACRCB-3-EPA
1-C-3-EPB CARS Zone FACRCB-3-EPB
1-C-1-BAL CARS Zone FACRCB-1-BL

Fire Area Passive Protection

Fire area passive protection consists of 3 hour fire rated enclosure. Containment hatches are equivalent to 3 hour rated fire doors. Potentially radioactive fire water discharge is removed by containment sump whch discharges to the Waste Processing System.

Fire Area Active Protection

Active protection in the fire area consists of multi-cycle sprinklers actuated by thermal detectors over charcoal filter housings and cable tray. Hose stations, portable extinguishers and manual alarm stations are available in the fire area. Early warning ionization detection is provided where cable trays are present in the electrical penetration areas.

Equipment Exposed To A Fire

The redundant cables, equipment and associated circuits necessary to achieve and maintain shutdown in this fire area meet Appendix R to 10CFR50 Paragraph III.G.2.D criteria.

Comments

1. Safety Injection Accumulator Tank Isolation Valves 2SI-V535SA, 2SI-V536SB and 2SI-V537SA should operate when the RCS pressure drops below 660 PSIG. They are normally open and should be capable of closing. In the event of fire damage to these valves continued cooldown to cold shutdown can be achieved within 72 hours. Therefore, we conclude that no further analysis of these valves is required.

2. Equipment designated SW, excluding pressurizer heaters and PORV's, do not require electrical power during safe shutdown operations.

Fire Area: 1-C

3. Pressurizer heaters and PORV's are designated SN and are required for safe shutdown. They require electrical power during safe shutdown and are fed by non-safety cables which are connectable to the diesel generator. Therefore, the cables and conduits are protected by automatic fire detection and suppression systems.

4. Each RHR train is provided with two (2) in series motor operated isolation valves in series, each powered from a different safety train. One valve in each train is provided with an alternative power feed from its redundant division MCC and is brought to the terminal box at the outboard side of the penetration that is used by the permanent feeder to the respective valve.

Modifications

1. Extend automatic multi-cycle sprinkler systems actuated by thermal detection to protect the following equipment as shown on drawings CAR-SH-SK-668S01 and S02.

   AH-1(1A-SB) Containment Fan Cooler
   AH-1(1B-SB) Containment Fan Cooler
   AH-2(1A-SA) Containment Fan Cooler
   AH-2(1B-SA) Containment Fan Cooler
   Cable trays and conduits to pressurizer heaters and PORV's.

Exemption Requests and Justifications

1. As listed above, multi-cycle sprinklers are located over charcoal filters, cable trays and required equipment. An exemption from providing sprinklers throughout the entire fire area is requested.

   The redundant cables, equipment and associated non-safety circuits necessary to achieve and maintain hot shutdown conditions in this fire area meet Appendix R to 10CFR50 Paragraph III.G.2.D separation criteria. Automatic multi-cycle sprinkler systems actuated by thermal detection are provided over cable penetration areas, Fire Zones 1-C-3-EPA (FACRCB-3-EPA) and 1-C-3-EPB (FACRCB-3-EPB). Early warning ionization is also provided over all electrical cable tray.

General Comments

The drawings show that various SA and SB instrument racks are within 20 ft. of each other. A loss of a set of Local A & B instrument racks does not result in a failure to achieve shutdown because only one steam generator is required to achieve shutdown. The following list specifies the function of instruments on each rack. Each grouping of an A and B instrument rack supports the instrumentation associated with the local generator.

Fire Area: 1-C

Rack I.D.	Safety Train	Instrument ID	Function
C1-R2	A	LT-1FW-0476 IIIW	Stm. Gen 1A Narrow Range Level
C1-R3	B	LT-1FW-0475 IIW	Stm. Gen. 1A Narrow Range Level
C1-R4	A	LT-1FW-0474 IW	Stm. Gen. Narrow Range Level
		LT-1FW-0477 IW	Stm. Gen. Wide Range Level
C1-R6	A	PT-1RC-0455 IW	Pressurizer Pressure
		LT-1RC-0459 IW	Pressurizer Level
C1-R7	B	PT-1RC-0403 IVW	RCS Wide Range Loop A Pressure
C1-R8	A	LT-1FW-0486 IIIW	Stm. Gen. Narrow Range Level
		LT-1RC-0461 IIIW	Pressurizer Level
		PT-1RC-0457 IIIW	Pressurizer Pressure
C1-R9	B	LT-1RC-0460 IIW	Pressurizer Level
		LT-1FW-0485 IIW	Stm. Gen. 1B Narrow Range Level
		LT-1FW-0487 IIW	Stm. Gen. Wide Range Level
C1-R10	A	LT-1FW-0484 IW	Stm. Gen. Narrow Range Level
C1-R13	A	LT-1FW-0496 IIIW	Stm. Gen. 1C Narrow Range Level
		LT-1FW-0497 IIIW	Stm. Gen. 1C Wide Range Level
C1-R14	B	LT-1FW-0495 IIW	Stm. Gen. 1C Narrow Range Level
C1-R15	A	LT-1FW-0494 IW	Stm. Gen. 1C Narrow Range Level
		PT-1RC-0402 IW	RCS Wide Range Loop C Pressure

TABLE 9.5B-3 REVISION 2
SAFE SHUTDOWN ANALYSIS IN CASE OF FIRE

Fire Area: 12-I-ESWPA, CARS Area Identifier FCIESA

Safe Shutdown Analysis Drawing: CAR-SH-SK-668S27

Elevation: 262

SHNPP Fire Hazards Analysis, Fire Area 12-I-ESWPA lists the combustible load and detailed information.

Fire Area Passive Protection

Fire Area passive protection consists of 3 hour fire rated barriers enclosing the fire area and penetration fire stops. Smoke removal is by a normal once through ventilation system.

Fire Area Active Protection

Hose streams from fire hydrants are available and portable extinguishers and manual alarm stations are provided in the fire area. Fire area active protection consists of untraviolet flame detection is provided over the Emergency Service Water Pumps and ionization smoke detection is provided in the electrical equipment room.

Equipment Exposed to a Common Fire

A fire in this area will expose only Safety Train A equipment.

Modifications

No modifications are required.

General Comments

No redundant systems required for safe shutdown are located within this fire area.

The present design provides approximately 25 ft separation between TE-1EV-6591B-SB and TE-1EV-6589B-SB and their redundant counterparts. These temperature elements are located outdoors, outside of Fire Area 12-I-ESWPA (FCIE3) and are not exposed to any fire load.
TE-1EV-6589A-SA and TE-1EV-6589B-SB actuate the coolers in the electrical equipment room at 70°F. If these fail to actuate the coolers, other controls inside the room actuate them at 95°F.
TE-1EV-6591A-SA and TE-1EV-6591B-SB actuate exhaust fans for the pump rooms. Since the exhaust fans are arranged to run when the pumps are started, failure of these items will not prevent the fans from operating. Therefore, these items could be lost with no impact on shutdown.

Fire Area: 12-1-ESWPA

Exemption Request and Justification

Request exemption from providing 3 hour rated fire doors at the exterio- of the ESW Intake Structure. Present plant doors D1169, D1170 provide the degree of fire resistance required for the described occupancy and hazard. Fire area fire loading is 7,500 BTU/sq/ft.

TABLE 9.5B-3 REVISION 2
SAFE SHUTDOWN ANALYSIS IN CASE OF FIRE

Fire Area: 12-I-ESWPB, CARS Area Identifier FCIESB

Safe Shutdown Analysis Drawing: CAR-SH-SK-668S27

Elevation: 262

SHNPP Fire Hazards Analysis, Fire Area 12-I-ESWPB lists the combustible load and detailed information.

Fire Area Passive Protection

Fire area passive protection consists of 3 hour fire rated barriers enclosing the fire area and penetration fire stops. Smoke removal is by a normal once through ventilation system.

Fire Area Active Protection

Hose streams from fire hydrants are available and portable extinguishers and manual alarm stations are provided in the fire area. Fire area active protection consists of ultraviolet flame detection is provided over the Emergency Service Water Pumps and ionization smoke detection is provided in the electrical equipment room.

Equipment Exposed to a Common Fire

A fire in this area will expose only Safety Train B equipment.

Modifications

No modifications are required.

General Comments

No redundant systems required for safe shutdown are located within this fire area.

The present design provides approximately 25 ft separation between TE-1EV-6591B-SB and TE-1EV-6589B-SB and their redundant counterparts. These temperature elements are located outdoors, outside the Fire Area 12-I-ESWPA (FCIESB) and are not exposed to any fire load.
TE-1EV-6589A-SA and TE-1EV-6589B-SB actuate the coolers in the electrical equipment room at 70°F. If these fail to actuate the coolers, other controls inside the room actuate them at 95°F.
TE-1EV-6591A-SA and TE-1EV-6591B-SB actuate exhaust fans for the pump rooms. Since the exhaust fans are also arranged to run when the pumps are started, failure of these items will not prevent the fans from operating. Therefore, these items could be lost with no impact on shutdown.

Fire Area: [illegible]

Exemption Requests and Justification

Request exemption from providing 3 hour rated fire doors at the exterior of the ESW Intake Structure. Present plant doors D1173 and D1174 provide the degree of fire resistance required for the described occupancy and hazard. They will be electronically monitored in closed position. Fire area fire loading is 7,500 BTU/sq ft.

TABLE 9.5B-3
SAFE SHUTDOWN ANALYSIS IN CASE OF FIRE

Fire Area: 1-G, CARS Area Identifier FATTGB, Turbine Generator Building, Unit 1, All Areas

Safe Shutdown Analysis Drawing: None

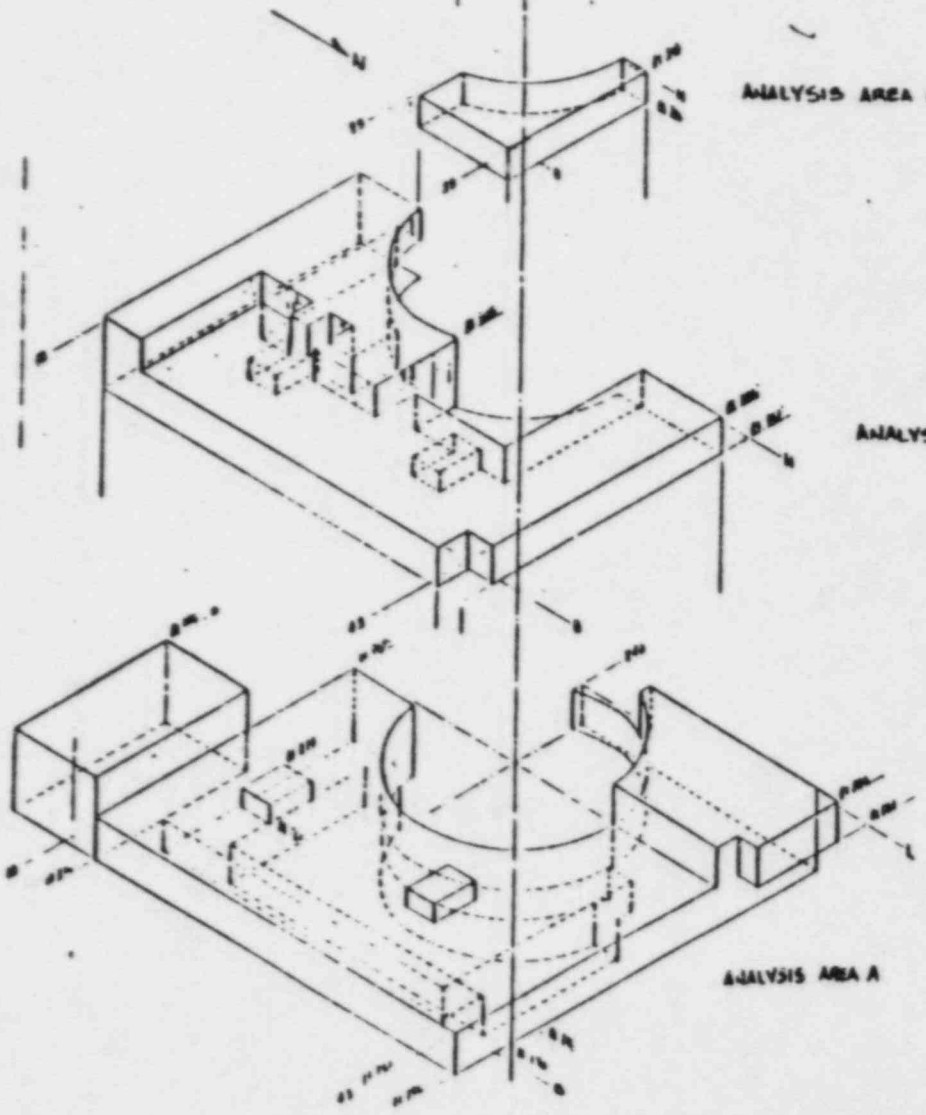
Elevation: 240

SHNPP Fire Hazards Analysis, Fire Area 1-G lists the combustible load and detailed information.

General Comments

This is a non-safety related area used for power generation. It is separated from safety-related areas by 3 hour fire rated barriers. No sketch is provided for this area.

No fire in this area will adversely affect plant shutdown.


ANALYSIS AREA C
ANALYSIS AREA B
ANALYSIS AREA A

FIRE DAMPERS

ATTACHMENTS

1. Typical Duct Layout #1
2. Typical Duct Layout #4
3. Typical Duct Layout #5
4. Specific list of exemption requests including type and location

Objective

To demonstrate that the present design meets the intent of a three-hour, fire-resistant rated floor without fire dampers in floors or portions of floors separating Elevations 236 from 261 and 261 from 286.

To support the request for an exemption from provision of three-hour rated fire dampers in the above-listed floors based on low combustible loading below and above these slabs and thermal detectors, presence of sprinkler systems, height and volume of the end fire zones under consideration, sealing of all penetrations through these slabs.

Discussion

Approximately 176 fire dampers have been installed throughout the plant; the installations were in walls and floors.

Approximately 12 additional fire dampers would be required as a result of this exemption denial.

We are not requesting an exemption from installing fire dampers. We are requesting specific exemption in areas where we do not believe adding dampers will materially enhance the safety of the plant.

FIRE DAMPERS (Cont'd)

We performed an individual fire damper study indicating that combustible loading in the area of the exemption request is low. This information is available as part of Table 9.5B-3 and the fire damper study.

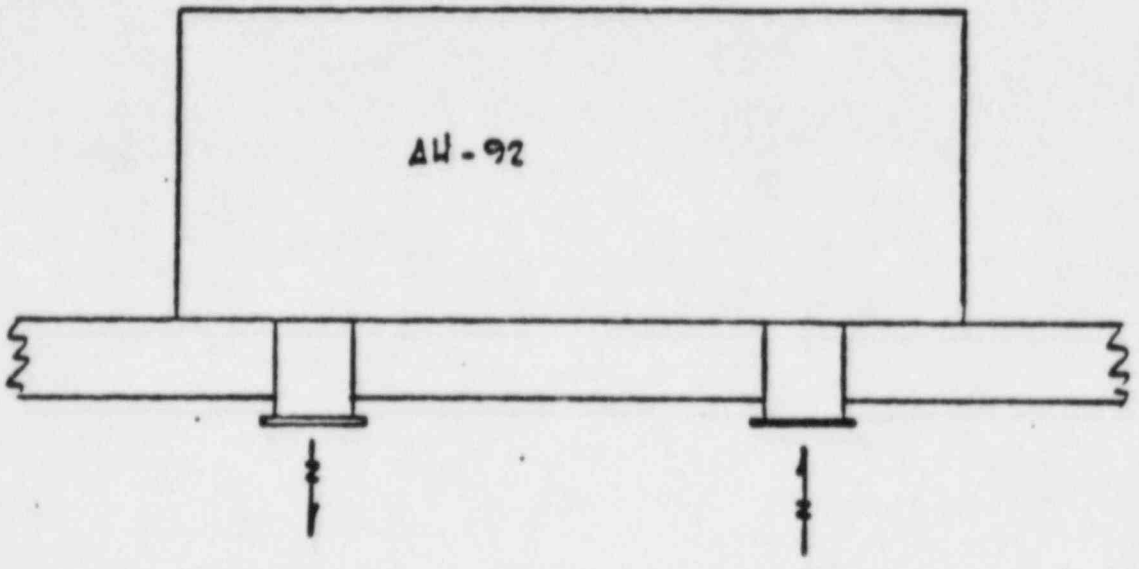
Early warning ionization type smoke detectors, thermal detectors, manual alarm stations and automatic suppression systems are present throughout the plant on both sides of the slabs under consideration, as detailed in the Safe Shutdown Analysis by fire area.

All penetrations through these slabs are sealed with fire stops having approved three-hour fire resistance rating.

Low combustible loadings are present in the areas of consideration, thus reducing the hazard of fire.

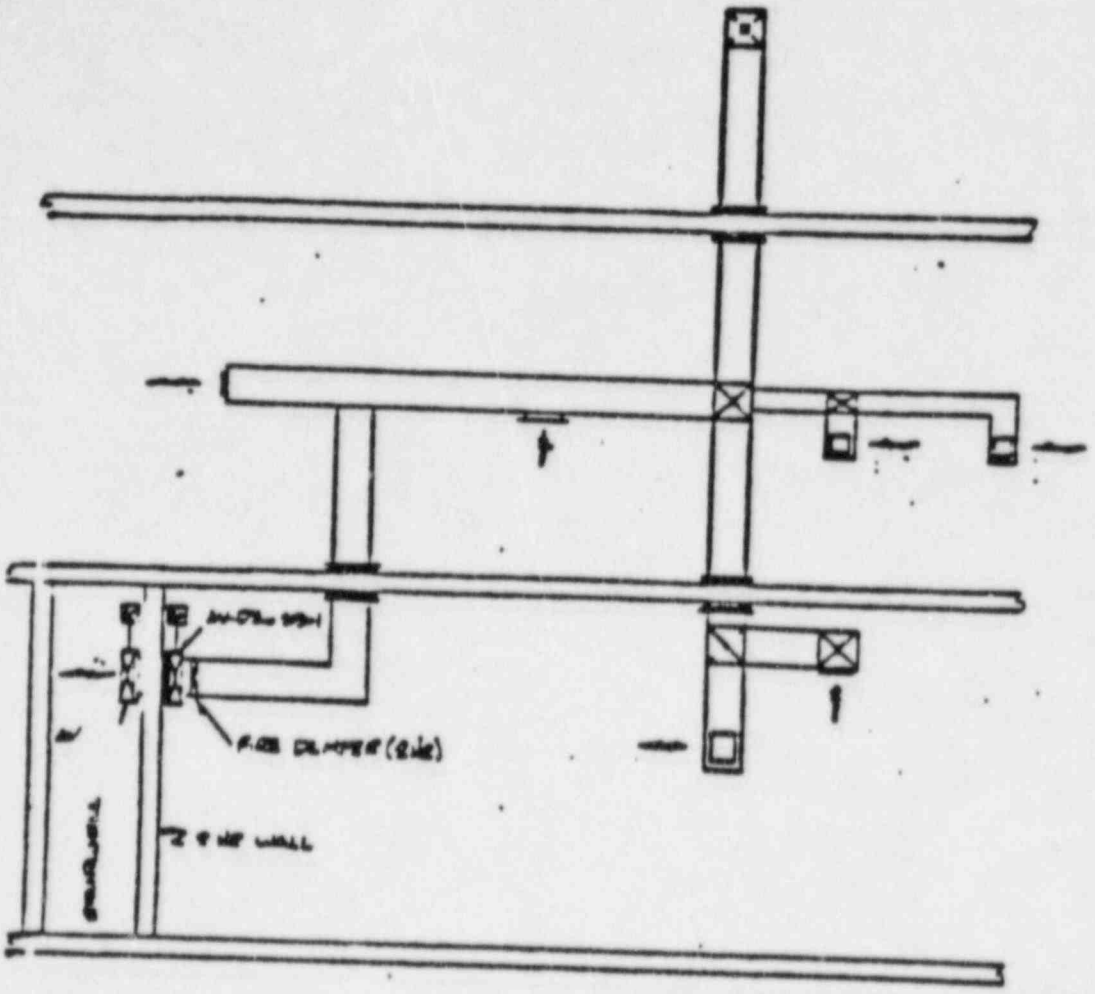
Fire damage to the duct is precluded because of the heavy gauge duct which varies from 14 to 22 gauge. A fire damper gauge is 22. Heavy duty supports, metal closure angles applied to the duct on both sides of the barrier serve to render the ductwork impervious to expansion deformation or heat failure for periods of the expected fire duration.

Localized high off-gas temperatures can be expected in the immediate vicinity of a fire. The air mixture dilution temperature at the duct (approximately 25 feet) above the floor is not expected to reach high temperatures. Since the ventilation duct remains intact, it is considered an extension of the fire barrier. The integrity of the fire barrier is thus considered undiminished.



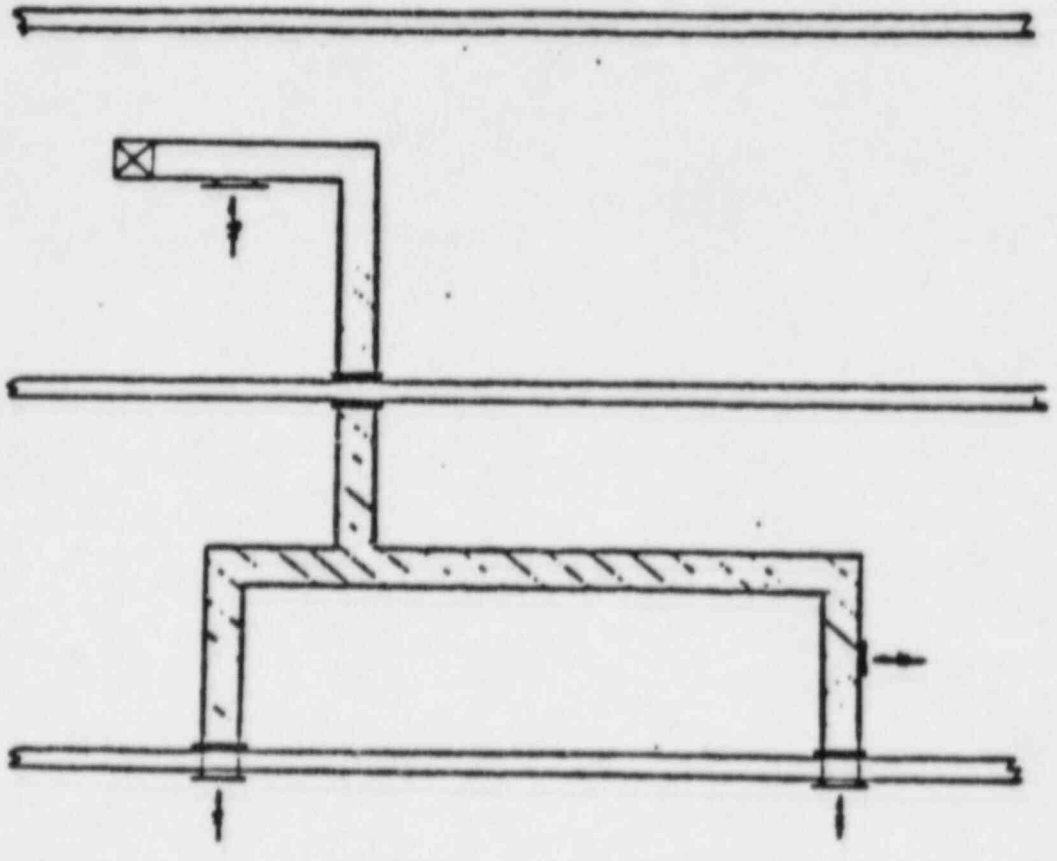
CASE #1 4 DAMPERS

ENCLOSURE 1



CASE #4 6 DAMPERS

ENCLOSURE 1



CASE #5 2 DAMPERS

TABLE 9.5B-3 REVISION 2

SAFE SHUTDOWN ANALYSIS IN CASE OF FIRE

Area: 1-A-BAL A, EL. 190', 216', 236', and 261'
Reactor Auxiliary Building

Safe Shutdown Analysis Drawings CAR-SH-SK-668S05, CAR-SH-SK-668S06, CAR-SH-SK-668S07, CAR-SH-SK-668S08, CAR-SH-SK-668S09, CAR-SH-SK-668S10, CAR-SH-SK-668S11, CAR-SH-SK-668S13 and CAR-SH-SK-668S22

See Fire Zones 1-A-1-PA -	CARS Zone	FAABL1-1-PA
1-A-1-PB	CARS Zone	FAABL1-1-PB
1-A-1-FD	CARS Zone	FAABL1-1-FD
1-A-1-ED	CARS Zone	FAABL1-1-ED
1-A-2-PT	CARS Zone	None
1-A-2-MP	CARS Zone	FAABL2-2-MP
1-A-2-COR	CARS Zone	FAABL2-2-COR
1-A-3-COR	CARS Zone	FAABL3-3-COR,
1-A-3-MP	CARS Zone	FAABL3-3-MP,
1-A-3-PB	CARS Zone	FAABL3-3-PB,
1-A-34-RHXA	CARS Zone	FAABL3-34-RHXA,
1-A-34-RHXB	CARS Zone	FAABL3-34-RHXB,
1-A-3-COMI	CARS Zone	FAABL3-3-COMI,
1-A-3-COME	CARS Zone	FAABL3-3-COME,
1-A-3-COMB	CARS Zone	FAABL3-3-COMB,
1-A-3-TA	CARS Zone	FAABL3-3-TA
1-A-4-CHFA	CARS Zone	FAABL4-4-CHFA
1-A-4-CHFB	CARS Zone	FAABL4-4-CHFB
1-A-4-COMI	CARS Zone	FAABL4-4-COMI
1-A-4TA CARS Zone		FAABL4-4-TA

Passive Protection

This area is enclosed by 3 hour fire rated barriers. Two hour fire rated barriers with 1 1/2 hour fire rated doors enclose stairwells. Smoke removal is by normal ventilation.

Active Protection

Area active protection consist of the following as listed by fire zone below:

Fire Zone 1-A-1-PA (FAABL1-1-PA) and 1-A-1-PB (FAABL1-1-PB) - Multicycle Sprinklers actuated by thermal detection is provided throughout the fire zone.

Fire Zone 1-A-1-FD (FAABL1-1-FD) and 1-A-1-ED (FAABL1-1-ED) - Early warning ionization detection is provided throughout the fire zones. Hose stations, portable extinguishers and manual alarm stations are available in and adjacent to the fire zone.

Area: 1-A-BAL A

Fire Zone 1-A-2-PT - Hose stations and portable extinguishers are located adjacent to the fire zone. A manual alarm station is located inside the fire zone.

Fire Zone 1-A-2-MP (FAABL2-2-MP) - Early warning ionization detection is provided throughout the fire zone. Hose stations, portable extinguishers and manual alarm stations are located in and adjacent to the fire zone.

Fire Zone 1-A-2-COR (FAABL2-2-COR) - Hose stations and portable extinguishers are located in and adjacent to the fire zone. A manual alarm station is located inside the fire zone.

Fire Zone 1-A-3-COR (FAABL3-3-COR) - Hose stations, portable extinguishers and manual alarm stations are provided in and adjacent to the fire zone.

Fire Zone 1-A-3-MP (FAABL3-3-MP) - Hose stations, portable extinguishers and manual alarm stations are provided in and adjacent to the fire zone.

Fire Zone 1-A-3-PB (FAABL3-3-PB) - Multi-cycle sprinklers actuated by thermal detectors are located throughout the fire zone except between columns 18 thru 23, D to E and 30 to 36, D to E. Early warning ionization detection is provided throughout the fire zone. Hose stations, portable extinguishers and manual alarm stations are provided in and adjacent to the fire zone.

Fire Zone 1-A-34-RHXA (FAABL3-34-RHXA) - Hose stations, portable extinguishers and manual alarm stations are available adjacent to the fire zone.

Fire Zone 1-A-34-RHXB (FAABL3-34-RHXB) - Hose stations, portable extinguishers and manual alarm stations are available adjacent to the fire zone.

Fire Zone 1-A-3-COMI (FAABL3-3-COMI) - Multi-cycle sprinklers actuated by thermal detection are provided over safety train A and B cable trays in columns 42 to 43, I to L. Early warning ionization detection is provided throughout the remainder of the fire zone. Hose stations, portable extinguishers and manual alarms stations are available in and adjacent to the fire zone.

Fire Zone 1-A-3-COME (FAABL3-3-COME) - Multi-cycle sprinklers actuated by thermal detectors are provided over safety train A and B cable trays between columns 42 to 43, E to H. Early warning ionization detection is provided throughout the entire fire zone. Manual alarm stations are available in the fire zone. Hose stations and portable extinguishers are available adjacent to the fire zone.

Area; 1-A-BA

Fire Zone 1-A-3-COMB (FAABL3-3-COMB) - Multi-cycle sprinklers actuated by thermal detectors are provided over safety train A and B cable trays and most of the fire zone. A section between columns 41 to 43, D to E. Early warning ionization detection is provided throughout the fire zone. Manual alarm stations are available in and adjacent to the fire zone. Hose stations and portable extinguishers are available adjacent to the fire zone.

Fire Zone 1-A-3-TA (FAABL3-3-TA) - Hose stations, portable extinguishers are available adjacent to the fire zone. A manual alarm station is available inside the fire zone.

Fire Zone 1-A-4-CHFAL (FAABL4-4-CHFA) - Multicycle sprinklers actuated by thermal detection are provided over the charcoal filter unit. Hose stations, portable fire extinguishers, and manual alarm stations are provided in, and adjacent to, the fire zone. Early warning ionization detection is provided throughout the fire zone.

Fire Zone 1-A-4-CHFB (FAABL4-4-CHFB) - Multi-cycle sprinklers actuated by thermal detection are provided over the charcoal filter unit. Hose stations, portable fire extinguishers, and manual alarm stations are provided in, and adjacent to the fire zone. Early warning ionization detection is provided throughout the fire zone.

Fire Zone 1-A-4-CHFB (FAABL4-4-CHFB) - Multi-cycle sprinklers actuated by thermal detection are provided throughout the fire zone except in an area bounded by column line L, a line parallel to and 7 ft west of column line Jx, a line parallel to and 8 ft east of column line Jz, a line parallel to and 12 ft south of column line 43, and column line 43, and a line parallel to and 14 ft north of column line 43. Early warning ionization detection is provided throughout the fire zone. Hose stations, portable fire extinguishers, and manual alarm stations are provided in, and adjacent to the fire zone.

Fire Zone 1-A-34-RHXA (FAABL4-34-RHXA) - Hose stations, portable fire extinguishers, and manual alarm stations are provided adjacent to the fire zone.

Fire Zone 1-A-34-RHXB (FAABL4-34-RHXB) - Hose stations, portable fire extinguishers, and manual alarm stations are provided adjacent to the fire zone.

TA Equipment Exposed to a Common Fire

Review of the equipment located in this area indicates that separation criteria was met or an exemption request is provided. A fire could expose certain Safety Train A and B valves, which would not adversely affect shutdown. Also redundant train cable and equipment in certain zones could be exposed, but as protected or explained below would not adversely affect the safe shutdown.

Area: 1-A-BAL A

Comments

1. Valves MOV-2SW-B47SA-1, MOV-2SW-B48SB-1, MOV-2SW-B49SA-1 and MOV-2SW-B52SB-1 are Service Water System Valves located in the return from the Emergency Containment Fan Coolers. They are normally open during plant operation and are required to be open during safe shutdown. Postulation of fire in this area with resulting loss of power to these valves would not affect their function. These valves will fail as is which is the open position.

2. Instrument rack A21-R17-ESF-A and associated conduits 16041S-SA-3 and 17023H-SA-3 and junction boxes B1519-SA and B1520-SA were not protected from their redundant counterparts. Although these instrument racks, located in Fire Zone 1-A-3-TA (FAABL3-3-TA), contain instruments associated with essential systems, loss of instruments will not jeopardize operation of respective systems because alternative means can be used. The alternatives to the condensate storage tank level transmitters LT-9010A and LT-9010B, located in instrument racks A21-R17-ESF-A and A21-R15-ESF-B respectively, are the Auxiliary Feedwater Pump Suction Pressure Transmitters PT-2250-A and PT-2270, located, respectively in instrument racks A1-R14 and A1-R29 on E1.236.00 in Fire Zone 1-A-3-PB (FAABL3-3-PB). Therefore, we conclude that no further analysis of these instruments is required.

3. Valves MOV-2SI-579SA and MOV-2SI-578SB are Safety Injection System Isolation Valves in the RHR Recirculation System. They are located in Fire Zone 1-A-3-MP (FAABL3-3-MP). They are normally open during plant operation and are required to open during safe shutdown. A fire on this elevation with loss of power to the valves will not cause them to close. Therefore, we conclude that no further analysis of these valves is required.

4. Valves MOV-2CS-V609SB and MOV-2CS-V610SA are Chemical and Volume Control System Valves located in series and used for isolation during LOCA. They are located in Fire Zone 1-A-3-MP (FAABL3-3-MP). They are normally open during plant operation and are required to be open during safe shutdown. Postulation of a fire on this elevation with resulting loss of power to these valves will not cause them to close. Therefore, we conclude that no further analysis of these valves is required.

5. Air Handling Unit AH-11(1B-SB) and AH-11(1A-SA) located in Fire Zone 1-A-3-MP (FAABL3-3-MP) only provide local cooling for the equipment in the area.

6. Valve AOV-3CX-W105B, located in Fire Zone 1-A-3-PB (FAABL3-3-PB), is required for safe shutdown. It is a chilled water distribution valve on the discharge side of Air Handling Unit AH-6(1B-SB). This 3 way valve is designed to fail such that flow is maintained between coil and unit. Therefore, we conclude that no further analysis of this valve is required.

Area: 1-A-BAL A

7. Valve MOV-3CC-B6SB, located in Fire Zone 1-A-3-PB (FAABL3-3-PB), is required for safe shutdown. It is a component cooling water system suction isolation valve for component cooling water Pump B. It is normally open and required to be open for safe shutdown. A fire on this elevation with resulting loss of power to the valve will not cause it to close. Therefore, we conclude that no further analysis of this valve is required.

8. Drawing SK-668S11 indicates that a partial barrier will be installed between boric acid transfer pumps. This modification will be removed since further analysis indicates that an alternative method of Boric Acid addition is available. Operation of Valve 2-CS-D633 will allow the introduction of boric acid through the CVCS system. This valve is located in the area of drawing SK-668S09 (C18). Also, modifications extending sprinklers will removed.

Modifications

1. Provide a multi-cycle sprinkler system actuated by thermal detection in Fire Zone 1-A-2-MP (FAABL2-2-MP) between columns 15 through 39, E through G to protect all equipment and related controls required for safe shutdown.

2. Provide multi-cycle sprinklers activated by thermal detectors to protect all equipment and related controls required for safe shutdown in Fire Zones 1-A-3-COR (FAABL3-3-COR) and 1-A-3-MP (FAABL3-3-MP).

3. Provide a curb between air handling units AH-11(1B-SB) and AH-11(1A-SA) located in Fire Zone 1-A-3-MP (FAABL3-3-MP).

4. Provide 1 hour rated enclosure for the following:

   Junction Boxes B-1453-SB, B1452-SB
   Conduits 12775A-SB-1-1/2, 12768A-SB-1-1/2,
   15436G-SB-4, 12774A-SA-1-1/2, 12767A-SA-1-1/2,
   15449R-SA-3, 12212A-SB-4, 15400A-SB-4, 11779B-SB-4, 16000B-SB-4
   Cable Trays P1806-SB, P1306-SA
   All of the above are located in Fire Zone 1-A-3-MP (FAABL3-3-MP).

5. Provide a 1 hour fire rated enclosure for valve MOV-3CC-V167SB located in Fire Zone 1-A-3-PB (FAABL3-3-PB). This is a component cooling water system valve. It is the outlet isolation valve from the RHR Heat Exchanger. This valve is normally closed but required to open for safe shutdown.

6. Provide 1 hour fire rated enclosure for the following conduits and junction boxes located in Fire Zone 1-A-3-PB (FAABL3-3-PB).

   Junction Boxes B1455-SB, B1414-SB, B1457-SB, B1482-SB, B1483-SB, B1593-SB.
   Conduits 16044W-SB-2, 16044X-SB-3, 12761A-SB-2, 16046L-SB-3, 16046G-SB-3,
   16046F-SB-3 16044Y-SB-3, 16040Y-SB-3 16046B-SB-3, 15434J-SB-3 12763A-SB-2

Area: 1-A-BAL A

7. The following cables, located in Fire Zone 1-A-3-PB (FAABL3-3-PB), will be removed from cable trays and existing conduit and be rerouted in dedicated conduits:
10953A, 10953B, 12208B, 12259A, 12260A, 12260B, 12263A, 12264A, 12761A, 12763A

8. Cables required for safe shutdown will be removed from cable trays P1803 and C1808, located in Fire Zones 1-A-3-COME (FAABL3-3-COME) and 1-A-3-COMB (FAABL3-3-COMB) and will be installed in separate, 1 hour protected conduits. No protection of cable trays will be required.

9. Provide a 1 hour enclosure for conduit 17022S, located in Fire Zone 1-A-3-COME (FAABL3-3-COME).

10. Extend sprinkler system to cover conduit 17022S.

11. Provide multi-cycle sprinklers actuated by thermal detection above Auxiliary Feedwater Pumps P1A-SA and P1X-SAB along the partial high walls separating the pumps.

12. Provide 1 hour fire rated enclosures for conduits and junction boxes, located in Fire Zone 1-A-3-COME (FAABL3-3-COME), listed below:

Conduits 15432U-SB-4, 16044A-SB-4, 15432V-SB-4, 16030K-SB-2, 15412X-SB-2. These are protected for their entire length.
Junction Boxes B1586-SB, B1587-SB, B1588-SB, B1476-SB, B1477-SB.

13. Classify the existing wall at column line KZ between columns 24Z and 27, in Fire Zone 1-A-3-COMI (FAABL3-3-COMI), as 3 hour fire rated in order to maintain separation of redundant equipment and systems associated with AH-23, AH-29 and Containment Fan Coolers AH-1(1A-SB), AH-1(1B-SB), AH-2(1A-SA) and AH-2(1B-SA).

14. Cable trays acting as a source of intervening combustibles between redundant safety related equipment will be provided with fire breaks*. The cable trays so equipped are listed below for Fire Zone 1-A-3-PB (FAABL3-3-PB).

a) Between Auxiliary Feedwater Pumps P1A-SA, and P1X-SAB
C1808, L1801, X1803, P1803
Tray P1217 and C1208 pass within 20 ft of pumps 1A-SA in the North-South and East-West directions. Since they do not run between redundant equipment they are not provided with firebreaks.

b) Between component cooling water pumps 1B-SB and 1C-SAB component cooling water heat exchanger 1A-SA and 1B-SB
P1808, C1808, L1801, X1803

Area: 1-A-BAL A

c) Between Service Water Booster Pumps 1A-SA and 1B-SB. Pump 1B-SB is located in Fire Zone 1-A-3-COMB (FAABL3-3-COR).
P1300, C1303, L1303, P1305, C1304, L1401, X1500, P1217, C1208 Trays P1217 and C1208 pass within 20 ft of booster pump 1A-SA in the North-South and East-West directions. Since they cannot convey a fire between the redundant units, they are not provided with fire breaks.

d) Between CVCS charge pumps 1A-SA, 1B-SB, 1C-SAB
P1300, C1303, L1303, X1300

15. In Fire Zones 1-A-4-COMI (FAABL4-4-COMI) and 1-A-4-CHFA (FAABL4-4-CHFA), remove essential cables 12550A, 13285A, and 13286A from cable tray F1808 and reroute cable in separate protected conduit. Extend multicycle sprinklers, actuated by thermal detection, to protect new conduits. Reroute cable in separate protected conduit.

16. In Fire Zones 1-A-4-COMI (FAABL4-4-COMI) and 1-A-4-CHFA (FAABL4-4-CHFA), remove essential cable 13285E from cable tray C1810 and reroute cable in separate protected conduit. Extend multicycle sprinklers, actuated by thermal detection, to protect the new conduit. Reroute cable in separate protected conduit.

Exemption Requests and Justifications

1. Request exemption from installation of fire detection and automatic sprinkler systems throughout the entire Fire Area 1-A-BAL A. Justifications for each fire zone are listed below.

- 1-A-1-PA (FAABL1-1-PA) and 1-A-1-PB (FAABL1-1-PB) - A multi-cycle sprinkler system actuated by thermal detectors is provided throughout the entire fire zone. Manual alarm stations are located inside the fire zone. Hose stations, portable extinguishers are available in and adjacent to the fire zone. The fire loading in 1A-1-PA (FAABL1-1-PA) is low at the 12, 800 BTU/SF and in 1-A-1-PB (FAABL1-1-PB) is low at 12,500 BTU/SF. 14,679

- 1-A-1-FD (FAABL1-1-FD) and 1-A-1-ED (FAABL1-1-ED) - Ionization detections provided throughtout the entire fire zone. Manual alarm stations, portable extinguishers and hose stations are available adjacent to the fire zone. The fire loadings in each zone are negligible.

- 1-A-2-COR (FAABL2-2-COR) - A manual alarm station and hose station arte provided inside the fire zone. The fire loading is negligible (1,000 BTU/SF).

- 1-A-3-TA (FAABL3-3-TA) - No automatic suppression or detection is provided based on negligible combustible loading, less than 1,000 BTU/SF. ft of fire area, low transient combustible loading and cables in conduit. Manual alarm stations are provided in stairways and hoseline backup from RAB stations or yard hydrants is available.

TABLE 9.5B-3 REVISION 2

SAFE SHUTDOWN ANALYSIS IN CASE OF FIRE

FIRE DAMPER EXEMPTION REQUEST FOR FIRE AREA 1-A-BAL

LEGEND

I - Ionization Detection

T - Thermal Detection (Actuates Suppression System)

M - Multi-Cycle Suppression System

P - Pre-Action Suppression System

NNS - Non-Nuclear Safety

The BTU/SF under Column "Combustible loading (20' RAD)" was based on the summation of all concentrated combustible loadings (power, control, low level cable trays and charcoal) within 20' RAD and divided by 1256SF. The 1256SF is the area of 20' RAD circle.

Following data was used to calculate BTU load for each type of cable tray and combustibles.

P - Power cable tray - 150,000 1.8×10^5 BTU/LF R

C - Control cable tray - 255,000 1.58×10^5 BTU/LF R

L - Low level cable tray - 232,500 9.5×10^4 BTU/LF R

Charcoal = 1.2×10^4 BTU/LB

Oil = 1.5×10^5 BTU/GAL

See Figures 9.5B-1 through 9.5B-4 for approximate locations of HVAC Duct Penetrations.
The functions of instruments and equipment indicated under column "Safe Shutdown Equipment (20' RAD): are listed in Attachment A.

Safe shutdown equipment function: FS - Fail Safe
FAI - Fail As Is
NR - Not Required

TABLE 9.5B-3
SAFE SHUTDOWN ANALYSIS IN CASE OF FIRE
FIRE DAMPER EXEMPTION REQUEST FOR FIRE AREA 1-A-BAL

FLOOR ELEVATION 286'-0 (SEE FIGURE 9.5B-3)

HVAC DUCT PENETRATION I.D. NO.	DUCT SIZE(in) HVAC DWG CAR-2168	HVAC DUCT CATEGORY	HVAC SYSTEM		FIRE ZONE	FIRE ZONE COMBUSTIBLE LOADING (BTU/SF)	DETECTION / SUPPRESSION	ENCLOSURE GATE / ISOLATION VALVE	SAFE SHUTDOWN EQUIPMENT (20' RAD)	COMBUSTIBLE LOADING (20' RAD) (BTU/SF)	
FD-3 CASE 1	24x24	SAFETY	AH-92 (1A-SA)	ABOVE	12-A-BAL 12-A-5-DIN	15,737 (14,590)	I, T P (T)	18 No	AH-92 (1A-SA) AH-92 (1B-SB) SOV 3CB-W125A-1(FS) see enc. 2 SOV 3CB-W135B-1 (FS) see enc. 2 DPB AC-D115A-1(Bkt.) [Protected DPB AC-D145B-1 See SSA 9.5B-3]	Negligible	
	G-805 REV 5			BELOW	1-A-BAL 1-A-4-COMP	38,514 (21,400)	I, T M (T)	Transfer Grille No	MCC-1A35-SA MCC-1B35-SB [Separated by a 1 HR rated fire wall as described in the SSA 9.5B-3]	~~P-80²,D=1.44x10⁷~~ ~~C-80²,D=1.26x10⁷~~ ~~L-80²,D=7.6x10⁶~~ ~~23,550~~ 59,742	11,346 25,315 23,081
FD-4 CASE 1	24x24	SAFETY	AH-92 (1B-SB)	ABOVE	12-A-BAL 12-A-5-DIN	15,737 (14,590)	I, T M (T)	18 No	Same as FD-3	Negligible	
	G-805 REV 5			BELOW	1-A-BAL 1-A-4-COMP	38,514 (21,400)	I, T M (T)	Transfer Grille No	Same as FD-3	~~P-80²,D=1.44x10⁷~~ ~~C-80²,D=1.26x10⁷~~ ~~L-80²,D=7.6x10⁶~~ ~~23,550~~ 59,742	11,346 25,315 23,081
FD-5 CASE 1	32x16	SAFETY	AH-92 (1A-SA)	ABOVE	12-A-BAL 1-A-5-DIN	15,737 (14,590)	I, T P (T)	16 No	Same as FD-3	Negligible	
	G-805 REV 5			BELOW	1-A-BAL 1-A-4-COMP	38,514 (21,400)	I, T M (T)	Transfer Grille No	Same as FD-3	~~P-80²,D=1.44x10⁷~~ ~~C-80²,D=1.26x10⁷~~ ~~L-80²,D=7.6x10⁶~~ ~~23,550~~ 59,742	11,346 25,315 23,081
FD-6 CASE 1	32x16	SAFETY	AH-92 (1B-SB)	ABOVE	12-A-BAL 12-A-5-DIN	15,737 (14,590)	I, T P (T)	16 No	Same as FD-3	Negligible	
	G-805 REV 5			BELOW	1-A-BAL 1-A-4-COMP	38,514 (21,400)	I, T M (T)	Transfer Grille No	Same as FD-3	~~P-80²,D=1.44x10⁷~~ ~~P-80²,D=1.26x10⁷~~ ~~P-80²,D=7.6x10⁶~~ ~~23,550~~ 59,742	11,346 25,315 23,081

TABLE 9.5A-3

SAFE SHUTDOWN ANALYSIS IN CASE OF FIRE

FIRE DAMPER EXPOSITION REQUEST FOR FIRE AREA 3-A-EAL

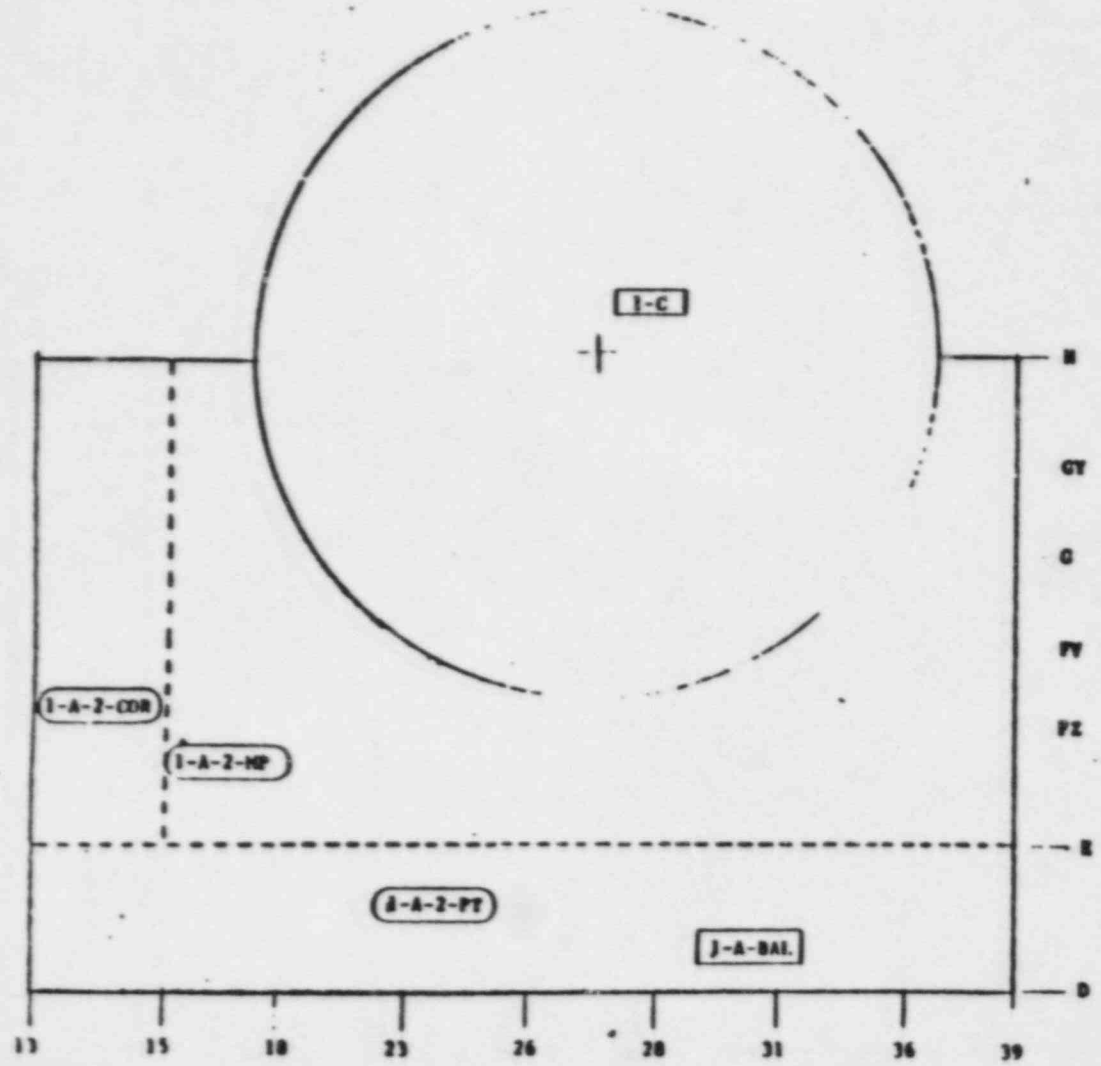
FLOOR ELEVATION +261'-0 (SEE FIGURE 9.5A-2)

HVAC DUCT PENETRATION I.D. NO.:	DUCT SIZE(IN) HVAC DUCT CAT-2168	HVAC DUCT CATEGORY	HVAC SYSTEM		FIRE ZONE	FIRE ZONE COMBUSTIBLE LOADING (BTU'S/SF)	DETECTION SUPPRESSION	SMOKE/HEAT BARRIER ISOLATION VALVE	SAFE SHUTDOWN EQUIPMENT (20' RAD)	COMBUSTIBLE LOADING (20' RAD) (BTU'S/SF)	
FD-41 CASE 4	10x14	SAFETY	E-6 (1A-SA)	ABOVE	3-A-4-CHLR	155,296 / 88,000	1, 1 / N (I)	14 / No	Nearest Equipment App. Dist. 25'-0 TE 1AV-6547B (NR)	P-25'-0-1.4x10^7, C-100'-0-1.6x10^6, L-25'-0-7.2x10^6 28,800	4,777 21,318 10,933
	G-523501 REV 6			BELOW	3-A-3-PB	16,190 / 12,500	1, 1 / N (I)	14 / No	AOV 3CC-D276SK-1 See enc. 2 AOV 2BB-B5001SN-1(FS)See enc. 2 AOV 2BB-B5001SN-1(FS)See enc. 2 MOV 2BB-V5065B-1(FAI)See enc. 2 (3-A-34-BBBB)	P-90'-0-1.2x10^6 C-100'-0-1.6x10^6 2,700	597 1,332
										1,929	
FD-37 CASE 4	10x14	SAFETY	E-6 (1A-SA)	ABOVE	3-A-3-CHLR	155,296 / 88,000	1, 1 / N (I)	18 / No	Nearest Equipment App. Dist. 25'-0 TE 1AV-6542A-SA (NR)	P-325'-0-4.0x10^7, C-200'-0-3.1x10^6, L-75'-0-7.1x10^6 62,700	21,460 42,635 10,933
	G-523501 REV 6			BELOW	3-A-3-PB	16,190 / 12,500	1, 1 / N (I)	18 / No	SW Breaker P(1A-SA)-1B-SB over 150' MHB HX 1A-SA 1B-SB over 110' AOV 2BB-F5001SN-1(FS)See enc. 2 AOV 2BB-B5001SN-1(FS)See enc. 2 MOV 2BB-V5075A-1(FAI)See enc. 2 (3-A-34-BBBA)	P-75'-0-2.7x10^6 C-100'-0-1.6x10^6 3,600	1,732 2,398
										4,130	
FD-38 CASE 4	10x14	SAFETY	E-6 (1B-SB)	ABOVE	3-A-4-CHLR	155,296 / 88,000	1, 1 / N (I)	18 / No	Nearest Equipment App. Dist. 25'-0 TE 1AV-6542A-SA (NR)	P-225'-0-4.0x10^7, C-200'-0-3.1x10^6, L-75'-0-7.1x10^6 62,700	21,460 42,635 10,933
	G-523501 REV 6			BELOW	3-A-3-PB	16,190 / 12,500	1, 1 / N (I)	18 / No	Same as FD-37	P-75'-0-2.7x10^6 C-100'-0-1.6x10^6 3,600	1,732 2,398
										4,130	
FD-40 CASE 4	10x14	SAFETY	E-6 (1B-SB)	ABOVE	3-A-4-CHLR	155,296 / 88,000	1, 1 / N (I)	18 / No	Nearest Equipment App. Dist. 25'-0 TE 1AV-6547B (NR)	P-25'-0-1.4x10^7, C-100'-0-1.6x10^6, L-25'-0-7.2x10^6 28,800	4,777 21,318 10,933
	G-523501 REV 6			BELOW	3-A-3-PB	16,190 / 12,500	1, 1 / N (I)	18 / No	AOV 3CC-D276SK-1 See enc. 2 AOV 2BB-B5001SN-1(FS)See enc. 2 AOV 2BB-B5001SN-1(FS)See enc. 2 MOV 2BB V5065B-1(FAI)See enc. 2 MHB HX 1B-SB 1A SA over 110' (3-A-34-BB X B)		P - 597 C - 1,332
										37,028 1,929	

TABLE 9.5B-3
SAFE SHUTDOWN ANALYSIS IN CASE OF FIRE
FIRE BARRIER EXEMPTION REQUEST FOR FIRE AREA 1-A-BAL

FLOOR ELEVATION: 426'-0 (SEE FIGURE 9.5B-2) and 426.00'

HVAC DUCT PENETRATION I.D. NO.:	DUCT SIZE (IN) HVAC DUCT CAR-2168	HVAC DUCT CATEGORY	HVAC SYSTEM		FIRE ZONE	FIRE ZONE COMBUSTIBLE LOADING (BTU/SF)	DETECTION / SUPPRESSION	DAMPER & AFJ / INSULATION VALVE	SAFE SHUTDOWN EQUIPMENT (20' RAD)	COMBUSTIBLE LOADING 20' RAD (BTU/SF)	
FD-69 CASE 5	24x16 G-805 REV 4	NNS	E-17 THRU E-20 (1E-NNS)	ABOVE	1-A-4-COMB	89,258 49,000	I, T / N (T)	14 / No	Nearest Equipment App. Dist. 50'-0 Boric Acid Tank 1s - SB	P 16,720 C 26,647 I 8,504 51,871	
				BELOW	1-A-3-COMB	53,092 39,000	I, T / N (T)	14 / No	Nearest Equipment App. Dist. 40'-0 Inst. Rack A1-832-ESF-B (NR)	5,374 19,986 8,221 43,581	
FD-70 CASE 4	28x22 G-805 REV 4	NNS (SEISMIC)	E-17 THRU E-20 (1E-NNS)	ABOVE	1-A-4-COMB	38,514 49,000	I, T / N (T)	14 / No	MCC-1A35-SA MCC-1B25-SB within 50' Separated by a 1 HR rated fire wall as described in the SSA 9.5B-3	9,460 1,822 11,282	
				BELOW	1-A-3-COMB	53,092 39,000	I, T / N (T)	14 / No	MOV 2RH-F51250-1 (PA) See Enc. 2 (1-A-3-MP)	Negligible	
FD-25 Case 4	18 x 18 G-503501 REV 10	NNS	E-17	ABOVE	1-A-3-PB	12,500 16,190	I,T / N(T)	14	AOV 2RH-B500SN-1(PS) (1-A-34-RHRB) AOV 3CC-D276SB-1(NR) (1-A-3-PB)	Negligible.	
				BELOW	1-A-2-PT	Negligible	Manual Alarm Sta. / None	14	Inst. Rack A1-832-ESF-B(NR) (1-A-2-MC)	Negligible	
FD-39 Case 5	18 x 18 G-523501 REV 6	NNS	E-17 thru E-20 (1E-NNS)	ABOVE	1-A-3-PB	12,500 16,190	I,T / N(T)	14	AOV 3CC-D276SN-1(NR) AOV 2RH-B500SN-1(PS) AOV 2RH-F500SN-1(PS) MOV 2RH-V506SB-1(NR) (1-A-34-RHRB)	P-10'-0-1.8 x C-10'-0-1.6 x 2,700	
				BELOW	1-A-2-PT	Negligible	Manual Alarm Sta. / None	18	Nearest Equipment App. Dist. 50'-0 IE 1-SW-92058-SB, Required Redundant Counterpart in same fire zone 175 ft. away.	Negligible	



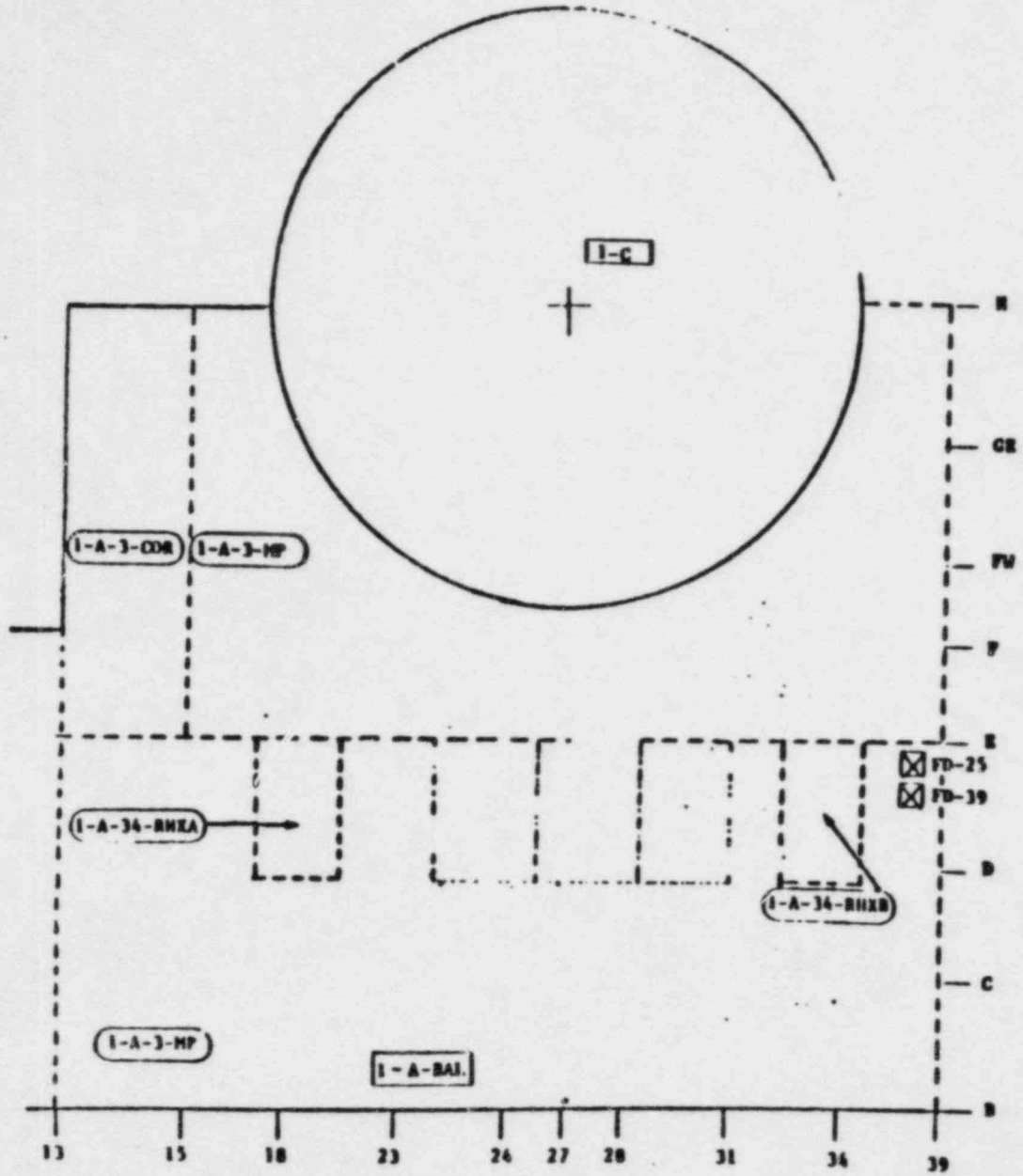
PLAN AT EL. 216.00'

LEGEND

- FIRE AREA BOUNDARY
- FIRE ZONE BOUNDARY
- INTERMEDIATE SLAB
- HVAC DUCT PENETRATION - SQUARE/RECT. OR ROUND
- FD-42 HVAC DUCT PEN. I.D. NUMBER
- FIRE AREA DESIGNATION
- FIRE ZONE DESIGNATION

SHEARON HARRIS NUCLEAR POWER PLANT
Carolina Power & Light Company
FIRE DAMPER EXEMPTION REQUEST STUDY

FIRE PROTECTION - REACTOR
AUXILIARY BLDG - PLAN EL. 216.00'
FIGURE 9.5A-1



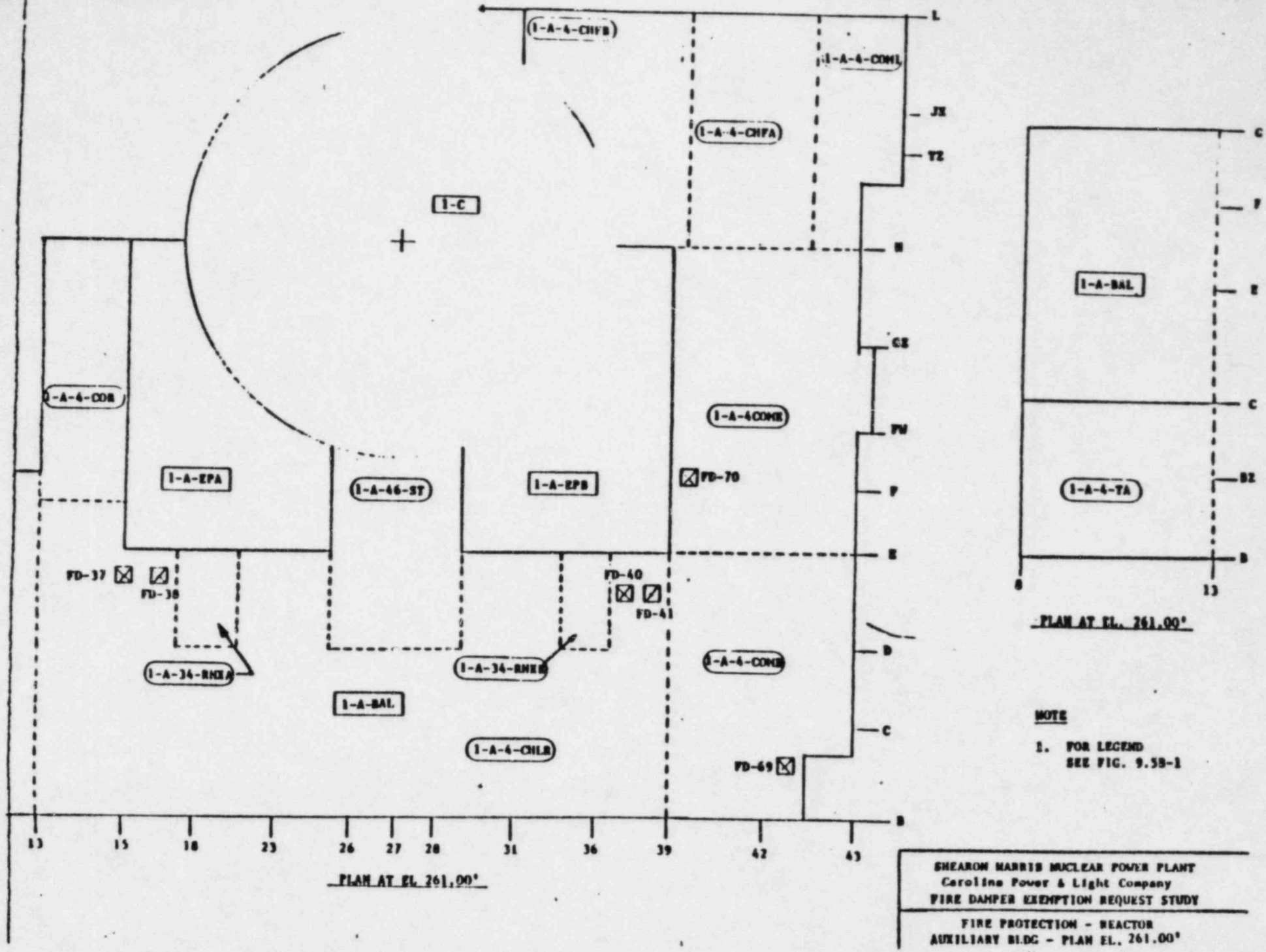
PLAN AT EL. 236.00'

NOTE

1. FOR LEGEND SEE FIG. 9.5B-1

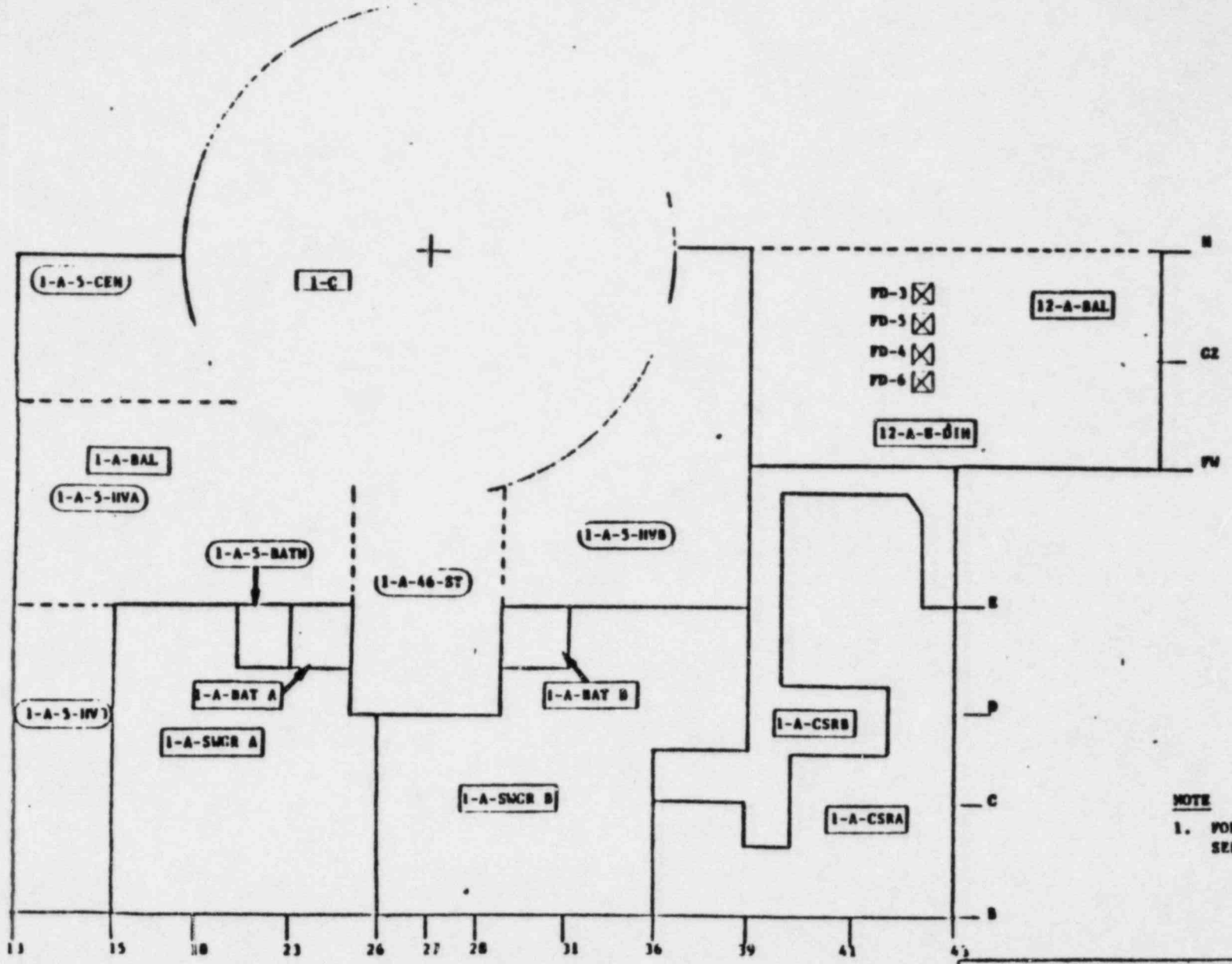
SHEARON HARRIS NUCLEAR POWER PLANT
Carolina Power & Light Company
FIRE DAMPER EXEMPTION REQUEST STUDY

FIRE PROTECTION - REACTOR
AUXILIARY BLDG. - PLAN EL. 236.00'



SHEARON HARRIS NUCLEAR POWER PLANT
Carolina Power & Light Company
FIRE DAMPER EXEMPTION REQUEST STUDY

FIRE PROTECTION - REACTOR AUXILIARY BLDG - PLAN EL. 261.00'



PLAN AT EL 286.00'

NOTE

1. FOR LEGEND SEE FIG. 9.5B-1

SHEARON HARRIS NUCLEAR POWER PLANT
Carolina Power & Light Company
FIRE DAMPER EXEMPTION REQUEST STUDY

FIRE PROTECTION - REACTOR AUXILIARY BLDG - PLAN EL. 286.00'

AH-92

DESCRIPTION OF EQUIPMENT

The structural framework of each unit consists of 1-1/2-inch square, 14-gage, carbon steel tubing everywhere but the coil section. The structural framing around each coil is 2-inch square, 11-gage, carbon steel tubing. All units have C8 x 13.75 steel channels forming a perimeter for their bases through which the units are bolted down using 5/8-inch ASTM A-325 bolts. Additional channel and rectangular tubing is welded into the base to provide a foundation for decking and components such as coils, fans, and fan motors. A sheet metal cover of 14-gage carbon steel encloses each unit. The insulated sections are covered with sandwich panels constructed of 14-gage sheets outside and 20-gage stainless steel sheets inside which sandwich 1-1/2 inches of insulation.

FIRE DAMPER EXEMPTION REQUEST FOR AREA 1-A-BAL
(JUNCTION OF SAFE SHUTDOWN EQUIPMENT IN 20' RADIUS)

ENCLOSURE 2 ATTACHMENT A

INSTRUMENT RACK ID	SAFETY TRAIN	INSTRUMENT ID	INSTRUMENT FUNCTION
A1-R32-ESF-B	B	PT 1SW-9112B-SB	Service Water Booster Pump B Discharge Pressure
A1-R35-ESF-B	B	FT 1SW-9112B-SB	Service Water Booster Pump B Discharge Flow

ENCLOSURE 2 ATTACHMENT A

INSTRUMENT ID	FUNCTION
TE-1AV-6542A-SA	Auxiliary Pump Rooms - HVAC Chiller AH 19 ASA Area Temp.
TE-1AV-6547B-SB	Auxiliary Pump Rooms - HVAC Chiller AH 20 BSB Area Temp.
TE-1SW-9205B-SB	Service Water to B Auxiliary Building Chiller WC-2 1B-SB

ENCLOSURE 2 ATTACHMENT A

MOTOR CONTROL CENTER	SYSTEM	COMPONENT
MCC-1A35-SA	Auxiliary Feedwater System SA	Service Water Valve 3SW-B70SA
		Service Water Valve 3SW-B71SA
		Service Water Valve 3SW-B74SA
		Service Water Valve 3SW-B75SA
	Component Cooling Water System SA	CCW Motor Operated Valve 3CC-855A
		CCW Motor Operated Valve 3CC-B19SA
		RHR Heat Exchanger Valve 2CC-V165SA
	Chemical and Volume Control System SA	Boric Acid Transfer Pump 1A-SA
		Charging Pump Valve 2CS-V589SA
		Charging Pump Valve 2CS-V587SA
		Charging Pump Valve 2CS-V603SA
		Charging Pump Valve 2CS-V605SA
	Chilled Water System SA	Water Chiller Unit WC-2(1A-SA)
		Chilled Water Dist. Valve 3CX-W5SA-1
		Chilled Water Dist. Valve 3CX-W8SA-1
		Chilled Water Dist. Valve 3CX-W9SA-1
		Chilled Water Dist. Valve 3CX-W20SA-1
		Chilled Water Dist. Valve 3CX-W21SA-1
		Chilled Water Dist. Valve 3CX-W32SA-1
	Emergency Diesel Generator System SA	Fuel Oil Transfer Pump 1A-SA
	Emergency Service Water System SA	Service Water Valve 3SW-815SA
	Fuel Oil Storage Building - HVAC System SA	Exhaust Fan E-85 (1A-SA)
		Exhaust Fan E-85 (1B-SB)

ENCLOSURE 2 ATTACHMENT A

MOTOR CONTROL CENTER	SYSTEM	COMPONENT
MCC-1A35-SA	Mech/Elec Penetration Areas - HVAC System SA	Air Handling Unit AH-92(1A-SA)
		Air Handling Unit AH-23(1X-SA)
	Auxiliary Building Shutdown Systems - HVAC System SA	Air Handling Unit AH-7(1A-SA)
		Air Handling Unit AH-20(1A-SA)
		Air Handling Unit AH-9(1A-SA)
		Air Handling Unit AH-10(1A-SA)
MCC-1B35-SB	Auxiliary Feedwater Systems SB	Service Water Valve 3SW-72SB
		Service Water Valve 3SW-73SB
	Component Cooling Water System SB	CCW Motor Operated Valve 3CC-B6SB
		CCW Motor Operated Valve 3CC-B20SB
		RHR Heat Exchanger Valve 3CC-V167SB
	Chemical and Volume Control System SB	Boric Acid Transfer Pump 1B-SB
		Charging Pump Valve 2CS-V590SB
		Charging Pump Valve 2CS-V588SB
		Charging Pump Valve 2CS-V604SB
		Charging Pump Valve 2CS-V606SB
	Chilled Water System SB	Water Chiller Unit WC-2(1B-SB)
		Chilled Water Dist. Valve 3CX W10SA-1
		Chilled Water Dist. Valve 3CX W14SB-1
		Chilled Water Dist. Valve 3CX W27SB-1
		Chilled Water Dist. Valve 3CX W28SB-1
		Chilled Water Dist. Valve 3CX W33SB-1

ENCLOSURE 2 ATTACHMENT A

MOTOR CONTROL CENTER	SYSTEM	COMPONENT
MCC-1B3S-SB	Emergency Diesel Generator System SB	Fuel Oil Transfer Pump 1B-SB
	Emergency Service Water System SB	Service Water Valve 3SW-B16SB
	Fuel Oil Storage Building - HVAC System SB	Exhaust Fan E-85 (1A-SB) Exhaust Fan E-85 (1B-SB)
	Mech/Elec Penetration Areas - HVAC System SB	Air Handling Unit AH-92 (1B-SB)
	Auxiliary Building Shutdown Systems - HVAC System SB	Air Handling Unit AH-6 (1B-SB) Air Handling Unit AH-7 (1B-SB) Air Handling Unit AH-19 (1B-SB) Air Handling Unit AH-20 (1B-SB)

ENCLOSURE 2 ATTACHMENT A

VALVE ID	NORMAL POSITION	FAIL POSITION	SAFE SHUTDOWN POSITION	FUNCTION
MOV 2RH-F513SA-1	Open	FAI	Open	RHR Pump Miniflow Iso.
MOV 2RH-V506SB-1	Closed	FAI	Closed	RHR Pump Disch. to CVCS Chg. Pump Suction Iso.
AOV 2RH-B500SN-1	Open	Open	Open	RHR Flow Control
AOV 2RH-F500SN-1	Closed	Closed	Closed	RHR HX Bypass
AOV 2RH-B501SN-1	Open	Open	Open	RHR Flow Control
AOV 2RH-V507SA-1	Closed	FAI	Closed	RHR Disch. to CVCS Chg. Pump Suction Iso.
AOV 3CC-D276SH-1	Closed	Closed	Closed	CCW Makeup Isolation Valve
SOV 3CX-W32SA-1	Note: Fail in such a way that water flows through chilled water coil of AHH.			Chilled Water Valves, flow to AH-92SA
SOV 3CX-W31SB-1				AH-92SB
DDR AC-D115A-1	Open	Closed	Open	RAB Swgr. Room A Return Damper
DDR AC-D145B-1	Open	Closed	Open	RAB Swgr. Room B Return Damper

ATTACHMENT 2

C.5.d(4) Storage and use of flammable and combustible liquids follows the intent and basic criteria of NFPA 30, "Flammable and Combustible Liquid Code" except that the requirements of NFPA-37 "Installation and Use of Stationary Combustion Engines and Gas Turbines" apply to the installation of the Diesel Generator Day Tank. Specific standard requirements are met where compatible with other design requirements.

NRC GUIDELINES: C. POSITION (Cont'd)

C.5.d(5) Hydrogen lines in safety-related areas should be either designed to seismic Class I requirements, or sleeve such that the water pipe is directly vented to the outside, or should be equipped with excess flow valves so that in case of a line break, the hydrogen concentration in the affected areas will not exceed 2%.

PROJECT CONFORMANCE: C. POSITION (Cont'd)

C.5.d(5) One of the options described above will be used to ensure compliance. (2)

NRC GUIDELINES: C. POSITION (Cont'd)

C.5.e. Electrical Cable Construction, Cable Trays, and Cable Penetrations

(1) Only metal should be used for cable trays. Only metallic tubing should be used for conduit. Thin-wall metallic tubing should not be used. Flexible metallic tubing should only be used in short lengths to connect components to equipment. Other raceways should be made of noncombustible material.

PROJECT CONFORMANCE: C. POSITION (Cont'd)

C.5.e. Electrical Cable Construction, Cable Trays, and Cable Penetrations

(1) Cable trays and other raceways are constructed of non-combustible material. Metallic tubing is used for conduit and thin wall tubing is not used. Short lengths of flexible metallic tubing are used to connect components to equipment. A small quantity of vinyl is used for cable trays as described in Position C.5.d(3). PVC is used only for raceways embedded in concrete or underground applications.

NRC GUIDELINES: C. POSITION (Cont'd)

C.5.e(2) Redundant safety-related cable systems outside the cable spreading room should be separated from each other and from potential fire exposure hazards in nonsafety-related areas by

PROJECT CONFORMANCE: C. POSITION (Cont'd)

C.7.b Control Room Fire Area (Cont'd)

Manual fire fighting capability is provided for fires (1) within cabinets, consoles or connecting cables and (2) exposure fires involving combustibles in the general room area by means of Class A and Class C fire extinguishers inside the control room and a hose located just outside the control room.

Adjustable nozzles, approved for use on electrical fires, will be provided for the hose station. The nozzle selected will also minimize physical damage to electrical equipment from hose stream impingement.

Ionization detectors will be provided in the control and peripheral rooms at the ceiling level. The Control Room cabinets, panels and consoles are of the self ventilating type permitting smoke to quickly migrate to the ceiling of the room. Rapid migration of combustion by-products and quick response by highly sensitive type of detector mitigates the need for detectors within control room cabinets or consoles. Alarm and local indication will be provided in the control room. Ionization detectors will be provided inside the Main Control Board. (2)
Self-Contained breathing apparatus will be available for use by the operators until the room ventilation system can evacuate smoke.

The Control Room is designed for a positive pressure minimum air leakage envelope (See FSAR Section 6.4 for details).

Smoke detectors are provided at the outside air makeup inlet so that smoke induction into the Control room can be minimized by manual switchover to other inlets following smoke alarms transmitted to the Control Room. The normally recirculating (with limited makeup air) Control Room Ventilation System is designed so that it may be switched manually to operate in a nonrecirculating mode. This is used only for clearing the Control Room of heavy smoke concentration.

NRC GUIDELINES: C. POSITION (Cont'd)

C.7.b Control Room Fire Area (Cont'd)

All cables that enter the control room should terminate in the control room. That is, no cabling should be routed through the control room from one area to another. Cables in underfloor and ceiling spaces should meet the separation criteria necessary for fire protection.

Air-handling functions should be ducted separately from cable runs in such spaces; i.e., if cables are routed inunderfloor or ceiling spaces, these spaces should not be used as air plenums for ventilation of the control room. Fully enclosed electrical raceways located in such underfloor and ceiling spaces, if over 1 square foot in cross-sectional area, should have automatic fire suppression inside. Area automatic fire suppression should be provided for underfloor and ceiling spaces if used for cable runs

ATTACHMENT 3

ESSENTIAL SYSTEMS FOR SAFE SHUTDOWN

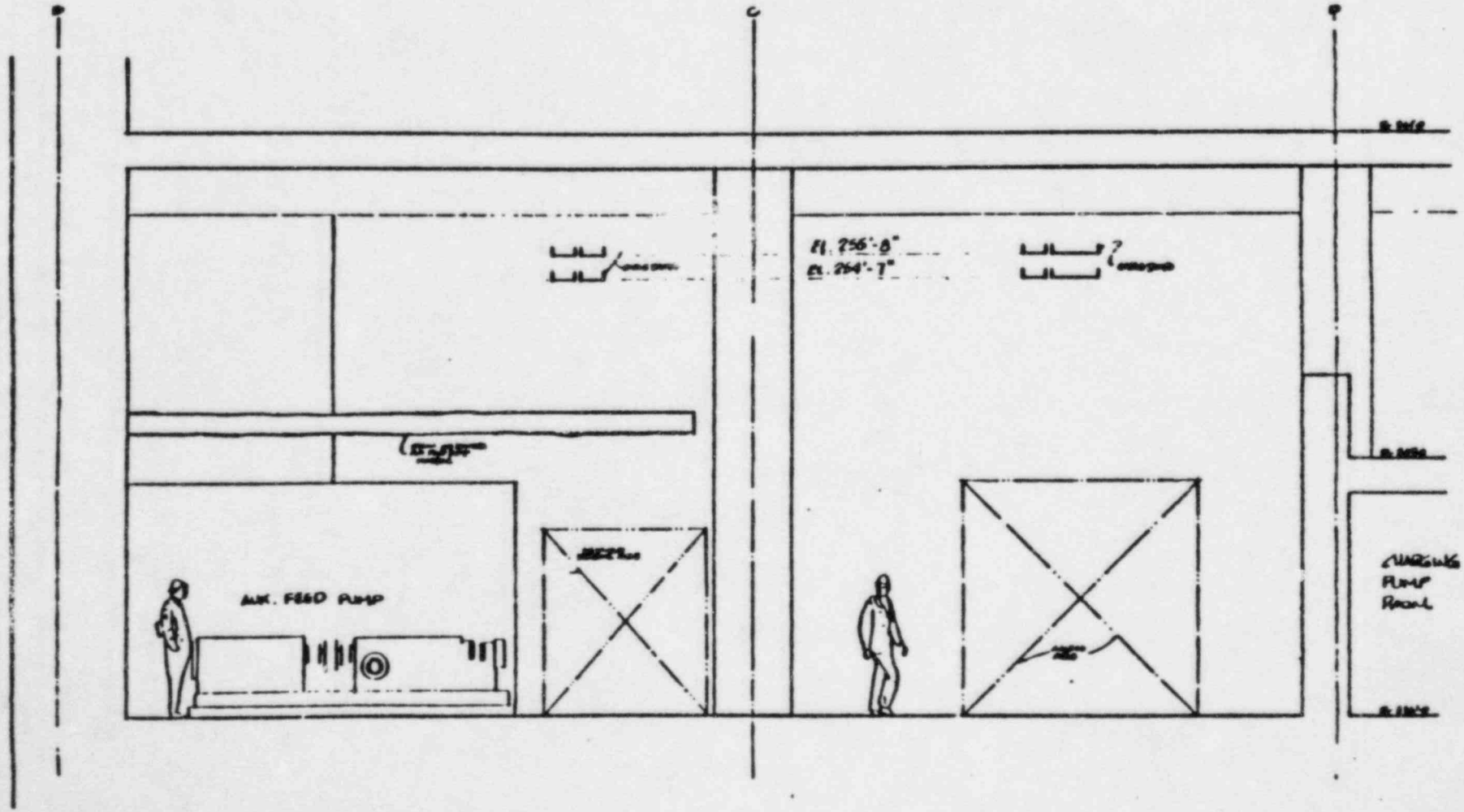
SYSTEM	APP.R ANALYSIS DESIGNATION
EMERGENCY DIESEL GENERATOR	EDGS
AUXILIARY FEEDWATER SYSTEM	AFW
EMERGENCY SERVICE WATER SYSTEM	ESWS
MAIN STEAM SYSTEM	MSS
RCS PRESSURE CONTROL	PPCS
CHEMICAL & VOLUME CONTROL	CVCS
SAFETY INJECTION SYSTEM	SIS
RESIDUAL HEAT REMOVAL SYSTEM	RHRS
COMPONENT COOLING WATER	CCW
CONTAINMENT FAN COOLERS	RCFC
CONTROL ROOM HVAC	RCRH
ELECTRIC EQUIPMENT ROOM HVAC	RCRC
SWITCHGEAR ROOM HVAC	RHAA
DIESEL GEN. BUILDING HVAC	RHGB
F.O. STOR. TANK BLDG. HVAC	RFOB
ESW INTAKE STRUCTURE HVAC	RSWI
MECH/ELECT PENETRATION HVAC	RMCC
MISC. RAB AREAS HVAC	RHAS
CHILLED WATER SYSTEM	CHS
DC POWER DISTRIBUTION	PDSDC
AC POWER DISTRIBUTION	PDSAC
CONTROL ROOM LIGHTING	CRLT
REACTOR TRIP SYSTEM	RSS

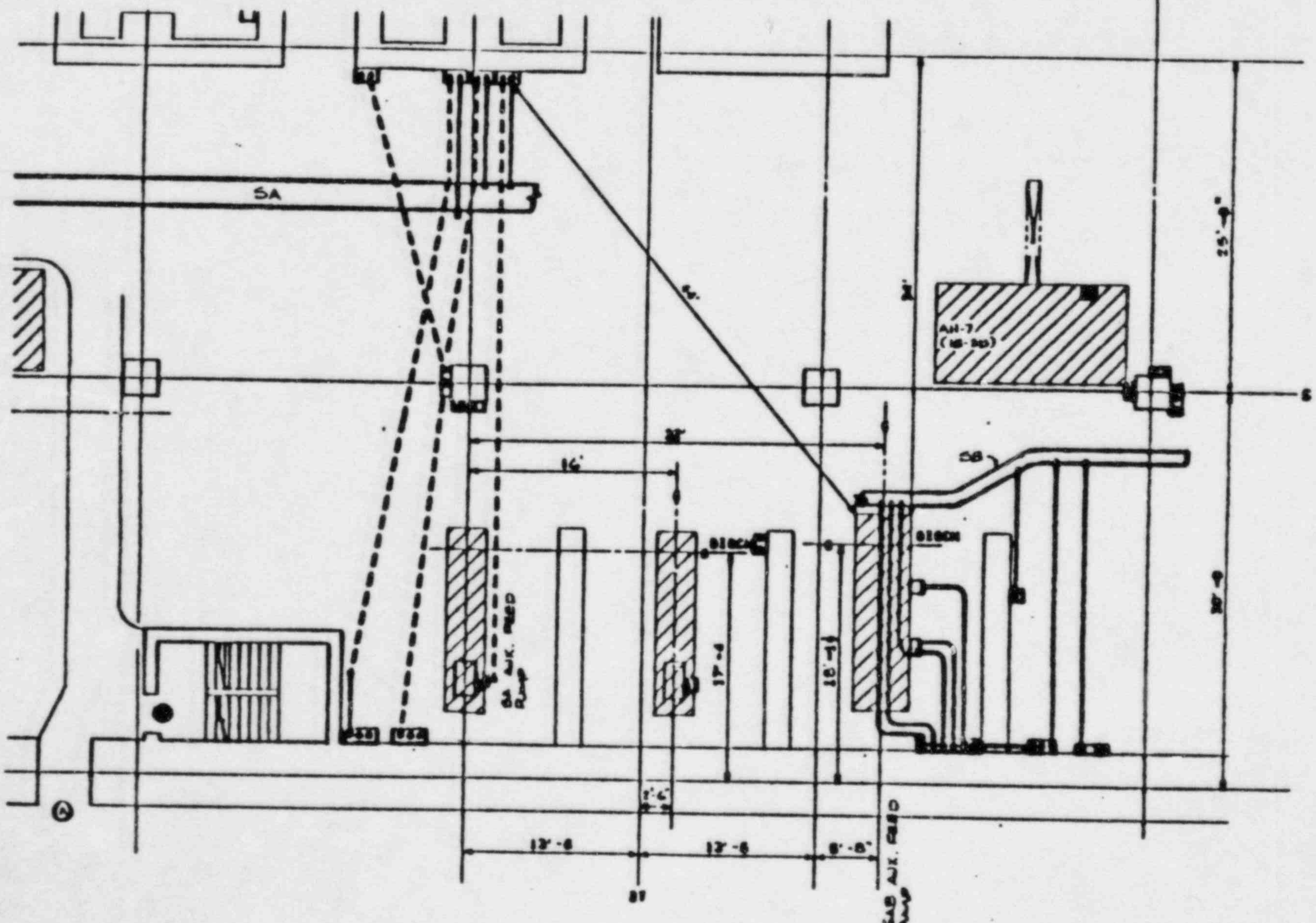
SHEARON HARRIS NUCLEAR POWER PLANT

SYSTEMS REQUIRED FOR PLANT SHUTDOWN
IN CASE OF FIRE

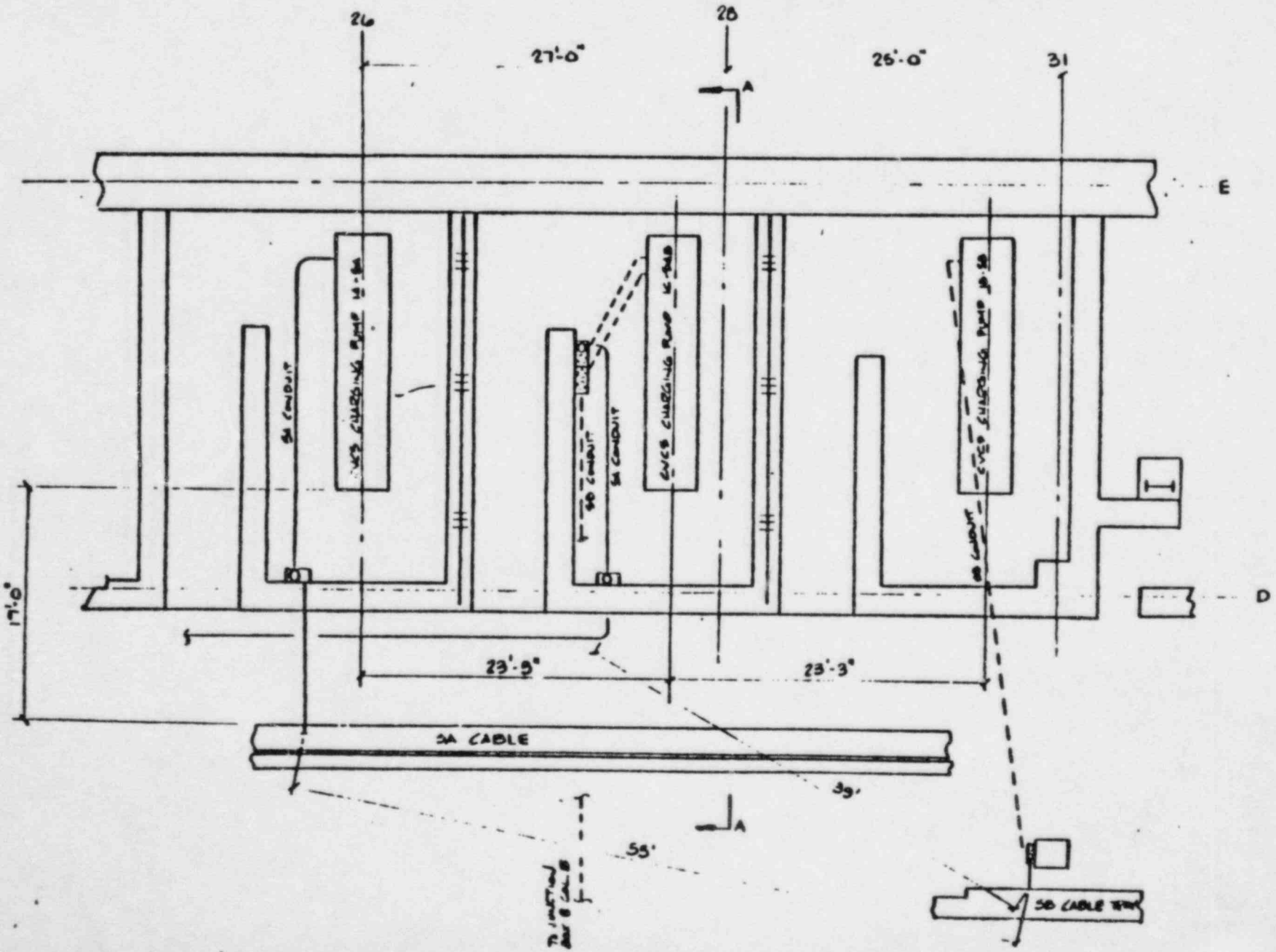
(1)	AUXILIARY FEEDWATER SYSTEM	HOT
(2)	COMPONENT COOLING WATER SYSTEM	COLD
(3)	CHEMICAL VOLUME & CONTROL SYSTEM	HOT & COLD
(4)	EMERGENCY DIESEL GENERATOR SYSTEM	HOT & COLD
(5)	EMERGENCY SERVICE WATER SYSTEM	HOT & COLD
(6)	MAIN STEAM SUPPLY SYSTEM	HOT
(7)	PRESSURIZER PRESSURE CONTROL SYSTEM	HOT & COLD
(8)	RESIDUAL HEAT REMOVAL SYSTEM	COLD
(9)	SAFETY INJECTION SYSTEM	HOT & COLD
(10)	CONTROL ROOM LIGHTING SYSTEM	HOT & COLD
(11)	CHILLED WATER SYSTEM	HOT & COLD
(12)	CONTAINMENT FAN COOLING SYSTEM	HOT & COLD
(13)	CONTROL ROOM COMPLEX COOLING SYSTEM	HOT & COLD
(14)	HVAC SYSTEM - FUEL OIL STORAGE BUILDING	HOT & COLD
(15)	HVAC SYSTEM - DIESEL GENERATOR BUILDING	HOT & COLD
(16)	MMC - MECH/ELECT PENETRATION AREAS	HOT & COLD
	COOLING SYSTEM	HOT & COLD
(17)	HVAC - AUXILIARY BUILDING SHUTDOWN AREAS	HOT & COLD
(18)	HVAC - ESW INTAKE SYSTEM	HOT & COLD
(19)	PDSAC - AC POWER DISTRIBUTION SYSTEM	HOT & COLD
(20)	PDSDC - 125 V DC POWER DISTRIBUTION SYSTEM	HOT & COLD

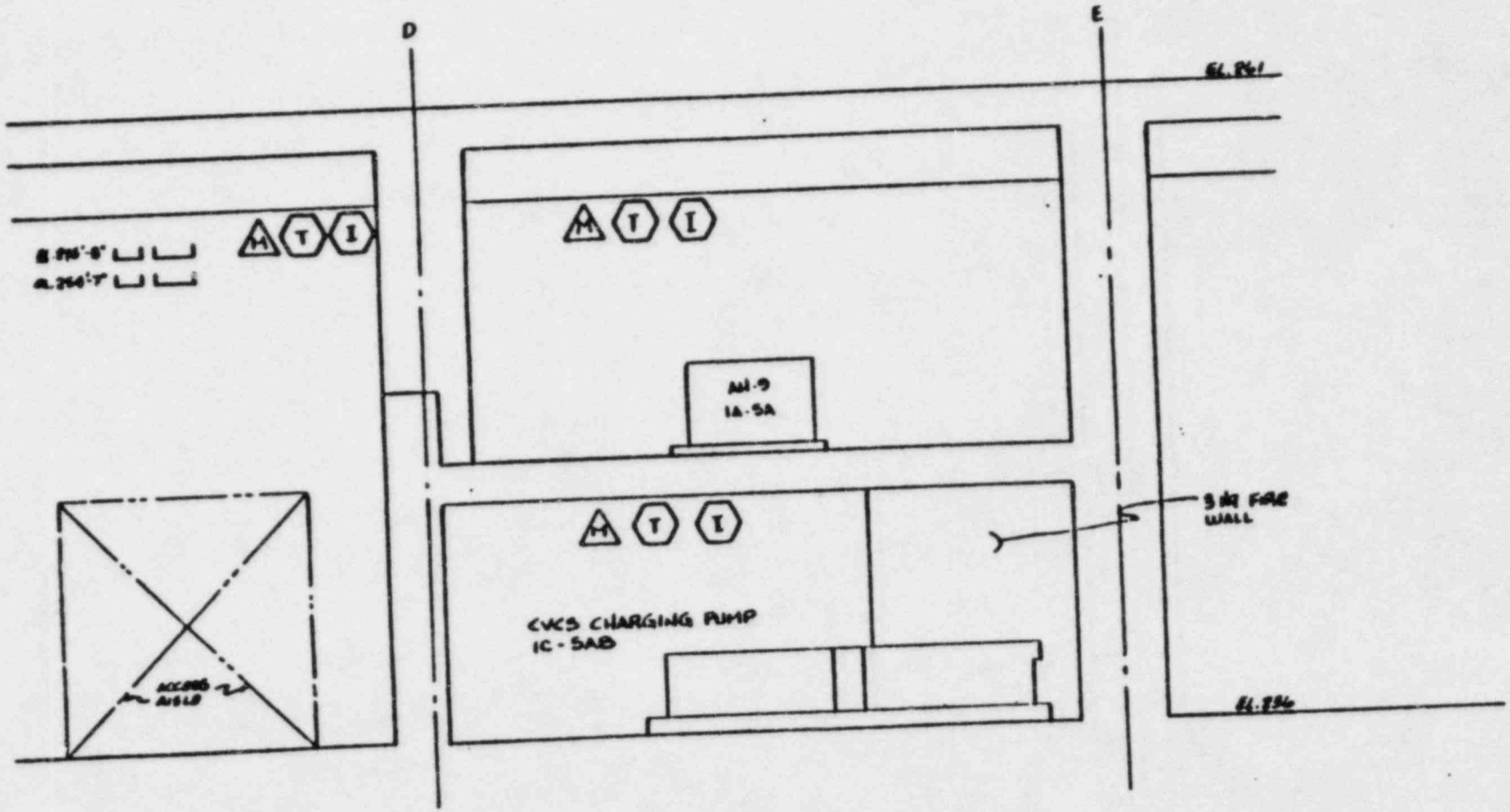
AUXILIARY FEED PUMP




5A
5A AUX. FEED PUMP
5AB AUX. FEED PUMP
5B
AH-7
(18-313)
16'
31'
17'-4
18'-1½
12'-6
12'-6
8'-8"
30'-0
25'-9"

CVCS CHARGING PUMPS




D
E
EL. 786'
EL. 734'
AH-9
1A-5A
CVCS CHARGING PUMP
1C-5AB
3 HR FIRE WALL

SECTION A-A

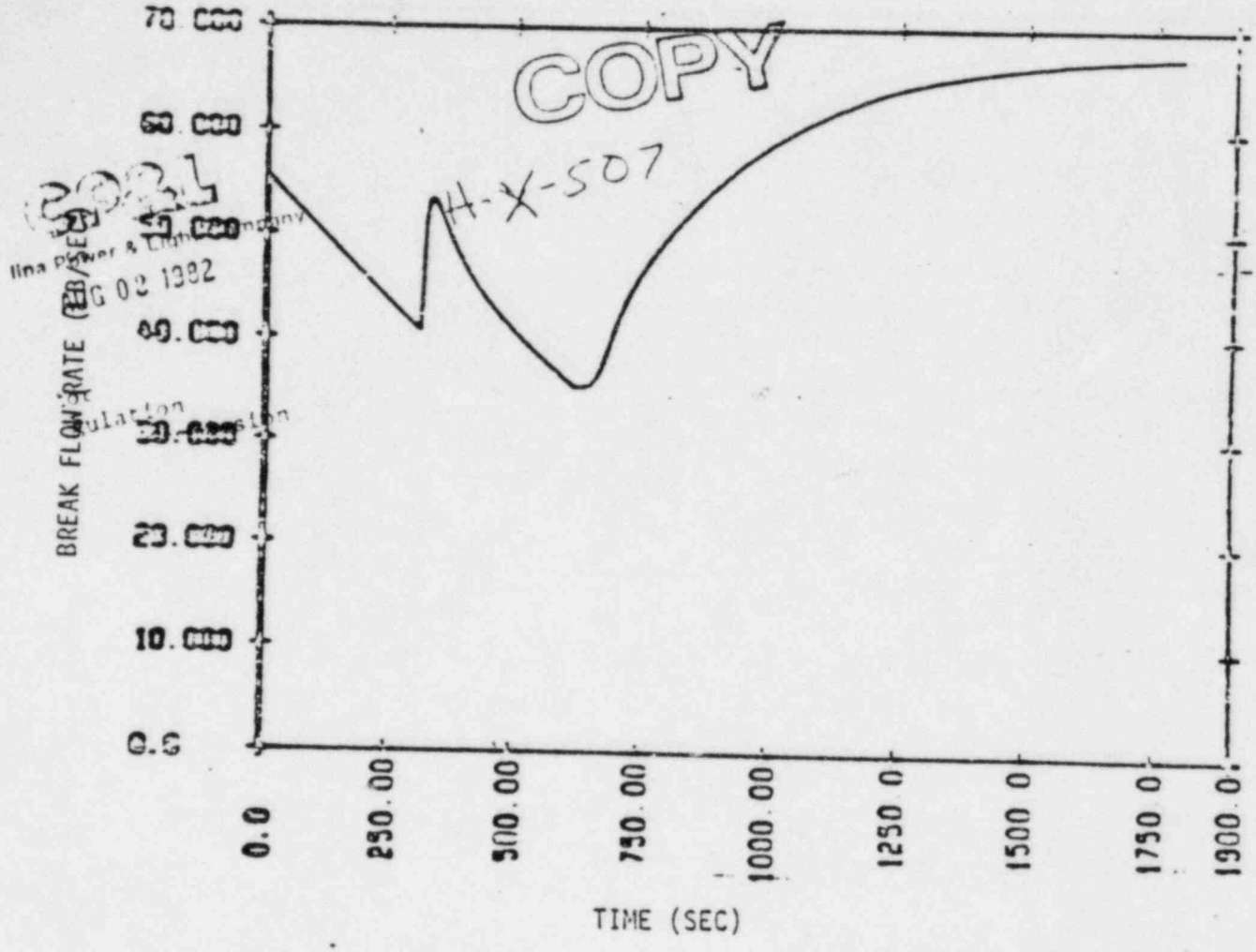


Figure 1
BREAK FLOW RATE

EXHIBIT 7

U.S. NUCLEAR REGULATORY COMMISSION

STANDARD REVIEW PLAN

OFFICE OF NUCLEAR REACTOR REGULATION

9.5.1 FIRE PROTECTION PROGRAM

REVIEW RESPONSIBILITIES

Primary - Chemical Engineering Branch (CMEB)

Secondary - None

I. AREAS OF REVIEW

The purpose of the fire protection program (FPP) is to provide assurance, through a defense-in-depth design, that a fire will not prevent the performance of necessary safe plant shutdown functions and will not significantly increase the risk of radioactive releases to the environment in accordance with General Design Criteria 3 and 5. The fire protection program consists of fire detection and extinguishing systems and equipment, administrative controls and procedures, and trained personnel.

The CMEB review of the fire protection program includes a review of the evaluation of potential fire hazards described in the applicant's Safety Analysis Report (SAR), and a review of the description of the fire protection system design showing the system characteristics and layout which define the "fire prevention" and "fire protection" portions of the program.

The CMEB reviews the total fire protection program described in the applicant's Safety Analysis Report (SAR) with respect to the criteria of Branch Technical Position CMEB 9.5-1 attached to this SRP section, specifically with respect to the following:

1. Overall fire protection program requirements, including the degree of involvement and assigned responsibility of management; fire protection administrative controls and quality assurance program; fire brigade training activities and coordination with offsite fire fighting organizations, including their capability in assisting in the extinguishment of plant fires.

2. Evaluation of potential fire hazards for safety-related areas throughout the plant and the effect of postulated fires relative to maintaining the ability

to perform safe shutdown functions, and minimizing radioactive releases to the environment.

3. Plant layout, egress routes, facility arrangements, and structural design features which control separation or isolation of redundant safety systems and selection of the methods for fire detection, control and extinguishing; control of fire hazards; fire barriers and walls; use of noncombustible materials; floor drains, ventilation, emergency lighting and communication systems.

4. The functional performance of the fire fighting systems, extinguishing agents, including the detection, alarm, suppression, control, and extinguishing systems described in the SAR to verify the adequacy of the FPP to protect safety-related equipment.

5. The fire protection system piping and instrumentation diagrams (P&IDs); including redundancy of equipment; the FPP design criteria and failure modes and effects analysis (impairment).

6. On multiple unit applications, the additional fire protection and control provisions during construction of the remaining units will be reviewed to verify that the integrity and operability of the fire protection system is maintained.

The CMEB will coordinate other branches' activities related to fire protection as follows:

The Auxiliary Systems Branch (ASB)* reviews the applicant's list of systems and components needed to provide safe shutdown capability and reviews the applicant's program for identification of the locations where redundant trains or divisions of safe shutdown systems are separated by less than 20 feet. The results of these reviews are provided to CMEB. CMEB notifies the applicant of results as appropriate and reviews the applicant's fire protection measures to deal with separation deficiencies. If such measures involve modifications of original system (including emergency lighting and communication) or circuit designs, or changes in layout of equipment, ASB* will review upon request from CMEB. The designs will be reviewed against the criteria for shutdown systems given in BTP CMEB 9.5-1, Positions C.5.b and C.5.c. The review of these modifications will be documented in SER sections dealing with the systems involved.

The Emergency Preparedness Licensing Branch (EPLB) will evaluate the adequacy of the offsite emergency planning as part of its primary review responsibility for SRP Section 13.3. The Licensing Qualification Branch (LQB) will evaluate the fire protection brigade training programs and will evaluate the organizational arrangements as part of its primary review responsibilities for SRP Sections 13.2.2 and 13.1, respectively. The Procedures and Test Review Branch (PTRB) will evaluate the fire protection plant procedures as part of its primary responsibility for SRP Section 13.5. The Quality Assurance Branch (QAB) will evaluate the adequacy of the QA Program as part of its primary review responsibility for SRP Section 17.0. The Licensing Guidance Branch will review the technical specifications prepared by the applicant for fire protection as part of its primary review responsibility for SRP Section 16.0. The Structural Engineering Branch (SEB) will, upon request, verify the acceptability of the

*With assistance from other PS branches (RSB, ICSB, PSB) as required.

design analyses, procedures, and criteria used for seismic Category I supporting structures for the FPP, and for externally imposed system loads resulting from less severe natural phenomena. The Mechanical Engineering Branch (MEB) will, upon request, review that portion of the hose standpipe system which should remain functional following a postulated SSE, and confirm that systems components, piping, and structures are designed in accordance with applicable seismic design criteria. The Instrumentation and Control Systems Branch (ICSB) verifies, on request, the adequacy of the fire protection instrumentation and controls.

For those areas of review identified above as being reviewed as part of the primary responsibility of other branches, the acceptance criteria necessary for the review and their methods of application are contained in the referenced SRP section of the corresponding primary branch.

II. ACCEPTANCE CRITERIA

The applicant's fire protection program is acceptable if it is in accordance with the following criteria:

1. 10 CFR Part 50 §50.48, and General Design Criterion 3, as related to fire prevention, the design and operation of fire detection and protection systems, and administrative controls provided to protect safety-related structures, systems, and components of the reactor facility.

2. General Design Criterion 5, as related to fire protection for shared safety-related structures, systems, and components to assure the ability to perform their intended safety function.

The following specific criteria provide information, recommendations, and guidance and in general describe a basis acceptable to the staff that may be used to meet the requirements of §50.48, GDC 3 and 5:

a. Branch Technical Position (BTP) CMEB 9.5-1 as it relates to the design provisions given to implement the fire protection program.

b. Regulatory Guide 1.78 as it relates to habitable areas such as the control room and to the use of specific fire extinguishing agents.

c. Regulatory Guide 1.101, as it relates to fire protection emergency planning.

III. REVIEW PROCEDURES

The secondary and coordinated review branches will provide input for the areas of review stated in subsection I of this SRP section. The primary reviewer obtains and uses such input as required to assure that this review procedure is complete.

The reviewer will select and emphasize material from this SRP section as may be appropriate for a particular case.

1. CMEB reviews the SAR to determine that the appropriate levels of management and trained, experienced personnel are responsible for the design and implementation of the fire protection program in accordance with BTP CMEB 9.5-1.

2. CMEB reviews the analysis in the SAR of the fire potential in safety-related plant areas and the hazard of fires to these areas to determine that the proposed fire protection program is able to maintain the ability to perform safe shutdown functions and to minimize radioactive releases to the environment.

3. CMEB reviews the FPP P&IDs and plant layout drawings to verify that facility arrangement, buildings, and structural and compartmentation features which affect the methods used for fire protection, fire control, and control of hazards are acceptable for the protection of safety-related equipment.

4. CMEB determines that design criteria and bases for the detection and suppression systems for smoke, heat and flame control are in accordance with the BTP guidelines and provide adequate protection for safety-related structures, systems, and components. The reviewer determines that fire protection support systems, such as emergency lighting and communication systems, floor drain systems, and ventilation and exhaust systems are designed to operate consistent with this objective. CMEB reviews the results of an FPP failure modes and effect analysis (impairment) to assure that the entire fire protection system for one safety-related area cannot be impaired by a single failure.

5. For multiple unit sites, CMEB determines that protection is provided to operating units during concurrent construction of other units. This includes an evaluation of the total fire protection program for each plant, the overall program for the site, including division of responsibility on fire protection matters.

6. CMEB reviews the technical specifications proposed by the applicant for fire protection (OL). The reviewer will determine that the limiting conditions for operation and surveillance requirements of the technical specifications are in agreement with the requirements developed as a result of the staff's review.

IV. EVALUATION FINDINGS

CMEB verifies that sufficient information has been provided and that the review is adequate to support conclusions of the following type, to be included in the staff's safety evaluation report:

> The staff concludes that the fire protection program's design criteria and bases are acceptable and meet the requirements of 10 CFR Part 50, §50.48 and General Design Criteria 3 and 5. This conclusion is based on the applicant meeting the guidelines of Branch Technical Position CMEB 9.5-1, and Regulatory Guides 1.78 and 1.101 as well as applicable industry standards. In meeting these guidelines the applicant has provided an acceptable basis for the design and location of safety-related structures and systems to minimize the probability and effect of fires and explosions; has used noncombustible and heat resistant materials whenever practical; has provided of fire detection and fire fighting systems of appropriate capacity and capability to minimize adverse effects of fire on safety-related systems. In addition, the applicant has demonstrated that shared structures, systems, and components of the fire protection systems will not prevent their ability to perform their intended safety functions.

V. IMPLEMENTATION

The following is intended to provide guidance to applicants and licensees regarding the NRC staff's plans for using this SRP section.

Except in those cases in which the applicant proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the method described herein will be used by the staff in its evaluation of conformance with Commission regulations.

Implementation schedules for conformance to parts of the method discussed herein are contained in the referenced regulatory guides.

VI. REFERENCES

1. 10 CFR Part 50, Appendix A, General Design Criterion 3, "Fire Protection."

2. 10 CFR Part 50, Appendix A, General Design Criterion 5, "Sharing of Structures, Systems, and Components."

3. Regulatory Guide 1.78, "Assumptions for Evaluating the Habitability of a Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release."

4. Regulatory Guide 1.101, "Emergency Planning for Nuclear Power Plants."

5. Branch Technical Position CMEB 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants."

6. 10 CFR Part 50, § 50.48, "Fire Protection."

7. Appendix R to 10 CFR Part 50, "Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979."

BRANCH TECHNICAL POSITION CMEB 9.5-1

(Formerly BTP ASB 9.5-1)

GUIDELINES FOR

FIRE PROTECTION FOR NUCLEAR POWER PLANTS.

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A. INTRODUCTION

General Design Criterion 3, "Fire Protection," of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, "Licensing of Production and Utilization Facilities," requires that structures, systems, and components important to safety be designed and located to minimize, consistent with other safety requirements, the probability and effect of fires and explosions. Noncombustible and heat-resistant materials are required to be used wherever practical throughout the unit, particularly in locations such as the containment and control room. Criterion 3 also requires that fire detection and suppression systems of appropriate capacity and capability be provided and designed to minimize the adverse effect of fires on structures, systems, and components important to safety and that firefighting systems be designed to ensure that their failure, rupture or inadvertent operation does not significantly impair the safety capability of these structures, systems, and components.

This Branch Technical Position (BTP) presents guidelines acceptable to the NRC staff for implementing this criterion in the development of a fire protection program for nuclear power plants. These revised guidelines include the acceptance criteria listed in a number of documents, including Appendix R to 10 CFR Part 50 and 10 CFR Part 50, § 50.48. The purpose of the fire protection program is to ensure the capability to shut down the reactor and maintain it in a safe shutdown condition and to minimize radioactive releases to the environment in the event of a fire. It implements the philosophy of defense-in-depth protection against the hazards of fire and its associated effects on safety-related equipment. If designs or methods different from the guidelines recommended herein are used, they must provide equivalent fire protection. Suitable bases and justification should be provided for alternative approaches to establish acceptable implementation of General Design Criterion 3.

This BTP addresses fire protection programs for safety-related systems and equipment and for other plant areas containing fire hazards that could adversely affect safety-related systems. It does not give guidance for protecting the life or safety of the site personnel or for protection against economic or property loss. This document supplements Regulatory Guide 1.75, "Physical Independence of Electrical Systems," in determining the fire protection for redundant cable systems.

B. DISCUSSION

There have been numerous fires in operating U.S. nuclear power plants through December 1975 of which 32 were important enough to report. Of these, the fire on March 22, 1975 at Browns Ferry nuclear plant was the most severe. With approximately 250 operating reactor years of experience, one may infer a frequency on the order of one fire per 10 reactor years. Thus, on the average, a nuclear power plant may experience one or more fires of varying severity during its operating life. Although WASH-1400, "Reactor Safety Study - An Assessment of Accident Risks in U.S. Commercial Nuclear Power Plants," dated October 1975, concluded that the Browns Ferry fire did not affect the validity of the overall risk assessment, the staff concluded that cost-effective fire protection measures should be instituted to significantly decrease the frequency and severity of fires and consequently initiated the development of this BTP. In this development, the staff made use of many national standards and other publications related to fire protection. The documents discussed below were particularly useful.

A document entitled "The International Guidelines for the Fire Protection of Nuclear Power Plants" (IGL), 1974 Edition, Second Reprint, published on behalf of the National Nuclear Risks Insurance Pools and Association, provides a step-by-step approach to assessing the fire risk in a nuclear power plant and describes protective measures to be taken as a part of the fire protection of these plants. It provides useful guidance in this important area. The Nuclear Energy Liability and Property Insurance Association (NELPIA) and the Mutual Atomic Energy Reinsurance Pool (MAERP) have prepared a document entitled "Specifications for Fire Protection of New Plants," which gives general conditions and valuable criteria. A special review group organized by NRC under Dr. Stephen H. Hanauer, Technical Advisor to the Executive Director for Operations, to study the Browns Ferry fire, issued a report, NUREG-0050, "Recommendations Related to Browns Ferry Fire," in February 1976, which contains recommendations applicable to all nuclear power plants. This BTP uses the applicable information contained in these documents.

The fire protection program for a nuclear power plant presented in this BTP consists of design features, personnel, equipment, and procedures that provide the defense-in-depth protection of the public health and safety. The purpose of the program is to prevent significant fires, to ensure the capability to shut down the reactor and maintain it in a safe shutdown condition, and to minimize radioactive releases to the environment in the event of a significant fire. To meet these objectives, it is essential that management participation in the program begin with early design concepts and plant layout work and continue through plant operation and that a qualified staff be responsible for engineering and design of fire protection features that provide fire detection, annunciation, confinement, and suppression for the plant. The staff should also be responsible for fire prevention activities, maintenance of fire protection systems, training, and manual firefighting activities. It is the combination of all these that provides the needed defense-in-depth protection of the public health and safety.

Some of the major conclusions that emerged from the Browns Ferry fire investigations warrant emphasis and are discussed below.

1. Defense-in-Depth

Nuclear power plants use the concept of defense-in-depth to achieve the required high degree of safety by using echelons of safety systems. This concept is also applicable to fire safety in nuclear power plants. With respect to the fire protection program, the defense-in-depth principle is aimed at achieving an adequate balance in:

a. Preventing fires from starting;

b. Detecting fires quickly, suppressing those fires that occur, putting them out quickly, and limiting their damage; and

c. Designing plant safety systems so that a fire that starts in spite of the fire prevention program and burns for a considerable time in spite of fire protection activities will not prevent essential plant safety functions from being performed.

No one of these echelons can be perfect or complete by itself. Each echelon should meet certain minimum requirements; however, strengthening any one can compensate in some measure for weaknesses, known or unknown, in the others.

The primary objective of the fire protection program is to minimize both the probability and consequences of postulated fires. In spite of steps taken to reduce the probability of fire, fires are expected to occur. Therefore, means are needed to detect and suppress fires with particular emphasis on providing passive and active fire protection of appropriate capability and adequate capacity for the systems necessary to achieve and maintain safe plant shutdown with or without offsite power. For other safety-related systems, the fire protection should ensure that a fire will not cause the loss of function of such systems, even though loss of redundancy within a system may occur as a result of the fire. Generally, in plant areas where the potential fire damage may jeopardize safe plant shutdown, the primary means of fire protection should consist of fire barriers and fixed automatic fire detection and suppression systems. Also, a backup manual firefighting capability should be provided throughout the plant to limit the extent of fire damage. Portable equipment consisting of hoses, nozzles, portable extinguishers, complete personnel protective equipment, and air breathing equipment should be provided for use by properly trained firefighting personnel. Access for effective manual application of fire extinguishing agents to combustibles should be provided. The adequacy of fire protection for any particular plant safety system or area should be determined by analysis of the effects of the postulated fire relative to maintaining the ability to safely shut down the plant and minimize radioactive releases to the environment in the event of a fire.

Fire protection starts with design and must be carried through all phases of construction and operation. A quality assurance (QA) program is needed to identify and rectify errors in design, construction, and operation and is an essential part of defense-in-depth.

2. Use of Water on Electrical Cable Fires

Experience with major electrical cable fires shows that water will promptly extinguish such fires. Since prompt extinguishing of the fire is vital to reactor safety, fire and water damage to safety systems is reduced by the more efficient application of water from fixed systems spraying directly on the fire rather than by manual application with fire hoses. Appropriate firefighting procedures and fire training should provide the techniques, equipment, and skills for the use of water in fighting electrical cable fires in nuclear plants, particularly in areas containing a high concentration of electric cables with plastic insulation.

This is not to say that fixed water systems should be installed everywhere. Equipment that may be damaged by water should be shielded or relocated away from the fire hazard and the water. Drains should be provided to remove any water used for fire suppression and extinguishment to ensure that water accumulation does not incapacitate safety-related equipment.

3. Establishment and Use of Fire Areas

Separate fire areas for each division of safety-related systems will reduce the possibility of fire-related damage to redundant safety-related equipment. Fire areas should be established to separate redundant safety divisions and isolate safety-related systems from fire hazards in nonsafety-related areas. Particular design attention to the use of separate isolated fire areas for redundant cables will help to avoid loss of redundant safety-related cables. Separate fire areas should also be employed to limit the spread of fires between components that are major fire hazards within a safety division. Where redundant

systems cannot be separated by fire barriers, as in containment and the control room, it is necessary to employ other measures to prevent a fire from causing the loss of function of safety-related systems.

Within fire areas containing components of a safety-related system, special attention should be given to detecting and suppressing fires that may adversely affect the system. Measures that may be taken to reduce the effects of a postulated fire in a given fire area include limiting the amount of combustible materials, installing fire-resistant construction, providing fire rated barriers for cable trays, installing fire detection systems and fixed fire suppression systems, or providing other protection suitable to the installation. The fire hazard analysis will be the mechanism to determine that fire areas have been properly selected.

Suitable design of the ventilation systems can limit the consequences of a fire by preventing the spread of the products of combustion to other fire areas. It is important that means be provided to ventilate, exhaust, or isolate the fire area as required and that consideration be given to the consequences of failure of ventilation systems due to fire causing loss of control for venting, exhausting, or isolating a given fire area. The capability to ventilate, exhaust, or isolate is particularly important to ensure the habitability of rooms or spaces that must be attended in an emergency. In the design, provision should be made for personnel access to and escape routes from each fire area.

4. Definitions

For the user's convenience, some of the terms related to fire protection are presented below with their definitions as used in this BTP.

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

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

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

Control Room Complex - the zone served by the control room emergency ventilation system (see SRP Section 6.4, "Habitability Systems").

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

Fire Area - that portion of a building or plant that is separated from other areas by boundary fire barriers.

Fire Barrier - those components of construction (walls, floors, and their supports), including beams, joists, columns, penetration seals or closures, fire doors, and fire dampers that are rated by approving laboratories in hours of resistance to fire and are used to prevent the spread of fire.

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

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

Fire Detectors - a device designed to automatically detect the presence of fire and initiate an alarm system and other appropriate action (see NFPA 72E, "Automatic Fire Detectors"). Some typical fire detectors are classified as follows:

Heat Detector - a device that detects a predetermined (fixed) temperature or rate of temperature rise.

Smoke Detector - a device that detects the visible or invisible products of combustion.

Flame Detector - a device that detects the infrared, ultraviolet, or visible radiation produced by a fire.

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

Fire Protection Program - the integrated effort involving components, procedures, and personnel utilized in carrying out all activities of fire protection. It includes system and facility design, fire prevention, fire detection, annunciation, confinement, suppression, administrative controls, fire brigade organization, inspection and maintenance, training, quality assurance, and testing.

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

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

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

Noncombustible Material

a. A material which in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors when subjected to fire or heat.

b. Material having a structural base of noncombustible material, as defined in a., above, with a surfacing not over 1/8-inch thick that has a flame spread rating not higher than 50 when measured using ASTM E-84 Test "Surface Burning Characteristics of Building Materials."

Raceway - refer to Regulatory Guide 1.75.

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

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

Secondary Containment - a structure that completely encloses primary containment, used for controlling containment leakage.

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

- Wet-Pipe System
- Dry-Pipe System
- Preaction System
- Deluge System
- Combined Dry-Pipe and Preaction System
- On-Off System

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

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

C. POSITION

1. Fire Protection Program Requirements

a. Fire Protection Program

A fire protection program should be established at each nuclear power plant. The program should establish the fire protection policy for the protection of structures, systems, and components important to safety at each plant and the procedures, equipment, and personnel required to implement the program at the plant site.

(1) The fire protection program should be under the direction of an individual who has been delegated authority commensurate with the responsibilities

of the position and who has available staff personnel knowledgeable in both fire protection and nuclear safety.

(2) The fire protection program should extend the concept of defense-in-depth to fire protection in fire areas important to safety, with the following objectives:

- to prevent fires from starting;
- to detect rapidly, control, and extinguish promptly those fires that do occur;
- to provide protection for structures, systems, and components important to safety so that a fire that is not promptly extinguished by the fire suppression activities will not prevent the safe shutdown of the plant.

(3) Responsibility for the overall fire protection program should be assigned to a person who has management control over all organizations involved in fire protection activities. Formulation and assurance of program implementation may be delegated to a staff composed of personnel prepared by training and experience in fire protection and personnel prepared by training and experience in nuclear plant safety to provide a balanced approach in directing the fire protection program for the nuclear power plant.

The staff should be responsible for:

(a) Fire protection program requirements, including consideration of potential hazards associated with postulated fires, with knowledge of building layout and systems design.

(b) Post-fire shutdown capability.

(c) Design, maintenance, surveillance, and quality assurance of all fire protection features (e.g., detection systems, suppression systems, barriers, dampers, doors, penetration seals, and fire brigade equipment).

(d) Fire prevention activities (administrative controls and training).

(e) Fire brigade organization and training.

(f) Prefire planning.

(4) The organizational responsibilities and lines of communication pertaining to fire protection should be defined between the various positions through the use of organizational charts and functional descriptions of each position's responsibilities. The following positions/organizations should be designated:

(a) The upper level offsite managment position which has management responsibility for the formulation, implementation, and assessment of the effectiveness of the nuclear plant fire protection program.

(b) The offsite management position(s) directly responsible for formulating, implementing, and periodically assessing the effectiveness of the fire protection program for the licensee's nuclear power plant

including fire drills and training conducted by the fire brigade and plant personnel. The results of these assessments should be reported to the upper level management position responsible for fire protection with recommendations for improvements or corrective actions as deemed necessary.

(c) The onsite management position responsible for the overall administration of the plant operations and emergency plans which include the fire protection and prevention program and which provide a single point of control and contact for all contingencies.

(d) The onsite position(s) which:

i. Implements periodic inspections to: minimize the amount of combustibles in safety-related areas; determine the effectiveness of housekeeping practices; assure the availability and acceptable condition of all fire protection systems/equipment, emergency breathing apparatus, emergency lighting, communication equipment, fire stops, penetration seals, and fire retardant coatings; and assures the prompt and effective corrective actions are taken to correct conditions adverse to fire protection and preclude their recurrence.

ii. Is responsible for the fire fighting training for operating plant personnel and the plant's fire brigade; design and selection of equipment; periodic inspection and testing of fire protection systems and equipment in accordance with established procedures, and evaluate test results and determine the acceptability of the systems under test.

iii. Assists in the critique of all fire drills to determine how well the training objectives have been met.

iv. Reviews and evaluates proposed work activities to identify potential transient fire loads.

v. Implements a program for indoctrination of all plant contractor personnel in appropriate administrative procedures which implement the fire protection program, and the emergency procedures relative to fire protection.

vi. Implements a program for instruction of personnel on the proper handling of accidental events such as leaks or spills of flammable materials that are related to fire protection.

(e) The onsite position responsible for fire protection quality assurance. This position should be responsible for assuring the effective implementation of the fire protection program by planned inspections, scheduled audits, and verification that the results of these inspections of audits are promptly reported to cognizant management personnel.

(f) The positions which are part of the plant fire brigade:

i. The plant fire brigade positions should be responsible for fighting fires. The authority and responsibility of each fire brigade position relative to fire protection should be clearly defined.

ii. The responsibilities of each fire brigade position should correspond with the actions required by the fire fighting procedures.

iii. The responsibilities of the fire brigade members under normal plant conditions should not conflict with their responsibilities during a fire emergency.

iv. The minimum number of trained fire brigade members available onsite for each operating shift should be consistent with the activities required to combat the most significant fire. The size of the fire brigade should be based upon the functions required to fight fires with adequate allowance for injuries.

v. The recommendations for organization, training, and equipment of "Private Fire Brigades" as specified in NFPA No. 27-1975, including the applicable NFPA publications listed in the appendix to NFPA No. 27, are considered appropriate criteria for organizing, training, and operating a plant fire brigade.

(5) Personnel Qualifications

(a) The position responsible for formulation and implementation of the fire protection program should have within his organization or as a consultant a fire protection engineer who is a graduate of an engineering curriculum of accepted standing and shall have completed not less than 6 years of engineering attainment indicative of growth in engineering competency and achievement, 3 years of which shall have been in responsible charge of fire protection engineering work. These requirements are the eligibility requirements as a Member in the Society of Fire Protection Engineers.

(b) The fire brigade members' qualifications should include satisfactory completion of a physical examination for performing strenuous activity, and of the fire brigade training described in Position C.3.d.

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

(d) The personnel responsible for the training of the fire brigade should be qualified by training and experience for such work.

(6) The following NFPA publications should be used for guidance to develop the fire protection program:

No. 4 - "Organization for Fire Services"
No. 4A - "Organization of a Fire Department"
No. 6 - "Industrial Fire Loss Prevention"
No. 7 - "Management of Fire Emergencies"
No. 8 - "Management Responsibilities for Effects of Fire on Operations"
No. 27 - "Private Fire Brigades"

(7) On sites where there is an operating reactor and construction or modification of other units is underway, the superintendent of the operating plant should have the lead responsibility for site fire protection.

b. Fire Hazards Analysis

The fire hazards analysis should demonstrate that the plant will maintain the ability to perform safe shutdown functions and minimize radioactive releases to the environment in the event of a fire.

The fire hazards analysis should be performed by qualified fire protection and reactor systems engineers to (1) consider potential in situ and transient fire hazards; (2) determine the consequences of fire in any location in the plant on the ability to safely shut down the reactor or on the ability to minimize and control the release of radioactivity to the environment; and (3) specify measures for fire prevention, fire detection, fire suppression, and fire containment and alternative shutdown capability as required for each fire area containing structures, systems, and components important to safety that are in conformance with NRC guidelines and regulations.

"Worst case" fires need not be postulated to be simultaneous with nonfire-related failures in safety systems, plant accidents, or the most severe natural phenomena.

On multiple-reactor sites, unrelated fires in two or more units need not be postulated to occur simultaneously. Fires involving facilities shared between units and fires due to man-made site-related events that have a reasonable probability of occurring and affecting more than one reactor unit (such as an aircraft crash) should be considered.

Because fire may affect safe shutdown systems and because the loss of function of systems used to mitigate the consequences of design basis accidents under postfire conditions does not per se impact public safety, the need to limit fire damage to systems required to achieve and maintain safe shutdown conditions is greater than the need to limit fire damage to those systems required to mitigate the consequences of design basis accidents. Three levels of fire damage limits are established according to the safety function of the structure, system, or component:

Safety Function	Fire Damage Limits
Hot shutdown	One train of equipment necessary to achieve hot shutdown from either the control room or emergency control station(s) must be maintained free of fire damage by a single fire, including an exposure fire.
Cold shutdown	Both trains of equipment necessary to achieve cold shutdown may be damaged by a single fire, including an exposure fire, but damage must be limited so that at least one train can be repaired or made operable within 72 hours using onsite capability.
Design basis accidents	Both trains of equipment necessary for mitigation of consequences following design basis accidents may be damaged by a single exposure fire.

The most stringent fire damage limit should apply for those systems that fall into more than one category. Redundant systems used to mitigate the consequences of other design basis accidents but not necessary for safe shutdown may be lost to a single exposure fire. However, protection shall be provided so that a fire within only one such system will not damage the redundant system.

The fire hazards analysis should separately identify hazards and provide appropriate protection in locations where safety-related losses can occur as a result of:

(1) Concentrations of combustible contents, including transient fire loads due to combustibles expected to be used in normal operations such as refueling, maintenance, and modifications;

(2) Continuity of combustible contents, furnishings, building materials, or combinations thereof in configurations conducive to fire spread;

(3) Exposure fire, heat, smoke, or water exposure, including those that may necessitate evacuation from areas that are required to be attended for safe shutdown;

(4) Fire in control rooms or other locations having critical safety-related functions;

(5) Lack of adequate access or smoke removal facilities that impede fire extinguishment in safety-related areas;

(6) Lack of explosion-prevention measures;

(7) Loss of electric power or control circuits;

(8) Inadvertent operation of fire suppression systems.

The fire hazards analysis should verify that the NRC fire protection program guidelines have been met. The analysis should list applicable elements of the program, with explanatory statements as needed to identify location, type of system, and design criteria. The analysis should identify and justify any deviations from the regulatory guidelines. Justification for deviations from the regulatory guidelines should show that an equivalent level of protection will be achieved. Deletion of a protective feature without compensating alternative protection measures will not be acceptable, unless it is clearly demonstrated that the protective measure is not needed because of the design and arrangement of the particular plant.

c. Fire Suppression System Design Basis

(1) Total reliance should not be placed on a single fire suppression system. Appropriate backup fire suppression capability should be provided.

(2) A single active failure or a crack in a moderate-energy line (pipe) in the fire suppression system should not impair both the primary and backup fire suppression capability. For example, neither the failure of a fire pump, its power supply or controls, nor a crack in a moderate-energy line in the fire suppression system, should result in loss of function of both sprinkler and hose standpipe systems in an area protected by such primary and backup systems.

(3) As a minimum, the fire suppression system should be capable of delivering water to manual hose stations located within hose reach of areas containing equipment required for safe plant shutdown following the safe shutdown earthquake (SSE). In areas of high seismic activity, the staff will

consider on a case-by-case basis the need to design the fire detection and suppression systems to be functional following the SSE.

(4) The fire protection systems should retain their original design capability for (a) natural phenomena of less severity and greater frequency than the most severe natural phenomena (approximately once in 10 years) such as tornadoes, hurricanes, floods, ice storms, or small-intensity earthquakes that are characteristic of the geographic region, and (b) potential man-made site-related events such as oil barge collisions or aircraft crashes that have a reasonable probability of occurring at a specific plant site. The effects of lightning strikes should be included in the overall plant fire protection program.

(5) The consequences of inadvertent operation of or a crack in a moderate energy line in the fire suppression system should meet the guidelines specified for moderate-energy systems outside containment in SRP Section 3.6.1.

d. Alternative or Dedicated Shutdown

Alternative or dedicated shutdown capability should be provided where the protection of systems whose functions are required for safe shutdown is not provided by established fire suppression methods or by Position C 5.6.

e. Implementation of Fire Protection Programs

(1) The fire protection program (plans, personnel, and equipment) for buildings storing new reactor fuel and for adjacent fire areas that could affect the fuel storage area should be fully operational before fuel is received at the site. Such adjacent areas include those whose flames, hot gases, and fire-generated toxic and corrosive products may jeopardize safety and surveillance of the stored fuel.

(2) The fire protection program for an entire reactor unit should be fully operational prior to initial fuel loading in that reactor unit.

(3) On reactor sites where there is an operating reactor and construction or modification of other units is under way, the fire protection program should provide for continuing evaluation of fire hazards. Additional fire barriers, fire protection capability, and administrative controls should be provided as necessary to protect the operating unit from construction fire hazards.

2. Administrative Controls

Administrative controls should be used to maintain the performance of the fire protection system and personnel. These controls should establish procedures to:

a. Prohibit bulk storage of combustible materials inside or adjacent to safety-related buildings or systems during operation or maintenance periods. Regulatory Guide 1.39 provides guidance on housekeeping, including the disposal of combustible materials.

b. Govern the handling and limitation of the use of ordinary combustible materials, combustible and flammable gases and liquids, high efficiency

particulate air and charcoal filters, dry ion exchange resins, or other combustible supplies in safety-related areas.

c. Govern the handling of and limit transient fire loads such as combustible and flammable liquids, wood and plastic products, or other combustible materials in buildings containing safety-related systems or equipment during all phases of operating, and especially during maintenance, modification, or refueling operations.

d. Designate the onsite staff member responsible for the inplant fire protection review of proposed work activities to identify potential transient fire hazards and specify required additional fire protection in the work activity procedure.

e. Govern the use of ignition sources by use of a flame permit system to control welding, flame cutting, brazing, or soldering operations. A separate permit should be issued for each area where work is to be done. If work continues over more than one shift, the permit should be valid for not more than 24 hours when the plant is operating or for the duration of a particular job during plant shutdown.

f. Control the removal from the area of all waste, debris, scrap, oil spills, or other combustibles resulting from the work activity immediately following completion of the activity, or at the end of each work shift, whichever comes first.

g. Govern leak testing; similar procedures such as airflow determination should use one of the commercially available techniques. Open flames or combustion-generated smoke should not be permitted.

h. Maintain the periodic housekeeping inspections to ensure continued compliance with these administrative controls.

i. Control the use of specific combustibles in safety-related areas. All wood used in safety-related areas during maintenance, modification, or refueling operation (such as lay-down blocks or scaffolding) should be treated with a flame retardant. Equipment or supplies (such as new fuel) shipped in untreated combustible packing containers may be unpacked in safety-related areas if required for valid operating reasons. However, all combustible materials should be removed from the area immediately following unpacking. Such transient combustible material, unless stored in approved containers, should not be left unattended during lunch breaks, shift changes, or other similar periods. Loose combustible packing material such as wood or paper excelsior, or polyethylene sheeting should be placed in metal containers with tight-fitting self-closing metal covers.

j. Disarming of fire detection or fire suppression systems should be controlled by a permit system. Fire watches should be established in areas where systems are so disarmed.

k. Successful fire protection requires testing and maintenance of the fire protection equipment and the emergency lighting and communication. A test plant 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.

l. Control actions to be taken by an individual discovering a fire, for example, notification of control room, attempt to extinguish fire, and actuation of local fire suppression systems.

m. Control actions to be taken by the control room operator to determine the need for brigade assistance upon report of a fire or receipt of alarm on control room annunciator panel, for example, announcing location of fire over PA system, sounding fire alarms, and notifying the shift supervisor and the fire brigade leader of the type, size, and location of the fire.

n. Control actions to be taken by the fire brigade after notification by the control room operator of a fire, for example, assembling in a designated location, receiving directions from the fire brigade leader, and discharging specific fire fighting responsibilities, including selection and transportation of fire fighting equipment to fire location, selection of protective equipment, operating instructions for use of fire suppression systems, and use of preplanned strategies for fighting fires in specific areas.

o. Define the strategies for fighting fires in all safety-related areas and areas presenting a hazard to safety-related equipment. These strategies should designate:

(1) Fire hazards in each area covered by the specific prefire plans.

(2) Fire extinguishants best suited for controlling the fires associated with the fire hazards in that area and the nearest location of these extinguishants.

(3) Most favorable direction from which to attack a fire in each area in view of the ventilation direction, access hallways, stairs, and doors that are most likely to be free of fire, and the best station or elevation for fighting the fire. All access and egress routes that involve locked doors should be specifically identified in the procedure with the appropriate precautions and methods for access specified.

(4) Plant systems that should be managed to reduce the damage potential during a local fire and the location of local and remote controls for such management (e.g., any hydraulic or electrical systems in the zone covered by the specific fire fighting procedure that could increase the hazards in the area because of overpressurization or electrical hazards).

(5) Vital heat-sensitive system components that need to be kept cool while fighting a local fire. Particularly hazardous combustibles that need cooling should be designated.

(6) Organization of fire fighting brigades and the assignment of special duties according to job title so that all fire fighting functions are covered by any complete shift personnel complement. These duties include command control of the brigade, transporting fire suppression and support equipment to the fire scenes, applying the extinguishant

to the fire, communication with the control room, and coordination with outside fire departments.

(7) Potential radiological and toxic hazards in fire zones.

(8) Ventilation system operation that ensures desired plant air distribution when the ventilation flow is modified for fire containment or smoke clearing operation.

(9) Operations requiring control room and shift engineer coordination or authorization.

(10) Instructions for plant operators and general plant personnel during fire.

3. Fire Brigade

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

b. A site fire brigade trained and equipped for fire fighting should be established to ensure adequate manual fire fighting capability for all areas of the plant containing structures, systems, or components important to safety. The fire brigade should be at least five members on each shift. The brigade leader and at least two brigade members should have sufficient training in or knowledge of plant safety-related systems to understand the effects of fire and fire suppressants on safe shutdown capability. The qualification of fire brigade members should include an annual physical examination to determine their ability to perform strenuous fire fighting activities. The shift supervisor should not be a member of the fire brigade. The brigade leader shall be competent to assess the potential safety consequences of a fire and advise control room personnel. Such competence by the brigade leader may be evidenced by possession of an operator's license or equivalent knowledge of plant safety-related systems.

c. The minimum equipment provided for the brigade should consist of personal protective equipment such as turnout coats, boots, gloves, hard hats, emergency communications equipment, portable lights, portable ventilation equipment, and portable extinguishers. 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. At least 10 masks shall be available for fire brigade personnel. Control room personnel may be furnished breathing air by a manifold system piped from a storage reservoir if practical. Service or rated operating life shall 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 shall be used; compressors shall be operable assuming a loss of offsite power. Special care must be taken to locate the compressor in areas free of dust and contaminants.

d. The fire brigade training program shall ensure that the capability to fight potential fires is established and maintained. The program shall consist of an initial classroom instruction program followed by periodic classroom instruction, fire fighting practice, and fire drills.

(1) The initial classroom instruction should include:

(a) Indoctrination of the plant fire fighting plan with specific identification of each individual's responsibilities.

(b) Identification of the type and location of fire hazards and associated types of fires that could occur in the plant.

(c) The toxic and corrosive characteristics of expected products of combustion.

(d) Identification of the location of fire fighting equipment for each fire area and familiarization with the layout of the plant, including access and egress routes to each area.

(e) The proper use of available fire fighting equipment and the corrective method of fighting each type of fire. The types of fires covered should include fires in energized electrical equipment, fires in cables and cable trays, hydrogen fires, fires involving flammable and combustible liquids or hazardous process chemicals, fires resulting from construction or modification (welding), and record file fires.

(f) The proper use of communication, lighting, ventilation, and emergency breathing equipment.

(g) The proper method for fighting fires inside buildings and confined spaces.

(h) The direction and coordination of the fire fighting activities (fire brigade leaders only).

(i) Detailed review of fire fighting strategies and procedures.

(j) Review of the latest plant modifications and corresponding changes in fire fighting plans.

(k) Training of the plant fire brigade should be coordinated with the local fire department so that responsibilities and duties are delineated in advance. This coordination should be part of the training course and should be included in the training of the local fire department staff.

(l) Local fire departments should be provided training in operational precautions when fighting fires on nuclear power plant sites and should be made aware of the need for radiological protection of personnel and the special hazards associated with a nuclear power plant site.

Note: Items (i) and (j) may be deleted from the training of no more than two of the nonoperations personnel who may be assigned to the fire brigade.

(2) The instruction should be provided by qualified individuals who are knowledgeable, experienced, and suitably trained in fighting the types of fires that could occur in the plant and in using the types of equipment available in the nuclear power plant.

(3) Instruction should be provided to all fire brigade members and fire brigade leaders.

(4) Regular planned meetings should be held at least every 3 months for all brigade members to review changes in the fire protection program and other subjects as necessary.

(5) Periodic refresher training sessions shall be held to repeat the classroom instruction program for all brigade members over a 2-year period. These sessions may be concurrent with the regular planned meetings.

(6) Practice

(a) Practice sessions should be held for each shift fire brigade on the proper method of fighting the various types of fires that could occur in a nuclear power plant. These sessions shall provide brigade members with experience in actual fire extinguishment and the use of emergency breathing apparatus under strenuous conditions encountered in fire fighting.

(b) These practice sessions should be provided at least once per year for each fire brigade member.

(7) Drills

(a) Fire brigade drills should be performed in the plant so that the fire brigade can practice as a team.

(b) Drills should be performed at regular intervals not to exceed 3 months for each shift fire brigade. Each fire brigade member should participate in each drill, but must participate in at least two drills per year.

A sufficient number of these drills, but not less than one for each shift fire brigade per year, should be unannounced to determine the fire fighting readiness of the plant fire brigade, brigade leader, and fire protection systems and equipment. Persons planning and authorizing an unannounced drill should ensure that the responding shift fire brigade members are not aware that a drill is being planned until it is begun. Unannounced drills should not be scheduled closer than 4 weeks.

At least one drill per year should be performed on a "back shift" for each shift fire brigade.

(c) The drills should be preplanned to establish the training objectives of the drill and should be critiqued to determine how well the training objectives have been met. Unannounced drills should be planned and critiqued by members of the management staff responsible for plant safety and fire protection. Performance deficiencies of a fire brigade or of individual fire brigade members should be remedied by scheduling additional training for the brigade or members.

Unsatisfactory drill performance should be followed by a repeat drill within 30 days.

(d) These drills should provide for local fire department participation periodically (at least annually).

(e) At 3-year intervals, a randomly selected unannounced drill should be critiqued by qualified individuals independent of the licensee's staff. A copy of the written report from such individuals should be available for NRC review.

(f) Drills should as a minimum include the following:

i. Assessment of fire alarm effectiveness, time required to notify and assemble fire brigade, and selection, placement, and use of equipment and fire fighting strategies.

ii. Assessment of each brigade member's knowledge of his or her role in the fire fighting strategy for the area assumed to contain the fire. Assessment of the brigade members' conformance with established plant fire fighting procedures and use of fire fighting equipment, including self-contained emergency breathing apparatus, communication equipment, and ventilation equipment, to the extent practicable.

iii. The simulated use of fire fighting equipment required to cope with the situation and type of fire selected for the drill. The area and type of fire chosen for the drill should differ from those used in the previous drills so that brigade members are trained in fighting fires in various plant areas. The situation selected should simulate the size and arrangement of a fire that could reasonably occur in the area selected, allowing for fire development due to the time required to respond, to obtain equipment, and organize for the fire, assuming loss of automatic suppression capability.

iv. Assessment of brigade leader's direction of the fire fighting effort as to thoroughness, accuracy, and effectiveness.

(8) Records

Individual records of training provided to each fire brigade member, including drill critiques, should be maintained for at least 3 years to ensure that each member receives training in all parts of the training program. These records of training should be available for NRC review. Retraining or broadened training for fire fighting within buildings should be scheduled for all those brigade members whose performance records show deficiencies.

(9) Guidance Documents

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, NFPA 197, "Training Standard on Initial Fire Attacks," should be utilized as applicable. NFPA booklets and pamphlets listed in NFPA 27 may be used as applicable for training references. In addition, courses in fire prevention and fire suppression that are recognized or sponsored by the fire protection industry should be utilized.

4. Quality Assurance Program

The quality assurance (QA) programs of applicants and contractors should ensure that the guidelines for design, procurement, installation, and testing and the administrative controls for the fire protection systems for safety-related areas are satisfied. The QA program should be under the management control of the QA organization. This control consists of (1) formulating a fire protection QA program that incorporates suitable requirements and is acceptable to the management responsible for fire protection or verifying that the program incorporates suitable requirements and is acceptable to the management responsible for fire protection, and (2) verifying the effectiveness of the QA program for fire protection through review, surveillance, and audits. Performance of other QA program functions for meeting the fire protection program requirements may be performed by personnel outside of the QA organization. The QA program for fire protection should be part of the overall plant QA program. It should satisfy the specific criteria listed below.

a. Design and Procurement Document Control

Measures should be established to ensure that the guidelines of the regulatory position of this guide are included in design and procurement documents and that deviations therefrom are controlled.

b. Instructions, Procedures, and Drawings

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

c. Control of Purchased Material, Equipment, and Services

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

d. 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 and test procedures for accomplishing the activities.

e. Test and Test Control

A test program should be established and implemented to ensure 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.

f. Inspection, Test, and Operating Status

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

g. Nonconforming Items

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

h. Corrective Action

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

i. 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.

j. 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.

5. General Plant Guidelines

a. Building Design

(1) Fire barriers with a minimum fire resistance rating of 3 hours should be provided to:

(a) Separate safety-related systems from any potential fires in nonsafety-related areas that could affect their ability to perform their safety function;

(b) Separate redundant divisions or trains of safety-related systems from each other so that both are not subject to damage from a single fire;

(c) Separate individual units on a multiple-unit site unless the requirements of General Design Criterion 5 are met with respect to fires.

(2) Appropriate fire barriers should be provided within a single safety division to separate components that present a fire hazard to other safety-related

components or high concentrations of safety-related cables within that division.

(3) Openings through fire barriers for pipe, conduit, and cable trays which separate fire areas should be sealed or closed to provide a fire resistance rating at least equal to that required of the barrier itself. Openings inside conduit larger than 4 inches in diameter should be sealed at the fire barrier penetration. Openings inside conduit 4 inches or less in diameter should be sealed at the fire barrier unless the conduit extends at least 5 feet on each side of the fire barrier and is sealed either at both ends or at the fire barrier with noncombustible material to prevent the passage of smoke and hot gases. Fire barrier penetrations that must maintain environmental isolation or pressure differentials should be qualified by test to maintain the barrier integrity under such conditions.

Penetration designs should utilize only noncombustible materials and should be qualified by tests. The penetration qualification tests should use the time-temperature exposure curve specified by ASTM E-119, "Fire Test of Building Construction and Materials." The acceptance criteria for the test should require that:

(a) The fire barrier penetration has withstood the fire endurance test without passage of flame or ignition of cables on the unexposed side for a period of time equivalent to the fire resistance rating required of the barrier.

(b) The temperature levels recorded for the unexposed side are analyzed and demonstrate that the maximum temperature does not exceed 325°F.

(c) The fire barrier penetration remains intact and does not allow projection of water beyond the unexposed surface during the hose stream test. The stream shall be delivered through a 1-1/2-inch nozzle set at a discharge angle of 30% with a nozzle pressure of 75 psi and a minimum discharge of 75 gpm with the tip of the nozzle a maximum of 5 ft from the exposed face; or the stream shall be delivered through a 1-1/2-inch nozzle set at a discharge angle of 15% with a nozzle pressure of 75 psi and a minimum discharge of 75 gpm with the tip of the nozzle a maximum of 10 ft from the exposed face; or the stream shall be delivered through a 2-1/2-inch national standard playpipe equipped with 1-1/8-inch tip, nozzle pressure of 30 psi, located 20 ft from the exposed face.

(4) Penetration openings for ventilation systems should be protected by fire dampers having a rating equivalent to that required of the barrier (see NFPA-90A, "Air Conditioning and Ventilating Systems"). Flexible air duct coupling in ventilation and filter systems should be noncombustible.

(5) Door openings in fire barriers should be protected with equivalently rated doors, frames, and hardware that have been tested and approved by a nationally recognized laboratory. Such doors should be self-closing or provided with closing mechanisms and should be inspected semiannually to verify that automatic hold-open, release, and closing mechanisms and latches are operable. (See NFPA 80, "Fire Doors and Windows.")

One of the following measures should be provided to ensure they will protect the opening as required in case of fire:

(a) Fire doors should be kept closed and electrically supervised at a continuously manned location;

(b) Fire doors should be locked closed and inspected weekly to verify that the doors are in the closed position;

(c) Fire doors should be provided with automatic hold-open and release mechanisms and inspected daily to verify that doorways are free of obstructions; or

(d) Fire doors should be kept closed and inspected daily to verify that they are in the closed position.

The fire brigade leader should have ready access to keys for any locked fire doors.

Areas protected by automatic total flooding gas suppression systems should have electrically supervised self-closing fire doors or should satisfy option (a) above.

(6) Personnel access routes and escape routes should be provided for each fire area. Stairwells outside primary containment serving as escape routes, access routes for firefighting, or access routes to areas containing equipment necessary for safe shutdown should be enclosed in masonry or concrete towers with a minimum fire rating of 2 hours and self-closing Class B fire doors.

(7) Fire exist routes should be clearly marked.

(8) Each cable spreading room should contain only one redundant safety division. Cable spreading rooms should not be shared between reactors. Cable spreading rooms should be separated from each other and from other areas of the plant by barriers having a minimum fire resistance of 3 hours.

(9) Interior wall and structural components, thermal insulation materials, radiation shielding materials, and soundproofing should be noncombustible. Interior finishes should be non-combustible.

Materials that are acceptable for use as interior finish without evidence of test and listing by a nationally recognized laboratory are the following:

- Plaster, acoustic plaster, gypsum plasterboard (gypsum wallboard), either 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.

(10) Metal deck roof construction should be noncombustible and listed as "acceptable for fire" in the UL Building Materials Directory, or listed as Class I in the Factory Mutual System Approval Guide.

(11) Suspended ceiling and their supports should be of noncombustible construction. Concealed spaces should be devoid of combustibles except as noted in Position C.6.b.

(12) Transformers installed inside fire areas containing safety-related systems should be of the dry type or insulated and cooled with noncombustible liquid. Transformers filled with combustible fluid that are located indoors should be enclosed in a transformer vault (see Section 450(c) of NFPA 70, "National Electrical Code").

(13) Outdoor oil-filled transformers should have oil spill confinement features or drainage away from the buildings. Such transformers should be located at least 50 feet distant from the building, or by ensuring that such building walls within 50 feet of oil-filled transformers are without openings and have a fire resistance rating of at least 3 hours.

(14) Floor drains sized to remove expected firefighting waterflow without flooding safety-related equipment should be provided in those areas where fixed water fire suppression systems are installed. Floor drains should also be provided in other areas where hand hose lines may be used if such firefighting water could cause unacceptable damage to safety-related equipment in the area (see NFPA-92, "Waterproofing and Draining of Floors"). Where gas suppression systems are installed, the drains should be provided with adequate seals or the gas suppression system should be sized to compensate for the loss of the suppression agent through the drains. Drains in areas containing combustible liquids should have provisions for preventing the backflow of combustible liquids to safety-related areas through the interconnected drain systems. Water drainage from areas that may contain radioactivity should be collected, sampled, and analyzed before discharge to the environment.

b. Safe Shutdown Capability

(1) Fire protection features should be provided for structures, systems, and components important to safe shutdown. These features should be capable of limiting fire damage so that:

(a) One train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency control station(s) is free of fire damage; and

(b) Systems necessary to achieve and maintain cold shutdown from either the control room or emergency control station(s) can be repaired within 72 hours.

(2) To meet the guidelines of Position C5.b.1, one of the following means of ensuring that one of the redundant trains is free of fire damage should be provided:

(a) Separation of cables and equipment and associated circuits of redundant trains by a fire barrier having a 3-hour rating. Structural steel

forming a part of or supporting such fire barriers should be protected to provide fire resistance equivalent to that required of the barrier;

(b) Separation of cables and equipment and associated circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustible or fire hazards. In addition, fire detectors and an automatic fire suppression system should be installed in the fire area; or

(c) Enclosure of cable and equipment and associated circuits of one redundant train in a fire barrier having a 1-hour rating. In addition, fire detectors and an automatic fire suppression system should be installed in the fire area.

(3) If the guidelines of Positions C5.b.1 and C5.b.2 cannot be met, then alternative or dedicated shutdown capability and its associated circuits, independent of cables, systems or components in the area, room, or zone under consideration should be provided.

c. Alternative or Dedicated Shutdown Capability

(1) Alternative or dedicated shutdown capability provided for a specific fire area should be able to achieve and maintain subcritical reactivity conditions in the reactor, maintain reactor coolant inventory, achieve and maintain hot standby* conditions for a PWR (hot shutdown* for a BWR) and achieve cold shutdown* conditions within 72 hours and maintain cold shutdown conditions thereafter. During the postfire shutdown, the reactor coolant system process variables shall be maintained within those predicted for a loss of normal ac power, and the fission product boundary integrity shall not be affected; i.e., there shall be no fuel clad damage, rupture, or any primary coolant boundary, or rupture of the containment boundary.

(2) The performance goals for the shutdown functions should be:

(a) The reactivity control function should be capable of achieving and maintaining cold shutdown reactivity conditions.

(b) The reactor coolant makeup function should be capable of maintaining the reactor coolant level above the top of the core for BWRs and be within the level indication in the pressurizer for PWRs.

(c) The reactor heat removal function should be capable of achieving and maintaining decay heat removal.

(d) The process monitoring function should be capable of providing direct readings of the process variables necessary to perform and control the above functions.

(e) The supporting functions should be capable of providing the process cooling, lubrication, etc., necessary to permit the operation of the equipment used for safe shutdown functions.

*As defined in the Standard Technical Specifications.

(3) The shutdown capability for specific fire areas may be unique for each such area, or it may be one unique combination of systems for all such areas. In either case, the alternative shutdown capability shall be independent of the specific fire area(s) and shall accommodate postfire conditions where offsite power is available and where offsite power is not available for 72 hours. Procedures shall be in effect to implement this capability.

(4) If the capability to achieve and maintain cold shutdown will not be available because of fire damage, the equipment and systems comprising the means to achieve and maintain the hot standby or hot shutdown condition shall be capable of maintaining such conditions until cold shutdown can be achieved. If such equipment and systems will not be capable of being powered by both onsite and offsite electric power systems because of fire damage, an independent onsite power system shall be provided. The number of operating shift personnel, exclusive of fire brigade members, required to operate such equipment and systems shall be onsite at all times.

(5) Equipment and systems comprising the means to achieve and maintain cold shutdown conditions should not be damaged by fire; or the fire damage to such equipment and systems should be limited so that the systems can be made operable and cold shutdown achieved within 72 hours. Materials for such repairs shall be readily available onsite and procedures shall be in effect to implement such repairs. If such equipment and systems used prior to 72 hours after the fire will not be capable of being powered by both onsite and offsite electric power systems because of fire damage, an independent onsite power system should be provided. Equipment and systems used after 72 hours may be powered by offsite power only.

(6) Shutdown systems installed to ensure postfire shutdown capability need not be designed to meet seismic Category I criteria, single failure criteria, or other design basis accident criteria, except where required for other reasons, e.g., because of interface with or impact on existing safety systems, or because of adverse valve actions due to fire damage.

(7) The safe shutdown equipment and systems for each fire area should be known to be isolated from associated circuits in the fire area so that hot shorts, open circuits, or shorts to ground in the associated circuits will not prevent operation of the safe shutdown equipment. The separation and barriers between trays and conduits containing associated circuits of one safe shutdown division and trays and conduits containing associated circuits or safe shutdown cables from the redundant division, or the isolation of these associated circuits from the safe shutdown equipment, should be such that a postulated fire involving associated circuits will not prevent safe shutdown.

d. Control of Combustibles

(1) 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:

(a) Emergency diesel generator fuel oil day tanks.

(b) Turbine-generator oil and hydraulic control fluid systems.

(c) Reactor coolant pump lube oil system.

(2) 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.")

(3) The use of plastic materials should be minimized. In particular, halogenated plastics such as polyvinyl chloride (PVC) and neoprene should be used only when substitute noncombustible 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 halogenated plastics also release free chlorine and hydrogen chloride when burning which are toxic to humans and corrosive to equipment.

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

(5) Hydrogen lines in safety-related areas should be either designed to seismic Class I requirements, or sleeved such that the water pipe is directly vented to the outside, or should be equipped with excess flow valves so that in case of a line break, the hydrogen concentration in the affected areas will not exceed 2%.

e. Electrical Cable Construction, Cable Trays, and Cable Penetrations

(1) Only metal should be used for cable trays. Only metallic tubing should be used for conduit. Thin-wall metallic tubing should not be used. Flexible metallic tubing should only be used in short lengths to connect components to equipment. Other raceways should be made of noncombustible material.

(2) Redundant safety-related cable systems outside the cable spreading room should be separated from each other and from potential fire exposure hazards in nonsafety-related areas by fire barriers with a minimum fire rating of 3 hours. These cable trays should be provided with continuous line-type heat detectors and should be accessible for manual firefighting. Cables should be designed to allow wetting down with fire suppression water without electrical faulting. Manual hose stations and portable hand extinguishers should be provided.

Safety-related cable trays of a single division that are separated from redundant divisions by a fire barrier with a minimum rating of 3 hours

and are normally accessible for manual firefighting should be protected from the effects of a potential exposure fire by providing automatic water suppression in the area where such a fire could occur. Automatic area protection, where provided, should consider cable tray arrangements and possible transient combustibles to ensure adequate water coverage for areas that could present an exposure hazard to the cable system. Manual hose standpipe systems may be relied upon to provide the primary fire suppression (in lieu of automatic water suppression systems) for safety-related cable trays of a single division that are separated from redundant safety divisions by a fire barrier with a minimum rating of 3 hours and are normally accessible for manual firefighting if all of the following conditions are met:

(a) The number of equivalent* standard 24-inch-wide cable trays (both safety-related and nonsafety-related) in a given fire area is six or less;

(b) The cabling does not provide instrumentation, control or power to systems required to achieve and maintain hot shutdown; and

(c) Smoke detectors are provided in the area of these cable routings, and continuous line-type heat detectors are provide in the cable trays.

Safety-related cable trays that are not accessible for manual fire fighting should be protected by a zoned automatic water system with open-head deluge or open directional spray nozzles arranged so that adequate water coverage is provided for each cable tray. Such cable trays should also be protected from the effects of a potential exposure fire by providing automatic water suppression in the area where such a fire could occur.

In other areas where it may not be possible because of other overriding design features necessary for reasons of nuclear safety to separate redundant safety-related cable systems by 3-hour-rated fire barriers, cable trays should be protected by an automatic water system with open-head deluge or open directional spray nozzles arranged so that adequate water coverage is provided for each cable tray. Such cable trays should also be protected from the effects of a potential exposure fire by providing automatic water suppression in the area where such a fire could occur. The capability to achieve and maintain safe shutdown considering the effects of a fire involving fixed and potential transient combustibles should be evaluated with and without actuation of the automatic suppression system and should be justified on a suitably defined basis.

(3) Electric cable construction should, as a minimum, pass the flame test in the current IEEE Std 383. (This does not imply that cables passing this test will not require fire protection.)

(4) Cable raceways should be used only for cables.

(5) Miscellaneous storage and piping for flammable or combustible liquids or gases should not create a potential exposure hazard to safety-related systems.

*Trays exceeding 24 inches should be counted as two trays; trays exceeding 48 inches should be counted as three trays, regardless of tray fill.

f. Ventilation

(1) The products of combustion and the means by which they will be removed from each fire area should be established during the initial stages of plant design. Consideration should be given to the installation of automatic suppression systems as a means of limiting smoke and end heat generation. Smoke and corrosive gases should generally be discharged directly outside to an area that will not affect safety-related plant areas. The normal plant ventilation system may be used for this purpose if capable and available. To facilitate manual firefighting, separate smoke and heat vents should be provided in specific areas such as cable spreading rooms, diesel fuel oil storage areas, switchgear rooms, and other areas where the potential exists for heavy smoke conditions (see NFPA 204 for additional guidance on smoke control).

(2) Release of smoke and gases containing radioactive materials to the environment should be monitored in accordance with emergency plans as described in the guidelines of Regulatory Guide 1.101, "Emergency Planning for Nuclear Power Plants." Any ventilation system designed to exhaust potentially radioactive smoke or gases should be evaluated to ensure that inadvertent operation or single failures will not violate the radiologically controlled areas of the plant design. This requirement includes containment functions for protecting the public and maintaining habitability for operations personnel.

(3) Special protection for ventilation power and control cables may be required. The power supply and controls for mechanical ventilation systems should be run outside the fire area served by the system where practical.

(4) Engineered safety feature filters should be protected in accordance with the guidelines of Regulatory Guide 1.52. Any filter that includes combustible materials and is a potential exposure fire hazard that may affect safety-related components should be protected as determined by the fire hazards analysis.

(5) 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.

(6) Stairwells should be designed to minimize smoke infiltration during a fire.

(7) Where total flooding gas extinguishing systems are used, area intake and exhaust ventilation dampers should be controlled in accordance with NFPA 12, "Carbon Dioxide Systems," and NFPA 12A, "Halon 1301 Systems," to maintain the necessary gas concentration.

g. Lighting and Communication

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

(1) Fixed self-contained lighting consisting of fluorescent or sealed-beam units with individual 8-hour minimum battery power supplies should be provided in areas that must be manned for safe shutdown and for access

and egress routes to and from all fire areas. Safe shutdown areas include those required to be manned if the control room must be evacuated.

(2) Suitable sealed-beam battery-powered portable hand lights should be provided for emergency use by the fire brigade and other operations personnel required to achieve safe plant shutdown.

(3) Fixed emergency communications independent of the normal plant communication system should be installed at preselected stations.

(4) A portable radio communications system should be provided for use by the fire brigade and other operations personnel required to achieve safe plant shutdown. This system should not interfere with the communications capabilities of the plant security force. Fixed repeaters installed to permit use of portable radio communication units should be protected from exposure fire damage. Preoperational and periodic testing should demonstrate that the frequencies used for portable radio communication will not affect the actuation of protective relays.

6. Fire Detection and Suppression

a. Fire Detection

(1) Detection systems should be provided for all areas that contain or present a fire exposure to safety-related equipment.

(2) Fire detection systems should comply with the requirements of Class A systems as defined in NFPA 72D, "Standard for the Installation, Maintenance, and Use of Proprietary Protective Signaling Systems," and Class I circuits as defined in NFPA 70, "National Electrical Code."

(3) Fire detectors should be selected and installed in accordance with NFPA 72E, "Automatic Fire Detectors." Preoperational and periodic testing of pulsed line-type heat detectors should demonstrate that the frequencies used will not affect the actuation of protective relays in other plant systems.

(4) Fire detection systems should give audible and visual alarm and annunciation in the control room. Where zoned detection systems are used in a given fire area, local means should be provided to identify which detector zone has actuated. Local audible alarms should sound in the fire area.

(5) Fire alarms should be distinctive and unique so they will not be confused with any other plant system alarms.

(6) Primary and secondary power supplies should be provided for the fire detection system and for electrically operated control valves for automatic suppression systems. Such primary and secondary power supplies should satisfy provisions of Section 2220 of NFPA 72D. This can be accomplished by using normal offsite power as the primary supply with a 4-hour battery supply as secondary supply; and by providing capability for manual connection to the Class 1E emergency power bus within 4 hours of loss of offsite power. Such connection should follow the applicable guidelines in Regulatory Guides 1.6, 1.32, and 1.75.

b. Fire Protection Water Supply Systems

(1) An underground yard fire main loop should be installed to furnish anticipated 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). Type of pipe and water treatment should be design considerations with tuberculation as one of the parameters. Means for inspecting and flushing the systems should be provided.

(2) 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 supply to primary and backup fire suppression systems serving areas that contain or expose safety-related equipment.

(3) Valves should be installed to permit isolation of outside hydrants from the fire main for maintenance or repair without interrupting the water supply to automatic or manual fire suppression systems in any area containing or presenting a fire hazard to safety-related or safe shutdown equipment.

(4) The fire main system piping should be separate from service or sanitary water system piping, except as described in Position C.5.c.(4).

(5) A common yard fire main loop may serve multiunit nuclear power plant sites if cross-connected between units. Sectional control valves should permit maintaining independence of the individual loop around each unit. For such installations, common water supplies may also be utilized. For multiple-reactor sites with widely separated plants (approaching 1 mile or more), separate yard fire main loops should be used.

(6) If pumps are required to meet system pressure or flow requirements, a sufficient number of pumps should be provided to ensure that 100% capacity will be available assuming failure of the largest pump or loss of offsite power (e.g., three 50% pumps or two 100% pumps). This can be accomplished, for example, by providing either:

(a) Electric motor-driven fire pump(s) and diesel-driven fire pump(s); or

(b) Two or more seismic Category I Class 1E electric motor-driven fire pumps connected to redundant Class 1E emergency power buses (see Regulatory Guides 1.6, 1.32, and 1.75).

Individual fire pump connections to the yard fire main loop should be separated with sectionalizing valves between connections. Each pump and its driver and controls should be located in a room separated from the remaining fire pumps by a fire wall with a minimum rating of 3 hours. The fuel for the diesel fire pump(s) should be separated so that it does not provide a fire source exposing safety-related equipment. Alarms indicating pump running, driver availability, failure to start, and low fire main pressure should be provided in the control room.

The fire pump installation should conform to NFPA 20, "Standard for the Installation of Centrifugal Fire Pumps."

(7) Outside manual hose installation should be sufficient to provide an effective hose stream to any onsite location where fixed or transient combustibles could jeopardize safety-related equipment. Hydrants should be installed approximately every 250 ft on the yard main system. 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 ft. Alternatively, mobile means of providing hose and associated equipment, such as hose carts or trucks, may be used. When provided, such mobile equipment should be equivalent to the equipment supplied by three hose houses.

(8) Threads compatible with those used by local fire departments should be provided on all hydrants, hose couplings, and standpipe risers.

(9) Two separate, reliable freshwater supplies should be provided. Saltwater or brackish water should not be used unless all freshwater supplies have been exhausted. 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 failure in one tank or its piping should not cause both tanks to drain. Water supply capacity should be capable of refilling either tank in 8 hours or less.

(10) Common tanks are permitted for fire and sanitary or service water storage. When this is done, however, minimum fire water storage requirements should be dedicated by passive means, for example, use of a vertical standpipe for other water services. Administrative controls, including locks for tank outlet valves, are unacceptable as the only means to ensure minimum water volume.

(11) The fire water supply should be calculated on the basis of the largest expected flow rate for a period of 2 hours, but not less than 300,000 gallons. This flow rate should be based (conservatively) on 500 gpm for manual hose streams plus the largest design demand of any sprinkler or deluge system as determined in accordance with NFPA 13 or NFPA 15. The fire water supply should be capable of delivering this design demand over the longest route of the water supply system.

(12) Freshwater lakes or ponds of sufficient size may qualify as sole source of water for fire protection but require separate redundant suctions in one or more intake structures. These supplies should be separated so that a failure of one supply will not result in a failure of the other supply.

(13) When a common water supply is permitted for fire protection and the ultimate heat sink, the following conditions should also be satisfied:

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

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

(14) Other water systems that may be used as one of the two fire water supplies should be permanently connected to the fire main system and should be capable of automatic alignment to the fire main system. Pumps, controls, and power supplies in these systems should satisfy the requirements for

the main fire pumps. The use of other water systems for fire protection should not be incompatible with their functions required for safe plant shutdown. Failure of the other system should not degrade the fire main system.

c. Water Sprinkler and Hose Standpipe Systems

(1) Sprinkler systems and manual hose station standpipes should have connections to the plant underground water main so that a single active failure or a crack in a moderate-energy line cannot impair both the primary and backup fire suppression systems. Alternatively, headers fed from each end are permitted inside buildings to supply both sprinkler and standpipe systems, provided steel piping and fittings meeting the requirements of ANSI B31.1, "Power Piping," are used for the headers up to and including the first valve supplying the sprinkler systems where such headers are part of the seismically analyzed hose standpipe system. When provided, such headers are considered an extension of the yard main system. Each sprinkler and standpipe system should be equipped with OS&Y (outside screw and yoke) gate valve or other approved shutoff valve and waterflow alarm. Safety-related equipment that does not itself require sprinkler water fire protection but is subject to unacceptable damage if wet by sprinkler water discharge should be protected by water shields or baffles.

(2) Control and sectionalizing valves in the fire water systems should be electrically supervised or administratively controlled. The electrical supervision signal should indicate in the control room. All valves in the fire protection system should be periodically checked to verify position (see NFPA 26, "Supervision of Valves").

(3) Fixed water extinguishing systems should 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."

(4) Interior manual hose installation should be able to reach any location that contains, or could present a fire exposure hazard to, safety-related equipment with at least one effective hose stream. To accomplish this, standpipes with hose connections equipped with a maximum of 100 feet of 1-1/2-inch woven-jacket, lined fire hose and suitable nozzles should be provided in all buildings on all floors. Individual standpipes should be at least 4 inches in diameter for multiple hose connections and 2-1/2 inches in diameter for single hose connections. These systems should follow the requirements of NFPA 14, "Standpipe and Hose Systems," for sizing, spacing, and pipe support requirements.

Hose stations should be located as dictated by the fire hazard analysis to facilitate access and use for firefighting operations. Alternative hose stations should be provided for an area if the fire hazard could block access to a single hose station serving that area.

Provisions should be made to supply water at least to standpipes and hose connections for manual firefighting in areas containing equipment required for safe plant shutdown in the event of a safe shutdown earthquake. The piping system serving such hose stations should be analyzed for SSE loading and should be provided with supports to ensure system pressure integrity. The piping and valves for the portion of hose standpipe system affected by this functional requirement should, as a minimum, satisfy ANSI B31.1,

"Power Piping." The water supply for this condition may be obtained by manual operator actuation of valves in a connection to the hose standpipe header from a normal seismic Category I water system such as the essential service water system. The cross connection should be (a) capable of providing flow to at least two hose stations (approximately 75 gpm per hose station), and (b) designed to the same standards as the seismic Category I water system; it should not degrade the performance of the seismic Category I water system.

(5) The proper type of hose nozzle to be supplied to each area should be based on the fire hazard analysis. The usual combination spray/straight-stream nozzle should not be used in areas where the straight stream can cause unacceptable mechanical damage. Fixed fog nozzles should be provided at locations where high-voltage shock hazards exist. All hose nozzles should have shutoff capability. (Guidance on safe distances for water application to live electrical equipment may be found in the "NFPA Fire Protection Handbook.")

(6) Fire hose should be hydrostatically tested in accordance with the recommendations of NFPA 1962, "Fire Hose - Care, Use, Maintenance." Hose stored in outside hose houses should be tested annually. Interior standpipe hose should be tested every 3 years.

(7) Certain fires, such as those involving flammable liquids, respond well to foam suppression. Consideration should be given to use of mechanical low-expansion foam systems, high-expansion foam generators, or aqueous film-forming foam (AFFF) systems, including the AFFF deluge system. These systems should comply with the requirements of NFPA 11, NFPA 11A, NFPA 11B, and NFPA 16, as applicable.

d. Halon Suppression Systems

Halon fire extinguishing systems should comply with the requirements of NFPA 12A and NFPA 12B, "Halogenated Fire Extinguishing Agent Systems - Halon 1301 and Halon 1211." Only UL-listed or FM-approved agents should be used. Provisions for locally disarming automatic Halon systems should be key locked and under strict administrative control. Automatic Halon extinguishing systems should not be disarmed unless controls as described in Position C.2.c. are provided.

In addition to the guidelines of NFPA 12A and 12B, preventive 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:

(1) Minimum required Halon concentration, distribution, soak time, and ventilation control;

(2) Toxicity of Halon;

(3) Toxicity and corrosive characteristics of the thermal decomposition products of Halon; and

(4) Location and selection of the activating detectors.

e. Carbon Dioxide Suppression Systems

Carbon dioxide extinguishing systems should comply with the requirements of NFPA 12, "Carbon Dioxide Extinguishing Systems." Where automatic carbon dioxide systems are used, they should be equipped with a predischarge alarm system and a discharge delay to permit personnel egress. Provisions for locally disarming automatic carbon dioxide systems should be key locked and under strict administrative control. Automatic carbon dioxide extinguishing systems should not be disarmed unless controls as described in Position C.2.c. are provided.

Particular consideration should also be given to:

(1) Minimum required CO_2 concentration, distribution, soak time, and ventilation control;

(2) Anoxia and toxicity of CO_2;

(3) Possibility of secondary thermal shock (cooling) damage;

(4) Conflicting requirements for venting during CO_2 injection to prevent overpressurization versus sealing to prevent loss of agent; and

(5) Location and selection of the activating detectors.

f. Portable Extinguishers

Fire extinguishers should be provided in areas that contain, or could present a fire exposure hazard to, safety-related equipment in accordance with guidelines of NFPA 10, "Portable Fire Extinguishers, Installation, Maintenance and Use." Dry chemical extinguishers should be installed with due consideration given to possible adverse effects on safety-related equipment installed in the area.

7. Guidelines for Specific Plant Areas

a. Primary and Secondary Containment

(1) Normal Operation - Fire protection requirements for the primary and secondary containment areas should be provided for hazards identified by the fire hazards analysis.

Examples of such hazards include lubricating oil or hydraulic fluid system for the primary coolant pumps, cable tray arrangements and cable penetrations, and charcoal filters. Because of the general inaccessibility of primary containment during normal plant operation, protection should be provided by automatic fixed systems. The effects of postulated fires within the primary containment should be evaluated to ensure that the integrity of the primary coolant system and the containment is not jeopardized assuming no action is taken to fight the fire.

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

(b) Inside noninerted containment one of the fire protection means stated in Positions C.5.b.1 and C.5.b.2 or the following fire protection means should be provided: separation of cables and equipment and associated nonsafety circuits of redundant trains by a noncombustible radiant energy shield having a minimum fire rating of one-half hour.

(c) In primary containment, fire detection systems should be provided for each fire hazard. The type of detection used and the location of the detectors should be the most suitable for the particular type of fire hazard identified by the fire hazard analysis.

A general area fire detection capability should be provided in the primary containment as backup for the above described hazard detection. To accomplish this, suitable smoke or heat detectors compatible with the radiation environment should be installed.

(d) Standpipe and hose stations should be inside PWR containments and BWR containments that are not inerted. Standpipe and hose stations inside containment may be connected to a high quality water supply of sufficient quantity and pressure other than the fire main loop if plant-specific features prevent extending the fire main supply inside containment. For BWR drywells, standpipe and hose stations should be placed outside the drywell with adequate lengths of hose, no longer than 100 ft, to reach any location inside the drywell with an effective hose stream.

The containment penetration of the standpipe system should meet the isolation requirements of General Design Criterion 56 and should be seismic Category I and Quality Group B.

(e) The reactor coolant pumps should be equipped with an oil collection system if the containment is not inerted during normal operation. The oil collection system should be so designed, engineered, and installed that failure will not lead to fire during normal or design basis accident conditions and that there is reasonable assurance that the system will withstand the safe shutdown earthquake.

Such collection systems should be capable of collecting lube oil from all potential pressurized and unpressurized leakage sites in the reactor coolant pump lube oil systems. Leakage should be collected and drained to a vented closed container that can hold the entire lube oil system inventory. A flame arrester is required in the vent if the flash point characteristics of the oil present the hazard of fire flashback. Leakage points to be protected should include lift pump and piping overflow lines, lube oil cooler, oil fill and drain lines and plugs, flanged connections on oil lines, and lube oil reservoirs where such features exist on the reactor coolant pumps. The drain line should be large enough to accommodate the largest potential oil leak.

(f) For secondary containment areas, cable fire hazards that could affect safety should be protected as described in Position C.5.e(2). The type of detection system for other fire hazards identified by the fire hazards analysis should be the most suitable for the particular type of fire hazard.

(2) Refueling and Maintenance --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-gas fuel supply). Possible fires would not necessarily be in the vicinity of fixed detection and suppression systems. Management procedures and controls necessary to ensure adequate fire protection for transient fire loads are discussed in Position C.1.

Adequate self-contained breathing apparatus should be provided near the containment entrances for firefighting and damage control personnel. These units should be independent of any breathing apparatus or air supply systems provided for general plant activities and should be clearly marked as emergency equipment.

b. Control Room Complex

The control room complex (including galleys, office spaces, etc.) should be protected against disabling fire damage and should be separated from other areas of the plant by floors, walls, and roof having minimum fire resistance ratings of 3 hours. Peripheral rooms in the control room complex should have automatic water suppression and should be separated from the control room by noncombustible construction with a fire resistance rating of 1 hour. Ventilation system openings between the control room and peripheral rooms should have automatic smoke dampers that close on operation of the fire detection or suppression system. If a halon flooding system is used for fire suppression, these dampers should be strong enough to support the pressure rise accompanying halon discharge and seal tightly against infiltration of halon into the control room. Carbon dioxide flooding systems are not acceptable for these areas.

Manual firefighting capability should be provided for both:

(1) Fire originating within a cabinet, console, or connecting cables; and

(2) Exposure fires involving combustibles in the general room area.

Portable Class A and Class C fire extinguishers should be located in the control room. A hose station should be installed immediately outside the control room.

Nozzles that are compatible with the hazards and equipment in the control room should be provided for the manual hose station. The nozzles chosen should satisfy actual firefighting needs, satisfy electrical safety, and minimize physical damage to electrical equipment from hose stream impingement.

Smoke detectors should be provided in the control room, cabinets, and consoles. If redundant safe shutdown equipment is located in the same control room cabinet or console, additional fire protection measures should be provided. Alarm and local indication should be provided in the control room.

Breathing apparatus for control room operators should be readily available.

The outside air intake(s) for the control room ventilation system should be provided with smoke detection capability to alarm in the control room to enable manual isolation of the control room ventilation system and thus prevent smoke from entering the control room.

Venting of smoke produced by fire in the control room by means of the normal ventilation system is acceptable; however, provision should be made to permit isolation of the recirculating portion of the normal ventilation system. Manually operated venting of the control room should be available to the operators.

All cables that enter the control room should terminate in the control room. That is, no cabling should be routed through the control room from one area to another. Cables in underfloor and ceiling spaces should meet the separation criteria necessary for fire protection.

Air-handling functions should be ducted separately from cable runs in such spaces; i.e., if cables are routed in underfloor or ceiling spaces, these spaces should not be used as air plenums for ventilation of the control room. Fully enclosed electrical raceways located in such underfloor and ceiling spaces, if over 1 square foot in cross-sectional area, should have automatic fire suppression inside. Area automatic fire suppression should be provided for underfloor and ceiling spaces if used for cable runs unless all cable is run in 4-inch or smaller steel conduit or the cables are in fully enclosed raceways internally protected by automatic fire suppression.

There should be no carpeting in the control room.

c. Cable Spreading Room

The primary fire suppression in the cable spreading room should be an automatic water system such as closed-head sprinklers, open-head deluge system, or open directional water spray system. Deluge and open spray systems should have provisions for manual operation at a remote station; however, there should be provisions to preclude inadvertent operation. Location of sprinkler heads or spray nozzles should consider cable tray arrangements and possible transient combustibles to ensure adequate water coverage for areas that could present exposure hazards to the cable system. Cables should be designed to allow wetting down with water supplied by the fire suppression system without electrical faulting.

Open-head deluge and open directional spray systems should be zoned.

The use of foam is acceptable.

Cable spreading rooms should have:

(1) At least two remote and separate entrances for access by fire brigade personnel;

(2) An aisle separation between tray stacks at least 3 feet wide and 8 feet high;

(3) Hose stations and portable extinguishers installed immediately outside the room;

(4) Area smoke detection; and

(5) Continuous line-type heat detectors for cable trays inside the cable spreading room.

Drains to remove firefighting water should be provided. When gas systems are installed, drains should have adequate seals or the gas extinguishing systems should be sized to compensate for losses through the drains.

A separate cable spreading room should be provided for each redundant division. Cable spreading rooms should not be shared between reactors. Each cable spreading room should be separated from the others and from other areas of the plant by barriers with a minimum fire rating of 3 hours. If this is not possible, a dedicated system should be provided.

The ventilation system to each cable spreading room should be designed to isolate the area upon actuation of any gas extinguishing system in the area. Separate manually actuated smoke venting that is operable from outside the room should be provided for the cable spreading room.

d. Plant Computer Rooms

Computer rooms for computers performing safety-related functions that are not part of the control room complex should be separated from other areas of the plant by barriers having a minimum fire resistance rating of 3 hours and should be protected by automatic detection and fixed automatic suppression. Computers that are part of the control room complex but not in the control room should be separated and protected as described in Position C.7.b. Computer cabinets located in the control room should be protected as other control room equipment and cable runs therein. Nonsafety-related computers outside the control room complex should be separated from safety-related areas by fire barriers with a minimum rating of 3 hours and should be protected as needed to prevent fire and smoke damage to safety-related equipment.

e. Switchgear Rooms

Switchgear rooms containing safety-related equipment should be separated from the remainder of the plant by barriers with a minimum fire rating of 3 hours. Redundant switchgear safety divisions should be separated from each other by barriers with a 3-hour fire rating. Automatic fire detectors should alarm and annunciate in the control room and alarm locally. Cables entering the switchgear room that do not terminate or perform a function there should be kept at a minimum to minimize the combustible loading. These rooms should not be used for any other purpose. Fire hose stations and portable fire extinguishers should be readily available outside the area.

Equipment should be located to facilitate access for manual firefighting. Drains should be provided to prevent water accumulation from damaging safety-related equipment (see NFPA 92M, "Waterproofing and Draining of Floors"). Remote manually actuated ventilation should be provided for venting smoke when manual fire suppression effort is needed (see Position C.5.f).

f. Remote Safety-Related Panels

Redundant safety-related panels remote from the control room complex should be separated from each other by barriers having a minimum fire rating of 3 hours. Panels providing remote shutdown capability should be separated from the control room complex by barriers having a minimum fire rating of 3 hours. Panels providing remote shutdown capability should be electrically isolated from the control room complex so that a fire in either area will not affect shutdown capability from the other area. 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 readily available in the general area.

g. Safety-Related Battery Rooms

Safety-related battery rooms should be protected against fires and explosions. Battery rooms should be separated from each other and other areas of the plant by barriers having a minimum fire rating of 3 hours inclusive of all penetrations and openings. DC switchgear and inverters should not be located in these battery rooms. Automatic fire detection should be provided to alarm and annunciate in the control room and alarm locally. Ventilation systems in the battery rooms should be capable of maintaining the hydrogen concentration well below 2 vol-%. Loss of ventilation should be alarmed in the control room. Standpipe and hose and portable extinguishers should be readily available outside the room.

h. Turbine Building

The turbine building should be separated from adjacent structures containing safety-related equipment by a fire barrier with a minimum rating of 3 hours. The fire barriers should be designed so as to maintain structural integrity even in the event of a complete collapse of the turbine structure. Openings and penetrations in the fire barrier should be minimized and should not be located where the turbine oil system or generator hydrogen cooling system creates a direct fire exposure hazard to the barrier. Considering the severity of the fire hazards, defense in depth may dictate additional protection to ensure barrier integrity.

i. Diesel Generator Areas

Diesel generators should be separated from each other and from other areas of the plant by fire barriers having a minimum fire resistance rating of 3 hours.

Automatic fire suppression should be installed to combat any diesel generator or lubricating oil fires; such systems should be designed for operation when the diesel is running without affecting the diesel. Automatic fire detection should be provided to alarm and annunciate in the control room and alarm locally. Hose stations and portable extinguishers should be readily available outside the area. Drainage for firefighting water and means for local manual venting of smoke should be provided.

Day tanks with total capacity up to 1100 gallons are permitted in the diesel generator area under the following conditions:

(1) The day tank is located in a separate enclosure with a minimum fire resistance rating of 3 hours, including doors or penetrations. These enclosures should be capable of containing the entire contents of the day tanks and should be protected by an automatic fire suppression system, or

(2) The day tank is located inside the diesel generator room in a diked enclosure that has sufficient capacity to hold 110% of the contents of the day tank or is drained to a safe location.

j. Diesel Fuel Oil Storage Areas

Diesel fuel oil tanks with a capacity greater than 1,100 gallons should not be located inside buildings containing safety-related equipment. If above-ground tanks are used, 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 3 hours. Potential oil spills should be confined or directed away from buildings containing safety-related equipment. Totally buried tanks are acceptable outside or under buildings (see NFPA 30, "Flammable and Combustible Liquids Code," for additional guidance).

Above-ground tanks should be protected by an automatic fire suppression system.

k. Safety-Related Pumps

Pump houses and rooms housing redundant safety-related pump trains should be separated from each other and from other areas of the plant by fire barriers having at least 3-hour ratings. These rooms should be protected by automatic fire detection and suppression unless a fire hazards analysis can demonstrate that a fire will not endanger other safety-related equipment required for safe plant shutdown. Fire detection should alarm and annunciate in the control room and alarm locally. Hose stations and portable extinguishers should be readily accessible.

Floor drains should be provided to prevent water accumulation from damaging safety-related equipment (see Position C.5.a.(14)).

Provisions should be made for manual control of the ventilation system to facilitate smoke removal if required for manual firefighting operation (see Position C.5.f).

l. New Fuel Area

Hand portable extinguishers should be located within this area. Also, 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.

m. Spent Fuel Pool Area

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

n. Radwaste and Decontamination Areas

Fire barriers, automatic fire suppression and detection, and ventilation controls should be provided.

o. Safety-Related Water Tanks

Storage tanks that supply water for safe shutdown should be protected from the effects of an exposure fire. Combustible materials should not be stored next to outdoor tanks.

p. Records Storage Areas

Records storage areas should be so located and protected that a fire in these areas does not expose safety-related systems or equipment (see Regulatory Guide 1.88, "Collection, Storage, and Maintenance of Nuclear Power Quality Assurance Records").

q. Cooling Towers

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

r. Miscellaneous Areas

Miscellaneous areas such as shops, warehouses, auxiliary boiler rooms, fuel oil tanks, and flammable and combustible liquid storage tanks should be so located and protected that a fire or effects of a fire, including smoke, will not adversely affect any safety-related systems or equipment.

8. Special Protection Guidelines

a. Storage of Acetylene-Oxygen Fuel Gases

Gas cylinder storage locations should not be in areas that contain or expose safety-related equipment or the fire protection systems that serve those safety-related areas. A permit system should be required to use this equipment in safety-related areas of the plant (also see Position C.2).

b. Storage Areas for Ion Exchange Resins

Unused ion exchange resins should not be stored in areas that contain or expose safety-related equipment.

c. Hazardous Chemicals

Hazardous chemicals should not be stored in areas that contain or expose safety-related equipment.

d. Materials Containing Radioactivity

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 decay heat from entrained radioactive materials.

REFERENCES

National Fire Protection Association Codes and Standards

NFPA 4-1977, "Organization of Fire Services."

NFPA 4A-1969, "Fire Department Organization."

NFPA 6-1974, "Industrial Fire Loss Prevention."

NFPA 7-1974, "Fire Emergencies Management."

NFPA 8-1974, "Effects of Fire on Operations, Management Responsibility."

NFPA 10-1975, "Portable Fire Extinguishers, Installation, Maintenance, and Use."

NFPA 11-1975, "Foam Extinguishing Systems."

NFPA 11A-1970, "High Expansion Foam Systems."

NFPA 11B-1974, "Synthetic Foam and Combined Agent Systems."

NFPA 12-1973, "Carbon Dioxide Systems."

NFPA 12A-1973, "Halon 1301 Systems."

NFPA 12B-1973, "Halon 1211 Systems."

NFPA 13-1976, "Sprinkler Systems."

NFPA 14-1974, "Standpipe and Hose Systems."

NFPA 15-1973, "Water Spray Fixed Systems."

NFPA 16-1973, "Foam-Water Sprinkler and Spray Systems."

NFPA 20-1973, "Centrifugal Fire Pumps."

NFPA 24-1973, "Outside Protection."

NFPA 26-1958, "Supervision of Valves."

NFPA 27-1975, "Private Fire Brigade."

NFPA 30-1973, "Flammable Combustible Liquids Code."

NFPA 51B-1976 "Cutting and Welding Processes."

NFPA 69-1973, "Explosion Prevention Systems."

NFPA 70-1975, "National Electrical Code."

NFPA 72D-1975, "Proprietary Protective Signaling Systems."

NFPA 72E-1974, "Automatic Fire Detectors."

NFPA 80-1975, "Fire Doors and Windows."

NFPA 92M-1972, "Waterproofing and Draining of Floors."

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

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

NFPA 220-1975, "Types of Building Construction."

NFPA 251-1975, "Fire Tests, Building Construction and Materials."

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APPENDIX A TO BRANCH TECHNICAL POSITION APCSB 9.5-1
"GUIDELINES FOR FIRE PROTECTION FOR NUCLEAR POWER PLANTS
DOCKETED PRIOR TO JULY 1, 1976" (August 23, 1976)

(The guidelines of this appendix have been incorporated into BTP CMEB 9.5-1 and therefore this appendix has been deleted.)