Wayne H. Jens
Vice President
Nuclear Operations

Detroit Edison

Fermi-2
6400 North Dixie Highway
Newport, Michigan 48166
(313) 586-4150

August 3, 1984
EF2-72717

Director of Nuclear Reactor Regulation
Attention: Mr. B. J. Youngblood, Chief
Licensing Branch No. 1
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Youngblood:

Reference: (1) Fermi 2
NRC Docket No. 50-341

(2) NRC Generic Letter 83-33, "NRC Positions on Certain Requirements of Appendix R to 10CFR50", October 19, 1983

(3) IE Information Notice No. 84-09, "Lessons Learned from NRC Inspections of Fire Protection Safe Shutdown Systems (10CFR50, Appendix R)", February 13, 1984

(4) Detroit Edison to NRC Letter, "Transmittal of Fire Protection Information", EF2-69218, dated August 4, 1984

Subject: Submittal of Deviations from Staff Interpretations of Fire Protection Features in 10CFR50, Appendix R and Justification

References (2) and (3) provided further information concerning NRC staff interpretations and positions relative to 10CFR50, Appendix R. As discussed with your staff in various meetings and workshops, it was recommended that NTOL plants also review their fire protection features against the referenced guidance and submit for staff review information and justifications for any deviations from such guidance. Accordingly, please find attached the known deviations at Fermi 2 from Appendix R and the staff guidance on Appendix R except for the schedular deviation for the control center complex which will be addressed in a separate transmittal. The deviations include justification to show that an equivalent level of fire protection is provided. For convenience, the attached deviations are broken down as follows:

B002
1/40

Attachment I - Deviations due to variances to the automatic suppression criteria or intervening combustible criteria.

Attachment II - Deviation for the 3M one hour protective envelope to show equivalence to a one hour fire rated barrier.*

*See reference (4) for more detailed information concerning the test results for the 3M one hour protective envelope.

In addition, Attachment III provides an engineering analysis of fire zones which are not enclosed by 3 hour rated fire barriers. This is primarily due to unprotected openings or non-rated doors and hatches. The analysis is provided to support the equivalence of the zone boundaries defined in FSAR Section 9B (developed in conformance with Appendix A to BTP9.5-1) to the fire areas defined in 10CFR50, Appendix R.

In view of the fact that some of the deviations contain commitments for certain plant modifications, your expedited review is requested.

FSAR changes arising from the attached deviation requests will be included in a forthcoming amendment.

If you have any questions, please contact Mr. Keener Earle at (313) 586-4211.

Sincerely,

Wayne H. Jens

cc: Mr. P. M. Byron*
Mr. M. D. Lynch*
Mr. R. Eberly*
USNRC, Document Control Desk*
Washington, D. C. 20555

*With Attachments

FERMI 2

DEVIATIONS FROM 10CFR50

APPENDIX R

(Automatic Suppression or
Intervening Combustible Criteria)

NOTES

1) The type of cable insulation used is primarily ethylene propylene. Cables have overall fire retardant jackets of Neoprene or Hypalon. Cables have been type-tested in accordance with the flame test of Detroit Edison's Company Specification 3071-80 and are certified to be of fire retardant construction. This is equivalent to the IEE-383 test.

2) A third alternative for shutting down the plant, utilizing an existing emergency core cooling system, is being added to the Appendix R Analysis. For hot shutdown this method consists of manually depressurizing the reactor utilizing safety relief valves to remove steam (B21 System) and the core spray system (E 21 System) to provide water to the reactor. For cold shutdown, one of two methods may be used. The first (and preferred) method utilizes the RHR shutdown cooling mode as described in the Fermi 2 FSAR. The second method would utilize the core spray system to provide cooling water from the torus to the reactor, the SRVs to return that water to the torus, and the RHR torus cooling mode to remove heat from the torus. This alternative will be utilized in zones where HPCI and RCIC equipment cable locations has caused an interaction problem. The E 21 system equipment has been installed in the Reactor Building completely divisionally. Division I equipment is located on the north side while Division II equipment has been located on the south side.

3) A fourth alternative for shutting the plant down is to use an alternate shutdown path using the standby feedwater system. This capability will be available by startup after the first refueling outage. See DECo letter 72718 for more information on this concept.

4) Abbreviations:

   Appendix R = "R"

   Non Appendix R = Non "R"

   Intervening Combustibles = I.C.

5) Except for sketchs 3.4, 6 and 10, the sketches are portions of the Appendix R drawings which were previously submitted.

6) For unsealed opening in walls and floors see "Engineering Analysis for Zone Boundaries" which is included with this submittal (Attachment III).

7) 4 deviation requests were submitted on March 1, 1983 (EF2-61562). Three of the deviations, Zone 5 Auxiliary Building, Zone 13 Auxiliary Building, and Division II Control Center HVAC Room have been modified and are included in this package. The fourth, relay room stairwell is being withdrawn from consideration.

8) For doors in the summary sheets, the type of door is given first and the adjacent zone is given second. "A" means the door has a 3 hour fire resistance. "B" means the door has a 1 1/2 hour fire resistance.

FIRE ZONE 1

Torus Room Reactor Building
Elevation: 540'-0" to 583'-6"

Combustibles

Electrical insulation	270,000,000 BTU

Design Basis Fire

Fire Loading	19,000	BTU/sq. ft.

Fire Protection (Available)

Suppression: Automatic Sprinkler/area wide

Detection: Ionization detection (early warning)

Portable Extinguishers: (4) Dry chemical/Zone 2
(4) CO_2/Zone 2

Hose Stations: (4) Water/Zone 2

Fire Resistance Rating

Required: .25 hour

Actual:

Walls	-	minimum 36" thick reinforced concrete-
	-	exterior/North, South and West
Floor/Ceiling	-	24" thick reinforced concrete over Steel Beams ceiling
	-	concrete base mat floor
Fixed Openings	-	clear openings/Zone 5 (RB)
Sealed Penetrations	-	3-hour rated/steam tunnel all penetrations
	-	Fire stop/cable tray penetrations through unrated barriers
Unsealed Penetrations in unrated barriers	-	piping
	-	conduit
	-	ventilation
	-	ducting
Doors	-	(4) water tight/Zone 2 (RB)

Fire Zone 1 Reactor Building

Appendix R Drawing No. 6E721-2800-15, 16, 17, 18

*SYSTEMS REQUIRED FOR HOT OR COLD SHUTDOWN IN FIRE ZONE

		Div I	Div II
B21	Main Steam Isolation Valves; Safety Relief Valves (1) for Depressurizing Reactor Pressure Vessel; Reactor Vessel Pressure Instrumentation	X	X
B31	Recirculation (Inboard Isolation Valves Only)	X	X
C11	Control Rod Drive (Manual Scram Circuits Only)		
E11	RHR; Service Water System, Cooling Towers, Containment Cooling Mode and Shutdown Cooling Mode	X	X
E41	High Pressure Coolant Injection		X
E51	Reactor Core Isolation Cooling	X	
P44	Emergency Equipment Cooling Water		
P45	Emergency Equipment Service Water		
P50	Control Air (Control Center HVAC dampers)	X	X
R14	ESF a-c Distribution System for Shutdown Equip		
R16	ESF a-c Distribution System for Shutdown Equip	X	X
R30	ESF a-c Distribution System for Shutdown Equip		
R32	ESF d-c System		X
T41	Control Center HVAC System and ESF Fan Coil, Units for Areas Servicing Shutdown Systems	X	X
T50	Suppression-Pool Temperature Monitoring Equipment	X	X
X41	EDG and EDG Switchgear Room HVAC System		
E21	Core Spray System	X	X

* Required in this case means some subset of the system listed is required for hot or cold shutdown, not all of the system.

Fire Zone 1 Reactor Building

Appendix R Circuit/Component Protection:

Statement of Problem

Division I and II cables enter the torus room through the east wall at approximately elevation 578 feet. Division I enters at approximately column line 12 and angles off to the north area over the centerline of the torus. It extends around to the northeast (RCIC) and the northwest (RHR) corner rooms where appropriate Division I cables enter the two rooms.

Division II trays enter at approximately column line 11 (approximately 22 feet from Division I trays) and angle off to the south area over the centerline of the torus. Division II extends around to the southeast (core spray) and southwest (RHR) corner rooms where appropriate cables enter the rooms. Separation of Division I and II at the entry point (G, 11-13) is greater than 20 feet with no intervening combustibles.

Balance of plant (BOP) cable trays enter and traverse parallel to Divisions I and II cable trays around the torus. On the west side, the BOP trays continue around the torus encircling the drywell and linking Divisions I and II with intervening combustibles.

Therefore, Intervening Combustibles are present between redundant safe shutdown divisions.

The analysis below demonstrates that even though this is a deviation from the specific criteria in Section III.G.2 of Appendix R, equivalent protection is provided when taking into account all factors.

Analysis

The following provides justification demonstrating an equivalent level of protection to that of Appendix R Section III.G.2.

1. An early warning smoke detection system is installed for assuring early detection and response by the plant fire brigade ensuring early fire extinguishment.

2. A full zone automatic sprinkler system is installed in the upper level torus room.

3. There are three 12" BOP cable trays interconnecting Divisions I and II on the west side and are considered Intervening Combustibles (I.C.). The top tray (OP-016) is 20% filled by visual, the middle tray (OC-790) is approximately 5% filled (visual inspection), and the lower tray (OK-097)has a 1% visual fill.

There is 50 feet between redundant division cable trays and 40 ft. between divisional conduits on the west side. The 3 BOP cable trays pass approximately 4 ft. east of the division II conduits which will provide protection from the small loadings in the trays. Therefore, for a fire to affect both divisions, it will have to travel more than 50 ft.

The location of cable trays, over the top of the torus (approximately 35') significantly reduces the possibility of a fire on the lower level torus room causing a fire in the cable trays. The torus room has a very large volume in which heat from a fire can be dissipated. EPRI test at Factory Mutual Laboratories have shown that cable fires will not propagate from short circuits.

Division I and II safe shutdown cables, which are located within 10 feet of line 12.0 have been provided with a 1-hour rated protected envelope. Once in the majority division areas (north of line 12 Division I, south of line 12 Division II), the minority division has been provided with a 1-hour rated protective envelope while in the majority division area. For instances where minority division cables or equipment is unprotected in the majority division area or a cable/equipment is unprotected in the 20 ft. space around column line 12, a specific analysis and disposition has been completed on the circuits in question. (See Attachment)

4. The combustible loading of this zone is low (19,000 BTU/sq. ft.).

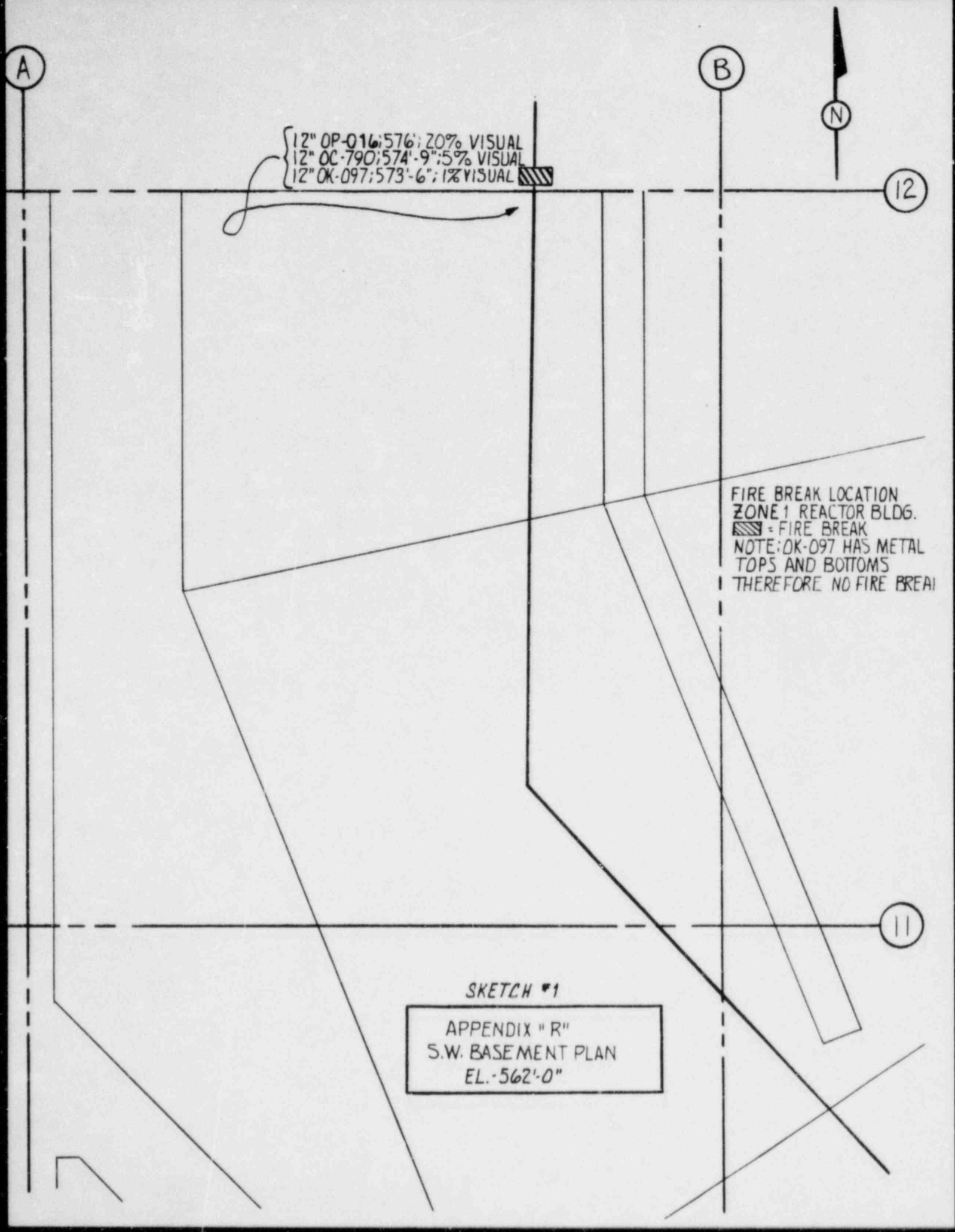
The following modification will be installed, per a mutually agreed to schedule, upon acceptance of the deviation:

For trays (2) OP-016 and OC-790 a tested fire break will be installed in the trays at approximately column line 12 $\pm$ 3 feet. (See sketch 1)

A break will not be installed in the third I.C. tray (OK-097) because instruments trays have been provided with metal covers and solid bottoms.

Conclusion

With the installation of the proposed modifications and in combination with the existing fire protection features, an adequate level of protection is achieved.


A
B
N
12
11
12" OP-016; 576'; 20% VISUAL
12" OC-790; 574'-9"; 5% VISUAL
12" OK-097; 573'-6"; 1% VISUAL
FIRE BREAK LOCATION
ZONE 1 REACTOR BLDG.
= FIRE BREAK
NOTE: OK-097 HAS METAL
TOPS AND BOTTOMS
THEREFORE NO FIRE BREAI
SKETCH #1
APPENDIX "R"
S.W. BASEMENT PLAN
EL. -562'-0"

Zone 1 Reactor Building Attachment

Equipment Analysis

E4150F042-HPCI suppression pool suction inboard isolation valve and its associated conduits BB-0401-2P and BB-404-2C

The valve is located 5 ft. south of column line 12. The nearest Division I RCIC circuit is bB-021-2K. This conduit is wrapped to a point 20 ft. north of column line 12. There is a minimum of 20 ft. seperation with no I.C. Additionally the HPCI pump can take suction from the condensate storage tank which is controlled by valve E4150F004. This valve is located in the HPCI Room (Zone 3 R.B.). Therefore, it is not necessary to provide protection for this valve and associated circuits.

FIRE ZONE 2

Northeast Corner Room Reactor Building
Elevations: 540'-0" and 562'-0"

Combustibles

Electrical Insulation	70,200,000	BTU
Lubricating Oil	20,800,000	BTU
	91,000,000	BTU

Design Basis Fire

Fire Loading 23,000 BTU/sq. ft.

Fire Protection (Available)

Suppression: Automatic Sprinkler/elevation 540'-0"

Detection: Ionization/zone wide (early warning)

Portable Extinguishers: (1) Dry chemical
(1) CO_2

Hose Stations: (2) water

Fire Resistance Rating

Required: 0.30 hour

Actual: Walls - minimum 36" reinforced concrete

Floor/Ceiling - 24" reinforced concrete (562' floor)
- concrete base mat floor

Fixed Openings - stairwell/Zone 5 (RB)
- metal hatch/Zone 5 (RB)

Sealed Penetrations - Fire stops/cable tray penetrations through unrated barriers

Unsealed Penetrations[2] in unrated barriers - ventilation ducting
- pressure relief penetrations
- conduits
- piping

1. This represents the total loading for all four corner rooms.

2. Penetrations in the corner rooms are sealed for ventilation and radiation purposes. The seals are not fire-rated.

Fire Zone 2 NE Reactor Building

Doors
- water tight/Zone 1 (RB)
- unrated (mtl)/Zone 4 (RB)
- A/Zone 1 (AB)

Appendix R Drawing No. 6E721-2800-14, 15

*SYSTEMS REQUIRED FOR HOT OR COLD SHUTDOWN IN FIRE ZONE

		Div I	Div II
B21	Main Steam Isolation Valves; Safety Relief Valves (I) for Depressurizing Reactor Pressure Vessel; Reactor Vessel Pressure Instrumentation	X	X
B31	Recirculation (Inboard Isolation Valves Only)	X	X
C11	Control Rod Drive (Manaul Scram Circuits Only)		
E11	RHR: Service Water System, Cooling Towers, Containment Cooling Mode and Shutdown Cooling Mode	X	X
E41	High Pressure Collant Injection		X
E51	Reactor Core Isolation Cooling	X	
E56	RHR Cooling Towers		
P44	Emergency Equipment Cooling Water		
P45	Emergency Equipment Service Water		
P50	Control Air (Control Center HVAC dampers)	X	
R14	ESF a-c Distribution System for Shutdown Equip		
R16	ESF a-c Distribution System for Shutdown Equip	X	
R30	ESF a-c Distribution System for Shutdown Equp		
R32	ESF d-c System		
T41	Control Center HVAC System and ESF Fan Coil, Units for Areas Servicing Shutdown Systems	X	X
T50	Suppression-Pool Temperature Monitoring Equipment	X	X
X41	EDG and EDG Switchgear Room HVAC System		
E21	Core Spray System	X	X

* Required in this case means some subset of the system listed is required for hot or cold shutdown, not all of the system.

Fire Zone 2 NE Reactor Building

Appendix R Circuit/Component Protection:

Statement of Problem

An area wide suppression system has not been provided for the north east corner room. The analysis below demonstrates that even though this is a deviation from the specific criteria of Appendix R, equivalent protection is provided when taking into account all factors.

Analysis

The following provides justification demonstrating an equivalent level of protection to that of Appendix R Section III.G.2.c.

1. An area wide early warning smoke detection system is installed for assuring early detection and response by the plant fire brigade ensuring early fire extinguishment.

2. An automatic sprinkler system is provided on the 540'-0" elevation for the RCIC pump and turbine room (major combustibles in zone).

3. Division II "R" circuitry is wrapped within this room with a one hour protective envelope. If a Division II circuit/equipment is unprotected, then a specific analysis and disposition has been done for the circuit in question.

4. The combustible loading in this room is low (23,000 BTU/ft^2). If the combustibles were totally consumed, they would produce a fire which corresponds to a fire severity on the ASTM time temperature curve of approximately 15 minutes.

Conclusion

The installation of an automatic suppression system throughout the room would not significantly enhance the fire protection provided by the current configuration.

FIRE ZONE 2

Southeast Corner Room Reactor Building
Elevations: 540'-0" and 562'-0"

Combustibles

Electrical Insulation	70,200,000	BTU
Lubricating Oil	20,800,000	BTU
	91,000,000[1]	BTU

Design Basis Fire

Fire Loading	23,000	BTU/sq. ft.

Fire Protection (Available)

Suppression: None

Detection: Ionization/zone wide (early warning)

Portable Extinguishers: (1) Dry chemical
(1) CO_2

Hose Stations: (2) water

Fire Resistance Rating

Required: 0.25 hour

Actual: Walls - minimum 36" reinforced concrete

Floor/Ceiling - reinforced concrete (562' floor)
- concrete base mat floor

Fixed Openings - stairwell/Zone 5 (RB)
- metal hatch/Zone 5 (RB)

Sealed Penetrations - Fire stops/cable tray penetrations through unrated barriers

Unsealed Penetrations[2] in unrated barriers - ventilation ducting
- pressure relief penetrations
- conduits
- piping

Doors - watertight/1RB
- watertight/3RB 540' nonrated (MN)/3RB 562'

FIRE ZONE 2 Cont'd

1. This loading represents the total for all four corner rooms.

2. Penetrations in the corner rooms are sealed for ventilation and radiation purposes. The seals are not fire-rated.

Fire Zone 2 SE Reactor Building

Appendix R Drawing No. 6E721-2800-15, 16

*SYSTEMS REQUIRED FOR HOT OR COLD SHUTDOWN IN FIRE ZONE

		Div I	Div II
B21	Main Steam Isolation Valves; Safety Relief Valves (I) for Depressurizing Reactor Pressure Vessel; Reactor Vessel Pressure Instrumentation	X	X
B31	Recirculation (Inboard Isolation Valves Only)	X	X
C11	Control Rod Drive (Manual Scram Circuits Only)		
E11	RHR: Service Water System, Cooling Towers, Containment Cooling Mode and Shutdown Cooling Mode	X	X
E41	High Pressure Coolant Injection		X
E51	Reactor Core Isolation Cooling	X	
P44	Emergency Equipment Cooling Water		
P45	Emergency Equipment Service Water		
P50	Control Air (Control Center HVAC dampers)	X	
R14	ESF a-c Distribution System for Shutdown Equip		
R16	ESF a-c Distribution System for Shutdown Equip	X	
R30	ESF a-c Distribution System for Shutdown Equip		
R32	ESF d-c System		
T41	Control Center HVAC System and ESF Fan Coil, Units for Areas Servicing Shutdown Systems	X	X
T50	Suppression-Pool Temperature Monitoring Equipment	X	X
X41	EDG and EDG Switchgear Room HVAC System		
E21	Core Spray System		X

* Required in ths case means some subset of the system listed is required for hot or cold shutdown, not all of the system.

Fire Zone 2 SE Reactor Building

Appendix R Circuit/Component Protection:

Statement of Problem

An area wide suppression system has not been provided for the south east corner room. The analysis below demonstrates that even though this is a deviation from the specific criteria of Appendix R, equivalent protection is provided when taking into account all factors.

Analysis

The following provides justification demonstrating an equivalent level of protection to that of Appendix R Section III.G.2.

1. An area wide early warning smoke detection system is installed for assuring early detection and response by the plant fire brigade ensuring early fire extinguishment.

2. This zone is a major Division II zone, Division I Appendix R circuitry is wrapped within this room with a one hour protective envelope. If a Division I Appendix R circuit equipment is not protected, then an analysis has been done on the circuit in question.

3. The combustible loading in this room is low (23,000 BTU/ft^2). If the combustibles were totally consumed, they would produce a fire which corresponds to a fire severity on the ASTM time temperature curve of approximately 15 minutes.

Conclusion

The installation of an automatic suppression system throughout the room would not significantly enhance the fire protection provided by the current configuration.

FIRE ZONE 4

Corridor Area Reactor Building
Elevations: 562'-0" and 564'-0"

Combustibles

Electrical Insulation	120,000,000	BTU

Design Basis Fire

Fire Loading	60,000	BTU/sq. ft.

Fire Protection (Available)

Suppression: Automatic Sprinkler System/562'-0" corridor

Detection: Photoelectric/564'-0" corridor (early warning)
Ionization/562'0" corridor (early warning)

Portable Extinguishers: (2) CO_2/Zone 2 RB
(2) Dry Chemical/Zone 2 RB

Hose Stations: (2) water/Zone 2 RB (NE & SE)
(1) water/Zone 3 RB

Fire Resistance Rating

Required: 0.75 hour

Actual: Walls
- 3-hour rated/Auxiliary Bldg. (Zone 1) and Turbine Bldg.
- 36" reinforced concrete/Zones 1 and 2 Reactor Bldg.

Floor/Ceiling
- 3-hour rated

Fixed Openings
- metal pressure relieving hatch/Turbine Bldg.

Sealed Penetrations
- 3-hour rated/through rated walls
- Fire stops/cable trays penetrations through unrated barriers

Unsealed Penetrations in unrated barriers
- piping
- ventilation ducting
- conduits
- pressure relief penetrations

Doors
- A/Turbine Bldg.
- non rated (MTL)/Zone 2 NE Corner Room
- non rated (MTL)/CRD Pump Room

Fire Zone 4 Reactor Building

Appendix R Drawing No. 6E721-2800-15, 16

*SYSTEMS REQUIRED FOR HOT OR COLD SHUTDOWN IN FIRE ZONE

		Div I	Div II
B21	Main Steam Isolation Valves; Safety Relief Valves (1) for Depressurizing Reactor Pressure Vessel; Reactor Vessel Pressure Instrumentation		X
B31	Recirculation (Inboard Isolation Valves Only)		
C11	Control Rod Drive (Manual Scram Circuits Only)		
E11	RHR; Service Water System, Cooling Towers, Containment Cooling Mode and Shutdown Cooling Mode	X	X
E41	High Pressure Coolant Injection		X
E51	Reactor Core Isolation Cooling	X	
P44	Emergency Equipment Cooling Water		
P45	Emergency Equipment Service Water		
P50	Control Air (Control Center HVAC dampers)	X	X
R14	ESF a-c Distribution System for Shutdown Equip		
R16	ESF a-c Distribution System for Shutdown Equip	X	
R30	ESF a-c Distribution System for Shutdown Equip		
R32	ESF d-c System		X
T41	Control Center HVAC System and ESF Fan Coil, Units for Areas Servicing Shutdown Systems	X	X
T50	Suppression-Pool Temperature Monitoring, Equipment		X
X41	EDG and EDG Switchgear Room HVAC System		
E21	Core Spray System	X	X

* Required in this case means some subset of the system listed is required for hot or cold shutdown, not all of the system.

Fire Zone 4 Reactor Building

Appendix R Circuit/Component Protection:

Statement of Problem

An area wide suppression system is not provided throughout this zone. In addition, intervening combustibles (cables) are present between Appendix R shutdown divisions. The analysis below demonstrates that even though this is a deviation from the specific criteria of Appendix R, equivalent protection is provided when taking into account all factors.

Analysis

The following provides justification demonstrating an equivalent level of protection to that of Appendix R Section III.G.2.

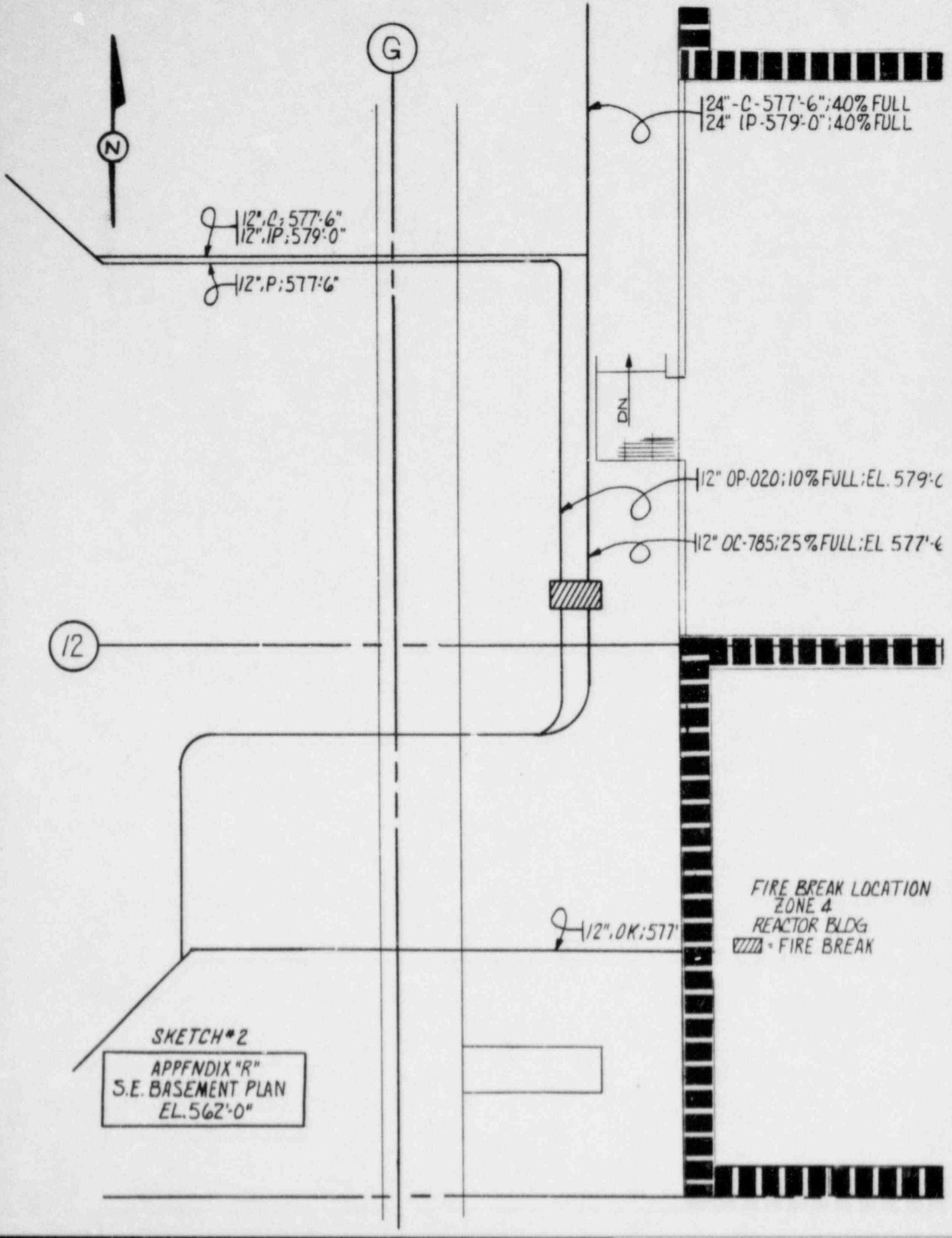
1. An area wide early warning smoke detection system is installed for assuring early detection and response by the plant fire brigade ensuring early fire extinguishment.

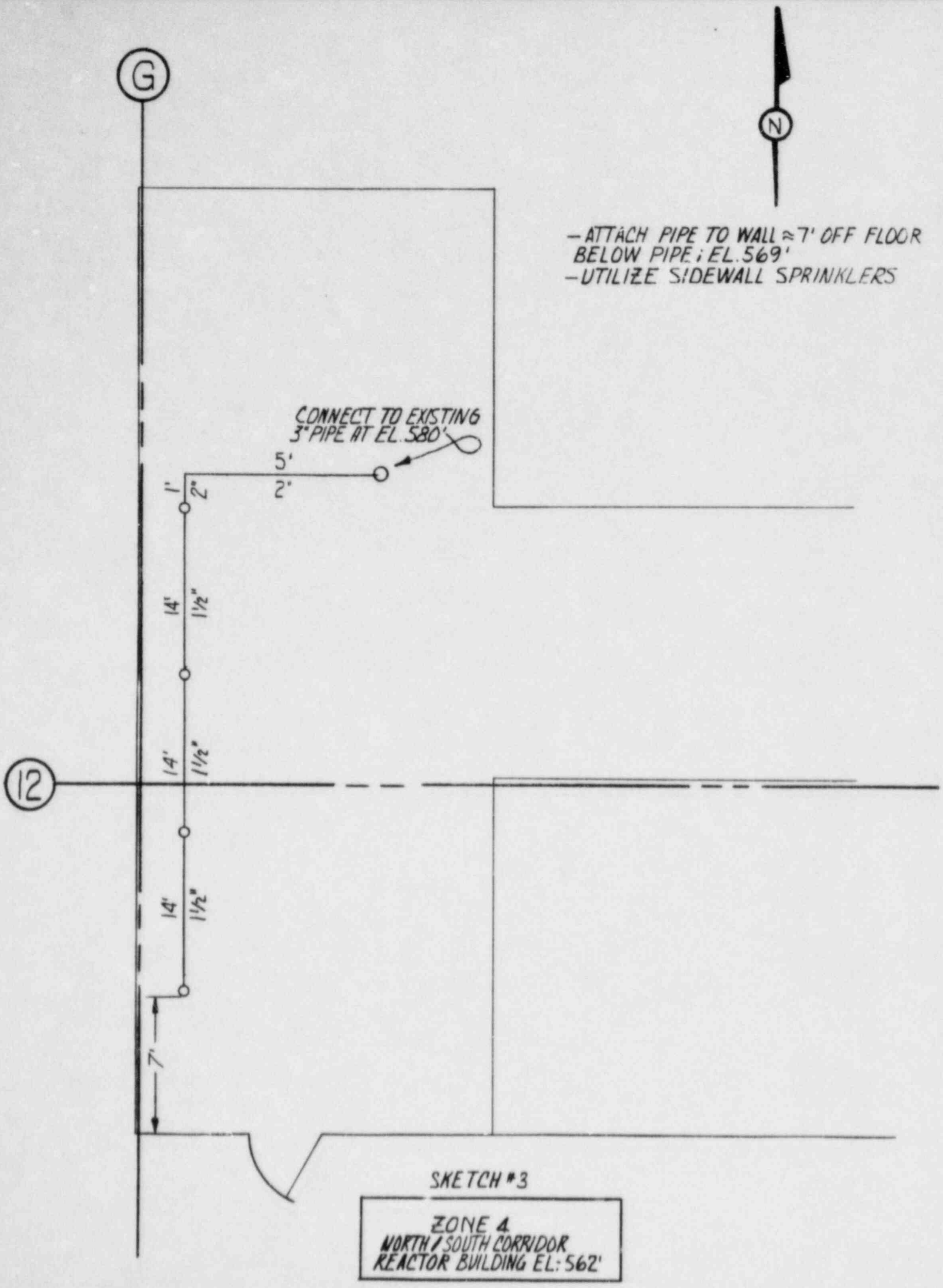
2. Automatic sprinklers are installed in the north-south corridor, (562') in the area of the cable trays (combustible loading for the room is concentrated in this area). There is no automatic sprinkler system in the east-west corridor (combustible loading is insignificant in this area). There are no shutdown cables in the area where automatic sprinkler protection has not been provided.

3. Division I circuitry is concentrated north of column 12 in this zone. Division II circuitry is concentrated south of column 12 in this zone.

4. Whenever Divison I Appendix R circuitry is within 20 feet of Divison II Appendix R circuitry a 1-hour protective envelope is provided or an analysis is completed justifying that no protection is required.

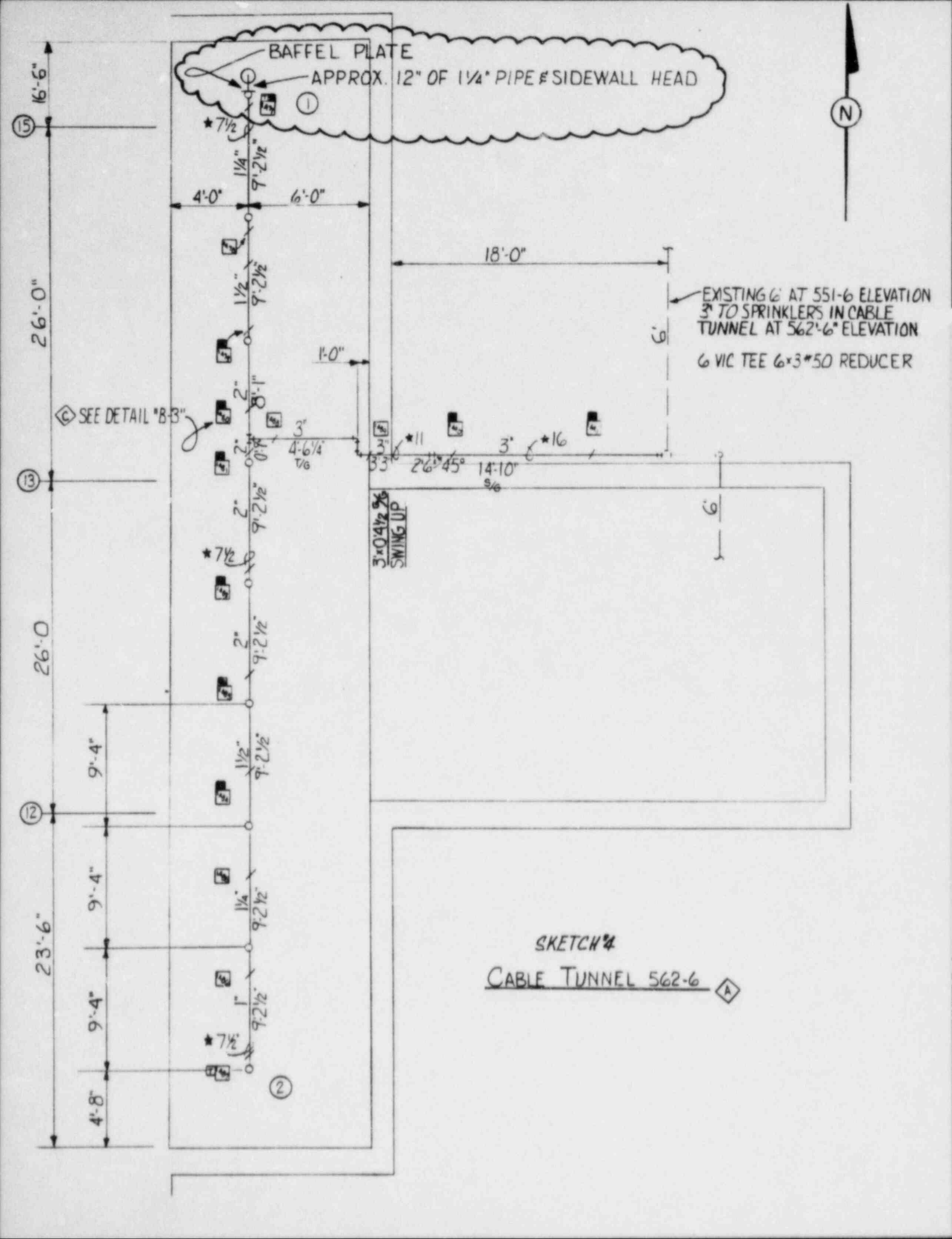
5. The intervening combustibles in this zone consist of 2 -12 inch non-Appendix R trays (OP-020 and OC-785) which enter from the Torus Room (Zone 1) south of column line 12, extend east into Zone 4 approximately 7 feet and then are routed north. Additionally a 12 inch non-Appendix "R" (non-"R") instrument tray (OK-034) is located approximately 10 feet south of the 2 -12 inch non-"R" trays. Since the instrument tray has a solid metal cover and bottom it is not considered an intervening combustible. An approximate 10 feet clear space exists between Division II "R" tray 2K-007 and the 2 non-"R" trays which have fills of 40% and 60% by visual inspection. The 2K-007 tray has a solid metal cover and bottom. Two other Division II "R" trays are located approximately 14 feet to the south of the 2 non-"R" trays.


G
N
24"-C-577'-6";40% FULL
24" IP-579'-0";40% FULL
12",C;577'-6"
12",IP;579'-0"
12",P;577'-6"
DN
12" OP-020;10% FULL;EL. 579'-0
12" OC-785;25% FULL;EL 577'-0
12
12",OK;577'
FIRE BREAK LOCATION
ZONE 4
REACTOR BLDG
▨ - FIRE BREAK
SKETCH #2
APPENDIX "R"
S.E. BASEMENT PLAN
EL. 562'-0"



SKETCH #3

ZONE 4
NORTH / SOUTH CORRIDOR
REACTOR BUILDING EL: 562'


BAFFEL PLATE
APPROX. 12" OF 1¼" PIPE & SIDEWALL HEAD
N
EXISTING 6" AT 551-6 ELEVATION
3" TO SPRINKLERS IN CABLE TUNNEL AT 562'-6" ELEVATION
6 VIC TEE 6×3"50 REDUCER
SEE DETAIL "B-3"
3"×04½ 90 SWING UP
SKETCH #4
CABLE TUNNEL 562-6 A

Fire Zone 4 Reactor Building

All trays run horizontal which causes a slow burning fire with smaller heat releases. An early warning smoke detector is located directly above the non-"R" cable trays near the entry and turning locations. Also, automatic sprinklers are located in this same area.

These non-"R" trays represent the only in-situ intervening combustible path between Divison I and II cables. For a single fire to affect both Division I and II cables, a cable tray fire must burn more than 20 feet and must traverse a clear space of approximately 10 feet.

The following modifications will be installed, per a mutually agreed to schedule, upon acceptance of the deviation:

1) For trays (2) OP-020 and OC-785 a tested fire break will be installed in the trays at approximately column line 12 $\pm$ 5 feet north. (See sketch 2)

2) Additional sprinkler heads will be installed below the pipe obstructions to improve sprinkler coverage of the area. (See sketch 3)

3) One (1) additional head will be provided to improve the coverage over the metal pressure relief hatch.[See (1) on sketch 4]

Conclusion

With the installation of the proposed modifications, and the existing fire protection provided, an adequate level of protection is achieved.

FIRE ZONE 5

First Floor Reactor Building
Elevation: 583'-6"

Combustibles

Electrical Insulation	472,000,000	BTU
Transient Combustibles (anticipated)	96,800,000	BTU
	568,800,000	BTU

Design Basis Fire

Fire Loading 30,000 BTU/sq. ft.

Fire Protection (Available)

Suppression: Automatic Sprinkler/column lines (A-B, 9-13)

Detection: Ionization/zone wide (early warning)
Heat/column lines (A-B, 9-13) (early warning)

Portable Extinguishers: (3) Dry chemical
(3) CO_2

Hose Stations: (4) water

Fire Resistance Rating

Required: .5 hour

Actual: Walls - 3-hour rated/east
- exterior/north, west, south

Floor/Ceiling - 24 inches reinforced concrete floor
12 inches reinforced concrete ceiling

Fixed Openings - (5) open stairwells/Zones 2 (RB) and 6 (RB)
(2) clear opening/Zone 6 (RB)
(2) concrete hatches/Zone 1 (RB)
(4) metal hatch/Zone 2 (RB)
(3) pipe chases/Zone 6 (RB)

Sealed Penetrations - 3-hour rated/through rated walls
- Fire stops/cable tray penetrations through unrated barriers

Unsealed Penetrations in unrated barriers - piping
- ventilation ducting
- conduits

Doors - blast resistant/steam tunnel

Fire Zone 5 Reactor Building

Appendix R Drawing No. 6E721-2801-15, 16, 17, 18

*SYSTEMS REQUIRED FOR HOT OR COLD SHUTDOWN IN FIRE ZONE

		Div I	Div II
B21	Main Steam Isolation Valves; Safety Relief Valves (I) for Depressurizing Reactor Pressure Vessel; Reactor Vessel Pressure Instrumentaion	X	X
B31	Recirculation (Inboard Isolation Valves Only)	X	X
C11	Control Rod Drive (Manual Scram Circuits Only)		
E11	RHR; Service Water System, Cooling Towers, Containment Cooling Mode and Shutdown Cooling Mode	X	X
E41	High Pressure Coolant Injection		X
E51	Reactor Core Isolation Cooling	X	
P44	Emergency Equipment Cooling Water	X	X
P45	Emergency Equipment Service Water		
P50	Control Air (Control Center HVAC dampers)	X	X
R14	ESF a-c Distribution System for Shutdown Equip	X	X
R16	ESF a-c Distribution System for Shutdown Equip	X	X
R30	ESF a-c Distribution System for Shutdown Equip	X	
R32	ESF d-c System	X	X
T41	Control Center HVAC System and ESF Fan Coil, Units for Areas Servicing Shutdown Systems	X	X
T50	Suppression-Pool Temperature Monitoring Equipment	X	
X41	EDG and EDG Switchgear Room HVAC System		
E21	Core Spray System	X	X

* Required in this case means some subset of the system listed is required for hot or cold shutdown, not all of the system.

Fire Zone 5 Reactor Building

Appendix R Circuit/Component Protection:

Statement of Problem

A full area suppression system has not been provided in this zone. The analysis below demonstrates that even though this is a deviation from the specific criteria of Appendix R, equivalent protection is provided when taking in account all factors.

Analysis

The following provides justification demonstrating an equivalent level of protection to that of Appendix R.III.G.2.c.

1. An area wide early warning smoke detection system (except for Railroad Bay) is installed for assuring early detection and response by the plant fire brigade ensuring early fire extinguishment.

2. An automatic sprinkler system is installed in the railroad bay (column A-B, 9-13).

3. A heat detection system is installed in the railroad bay (column lines A B, 9-13).

4. There is greater than 20 feet seperation with no intervening combutibles between Division I and II "R" circuits in the Railroad Bay within the zone between column lines A-B; 11-13.

5. The north end of this zone (columns 12-17) is a Division I "R" majority area while the south end (columns 9-12) is a Division II "R" majority area. The minority division will be protected with a one hour protective envelope while in the majority area. Both divisions are protected if located within 10 ft. either side of column 12 (20 ft.). For instances where a divisional cable or equipment should have be protected but was not, a specific analysis and disposition has been completed on the circuits in questions.

6. The drywell and steam tunnel walls provide fire barriers at least equivalent to 3-hour rated barriers.

7. The combustible loading of the zone is low (30,000 BTU/ft^2).

Conclusion

The installation of an automatic suppression system throughout the room would not significantly enhance the fire protection provided by the current configuration.

FIRE ZONE 6

Second Floor Reactor Building
Elevation: 613'-6"

Combustibles

Electrical Insulation	218,000,000	BTU
Lubricating Oil	760,000	BTU
	219,000,000	BTU

Design Basis Fire

Fire Loading: 14,000 BTU/sq. ft.

Fire Protection (Available)

Suppression: Automatic sprinklers/over cable trays on east wall between column lines 10-12

Detection: Ionization/zone wide (early warning)

Portable Extinguishers: (3) Dry chemical
(3) CO_2

Hose Stations: (5) water

Fire Resistance Rating

Required: 0.25 hours

Actual: Walls - 3-hour rated/Auxiliary Building and Steam Tunnel
- exterior/north, south, west

Floor/Ceiling - 12" thick reinforced concrete

Fixed Openings
- (1) stairwells/Zones 5 (RB) and 7 (RB)
- (1) stairwell/Zone 5 (RB)
- (1) stairwell/Zone 7 (RB)
- (3) pipe chases/Zone 5 (RB) and 7 (RB)
- (2) clear openings/Zones 5 (RB) and 7 (RB)

Sealed Penetrations
- 3-hour rated/Auxiliary Building and Steam Tunnel
- Fire stops/cable tray penetrations through unrated barriers

Unsealed Penetrations in unrated barriers
- piping
- ventilation ducting
- conduits

Doors - A/Zone 6 (AB)

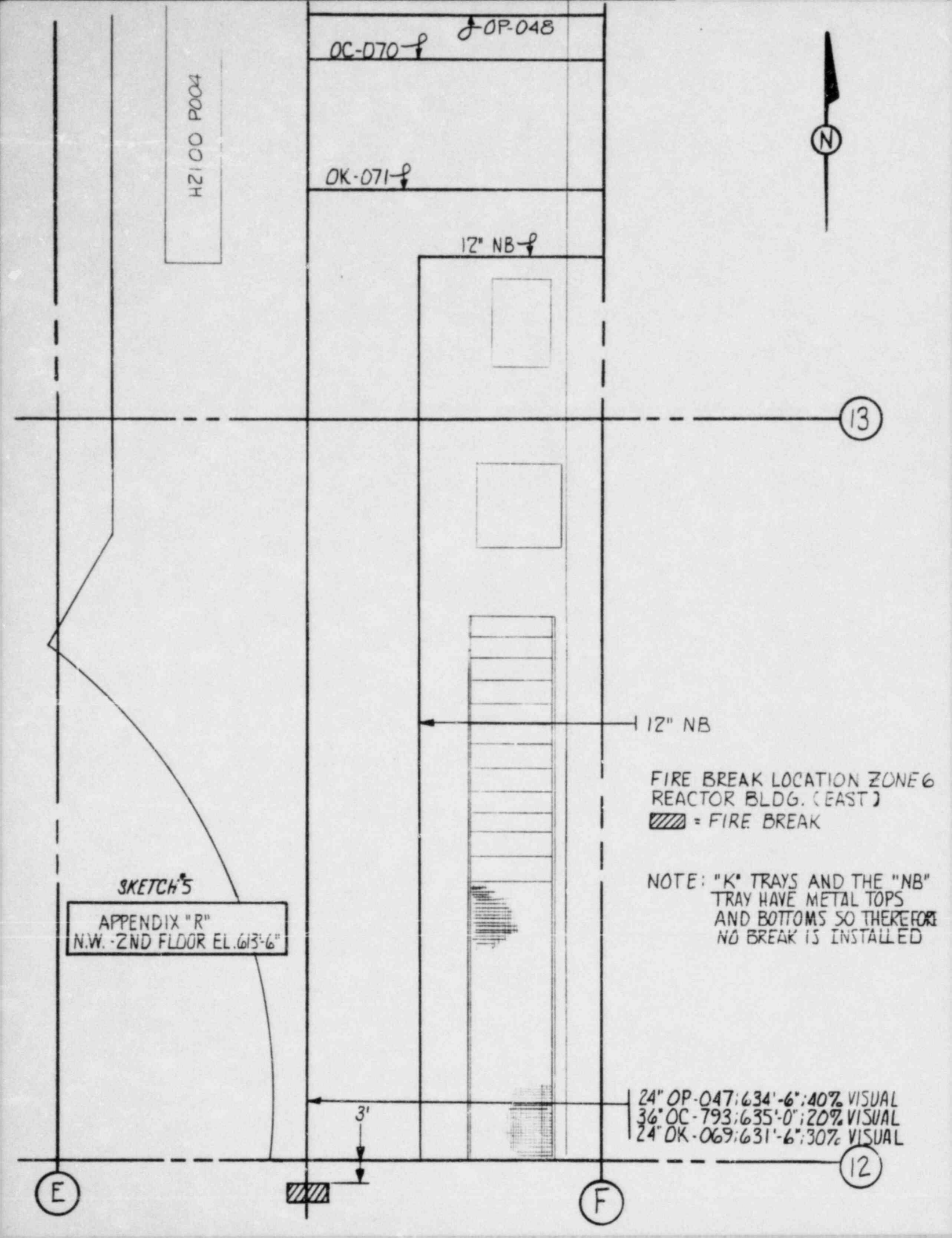
Fire Zone 6 Reactor Building

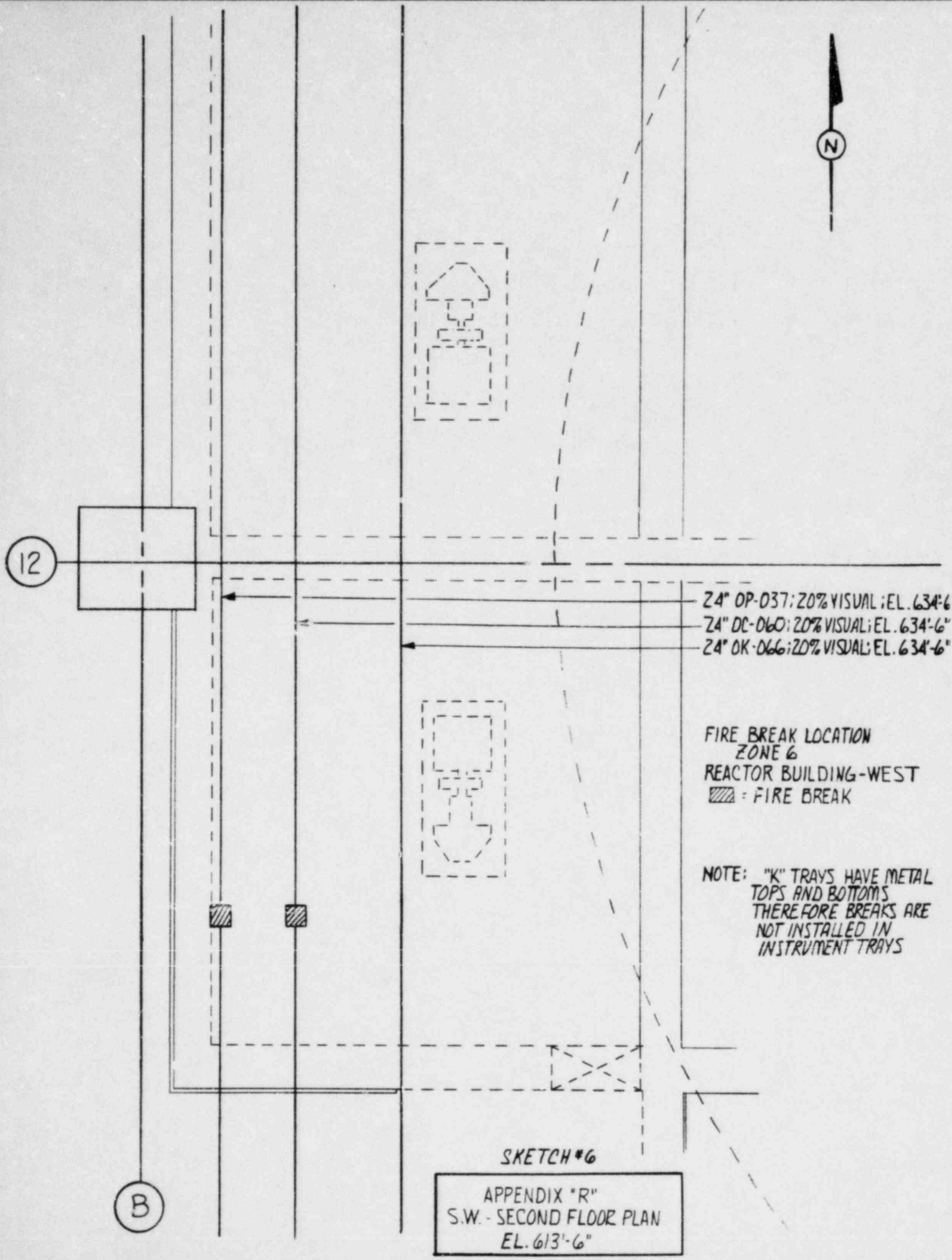
Appendix R Drawing No. 2802-13, 14

*SYSTEMS REQUIRED FOR HOT OR COLD SHUTDOWN IN FIRE ZONE

		Div I	Div II
B21	Main Steam Isolation Valves; Safety Relief Valves (I) for Depressurizing Reactor Pressure Vessel; Reactor Vessel Pressure Instrumentation	X	X
B31	Recirculation (Inboard Isolation Valves Only)		X
C11	Control Rod Drive (Manual Scram Circuits Only)		
E11	RHR; Service Water System, Cooling Towers, Containment Cooling Mode and Shutdown Cooling Mode	X	X
E41	High Pressure Coolant Injection		X
E51	Reactor Core Isolation Cooling	X	
P44	Emergency Equipment Cooling Water	X	X
P45	Emergency Equipment Service Water		
P50	Control Air (Control Center HVAC dampers)		X
R14	ESF a-c Distribution System for Shutdown Equip	X	X
R16	ESF a-c Distribution System for Shutdown Equip	X	X
R30	ESF a-c Distribution System for Shutdown Equip	X	
R32	ESF d-c System	X	
T41	Control Center HVAC System and ESF Fan Coil, Units for Areas Servicing Shutdown Systems	X	X
T50	Suppression-Pool Temperature Monitoring Equipment		
X41	EDG and EDG Switchgear Room HVAC System		
E21	Core Spray System	X	X

* Required in this case means some subset of the system listed is required for hot or cold shutdown, not all of the system.

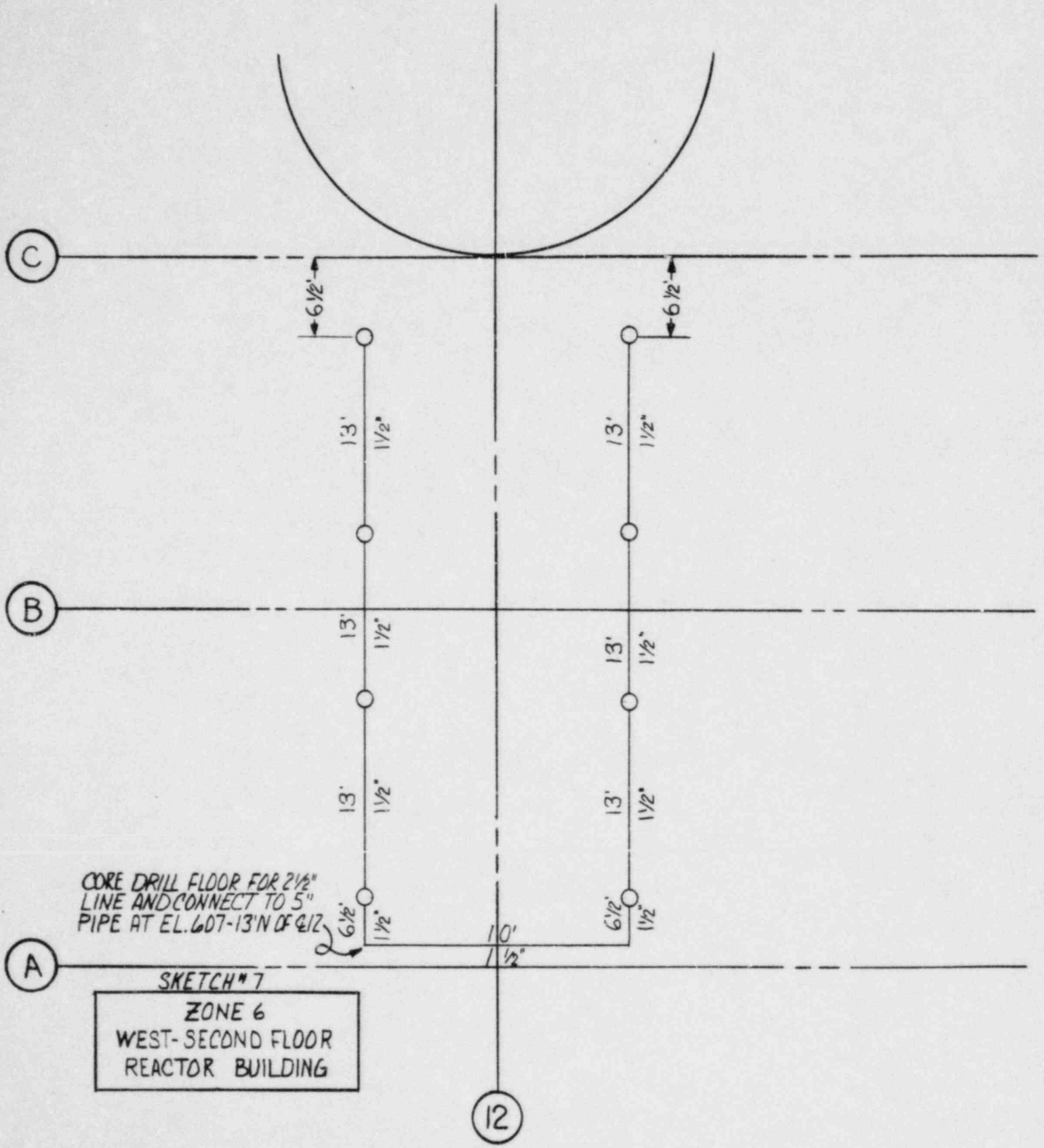

OP-048
OC-070
H2100 P004
OK-071
12" NB
N
13
12" NB
FIRE BREAK LOCATION ZONE 6
REACTOR BLDG. (EAST)
= FIRE BREAK
NOTE: "K" TRAYS AND THE "NB" TRAY HAVE METAL TOPS AND BOTTOMS SO THEREFORE NO BREAK IS INSTALLED
SKETCH 5
APPENDIX "R"
N.W. - 2ND FLOOR EL. 613'-6"
24" OP-047; 634'-6"; 40% VISUAL
36" OC-793; 635'-0"; 20% VISUAL
24" OK-069; 631'-6"; 30% VISUAL
3'
12
E
F



SKETCH #6

APPENDIX "R"
S.W. - SECOND FLOOR PLAN
EL. 613'-6"

— MAX. 13' BETWEEN SPRINKLERS
— MAX. 10' BETWEEN LINES
— DESIGN FOR ALL SPRINKLERS FLOWING 20 PSI END HEAD PRESSURE
— CLOSED HEAD SPRINKLERS-165° F RATEL
— PIPE ELEVATION 642'



SKETCH # 7

ZONE 6
WEST-SECOND FLOOR
REACTOR BUILDING

Fire Zone 6 Reactor Building

Western side of Reactor Building

1. An area wide early warning smoke detection system is installed for assuring early detection and response by the plant fire brigade ensuring early fire extinguishment.

2. Division I circuitry and equipment are concentrated in the northern portion of this floor. Division I conduits also run north-south along the west wall.

3. There are three non-safe shutdown trays (OP-037, OC-060 and OK-066) which are routed north-south along column line B. These trays represent the only intervening combustibles which could propogate a fire between Division I and II "R" circuits.

4. The location of the non-safe shutdown trays near the ceiling (approximately 25' off floor) significantly reduces the possibility of a fire on the second floor of the Reactor Building causing a fire in the trays above. Because of the fire retardant construction of cables, a significant exposure fire is required for cable ignition. EPRI tests at Factory Mutual Laboratories have shown that cable fires will not propagate from short circuits.

5. Combustible loading for the zone is low (14,000 BTU/ft^2).

6. For a single fire to affect both divisions a cable tray fire would have to burn a minimum of 35 feet.

The following modifications will be installed per a mutually agreed to schedule, upon acceptance of the deviation.

1) East Side Reactor Building - For trays (2) OP-047 and OC-793 a tested fire break will be installed in the trays approximately 3 ft. south of column line 12. (See sketch 5)

2) West Side Reactor Building - For trays (2) OP-037 and OC-060 a tested fire break will be installed in the trays at approximately 12 ft south of column line 12. (See sketch 6)

NOTE: The two instrument trays OK-069 and OK-066 will not have fire breaks installed because of metal tops and solid bottoms.

3) Sprinkler protection will be installed on the West Side of the Reactor Building between column line A-C, 12. (Sketch 7)

Conclusion

With the installation of the proposed modifications and the existing fire protection provided, an adequate level of protection is achieved.

Zone 6 Reactor Building

EQUIPMENT ANALYSIS

1) P44N401A/DD039-1K - Division I EECW inlet temp monitor required for Shutdown Equipment Room Coolers.

2) P4400F602A/CC-021C - Division I EECW valve required for Shutdown Equipment Room Coolers.

This Division I Equipment is located approximately 5 to 7 ft. south of column Line 12 which places them in a major Division II area. Approximately 32 ft. separate Division II Equipment from this Division I Equipment. Tray OP-037 (Intervening Combustibles) is routed approximately 18 ft away from the equipment. With the proposed sprinkler system and fire breaks a fire would not affect both Divisions. The Redundant Division II EECW equipment is located over 80 ft away. Therefore cable/equipment protection is adequate as is.

FIRE ZONE 7

Third Floor Reactor Building
Elevation: 641'-6"

Combustibles

Electrical Insulation	296,000,000	BTU
Lubricating Oil	304,000	BTU
Transient Combustibles (anticipated)	95,800,000	BTU
	392,104,000	BTU

Design Basis Fire

Fire Loading 29,000 BTU/sq. ft.

Fire Protection (Available)

Suppression: None

Detection: Ionization/zone wide (early warning)

Portable Extinguishers: (5) Dry chemical
(3) CO_2

Hose Stations: (4) water

Fire Resistance Rating

Required: 0.45 hour

Actual: Walls - exterior/north, west, south
- 3-hour rated/east

Floor/Ceiling - 12 inches reinforced concrete floor
- 12 inches reinforced concrete ceiling

Fixed Openings - (4) stairwells/Zones 6 (RB) and 8 (RB)
(2) clear openings/Zones 6 (RB) and 8 (RB)
(2) pipe chases/Zones 6 (RB) and 8 (RB)

Sealed Penetrations - 3-hour rated/through rated barriers
- Fire stops/cable trays penetration through unrated barriers
- 3-hour rated/Zone 8 Auxiliary Building

Unsealed Penetrations in unrated barriers - piping
- conduit
- ventilation ducting

Doors - None

Fire Zone 7 Reactor Building

Appendix "R" Drawing No. 6E721-2803-10, 11

*SYSTEMS REQUIRED FOR HOT OR COLD SHUTDOWN INF FIRE ZONE

		Div I	Div II
B21	Main Steam Isolation Valves; Safety Relief Valves (I) for Depressurizing Reactor Pressure Vessel; Reactor Vessel Pressure Instrumentation		X
B31	Recirculation (Inboard Isolation Valves Only)	X	X
C11	Control Rod Drive (Manual Scram Circuits Only)		
E11	RHR; Service Water System, Cooling Towers, Containment Cooling Mode and Shutdown Cooling Mode		X
E41	High Pressure Coolant Injection		X
E51	Reactor Core Isolation Cooling	X	
P44	Emergency Equipment Cooling Water		
P45	Emergency Equipment Service Water		
P50	Control Air (Control Center HVAC dampers)		
R14	ESF a-c Distribution System for Shutdown Equip		
R16	ESF a-c Distribution System for Shutdown Equip		
R30	ESF a-c Distribution System for Shutdown Equip		
R32	ESF d-c System		
T41	Control Center HVAC System and ESF Fan Coil, Units for Areas Servicing Shutdown Systems		
T50	Suppression-Pool Temperature Monitoring Equipment		
X41	EDG and EDG Switchgear Room HVAC System		
E21	Core Spray System		X

* Required in this case means some subset of the system listed is required for hot or cold shutdown, not all of the system.

Fire Zone 7 Reactor Building

Appendix R Circuit/Component Protection

Statement of Problem

An area wide suppression system is not provided for this zone. The analysis below demonstrates that even though this is a deviation from the specific criteria of Appendix R, equivalent protection is provided when taking into account all factors.

Analysis

The following provides justification demonstrating an equivalent level of protection to that of Appendix R, Section III.G.2.

1. An area wide early warning smoke detection system is installed for assuring early detection and response by the plant fire brigade ensuring early fire extinguishment.

2. North of column 12 is a major Division I "R" area while south of column line 12 is a major Division II "R" area. The minority division is protected by a one hour protective envelope unless an analysis and disposition has been completed (see Equipment Analysis).

3. In-situ intervening combustibles which provide a fire propagation path between redundant divisions are not present.

4. One passive means (20 ft. of separation) and one active means (ionization detection) is provided for this zone.

5. The combustible loading in this zone is low (29,000 BTU/ft^2).

6. Vertical tray covers will be provided on the vertical tray risers located at approximately F-13 (OP-123, OC-171 and OP-049).

Conclusion

The installation of an automatic suppression system throughout the room would not significantly enhance the fire protection provided by the current configuration.

Fire Zone 7 Reactor Building

Equipment Analysis

E11 50F023 and associated conduits DD-004-2C and DD-002-2P (Division II "R" equipment).

This valve is located approximately 20 ft. north of column 12 between columns B and C. The conduits are routed south back into the major Division II area and remain there on this floor. There are no Division I "R" cables on the west side of the Reactor Building. Any large openings which communicate with second floor Division I "R" are located approximately 50 ft. away. Therefore, any fire in this area will only affect Divsion II equipment.

Fire Zone 1 Auxiliary Building

Appendix R Circuit/Component Protection:

Statement of Problem

Intervening combustibles are present in the 20 ft. clearance between the shutdown divisions. The analysis below demonstrates that even though this is a deviation from the specific criteria of Appendix R, equivalent protection is provided when taking into account all factors.

Analysis

An equivalent level of protection to Appendix R Section III.G.2 is being provided based on the following:

1. An area wide early warning smoke detection system is installed for assuring early detection and response by the plant fire brigade ensuring early fire extinguishment.

2. An automatic sprinkler system is installed in the zone at both the 551' and 562' elevations.

3. Division I and II control air equipment is separated by a distance of 65 feet. Loss of this equipment affects the control center HVAC. An alternative method of relay room cooling will be available.

4. The combustible loading of the zone is low (80,000 BTU/ft^2).

5. This is a major Division I area. Division II conduits and cable trays are protected with a one hour protective envelope when they are within 20 ft. of Division I circuits.

   At the south end of the zone (column G-H, 9-11) intervening combustibles in the form of cables, exist in the 20 ft. separation between divisions (see Drawing 6E-721-2800-16). Three non-Appendix R cable trays (OP-005, OC-017 and OC-018) are routed with three Division II trays (2P-019, 2C-036 and OC-015). Two of the non-"R" trays have approximately 5% visual and 1% visual fill. The other non-"R" tray (12 inch) (OP-005) is the top tray of the six trays and has a 30% visual fill of power cables. This group of six trays is routed within approximately 6 ft. of Division I trays before the Division I trays exit the zone. The Division II trays are wrapped until a 20 ft. separation exist between the divisions. Due to the light loading in the trays, a minimum 6 ft. clearance, automatic sprinklers, a smoke detection system, and partial barriers to maintain a 20 ft. separation between division wall to wall barriers would not enhance the fire protection in this area.

Fire Zone 1 Auxiliary Building

The other location where intervening combustibles exist is at column lines G-H, 11-12, (see Drawing 6E7221-2800-16). Division II "R" trays and conduits are protected with a one hour protective envelope when within 20 ft. of Division I circuits. Approximately 10 ft. of clear space exist between the two divisions with only tray OP-002 (40% visual fill; 12 inch), being routed thru this clear space.

Three non-"R" trays run parallel to the unprotected portion of the Division II "R" trays (2P-026, 2C-035, 2K-011) in the area. The first, a solid bottom, metal cover instrument tray (OK-001) (10% visual fill) is located adjacent to a Division II solid bottom metal covered instrument tray (2K-011). The other two non-"R" trays (OP-005, OP-002) are located approximately 9 ft. and 10 ft. north of the instrument trays and are 12 inch power trays with visual fills of 40% and 25% respectively. The remainder of the I.C. trays run perpendicular to the unprotected portions of the Division II trays and are approximately 10 ft. away. Tray loading in the area is light with only one intervening trays exceeding 25% visual loading (40%).

Division II conduits BB040-2C is unprotected in this area and is located more than 20 ft. from Division I circuits. The conduit is located approximately 14 ft. below the three non-"R" trays in the area.

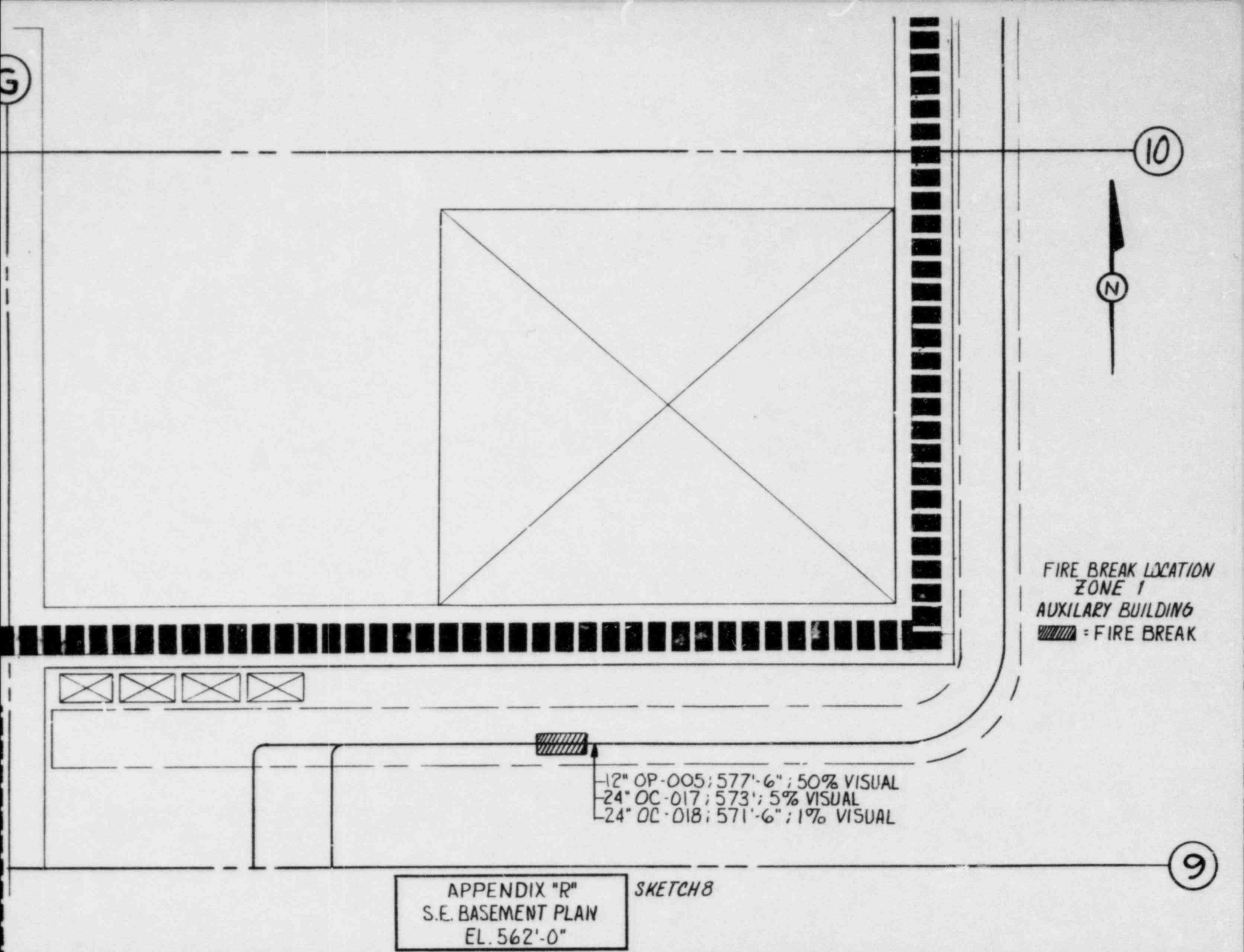
Due to the light loading, the high ceilings (unprotected portion of Division II trays 26 ft. of floor), automatic suppression and smoke detection system wall to wall bariers would not enhance the fire protection features in the area.

The following modifications will be installed, per a mutually agreed to schedule, upon acceptance of the deviation.

For trays (3) OP-005, OC-017, and OC-018 a tested fire break will be installed in the trays at approximately column line(s) 9 + 4 feet north, 11 + 24 feet west. (See sketch 8)

Conclusion

With the installation of the proposed modifications and the existing fire protection provided an adequate level of protection is achieved.



APPENDIX "R"
S.E. BASEMENT PLAN
EL. 562'-0"

SKETCH 8

FIRE ZONE 2

Mezzanine and Cable Tray Area Auxiliary Building
Elevations: 583'-6" and 603'-6"

Combustibles

Electrical Insulation — 424,000,000 BTU

Design Basis Fire

Fire Loading — 71,000 BTU/sq. ft.

Fire Protection (Available)

Suppression: Automatic Sprinklers/zone wide

Detection: Ionization/zone wide (early warning)

Portable Extinguishers: (2) Dry chemical

Hose Stations: (1) Water
(2) Water/Turbine Building

Fire Resistance Rating

Required: 1.0 hour

Actual: Walls - 3-hour rated/north, south, east and west exterior/north and south

Floor/Ceiling - 3 hour rated ceiling

Fixed Openings - Concrete hatch/Zone 3 (Reactor Building)

Sealed Penetrations - 3-hour rated

Unsealed Penetrations - none

Doors - A/Zone 3 (AB)
(2) A/TB
NR/Outside

Appendix "R" Drawing No. 6E721-2801-15, 16

Fire Zone 2 Auxiliary Building

Appendix R Circuit/Component Protection:

Statement of Problem

Intervening combustibles are present between the shutdown divisions. The analysis below demonstrates that even though this is a deviation from the specific criteria of Appendix R, equivalent protection is provided when taking into account all factors.

Analysis

The following provides justification demonstrating an equivalent level of protection to that of Appendix R Section III.G.2.

1. An area wide early warning smoke detection system is installed for assuring early detection and response by the plant fire brigade ensuring early fire extinguishment.

2. Suppression in the form of an automatic sprinkler system is provided throughout the zone both at the ceiling and into the trays near the floor (routed along the east wall).

3. The combustible loading of this zone is low (71,000 BTU/ft^2).

4. Division I cabling required for safe shutdown is concentrated in the northwest corner of this zone.

5. Division II cabling required for safe shutdown is concentrated in the southern end of this zone.

6. Where Division II "R" cabling is routed in the northern end of this zone, within 20 feet of Division I "R" circuitry, it is wrapped. Divisional cable or equipment has been protected or a special analysis and disposition has been completed on the circuits in question.

7. When Division I "R" cabling is routed in the southern end of this zone, within 20 feet of Division II "R" circuitry, it is wrapped. Divisional cable or equipment has been protected or a special analysis and disposition has been completed on the circuits in question.

8. In order for a single fire to affect both divisions it must burn a minimum of 20-feet. This fire would be a cable insulation fire since this is the only type of in-situ combustibles in this zone.

9. There is approximately 90 feet (between column lines 10 and 15) where there is no opposite division interaction of Appendix R circuits.

Fire Zone 2 Auxiliary Building

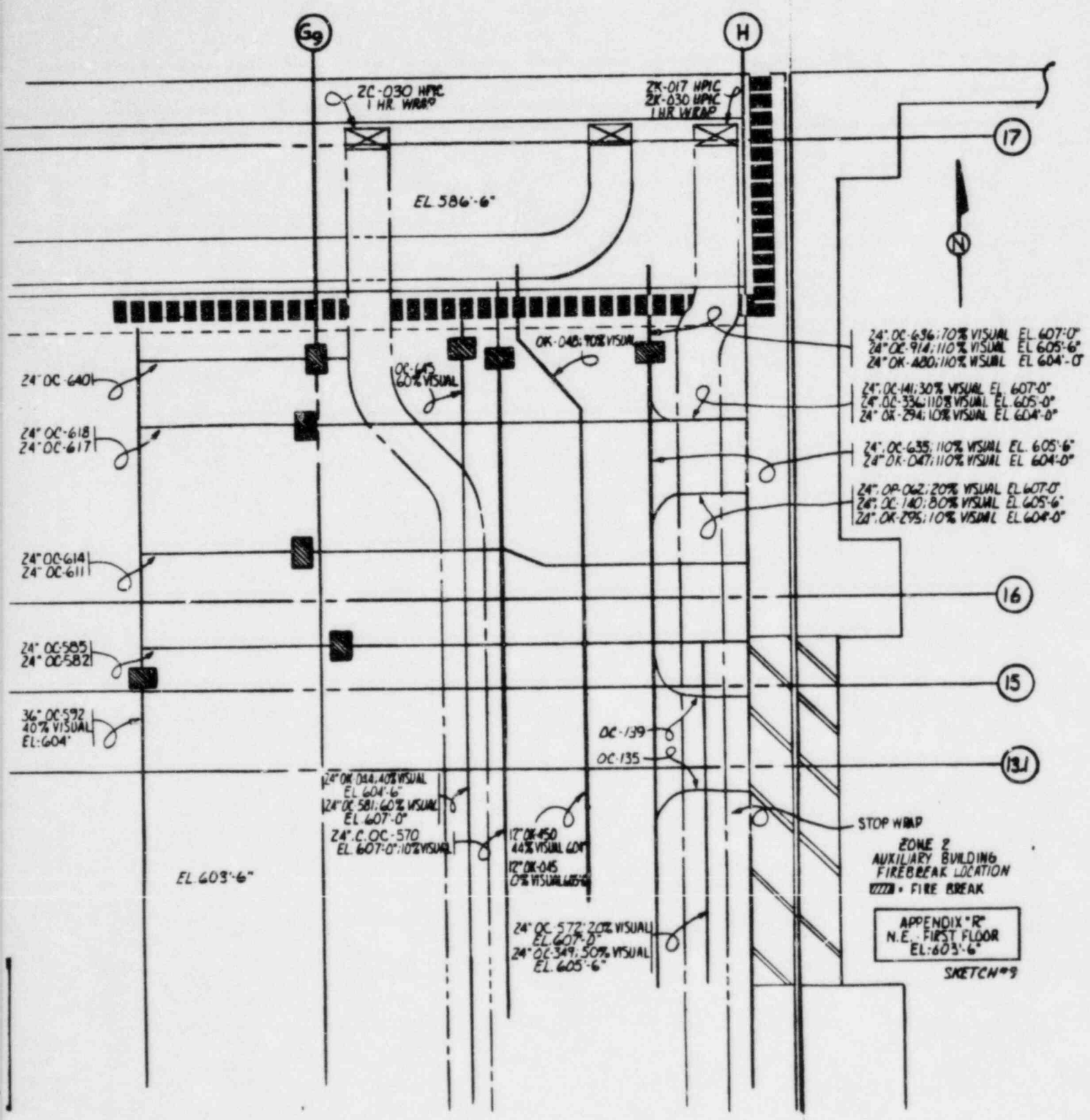
The following modifications will be installed, per a mutually agreed to schedule, upon acceptance of the deviation. A tested fire break will be installed in the trays at approximately column line(s). (See sketch 9).

For trays:

Tray ID#	FBL
OC-617	Break installed approx. 4 feet west of column at Gg.
OC-618	Break installed approx. 4 feet west of column at Gg.
OC-611	Break installed approx. 4 feet west of column at Gg.
OC-614	Break installed approx. 4 feet west of column at Gg.
OC-582	Break installed on east side of column at Gg.
OC-585	Break installed on east side of column at Gg.
OC-640	Break installed approx. 3 feet west of Gg.
OC-636	Break installed approx. 3 feet south of cable chase edge.
OC-914	Break installed approx. 3 feet south of cable chase edge.
OC-570	Break installed approx. 3 feet south of cable chase edge.
OC-645	Break installed approx. 3 feet south of cable chase edge.
OC-592	Break installed approx. at column Line 15.

Conclusion

With the installation of the proposed modifications and the existing fire protection provided, an adequate level of protection is achieved.


Gg
H
17
16
15
13.1
N
2C-030 HPIC
1 HR. WRAP
2K-017 HPIC
2K-030 HPIC
1 HR WRAP
EL 586'-6"
EL 603'-6"
24" OC-640
24" OC-618
24" OC-617
24" OC-614
24" OC-611
24" OC-585
24" OC-582
36" OC-592
40% VISUAL
EL:604'
OK-048; 90% VISUAL
OC-645
60% VISUAL
24" OK-044; 40% VISUAL
EL 604'-6"
24" OC-581; 60% VISUAL
EL 607'-0"
24" C.OC-570
EL 607'-0"; 10% VISUAL
OC-139
OC-135
12" OK-050
44% VISUAL 604'
12" OK-045
0% VISUAL 605'-6"
24" OC-572; 20% VISUAL
EL 607'-0"
24" OC-349; 50% VISUAL
EL 605'-6"
24" OC-636; 70% VISUAL EL 607'-0"
24" OC-914; 110% VISUAL EL 605'-6"
24" OK-480; 110% VISUAL EL 604'-0"
24" OC-141; 30% VISUAL EL 607'-0"
24" OC-336; 110% VISUAL EL 605'-0"
24" OK-294; 10% VISUAL EL 604'-0"
24" OC-635; 110% VISUAL EL 605'-6"
24" OK-047; 110% VISUAL EL 604'-0"
24" OP-062; 20% VISUAL EL 607'-0"
24" OC-140; 80% VISUAL EL 605'-6"
24" OK-295; 10% VISUAL EL 604'-0"
STOP WRAP
ZONE 2
AUXILIARY BUILDING
FIREBREAK LOCATION
• FIRE BREAK
APPENDIX "R"
N.E. FIRST FLOOR
EL: 603'-6"
SKETCH #9

FIRE ZONE 13

Ventilation Equipment Area Auxiliary Building
Elevation: 659'-6"

Combustibles

Electrical insulation	9,400,000	BTU

Design Basis Fire

Fire Loading	Northeast corner 14,000*	BTU/sq. ft.
	Total Zone Loading 1,190	BTU/sq. ft.

Fire Protection (Available)

Suppression: None

Detection: Ionization/zone wide (early warning)

Portable Extinguishers: (1) Dry chemical-north stairwell

Hose Stations: (2) Water

Fire Resistance Rating

Required: 0.25 hours

Actual:

Walls	-	3-hour rated/east, north, and west
	-	3-hour rated/northwest stairwell
	-	exterior/south
	-	concrete block enclosure, 3-hour dampered pipe chase
Floor/Ceiling	-	50 inches reinforced concrete floor 12 inches reinforced concrete ceiling
Fixed Openings	-	Metal hatch/Zone 11 AB and 15 AB
Sealed Penetrations	-	3-hour rated/through rated walls
in unrated barriers	-	Fire stops/cable tray penetrations through unrated barriers
Unsealed Penetrations	-	piping
	-	conduit
Doors	-	A/northwest stairwell A/Turbine Building

*Calculated for deviation request

Fire Zone 13 Auxiliary Building

Appendix "R" Drawing No. 6E721-2804-10, 11

*SYSTEMS REQUIRED FOR HOT OR COLD SHUTDOWN IN FIRE ZONE

		Div I	Div II
B21	Main Steam Isolation Valves; Safety Relief Valves (I) for Depressurizing Reactor Pressure Vessel; Reactor Vessel Pressure Instrumentation	X	X
B31	Recirculation (Inboard Isolation Valves Only)	X	X
C11	Control Rod Drive (Manual Scram Circuits Only)		
E11	RHR; Service Water System, Cooling Towers, Containment Cooling Mode and Shutdown Cooling Mode	X	X
E41	High Pressure Coolant Injection		X
E51	Reactor Core Isolation Cooling	X	
P44	Emergency Equipment Cooling Water		
P45	Emergency Equipment Service Water		
P50	Control Air (Control Center HVAC dampers)		
R14	ESF a-c Distribution System for Shutdown Equip	X	
R16	ESF a-c Distribution System for Shutdown Equip	X	
R30	ESF a-c Distribution System for Shutdown Equip		
R32	ESF d-c System		
T41	Control Center HVAC System and ESF Fan Coil, Units for Areas Servicing Shutdown Systems	X	X
T50	Suppression-Pool Temperature Monitoring Equipment		
X41	EDG and EDG Switchgear Room HVAC System		
E21	Core Spray System	X	X

* Required in this case means some subset of the system listed is required for hot or cold shutdown, not all of the system.

Fire Zone 13 Auxiliary Building

Appendix R Circuit/Component Protection:

Statement of Problem:

An area wide suppression system is not provided for this zone. The analysis below demonstrates that even though this is a deviation from the specific criteria of Appendix R, equivalent protection is provided when taking into account all factors.

Analysis

An equivalent level of protection to Appendix R Section III.G.2, is being provided in this zone based on the following:

1. An area wide early warning smoke detection system is installed for assuring early detection and response by the plant fire brigade ensuring early fire extinguishment.

2. Division II cables are provided with a 1-hour rated protective envelope. If a Division II circuit/equipment is not protected in the zone, then a specific analysis and disposition is completed.

3. The fire loading of this zone is very low (1,190 BTU/ft^2).

4. The Testability/Trip Cabinets (see equipment analysis - next page) are located 30 FT. apart with no intervening combustibles a minimum of 40 FT. separates the panels from the fixed combustibles in the zone (cable trays). The following modification will be installed per a mutually agreed to schedule, upon acceptance of the deviation:

   Erection of a one Hour fire partition routed in front of the Division II Cabinet to function as a radiant energy shield. As the fixed loading is low and large spatial seperation exists the partition will protect the Division II panel from an exposure fire which might affect its redundant counterpart.
   (See Sketch 10)

Conclusion

With the installation of the proposed modifications, and the existing fire protection provided, an adequate level of protection is achieved.

Fire Zone 13 Auxiliary Building

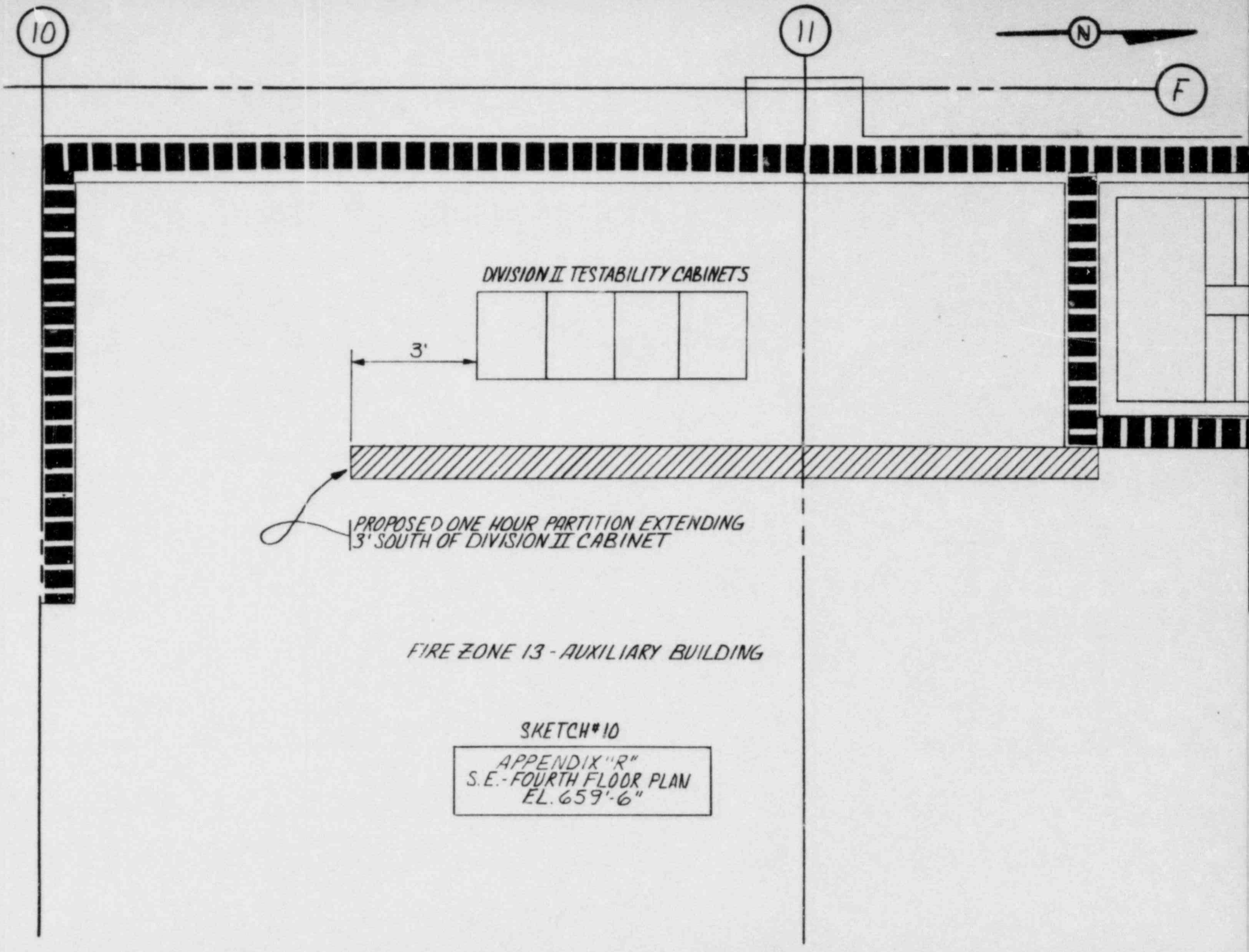
Equipment Analysis

Division I Trip/Testability cabinets H21-P080 and H21-P082

1) Loss of RCIC
2) Loss of HPIC
3) No Initiation of ADS Logic A, Low Pressure Core injection (LPCI) Logic A and Core Spray Logic A
4) Loss of Reactor vessel Level indication Division I

Division II Trip/Testability Cabinets H21-P081 and H21-P083

1) Loss of RCIC
2) Loss of HPIC
3) No Initiation of ADS Logic B, LPCI Logic B and Core Spray
4) Loss of Reactor Vessel Level indication Division II



SKETCH #10

APPENDIX "R"
S.E. - FOURTH FLOOR PLAN
EL. 659'-6"

FIRE ZONE 15

Ventilation Equipment Area Auxiliary Building
Elevation: 677'-6"

Combustibles

Charcoal filter material	4,880,000	BTU
Open Cable Trays Electrical Insulation	10,100,000	BTU
	14,980,000	BTU

Design Basis Fire

Fire Loading 2200 BTU/sq. ft.

Fire Protection (Available)

Suppression: manually actuated spray system/charcoal filters

Detection: ionization/zone wide (early warning)

Portable Extinguishers: (1) Dry chemical

Hose Stations: (2) water

Fire Resistance Rating

Required: 0.25 hour

Actual: Walls - 3-hour rated/east, west
- exterior/south
- minimum 24" reinforced concrete/north

Floor/Ceiling - 12 inches reinforced concrete exterior ceiling

Fixed Openings - metal hatch/zone 13

Sealed Penetrations
- 3-hour rated/through rated barriers
- Fire stops/cable trays penetrations through unrated barriers

Unsealed Penetrations in unrated barriers
- piping
- conduit
- ventilation ducting

Doors
- A/west stairwell
- unrated (MTL)/Zone 14 (AB)

Fire Zone 15 Auxiliary Building

Appendix "R" Drawing No. 6E721-2805-10

*SYSTEMS REQUIRED FOR HOT OR COLD SHUTDOWN IN FIRE ZONE

		Div I	Div II
B21	Main Steam Isolation Valves; Safety Relief Valves (I) for Depressurizing Reactor Pressure Vessel; Reactor Vessel Pressure Instrumentation		
B31	Recirculation (Inboard Isolation Valves Only)		
C11	Control Rod Drive (Manual Scram Circuits Only)		
E11	RHR; Service Water System, Cooling Towers, Containment Cooling Mode and Shutdown Cooling Mode		
E41	High Pressure Coolant Injection		
E51	Reactor Core Isolation Cooling		
P44	Emergency Equipment Cooling Water		
P45	Emergency Equipment Service Water		
P50	Control Air (Control Center HVAC dampers)		
R14	ESF a-c Distribution System for Shutdown Equip		
R16	ESF a-c Distribution System for Shutdown Equip	X	
R30	ESF a-c Distribution System for Shutdown Equip		
R32	ESF d-c System		
T41	Control Center HVAC System and ESF Fan Coil, Units for Areas Servicing Shutdown Systems	X	X
T50	Suppression-Pool Temperature Monitoring Equipment		
X41	EDG and EDG Switchgear Room HVAC System		
E21	Core Spray System		

* Required in this case means some subset of the system listed is required for hot or cold shutdown, not all of the system.

Fire Zone 15 Auxiliary Building

Appendix R Circuit/Component Protection:

Statement of Problem

An area wide suppression system is not provided for this zone. The analysis below demonstrates that even though this is a deviation from the specific criteria of Appendix R, equivalent protection is provided when taking into account all factors.

Analysis

An equivalent level of protection to Appendix R Section III.G.2, is being provided in this zone based on the following:

1. An area wide early warning smoke detection system is installed for assuring early detection and response by the plant fire brigade ensuring early fire extinguishment.

2. This is a major Division I zone. Division II shutdown cables are provided with a 1-hour rated fire barrier. For instances where a divisional cable or equipment should have been protected but was not, a specific analysis and disposition has been completed on the circuits in question.

3. The fire loading of this zone is very low.

Conclusion

Based on the low combustible loading, the 1-hour rated protective envelope, and area wide smoke detection the installation of automatic suppression in this zone would not enhance, to a significant degree, the fire protection provided by the current configuration.

Steam Tunnel Turbine Building
Elevation: 583'

Combustibles

No fixed combustibles (Steam valves contain less than 1 gallon of oil per valve. Therefore, the oil is not considered in the FHA (see section 9B3.2-2)

Design Basis Fire

Fire Loading 0 BTU/sq. ft.

Fire Protection (Available)

Suppression: None

Detection: None

Portable Extinguishers: CO_2, dry chemical, available in area

Hose Stations: available from RB & TB

Fire Resistance Rating

Required: N/A

Actual: Walls - east - metal plates separate tunnel from TB
- south - 3 hour rated between RB & tunnel
- north - " " " " " " "
- west - drywell

Floor/Ceiling - 3 hour rated between RB & tunnel
- ceiling 3 hour rated between AB & tunnel

Fixed Openings - tunnel connection to turbine bldg. at 628' elev.

Sealed Penetrations - 3-hour rated/through rated barriers

Unsealed Penetrations - N/A

Doors - blast resistant door between tunnel and RB A/Zone 6

Steam Tunnel

Appendix R Drawing No. 6E721-2801-15, 16

*SYSTEMS REQUIRED FOR HOT OR COLD SHUTDOWN IN FIRE ZONE

		Div I	Div II
B21	Main Steam Isolation Valves; Safety Relief Valves (I) for Depressurizing Reactor Pressure Vessel; Reactor Vessel Pressure Instrumentaion		X
B31	Recirculation (Inboard Isolation Valves Only)		
C11	Control Rod Drive (Manual Scram Circuits Only)		
E11	RHR; Service Water System, Cooling Towers, Containment Cooling Mode and Shutdown Cooling Mode		
E41	High Pressure Coolant Injection		X
E51	Reactor Core Isolation Cooling	X	
P44	Emergency Equipment Cooling Water		
P45	Emergency Equipment Service Water		
P50	Control Air (Control Center HVAC dampers)		
R14	ESF a-c Distribution System for Shutdown Equip		
R16	ESF a-c Distribution System for Shutdown Equip		
R30	ESF a-c Distribution System for Shutdown Equip		
R32	ESF d-c System		
T41	Control Center HVAC System and ESF Fan Coil, Units for Areas Servicing Shutdown Systems		
T50	Suppression-Pool Temperature Monitoring Equipment		
X41	EDG and EDG Switchgear Room HVAC System		
E21	Core Spray System		

Division I cables enter tunnel from north wall of tunnel

Division II cables enter tunnel from south wall of tunnel

* Required in this case means some subset of the system listed is required for hot or cold shutdown, not all of the system.

Fire Zone Steam Tunnel

Appendix R Circuit/Component Protection:

Statement of Problem:

A smoke detection system, an automatic sprinkler system, and fire barriers have not been provided for the steam tunnel (583' elevation at column G12). The analysis below demonstrates that even though this is a deviation from the specific criteria of Appendix R, equivalent protection is provided when all factors are taken into account.

Analysis

The following provides justification demonstrating an equivalent level of protection to that of Appendix R, Section II, G2.

1. Valves E41 F003 and E41 F600 are separated from valve E51 F008 (RCIC) by approximately 7 ft. These valves control the steam supply to their respective pumps/turbines. Valve E41 F003 (HPCI) is separated from valve E51 F0013 (RCIC) by approximately 14 ft. These valves are isolation valves for their respective pump/turbines. Figure 1 depicts the locations of these 4 valves

2. Manual suppression equipment is available for the tunnel area.

3. There are no fixed combustibles in the tunnel.

4. Due to the tunnel being a Radioactive Level X area (highest), access to this area will be controlled. Additionally, this is not the normal pathway between the Reactor and Turbine Building. This area will be posted for no storage.

5. All electrical circuits for controlling these valves are located in conduits. Division I circuits (RCIC) enter the tunnel from the north while Division II circuits (HPCI) enter the tunnel from the south.

6. The high ceiling area, approximately 57 ft., make the installation of an automatic sprinkler system smoke detection system impractical.

7. Steam tunnel temperatures are monitored by ambient tunnel temperature and HVAC differential temperature. (supply air vs. exhaust air temperature.)

Conclusion

The postulated fire for this area would involve less than 1 gallon of oil in each steam valve and the 7 ft. separation and conduit routing of circuits provide sufficient protection. The installation of smoke detection, automatic suppression, and barriers would not enhance the present fire protection features in the tunnel.

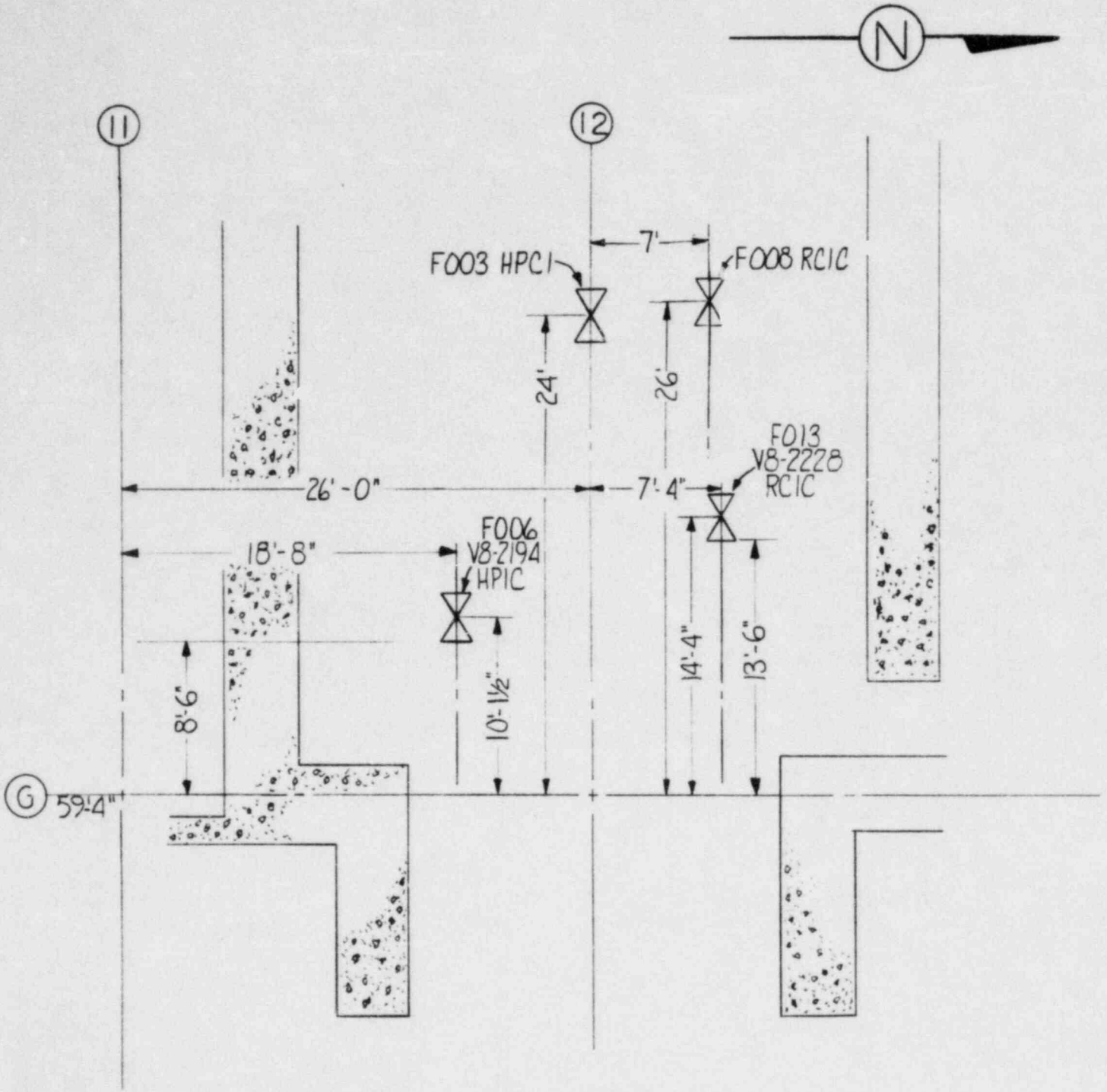


FIGURE 1
LOCATION OF VALVES E41-F006, E41-F003,
E51-F008 & E51-F013 IN THE STEAM TUNNEL

Fire Zone 14

AUXILIARY BUILDING - DIVISION II CONTROL ROOM VENTILATION EQUIPMENT ROOM, ELEVATION 677'-6"

Statement of Problem and Intended Change

Detroit Edison committed to install a three hour fire rated barrier around Division I cable and conduit in the room. Edison wishes to install its standard 3M one hour design in this area. The analysis below demonstrates that even though this is a deviation from the specific criteria of Section III.G.2 of Appendix R, it is equivalent protection when taking into account other factors.

Analysis

A. The room which houses the Division II equipment in the control room ventilation equipment room is described in the write-up for Zone 14 of Section 9B.4.2.15 of the Enrico Fermi Unit 2 (EF-2) FSAR.

The walls surrounding this room are constructed of reinforced concrete and concrete block. A one hour rated fire barrier with Class A fire doors separates Division I and II air conditioning equipment. A one hour rated fire barrier separates Division I and II cables. Penetrations through rated walls are sealed to provide a fire resistance equivalent to the walls in which they are located. The floor is constructed of reinforced concrete and provides a three hour fire rated barrier. Electrical and piping penetrations in the floor are sealed. Ducts are encased by three hour rated fire barriers. The ceiling is constructed of reinforced concrete over unprotected steel.

The ceiling height is 15 ft. The volume of the room in the control room ventilation equipment room where both Division I and Division II cables are present is 26,250 cu. ft.

Ventilation for this zone is provided by the control center air conditioning system. Conditioned air is supplied through ducts to the control room air conditioning equipment room. Exhaust air from the control room air conditioning equipment room is drawn through an exhaust duct opening to the control center air conditioning units located in the room. Additionally, local cooling and recirculation units in the control room air conditioning equipment room maintain suitable room ambient temperature when the control center air conditioning system is operating in the emergency recirculation mode.

During operation in the emergency recirculation mode, the supply and return air flows to and from the control center air conditioning equipment room are stopped. There are 1.2 air changes per hour.

This area is easily accessible for manual fire fighting.

B. Safe Shutdown Equipment

This room contains the following shutdown equipment:

1. Division II control center air conditioning equipment.

2. Division I and II control and power cables for T41 system control center HVAC

Either one of the two Divisions of cables is sufficient for hot shutdown.

C. Fire Hazard Analysis

Installed combustibles within this room consist of cable insulating and jacketing materials and lubricating oil in the ventilation equipment. The type of cable insulation used is primarily ethylene propylene. Cables have overall fire retardant jackets of Neoprene or Hypalon. For purposes of the fire hazards analysis, all cable insulation and jacketing was assumed to be combustible and to have a heat content of 10,000 Btu/lb. Cables have been type-tested in accordance with the flame test of Detroit Edison's Company Specification 3071-80 and are certified to be of fire retardant construction. This is equivalent to the IEEE-383 test. Transient combustibles are assumed to be a container of heptane.

The total quantity of combustible is 1,942 pounds of cable insulation and jacketing material, and approx. five gallons of lubricating oil. The total Btu content is 20,300,000. A one hour fire barrier will be installed on all Division I cable tray and conduit, resulting in a net reduction of 7,000,000 Btu; leaving 13,300,000 Btu. This results in a 7,600 Btu/sq. ft. fire loading for this room. Because of the fire retardant construction of the cables, a significant exposure fire is required for cable ignition. EPRI tests at Factory Mutual Laboratories have shown that cable fires will not propagate from short circuits.

The Btu release of 7,600 Btu/sq. ft. would have an equivalent fire severity of less than 10 minutes in accordance with the NFPA Handbook.

D. Fire Protection Existing or Committed

Fire detection equipment located within this zone consists of an area ionization detection system. Fire suppression equipment located in this zone consists of manual hose and portable fire extinguishers.

Conclusions

Equivalent protection to Section III.G.2 of Appendix R is provided based on the following:

1. This room contains a low concentration of combustibles, with a resultant fire severity of less than 10 minutes; also a one hour fire barrier is provided for the Division I cables.

2. An ionization detection system is provided in the room to give an early warning of a fire. This room is easily accessible for manual fire fighting.

Therefore, in the unlikely event a fire would occure, the installation with the proposed deviation meets the intent of the requirements of Appendix R.

ZONE 5 AUXILIARY BUILDING - CABLE TUNNEL, ELEVATION 613'-6"

Statement of Problem Intended Change

Detroit Edison committed to install one hour fire rated barriers around Division I and II cables. Since an automatic fire suppression system was also included, this met the requirements of Section III.b.2 of Appendix R. Due to physical construction problems involving tray wrap, Edison wished instead to erect a three hour fire rated wall to separate the two divisions and change the fire suppression system to be manually actuated. This is equivalent protection as defined in Section III.b.2.

Analysis

A. Area Description

This zone is described in Section 9B.4.2.6 of the Enrico Fermi Unit 2 (EF-2) FSAR.

This zone serves as a cable routing area for Division I, Division II and balance of plant cable. The Division I cables are located along the east side of the tunnel while the division II cables are located along the west wall. One hour protective envelopes will be provided on conduits which have been routed in the opposite division area.

The walls, floor, and ceiling separating this zone from other areas are constructed of reinforced concrete having a fire resistance rating of three hours. Penetrations through rated walls, floor, and ceiling are sealed to provide a three hour fire resistance rating. The door openings leading from the cable tunnel are protected by Class A fire doors.

The tunnel is divided in two by a three hour fire rated gypsum wall.

Ceiling height is 8 feet at the center of the cable tunnel and 17 feet at each end. Room volume is 8,000 cu. ft.

Ventilation for this zone is provided by the reactor/auxiliary building ventilation system. Air is ducted directly to the cable tunnel and exhausted through ducts to the auxiliary building main exhaust system. Relief air flows unducted from the cable tunnel to the corridor leading to the turbine building. Air flow entering the corridor is controlled by a backdraft damper. There are three air changes per hour.

This zone is easily accessible for manual fire fighting.

B. Safe Shutdown Equipment

*SYSTEMS REQUIRED FOR HOT OR COLD SHUTDOWN IN FIRE ZONE

		Div I	Div II
B21	Main Steam Isolation Valves; Safety Relief Valves (I) for Depressurizing Reactor Pressure Vessel; Reactor Vessel Pressure Instrumentation	X	X
B31	Recirculation (Inboard Isolation Valves Only)		
C11	Control Rod Drive (Manual Scram Circuits Only)	X	X
E11	RHR; Service Water System, Cooling Towers, Containment Cooling Mode and Shutdown Cooling Mode	X	X
E41	High Pressure Coolant Injection		X
E51	Reactor Core Isolation Cooling	X	
P44	Emergency Equipment Cooling Water	X	X
P45	Emergency Equipment Service Water		
P50	Control Air (Control Center HVAC dampers)	X	X
R14	ESF a-c Distribution System for Shutdown Equip	X	X
R16	ESF a-c Distribution System for Shutdown Equip		X
R30	ESF a-c Distribution System for Shutdown Equip	X	X
R32	ESF d-c System	X	X
T41	Control Center HVAC System and ESF Fan Coil, Units for Areas Servicing Shutdown Systems	X	X
T50	Suppression-Pool Temperature Monitoring Equipment		
X41	EDG and EDG Switchgear Room HVAC System		X
E21	Core Spray System	X	X

* Required in this case means some subset of the system listed is required for hot or cold shutdown, not all of the system.

C. Fire Hazard Analysis

Installed combustibles within this zone consist of cable insulating and jacketing materials. The type of cable insulation used is primarily ethylene propylene. Cables have overall fire retardant jackets of Neoprene or Hypalon. For purposes of the fire hazards analysis, all cable insulation and jacketing was assumed to be combustible and to have a heat content of 10,000 Btu/lb. Cables have been type-tested in accordance with the flame test of Detroit Edison's Company Specification 3071-80 and are certified to be of fire retardant construction. This is equivalent to the IEEE-383 test. Transient combustibles are assumed to be a container of heptane.

The total quantity of combustibles on the west side of the wall (Division II) is 36,860,000 BTU's due to cable insulation while the east side contains 59,260,000 BTU's due to pounds of cable insulation. The resultant fire loading for the west side of the tunnel is 78,400 Btu/sq. ft. the east side fire loading is 190,000 Btu/sq. ft.

The fire severity for the west side of the tunnel in accordance with the NFPA handbook is less than one hour and less than 2.5 hours for the east side. Because of the fire retardant construction of the cables, a significant exposure fire is required for cable ignition. EPFI tests at Factory Mutual Laboratories have shown that cable fires will not propagate from short circuits.

The Btu releases of 78,400 Btu/sq. ft. and 190,000 Btu/sq. ft. would have an equivalent fire severity of approx. three hours in accordance with the NFPA Handbook.

The inadvertent operation of the carbon dioxide suppression system will have no adverse affect on the cables.

D. Fire Protection Existing or Committed

Fire detection equipment in this zone consists of an ionization detection system. Fire suppression equipment consists of a manually actuated carbon dioxide system, hose stations, portable fire extinguishers and a CO_2 hose reel.

Conclusions

Equivalent protection to Section III.G.2 of Appendix R is provided based on the following:

Smoke Detection is provided to the Control Room and manual actuation is provided outside the tunnel for easy operation. As the tunnel is connected to the Control Center Complex Response time will be satisfactory. The CO_2 system has been designed for extended discharge (concentration hold time is 20 minutes). Therefore, automatic actuation does not significantly enhance the existing fire protection design.

FIRE AREA/ZONE 11

Miscellaneous Rooms Auxiliary Building
Elevation: 643'-6"

Combustibles

Electrical insulation	76,200,000	BTU

Design Basis Fire

Fire Loading	37,000	BTU/sq. ft.

Fire Protection (Available)

Suppression: CO_2/Zone wide

Detection: (2) ionization detection systems/zone wide (one actuates Halon system)

Portable Extinguishers: (2) Dry chemical (1 in corridor)
(1) CO_2

Hose Stations: (1) water - corridor
(1) CO_2

Fire Resistance Rating

Required: 0.50 hour

Actual: Walls - 3-hour rated/north, east, west, south

Floor/Ceiling - 3-hour rated

Fixed Openings - metal hatch/Zone 13

Sealed Penetrations - 3-hour rated

Unsealed Penetrations - None

Doors - (2) A/12 AB
(2) A/Zone 10 (AB)
A/Turbine Building

Safe Shutdown Equipment

Division I and II battery charges and associated cables.

Division I and II cables.

Zone 11 A.B.

Statement of Problem

Division I and Division II battery chargers and associated equipment in this zone are separated by a 4 inch solid concrete brick wall with a 3 hour firedoor. The wall has a minimum rating of 1 1/2 hours. The carbon dioxide system protects the area where the Division I equipment is located but suppression is not provided in the Division II cubicle. The analysis below demonstrates that even though this is a deviation from the specific criteria of Appendix B, equivalent protection is provided when taking into account all factors.

Analysis

An equivalent level of protection to Appendix R, Section III, G.2 is being provided based on the following:

1) The Division II battery charger cubicle contains a minor amount of fixed combustibles in the form of cables. No trays are located in this cubicle. The loading is less than 1000 BTU/sq. ft.

2) A carbon dioxide system is provided in the Division I battery charger area. The loading in this area is 37,000 BTU/sq. ft.

3) An automatic smoke detection system is provided in both the Division II cubicle and Division I area.

Conclusion

The installation of an automatic suppression system in the Division II cubicle would not significantly enhance the fire protector provided by the current configuration.

FIRE ZONE 9

Control Room Auxiliary Building
Elevation: 643'-6" to 655'-6"

Combustibles

Control Room:	
Electrical insulation	134,000,000 BTU
Paper	95,000,000 BTU
Transients (in computer room)	102,000,000 BTU
Peripheral Rooms:	
Paper, wood, plastic	222,000,000 BTU

Fire Protection (Available)

Suppression: None

Detection: Smoke detection (early warning) above drop ceiling and in Control Room panels

Portable Extinguishers: (2) CO_2
(3) Halon

Hose Stations: (2) Water/Turbine Building

Fire Resistance Rating

Actual: Walls - Reinforced concrete

Floor/Ceiling - Reinforced concrete

Fixed Openings - None

Sealed Penetrations - Penetrations sealed consistant with fire rating of walls, floor and ceiling

Unsealed Penetrations in barriers - Ventilation ducting

Doors - 2 bulletproof doors to Turbine Building (A)

- 1 bulletproof door to northeast stair tower

Fire Zone 9 Auxiliary Building

Appendix R Drawing No. 6E721-2803-8

SYSTEMS REQUIRED FOR HOT OR COLD SHUTDOWN IN FIRE ZONE

		Div I	Div II
B21	Main Steam Isolation Valves; Safety Relief Valves (1) for Depressurizing Reactor Pressure Vessel; Reactor Vessel Pressure Instrumentation	X	X
B31	Recirculation (Inboard Isolation Valves Only)	X	X
C11	Control Rod Drive (Manual Scram Circuits Only)	X	X
E11	RHR; Service Water System, Cooling Towers, Containment Cooling Mode and Shutdown Cooling Mode	X	X
E41	High Pressure Coolant Injection		X
E51	Reactor Core Isolation Cooling	X	
P44	Emergency Equipment Cooling Water	X	X
P45	Emergency Equipment Service Water	X	X
P50	Control Air (Control Center HVAC dampers)	X	X
R14	ESF a-c Distribution System for Shutdown Equip	X	X
R16	ESF a-c Distribution System for Shutdown Equip	X	X
R30	ESF a-c Distribution System for Shutdown Equip	X	X
R32	ESF d-c System	X	X
T41	Control Center HVAC System and ESF Fan Coil, Units for Areas Servicing Shutdown Systems	X	X
T50	Suppression-Pool Temperature Monitoring Equipment	X	X
X41	EDG and EDG Switchgear Room HVAC System		
E21	Core Spray System	X	X

* Required in this case means some subset of the system listed is required for hot or cold shutdown, not all of the system.

Fire Zone 9 Auxiliary Building

Appendix R Circuit/Component Protection:

Statement of Problem

An alternate shutdown system independent of the control complex is being designed and is scheduled to be in operation after the first refueling outage. An area wide suppression and detection system is not provided for the control room as required by Appendix R Section III.G.3. The analysis below demonstrates that even though this is a deviation from the specific criteria of Appendix R, equivalent protection is provided when taking into account all factors.

Analysis

The following provides justification demonstrating an equivalent level of protection to that of Appendix R Section III.G.3.

1. The control room is bounded by walls, floor and ceiling constructed of reinforced concrete having a fire resistance rating of three hours.

2. Supply and return control room HVAC ducts are provided with fire dampers where they penetrate three hour boundaries. Supply and return HVAC ducts for the cable spreading room and relay room pass through the control room and are not provided with fire dampers.

3. The northeast stair tower is constructed to a two hour fire rating and is provided with a Class B fire door. Two Class A fire doors communicate with the Turbine Building.

4. The control room is constantly manned, ensuring that potential fires are quickly detected and suppressed.

5. Portable fire extinguishers are located throughout the control room and adjacent fire zones. Water hose reels are also located in adjacent fire zones with the capability to reach the control room.

6. An area wide smoke detection system is provided above the control room drop ceiling.

7. Each control room operating panel is provided with smoke detection.

8. Control room operating panels each consist of a low combustible load and contain only low energy cables such as for control, indication and low power circuitry for control room instrumentation.

9. The surface burning characteristics of the glazed block walls, duct insulation and ceiling panels are rated 25 or less in accordance with ASTM-E-84 test method.

10. Smoke and fuel contribution of the walls, duct insulation and ceiling panels are rated as 50 or less in accordance with ASTM-E-84 test method.

11. Control cabinets are mounted on a 4 inch high concrete pad.

12. Ventilation louvers at the bottom of the control cabinets have been closed over by fixing a 1 inch thick marinite board over them.

13. An automatic Halon suppression system is provided for the computer room and underneath the raised floor.

14. Small fitup gaps around the marinite barriers will be blocked on safe shutdown panels 601, 602, 808, 809, 810 and 817. Adjacent panel bulkheads will have openings or gaps between them sealed with a fire retardant sealant or barrier.

15. An alternate shutdown system and temporary fire protection measures proposed until the alternate shutdown system is operational is addressed in Detroit Edison's letter EF2-72,718 to the NRC.

Conclusion

The installation of an area wide automatic suppression and detection system in the control room would not significantly enhance the fire protection provided by the current configuration.

Attachment II

Deviation for the 3M one hour protective envelope to show equivalence to a one hour fire rated barrier.

Deviation - The 3M Brand Fire Barrier materials and design configuration applied for protection of cables at Fermi 2 do not meet the acceptance for transmission of heat outlined in NFPA Standard 251, Standard Methods of Fire Tests of Building Construction and Materials. Specifically, paragraph 7-2.C limits the temperature increase on the unexposed surface to no more than 250°F (121°C) above ambient.

Design Objective - The design objective at Fermi 2 for cable protection is to ensure that one train of cables required for safe hot shutdown remain functional during and after a fire exposure so as not to preclude safe shutdown. An acceptable method to the USNRC for accomplishing this objective is outlined in 10CFR50 Appendix R paragraph III.G.2.c,

> "Enclosure of cables and equipment...in a fire barrier having a 1-hour rating. In addition, fire detectors and automatic fire suppression shall be installed in the fire area."

Fermi 2 meets this design objective with the 3M Brand Fire Barriers as installed for cable trays containing EPR/Hypalon cables.

Justification - The justification of this deviation request is outlined below in four major parts.

1. Independent Testing and Approval of Design - The design configurations were tested at Underwriters Laboratories using PE/PVC cables of various sizes in trays. The configurations were exposed to the standard time-temperature curve of NFPA 251 (ASTM E-119). After one hour of exposure to this standard fire, the barriers were exposed to a hose stream test to evaluate the effect of thermal shock representative of manual fire suppression activities. The acceptance criteria was that the circuit integrity was maintained during and after the fire exposure and after the hose stream test. The system passed UL's acceptance criteria with the PE/PVC cables.

   Cables temperatures monitored during these UL tests yielded the following range of values:

Cable Size	Temperature Range		
	Low	High	Ave
300 MCM	203°F	397°F	373°F
7/C - #12	247°F	436°F	402°F
2/C - #16	286°F	521°F	440°F

2. Quality of Fermi 2 EPR/Hypalon Cables - The EPR/Hypalon cables installed at Fermi 2 are significantly better from both a damageability and ignitability standpoint than the PE/PVC used in the UL tests. Tests (EPRI-NP 1767 dt'd 3/81) conducted by FMRC sponsored by EPRI showed that no EPR/Hypalon cables experienced any offgassing prior to 567°F (297°C) and did not allow piloted ignition below 900°F (482°C). These tests establish the effectiveness of the hypalon jacket on retarding ignition and damage to the EPR insulated conductors.

   Tests run specifically for Detroit Edison, by 3M on Fermi II EPR/Hypalon cables measured cable insulation failure by exposed weighted cables to a heated oven. Cables were weighted to 10 times the load expected on rungs of ladder type trays. The oven was preheated to 90°C to represent the peak load working temperature of the cables. The temperature was increased to 475°F in 45 minutes. After holding this temperature for 30 minutes the oven was then heated up at a rate of 5°F/minute to failure. Failure occurred in a range from 610°F to 875°F.

   Tests reported on at the Winter meeting of the IEEE January 1971, (IP33-PWR, IEEE Transactions, July-August 1971, Vol PAS 90 No. 40) verified the quality of EPR cable insulation to withstand high temperatures from cable overload without failure and without permanent changes in electrical properties. Test exposures to cables of 446°F (230°C) to 572°F (300°C) for periods of 4 hours were conducted. The EPR insulation continued to function as an insulator, and upon cooling back to ambient temperatures, experience no permanent change in electrical properties.

   These three sets of tests verify the quality of both the Hypalon jacket to retard the onset of damage and ignition and the EPR insulation to maintain its electrical properties during and after thermal exposure. Comparing the cable temperatures recorded in the UL test configuration using PE/PVC, to the performance of EPR/Hypalon described above, it can be concluded that the EPR/Hypalon cables protected by the 3M Fire Barrier system would remain free of fire damage for at least one hour.

3. Actual Fire Exposure from In-site Combustibles - The areas where the 3M Fire Barrier System is installed are areas of relatively low fire hazard. The actual fire exposure potential to these cables is significantly less severe than the standard fire exposure used in the UL Tests (NFPA 251 or ASTM E-119).

4. Fire Detection and Automatic Fire Suppression Systems - Most areas where the 3M Fire Barrier system is installed contain fire detection and automatic fire suppression systems designed to detect and suppress exposure fires.

Conclusion - Based on the justifications presented above, this deviation request should be granted because the cable protection system installed at Fermi II provides an equivalent level of protection to the specific requirements outlined in 10CFR50 Appendix R paragraph III.G.2.c.

ENGINEERING ANALYSIS

FIRE ZONE BOUNDARIES

Attachment 1 are the fire zones which are not enclosed by 3 hour rated fire barrier boundaries. These barriers were reviewed by the NRC in 1981 and found to provide an adequate level of protection (Supplement 2 to Fermi 2 Safety Evaluation Report).

It is Detroit Edison's position that these zone boundaries are adequate for the Appendix R analysis for the following reasons:

1. Combustible loading in these zones consists of electrical insulation and lubricating oil. The corresponding fire severity on the ASTM time temperature curve for these zones is never greater than 1 hour (see individual zone summary sheets).

2. Early warning smoke detection in each zone provides assurance of early fire awareness and response by the Fire Brigade.

3. Zones with concentrated fire loading are provided with an automatic suppression system (see individual zone summary sheets).

4. All cable tray penetrations are fire stopped at floors, ceilings and walls, therefore eliminating cable trays as a means of propagating fire between zones.

5. Fire zones may communicate by one of the following means: (see individual zone summary sheets)

   a. Unprotected hatches
   b. Open stairwells
   c. Non-rated covered hatches
   d. Piping, conduit and ventilation duct penetrations

   These openings will not affect the ability of Fermi 2 to shutdown. Further information is provided on these floor and wall penetrations on the following pages (parts A & B).

6. The major oil hazard is the Motor Generator Sets and their oil coolers. These are located on the fourth floor of the Reactor Building. Curbing of sufficient height to contain the oil is provided along with Automatic Sprinkler Protection. No shutdown cables are present in the area.

7. Heat and products of combustion from a fire in any zone of the Reactor Building would rise and dissipate to the Reactor Building volume.

Attachment 2 is a listing of where Detroit Edison utilized 12 inch concrete block walls as 3 hour fire barriers.

A. Floor Penetrations

At your request, for more information on unsealed floor penetrations in the Reactor Building fire zones, DECO has performed an analysis to evaluate the consequences of a postulated fire in a given fire zone. In depth consideration was given to the affect on redundant division safe shutdown capability and equipment.

Fermi 2 has several features which preclude a postulated fire from spreading vertically and preventing its safe shutdown. First and foremost is FERMI 2's design separating Divisions I and II cables and equipment from each other.

Fermi 2 Reactor Building was designed with Division I cables and equipment north of column line 12 and with Division II cables and equipment to the south of column line 12 in the Reactor Building.

For the Appendix R analysis ("R"), the same philosophy was utilized. The area north of column line 12 was designated a Division I "R" area and required Division II "R" circuitry are being protected by a one hour protective envelope. Divisional cable or equipment has been protected or a specific analysis and disposition has been completed on the circuits in question. The area south of column line 12 was designated a Division II "R" area and required Division I "R" circuitry are being protected. Divisional cable or equipment has been protected or a specific analysis and disposition has been completed on the circuits in question. The area 10 ft. north and south of column line 12 has been analyzed and Appendix R circuitry have been protected to maintain the necessary 20 ft. separation. Additionally intervening combustibles which might connect the 2 Divisional Areas have been addressed in individual deviations for the zone in question. Therefore Fermi has affectively subdivided the Reactor Building into two sub areas, a north area and a south area.

Only heat and hot gases will traverse to the floors above, because there are no combustible materials in the stairwell or open penetrations to propagate a fire. Additionally the large ceiling heights between floors (approx 30 ft. high) and a large building volume will make fire propagation virtually impossible.

The hot gases could have a localize affect around the openings, nearest the fire but the divisional separation and large building volume will protect both divisions of equipment are not affected. As indicated in the zone summary sheets (attached), these fire zones have low combustible loadings (less than one hour). In areas where there are specific hazards, i.e., 4th floor - M/G sets, First Floor Railroad Bay, and HPCI pump room, automatic sprinkler protection has been provided. Smoke detection has been provided throughout all Reactor Building zones.

The unsealed penetrations, pipe and duct chases, hatches and open stairwells are indicated on drawings 6A721-2246 thru 4A721-2265. These drawings were previously submitted. The color coded drawings indicate the location and limited number of unsealed penetrations in the Reactor Building fire zones

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containing safe shutdown equipment. The unsealed penetrations consist of pipe and conduit penetrations, ventilation duct chases, pipe chases, an open equipment hatch, open stairwells and steel or concrete covered hatchways. The large openings (stairwells and refueling hatch) are located well into either the north or south subzones (The refueling hatch is 25 ft. south of column 12; the stairwells are 50 ft. north or south of column 12). As discussed previously the localized hot gases could affect only one division.

The pipe penetrations and ventilation duct chases present no fire hazard to safe shutdown capablity due to their limited number, small clearance around the pipes, and penetration locations. The covered hatches present no hazard to safe shutdown capability because the cover will prevent passage of hot gases.

It is Edison's position that although unsealed penetrations exist in the Reactor Building that a fire in the Reactor Building will not affect both divisions of safe shutdown cables and equipment. This is based on the design criteria for the plant separation of Divisions I and II equipment, installation of automatic sprinklers, and smoke detection, and provision of 1-hour protective envelope.

B. Wall Penetrations

Detroit Edison Company (DECo) has performed an analysis of all unrated walls. The analysis included the unrated walls between zones 1 and 2, zones 2 and 3, and zone 1 and 4 of the Reactor Building and zones 14 and 15 of the Auxiliary Building.

Reactor Building

All unrated walls, excluding exterior boundary walls, were analyzed for unsealed penetrations in Reactor Building fire zones 1 (1RB), 2 (2RB), and 3 (3RB) and 4 (4RB). These fire zones are adjacent to each other as indicated on FSAR figures 9B-2 and 9B-3. The walls are a minimum thickness of 36 inch reinforced concrete. Combustible loading in all the zones is low as indicated on the summary sheets.

The interior walls of the four corner rooms connect zones 1RB and 2RB. All penetrations in these walls are sealed for one of the following purposes: 3-hour fire rated cable trays, radiation shielding, metal covered penetrations for pressure relief of the Torus Room during a steam break, air tightness, or ventilation flow control (back flow damper).

As discussed in the previous floor penetration analysis, the Reactor Building is divided at column 12 for the Appendix R analysis. Therefore the two north corner rooms (2RB) and the north end of 1RB area are Division I areas, while the south corner rooms (2RB) and the southend of 1RB are Division II "R" areas. Additionally the HPCI/Control Rod Drive Zone (3RB) is also a Division II "R" area and shares a commonwall with the southeast corner room 2RB (Div II) and the southend of 4RB (Div II). The last unrated wall is between zone 1RB and 4RB. Zone 4RB (north/south corridor) also utilizes the north-south concept at column 12. Therefore the walls in

question are not separating different divisional areas and need not be a rated barrier. In fact the walls are not utilized in the Appendix R analysis as fire barriers. They will however, effectively prevent fire propagation.

Auxiliary Building

The other unrated wall is located on the fifth floor of the Auxiliary Building and separates fire Zones 14 and 15 (14AB and 15AB respectively). Both fire zones are provided with early warning smoke detectors.

The wall was examined and determined to have no open penetrations as indicated on schedules 6A721-2369 Rev. H and 6A721-2370 Rev. G and confirmed by walkdown inspections. However, the wall does have five penetrations with air tight seals (A.T) which are not 3-hour rated. They are located approximately five feet from the ceiling in the southeast corner of Zone 14 (northeast corner of Zone 15). As the combustible loading is both of these Zones are minimal (less than a 10 minute fire), these air seals will prevent the propagation of fire.

Based on the wall analysis, a postulated fire will not affect both Appendix R shutdown divisions because of any unrated walls.

ATTACHMENT 1

ZONE SUMMARY SHEETS

NOTES: 1) For doors in the Summary Sheets. The type of door is given first and the adjacent zone is given second. "A" means the door has a three hour fire resistance. "B" means the door has a 1 1/2 hour resistance.

FIRE ZONE 1

Torus Room Reactor Building
Elevation: 540'-0" to 583'-6"

Combustibles

Electrical insulation	270,000,000 BTU

Design Basis Fire

Fire Loading	19,000	BTU/sq. ft.

Fire Protection (Available)

Suppression: Automatic Sprinkler/area wide

Detection: Ionization detection (early warning)

Portable Extinguishers: (4) Dry chemical/Zone 2
(4) CO_2/Zone 2

Hose Stations: (4) Water/Zone 2

Fire Resistance Rating

Required: .25 hour

Actual: Walls - minimum 36" thick reinforced concrete-
- exterior/North, South and West

Floor/Ceiling - 24" thick reinforced concrete over Steel Beams ceiling
- concrete base mat floor

Fixed Openings - clear openings/Zone 5 (RB)

Sealed Penetrations - 3-hour rated/steam tunnel all penetrations
- Fire stop/cable tray penetrations through unrated barriers

Unsealed Penetrations in unrated barriers - piping
- conduit
- ventilation
- ducting

Doors - (4) water tight/Zone 2 (RB)

FIRE AREA/ZONE 7

Northwest Corner Room Reactor Building
Elevations: 540'-0" and 562'-0"

Combustibles

Electrical Insulation	70,200,000	BTU
Lubricating Oil	20,800,000	BTU
	91,000,000[1]	BTU

Design Basis Fire

Fire Loading	23,000	BTU/sq. ft.

Fire Protection (Available)

Suppression: None

Detection: Ionization/zone wide (early warning)

Portable Extinguishers: (1) Dry chemical
(1) CO_2

Hose Stations: (2) water

Fire Resistance Rating

Required: 0.30 hour

Actual: Walls - 36" reinforced concrete

Floor/Ceiling - 2" reinforced concrete (562' floor)
- Concrete base mat floor

Fixed Openings - stairwell/Zone 5 (RB)
metal hatch/Zone 5 (RB)

Sealed Penetrations - Fire stops/cable tray penetrations through unrated barriers

Unsealed Penetrations in unrated barriers - ventilation ducts
- pressure relief penetrations
- piping
- conduit

Doors - water tight/Zone 1 (RB)

1. This loading represents the total for all four corner rooms.

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FIRE ZONE 2

Northeast Corner Room Reactor Building
Elevations: 540'-0" and 562'-0"

Combustibles

Electrical Insulation	70,200,000	BTU
Lubricating Oil	20,800,000	BTU
	91,000,000	BTU

Design Basis Fire

Fire Loading 23,000 BTU/sq. ft.

Fire Protection (Available)

Suppression: Automatic Sprinkler/elevation 540'-0"

Detection: Ionization/zone wide (early warning)

Portable Extinguishers: (1) Dry chemical
(1) CO_2

Hose Stations: (2) water

Fire Resistance Rating

Required: 0.30 hour

Actual: Walls - Minimum 36" reinforced concrete

Floor/Ceilling - 24" reinforced concrete (562'floor)
- concrete base mat floor

Fixed Openings - stairwell/Zone 5 (RB)
- metal hatch/Zone 5 (RB)

Sealed Penetrations - Fire stops/cable tray penetrations through unrated barriers

Unsealed Penetrations in unrated barriers [2]
- ventilation ducting
- pressure relief penetrations
- conduits
- piping

1. This represents the total loading for all four corner rooms.

2. Penetrations in the corner rooms are sealed for ventilation and radiation purposes. The seals are not fire-rated.

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Fire Zone 2 Reactor Building

Doors	-	water tight/Zone 1
	-	unrated (mtl)/Zone 4 (RB)
	-	A/Zone 1 (AB)

FIRE AREA/ZONE 2

Southwest Corner Room Reactor Building
Elevations: 540'-0" and 562'-0"

Combustibles

Electrical Insulation	70,200,000	BTU
Lubricating Oil	20,800,000	BTU
	91,000,000[1]	BTU

Design Basis Fire

Fire Loading	23,000	BTU/sq. ft.

Fire Protection (Available)

Suppression: None

Detection: Ionization/zone wide (early warning)

Portable Extinguishers: (1) Dry chemical
(1) CO_2

Hose Stations: (2) water

Fire Resistance Rating

Required: 0.30 hour

Actual: Walls - minimum 36" reinforced concrete

Floor/Ceiling - reinforced concrete (562' floor)
- concrete base mat floor

Fixed Openings - stairwell/Zone 5 (RB)
- metal hatch/Zone 5 (RB)

Sealed Penetrations[2] - Fire stops/cable tray penetrations through unrated barriers

Unsealed Penetrations in unrated barriers
- ventilation ducting
- pressure relief penetrations
- conduits
- piping

1. This loading represents the total for all four corner rooms.

2. Penetrations in the corner rooms are sealed for ventilation and radiation purposes. The seals are not fire rated.

Doors - water tight/Zone 1 (RB)

FIRE ZONE 2

Southeast Corner Room Reactor Building
Elevations: 540'-0" and 562'-0"

Combustibles

Electrical Insulation	70,200,000	BTU
Lubricating Oil	20,800,000	BTU
	91,000,000[1]	BTU

Design Basis Fire

Fire Loading 23,000 BTU/sq. ft.

Fire Protection (Available)

Suppression: None

Detection: Ionization/zone wide (early warning)

Portable Extinguishers: (1) Dry chemical
(1) CO_2

Hose Stations: (2) water

Fire Resistance Rating

Required: 0.25 hour

Actual: Walls - minimum 36" reinforced concrete

Floor/Ceiling - reinforced concrete (562' floor)
- concrete base mat floor

Fixed Openings - stairwell/Zone 5 (RB)
- metal hatch/Zone 5 (RB)

Sealed Penetrations - Fire stops/cable tray penetrations through unrated barriers

Unsealed Penetrations[2] in unrated barriers - ventilation ducting
- pressure relief penetrations
- conduits
- piping

Doors - water tight/1RB
- water tight/3RB 540'
non rated (MTL)/3RB 562'

1. This loading represents the total for all four corner rooms.

2. Penetrations in the corner rooms are sealed for ventilation and radiation purposes. The seals are not fire-rated.

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FIRE AREA/ZONE 3

HPCI Pump and Turbine and Control Rod Drive Pump Rooms Reactor Building
Elevation: 540'-0 and 562'-0

Combustibles

	16,300,000	BTU
Electrical insulation	29,600,000	BTU
Lubricating Oil	45,900,000	BTU

Design Basis Fire

Fire Loading 19,000 BTU/sq. ft.

Fire Protection (Available)

Suppression: Automatic Sprinkler/HPCI Turbine and pump room

Detection: Ionization/zone wide (early warning)

Portable Extinguishers: (2) Dry chemical
(2) CO_2

Hose Stations: (1) Water

Fire Resistance Rating

Required: 0.25 hour

Actual: Walls - 3 hour rated/south, east, north
36" reinforced concrete/west

Floor/Ceiling - concrete base mat floor
- reinforced concrete

Fixed Openings - unprotected hatch way

Sealed Penetrations
- 3-hour rated/south, east, and north walls
- 3-hour rated/portion of 562' ceiling
- fire stops/cable tray penetrations through unrated barriers

Unsealed Penetrations in unrated barriers
- piping
- conduit
- ventilation ducting

Doors
- water tight/Zone 2 (RB 540')
- unrated (mtl) Zone 4 (RB)
- A/Zone 1 (AB)
- unrated (mtl)/Zone 2 (RB 562')

FIRE ZONE 4

Corridor Area Reactor Building
Elevations: 562'-0" and 564'-0"

Combustibles

Electrical Insulation	120,000,000	BTU

Design Basis Fire

Fire Loading	60,000	BTU/sq. ft.

Fire Protection (Available)

Suppression: Automatic Sprinkler System/562'-0" corridor

Detection: Photoelectric/564'-0" corridor (early warning)
Ionization/562'0" corridor (early warning)

Portable Extinguishers: (2) CO_2/Zone 2RB
(2) Dry Chemical/Zone 2RB

Hose Stations: (2) water/Zone 2RB
(1) water/Zone 3RB

Fire Resistance Rating

Required: 0.75 hour

Actual: Walls
- 3-hour rated/Auxiliary Bldg. (Zone 1) and Turbine Bldg.
- 36" reinforced concrete/Zones 1 and 2 Reactor Bldg.

Floor/Ceiling
- 3-hour rated

Fixed Openings
- metal pressure relieving hatch/Turbine Bldg.

Sealed Penetrations
- 3-hour rated/through rated walls
- Fire stops/cable trays penetrations through unrated barriers

Unsealed Penetrations in unrated barriers
- piping
- ventilation ducting
- conduits
- pressure relief penetrations

Doors
- A/Turbine Bldg.
- non rated (MTL)/Zone 2 NE Corner Room
- non rated (MTL)/CRD Pump Room

Change from 1981 Zone Boundaries

Previously EF2 FSAR identified the ceiling of Zone 4 as a 3-hour rated fire barrier. However, at the north end of the north-south corridor there is a metal pressure relieving hatch in the ceiling. The hatch is designed for pipe break outside containment steam venting. Because of the light fireloading on each side of the hatch, the automatic sprinkler system in this zone, and the availability of manual suppression equipment, the metal hatch provides the necessary fire resistance for the zone.

FIRE ZONE 5

First Floor Reactor Building
Elevation: 583'-6"

Combustibles

Electrical Insulation	472,000,000 BTU
Transient Combustibles (anticipated)	96,800,000 BTU
	568,800,000 BTU

Design Basis Fire

Fire Loading 30,000 BTU/sq. ft.

Fire Protection (Available)

Suppression: Automatic Sprinkler/column lines (A-B, 9-13)

Detection: Ionization/zone wide (early warning)
Heat/column lines (A-B. 9-13) (early warning)

Portable Extinguishers: (3) Dry chemical
(3) CO_2

Hose Stations: (4) Water

Fire Resistance Rating

Required: .5 hour

Actual: Walls - 3-hour rated/east
- exterior/north, west and south

Floor/Ceiling - 24 inches reinforced concrete floor
12 inches reinforced concrete floor

Fixed Openings - (5) open stairwells/Zones 2 (RBV) and 6 (RB)
(2) clear opening/Zone 6 (RB)
(2) concrete hatches/Zone 1 (RB)
(4) metal hatch/Zone 2 (RB)
(3) pipe chases/Zone 6 (RB)

Sealed Penetrations - 3-hour rated/through rated walls
- Fire stop/cable tray penetrations through unrated barriers

Unsealed Penetrations in unrated barriers - piping
- ventilation ducting
- conduits
- ducting

Doors - blast resistant/steam tunnel

Fire Zone 5 Reactor Building

Deviation from FSAR change in 1981 zone boundary definition

Previously EF2 identified the door between the Reactor Building and Steam Tunnel as a Class A door. However, the door opening between this zone and the steam tunnel is protected by a heavy pressure-resistant door. The pressure-resistant door in combination with the labyrinth access passage and light fire loading will prevent the spread of a fire from the steam tunnel area to this zone.

FIRE ZONE 6

Second Floor Reactor Building
Elevation: 613'-6"

Combustibles

Electrical Insulation	218,000,000	BTU
Lubricating Oil	760,000	BTU
	219,000,000	BTU

Design Basis Fire

Fire Loading 14,000 BTU/sq. ft.

Fire Protection (Available)

Suppression: Automatic sprinklers/over cable trays on east wall between column lines 10-12

Detection: Ionization/zone wide (early warning)

Portable Extinguishers: (3) Dry chemical
(3) CO_2

Hose Stations: (5) water

Fire Resistance Rating

Required: 0.25 hours

Actual: Walls - 3-hour rated/Auxiliary Building and Steam Tunnel
- exterior/north, south, west

Floor/Ceiling - 12" thick reinforced concrete

Fixed Openings
- (1) stairwells/Zones 5 (RB) and 7 (RB)
- (1) stairwell/Zone 5 (RB)
- (1) stairwell/Zone 7 (RB)
- (3) pipe chases/Zone 5 (RB) and 7 (RB)
- (2) clear openings/Zones 5 (RB) and 7 (RB)

Sealed Penetrations
- 3-hour rated/Auxiliary Building and Steam Tunnel
- Fire stops/cable tray penetrations through unrated barriers

Unsealed Penetrations in unrated barriers
- piping
- ventilation ducting
- conduits

Doors - A/Zone 6 (AB)

FIRE ZONE 7

Third Floor Reactor Building
Elevation: 641'-6"

Combustibles

Electrical Insulation	296,000,000	BTU
Lubricating Oil	304,000	BTU
Transient Combustibles (anticipated)	95,800,000	BTU
	392,104,000	BTU

Design Basis Fire

Fire Loading 29,000 BTU/sq. ft.

Fire Protection (Available)

Suppression: None

Detection: Ionization/zone wide (early warning)

Portable Extinguishers: (5) Dry chemical
(3) CO_2

Hose Stations: (4) water

Fire Resistance Rating

Required: 0.45 hour

Actual: Walls - exterior/north, west, south
- 3-hour rated/east

Floor/Ceiling - 12 inches reinforced concrete floor
- 12 inches reinforced concrete ceiling

Fixed Openings - (4) stairwells/Zones 6 (RB) and 8 (RB)
(2) clear openings/Zones 6 (RB) and 8 (RB)
(2) pipe chases/Zones 6 (RB) and 8 (RB)

Sealed Penetrations - 3-hour rated/through rated barriers
- Fire stops/cable trays penetration through unrated barriers
- 3-hour rated/Zone 8 Auxiliary Building

Unsealed Penetrations in unrated barriers - piping
- conduit
- ventilation ducting

Doors - None

FIRE ZONE 8

Fourth Floor Reactor Building
Elevation: 659'-6"

Combustibles

Lubricating Oil	167,000,000	BTU
Electrical Insulation	142,000,000	BTU
	309,000,000	BTU

Design Basis Fire

Fire Loading 37,000 BTU/sq. ft.

Fire Protection (Available)

Suppression: Automatic sprinkler (MG sets and oil coolers)

Detection: Ionization (early warning)
heat (actuation)

Portable Extinguishers: (3) Dry chemical
(4) CO_2

Hose Stations: (4) water

Fire Resistance Rating

Required: 0.50 hour

Actual: Walls - 3-hour rated/east
- exterior/north, south, and west

Floor/Ceiling - 12" reinforced concrete floor
- 12" reinforced concrete ceiling

Fixed Openings - (3) stairwells/Zones 7 (RB) and 9 (RB)
(2) stairwell/Zone 7 (RB)
(2) clear openings/Zones 7 (RB) and 9 (RB)

Sealed Penetrations - 3-hour through rated walls
- Fire stops/cable trays penetration through unrated barriers

Unsealed Penetrations in unrated barriers - piping
- conduit
- ventilation ducting

Doors - None

FIRE AREA/ZONE 9

Fifth Floor Reactor Building
Elevation: 684'-6"

Combustibles

Lubricating Oil	12,000,000	BTU

Design Basis Fire

Fire Loading	600	BTU/sq. ft.

Fire Protection (Available)

Suppression: None

Detection: Ionization/zone wide (early warning)

Portable Extinguishers: (4) CO_2
(2) Dry chemical
(4) water

Hose Stations: (4) water

Fire Resistance Rating

Required: 0.25 hour

Actual: Walls - exterior/north, west, south, east (partial)
3-hour rated/east to 701'-0"

Floor/Ceiling - 12" reinforced concrete floor
- exterior ceiling

Fixed Openings - (6) concrete hatches/Zone 8
(2) metal hatches/Zone 8

Sealed Penetrations - 3-hour rated/through rated walls
- Fire stops/cable tray penetrations through unrated barriers

Unsealed Penetrations in unrated barriers - piping
- conduits
- ventilation ducting

Doors - A/Zone 15 (AB)
- (3) B/Zone 8 (RB)
- A/Zone 13 (AB)

FIRE ZONE 2

Mezzanine and Cable Tray Area Auxiliary Building
Elevations: 583'-6" and 603'-6"

Combustibles

Electrical Insulation — 424,000,000 BTU

Design Basis Fire

Fire Loading — 71,000 BTU/sq. ft.

Fire Protection (Available)

Suppression: Automatic Sprinklers/zone wide

Detection: Ionization/zone wide (early warning)

Portable Extinguishers: (2) Dry chemical

Hose Stations: (1) Water
(2) Water/Turbine Building

Fire Resistance Rating

Required: 1.0 hour

Actual: Walls - 3-hour rated/north, south, east and west exterior/north and south

Floor/Ceiling - 3 hour rated ceiling

Fixed Openings - Concrete hatch/Zone 3 (Reactor Building)

Sealed Penetrations - 3-hour rated

Unsealed Penetrations - none

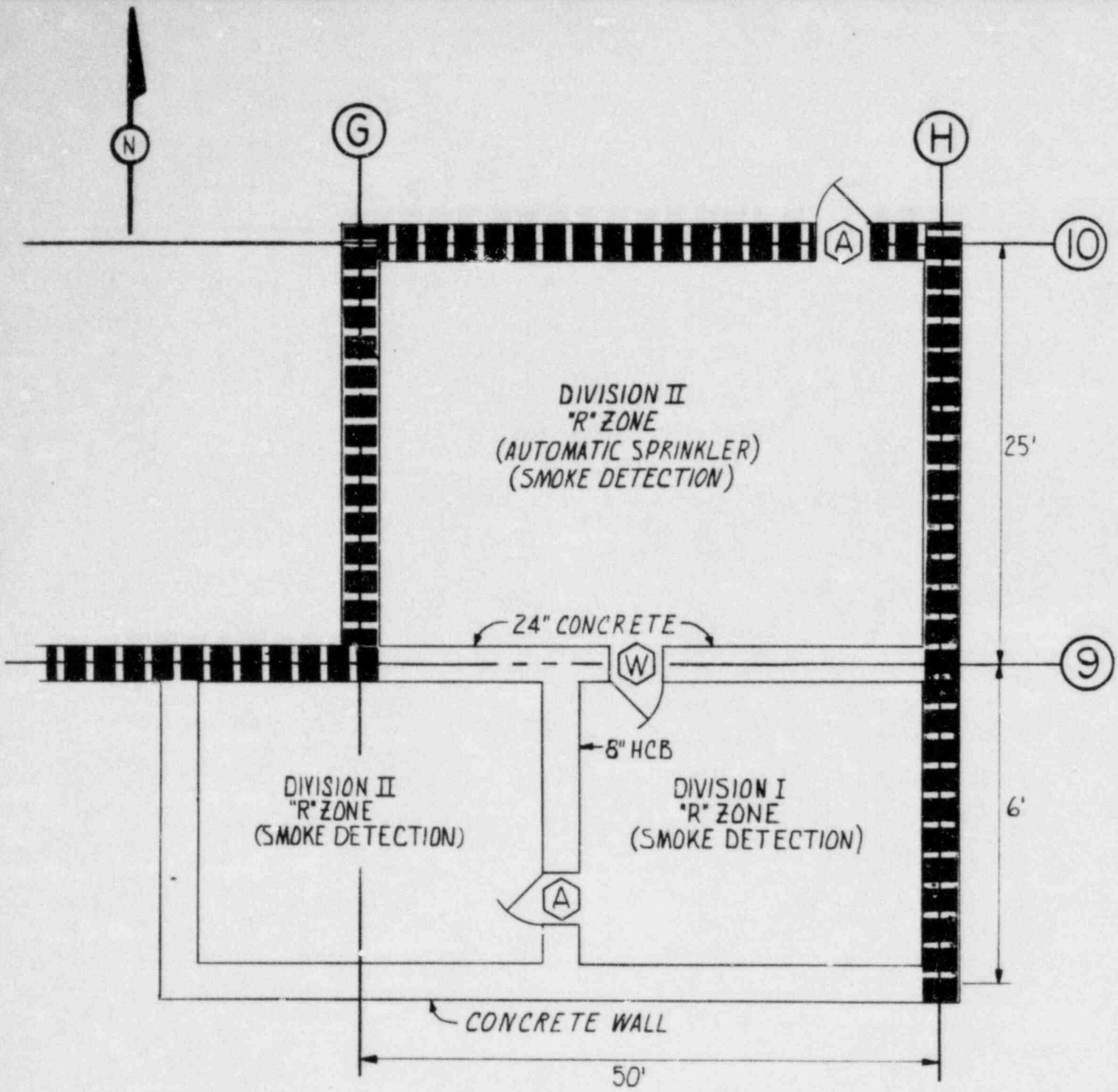
Doors - A/Zone 3 AB
TB

Appendix "R" Drawing No. 6E721-2801-15, 16

FIRE ZONE 2 AUXILIARY BUILDING

At the south end of Zone 2 is a cable vault area where cable enters from outside. This vault is separated from the remainder of Zone 2 (vault's north wall) by a 24 inch concrete wall. Penetrations in the wall are 3 hour fire rated. The door is a 1 inch thick steel water tight door. It is Detroit Edison's opinion the door will prevent a fire from propagating thru the opening. The loading on either side of the door consists of cables and are less than one hour.

Within this entry area, Division I Appendix R ("R") cables are located on the east side while Division II "R" cables are located on the west side. An eight inch hollow concrete block wall with a 3 hour rated fire door separates the two sides. Penetrations in this wall are 3 hour rated seals. Additionally each side contains 2 smoke detectors. Though an eight inch HCB wall does not provide a rated 3 hour fire barrier, the barrier will provide adequate resistance for a postulated fire in the cable vault area. (see sketch 1)



A = 3 HOUR RATED DOOR

W = WATERTIGHT DOOR

= 3 HOUR RATED

SKETCH #1

ZONE 2
S. AUXILIARY BLDG.
EL. 583'

FIRE AREA/ZONE 11

Miscellaneous Rooms Auxiliary Building
Elevation: 643'-6"

Combustibles

Electrical Insulation	76,200,000	BTU

Design Basis Fire

Fire Loading	37,000	BTU/sq. ft.

Fire Protection (Available)

Suppression: CO_2/Zone wide

Detection: (2) ionization detection systems/zone wide (one actuates Halon system)

Portable Extinguishers: (2) Dry chemical (1 in corridor)
(1) CO_2/corridor

Hose Stations: (1) water - corridor
(1) CO_2

Fire Resistance Rating

Required: 0.50 hour

Actual: Walls - 3-hour rated/north, east, west, south

Floor/Ceiling - 3-hour rated

Fixed Openings - metal hatch/Zone 13

Sealed Penetrations - 3-hour rated

Unsealed Penetrations - None

Doors - (2) A/Zone 12A
(2) A/Zone 10 (AB)
A/TB

Safe Shutdown Equipment

Division I and II battery chargers

Division I and II Cables

Change in 1981 Zone Boundary Definitions

EF2 FSAR Section 9B.4.2.12, "Miscellaneous Rooms, Zone 11", Paragraph 3 under "Description" states in part that "...the ceiling also has a metal hatch cover that is protected with a 3-hour rated coating...". Detroit Edison committed to this in Ammendment 52 based on our interpretation of Apendix R. Upon further analysis of Fermi 2's fire protection, we have determined that coating the metal hatch covers with a 3-hour rated coating is unnecessary.

Our conclusion was based on: (1) The low fuel loading, 37,000 BTU/ft.^{2}, in this zone; (2) having two independent early warning smoke detection systems; (3) the room being provided with an automatic/manually actuated CO_2 flooding system; and (4) the metal hatch cover design is 1/4" x 24 x 11" steel, reinforced with 1/4" x 4" steel welded to the underside.

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FIRE ZONE 13

Ventilation Equipment Area Auxiliary Building
Elevation: 659'-6"

Combustibles

Electrical insulation	9,400,000	BTU

Design Basis Fire

Fire Loading	Northeast corner 14,000*	BTU/sq. ft.
	Total Zone Loading 1,190	BTU/sq. ft.

Fire Protection (Available)

Suppression: None

Detection: Ionization/zone wide (early warning)

Portable Extinguishers: (1) Dry chemical-north stairwell

Hose Stations: (2) Water

Fire Resistance Rating

Required: 0.25 hours

Actual:

Walls	-	3-hour rated/east, north, and west
	-	3-hour rated/northwest stairwell
	-	exterior/south
	-	concrete block enclosure, 3-hour dampered pipe chase
Floor/Ceiling	-	50 inches reinforced concrete floor
		12 inches reinforced concrete ceiling
Fixed Openings	-	Metal hatch/Zone 11 AB and 15 AB
Sealed Penetrations in unrated barriers	-	3-hour rated/through rated walls
	-	Fire stops/cable tray penetrations through unrated barriers
Unsealed Penetrations	-	piping
	-	conduit
Doors	-	A/northwest stairwell
		A/Turbine Building

*Calculated for deviation request

100/R264A/1.79
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FIRE AREA/ZONE 14

Control Room Ventilation Equipment and Standby Gas Treatment System Rooms Auxiliary Building
Elevation: 677'-6"

Combustibles

Lubricating oil	725,000	BTU
Charcoal Filter	40,000,000	BTU
Electrical Insulation	19,420,000	BTU
	60,145,000	BTU

Design Basis Fire

Fire Loading: 7,600 BTU/sq. ft.

Fire Protection (Available)

Suppression: CO_2/SGTS charcoal filters

Detection: Ionization/zone wide (early warning)

Portable Extinguishers: (1) CO_2
(1) Dry Chemical

Hose Stations: (1) water

Fire Resistance Rating

Required: 0.25 hour

Actual: Walls - 3-hour rated/east and west
- minimum 24" reinforced concrete/south
- exterior/north

Floor/Ceiling - 3-hour rated/exterior ceiling

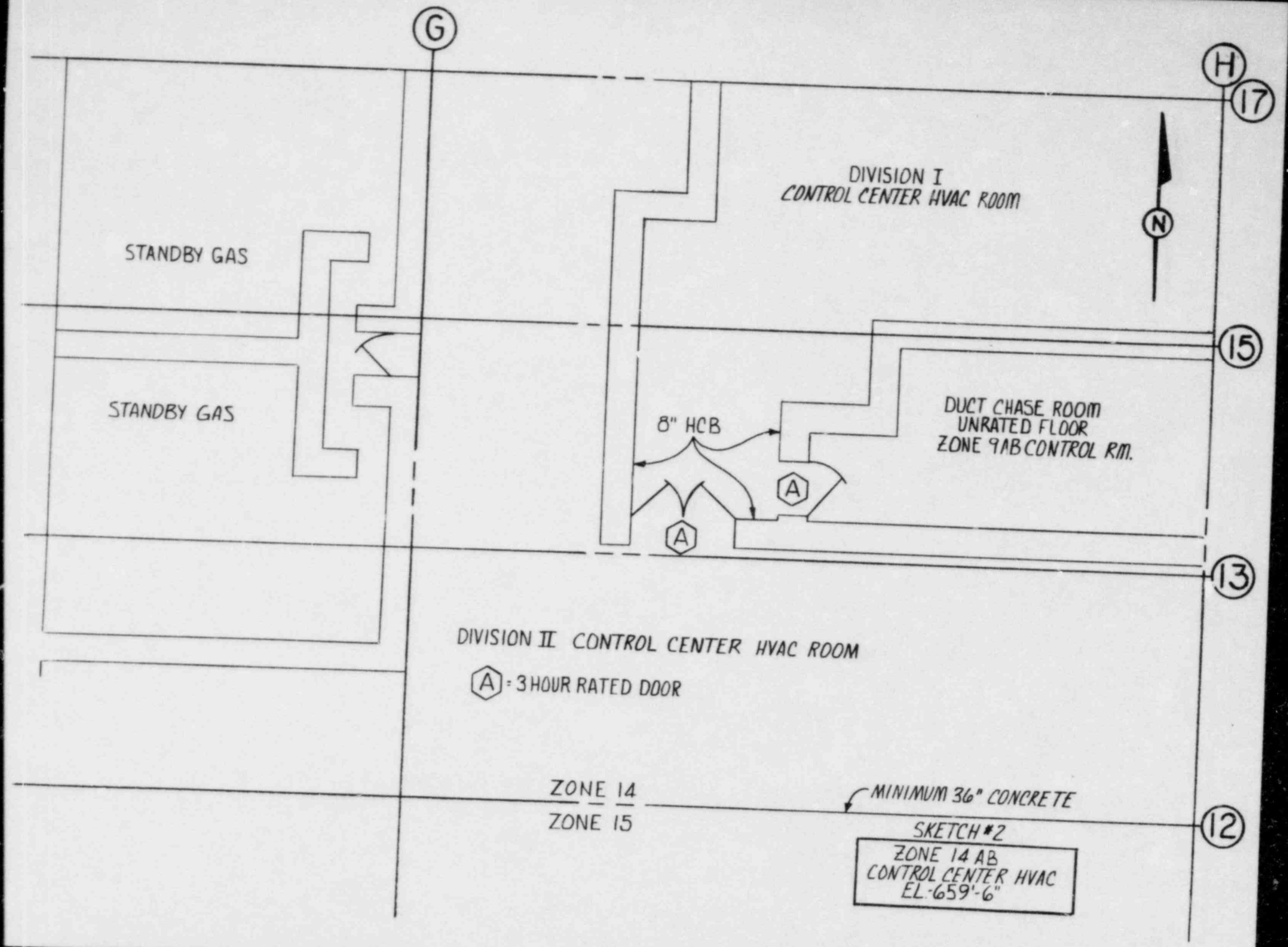
Fixed Openings - none

Sealed Penetrations - 3-hour rated/through rated walls
- Fire stop/cable tray penetrations through unrated barriers

Unsealed Penetrations in unrated barriers - conduit
- piping
- ventilation ducting

Doors - A/Between Division I and II rooms
- non rated (MTL)/Zone 15

Zone 14 consists of 3 rooms, Division I Control Center HVAC, Division II Control Center HVAC and a duct chase room which is a part of zone 9AB control room. These rooms are divided by 8 inch concrete block walls, with 3 hour rated fire doors, fire seals, and fire dampers. Even though the 8 inch HCB wall does not provide a rated 3 hour fire barrier, with the low fire loading in the area (800 BTU/sq. ft.) and smoke detection, the wall will prevent a postulated fire from propagating to another room.


G
H
17
15
13
12
DIVISION I
CONTROL CENTER HVAC ROOM
N
STANDBY GAS
STANDBY GAS
8" HCB
A
A
DUCT CHASE ROOM
UNRATED FLOOR
ZONE 9AB CONTROL RM.
DIVISION II CONTROL CENTER HVAC ROOM
A = 3 HOUR RATED DOOR
ZONE 14
ZONE 15
MINIMUM 36" CONCRETE
SKETCH #2
ZONE 14 AB
CONTROL CENTER HVAC
EL-659'-6"

FIRE ZONE 15

Ventilation Equipment Area Auxiliary Building
Elevation: 677'-6"

Combustibles

Charcoal filter material & electric installation	14,980,000	BTU

Design Basis Fire

Fire Loading	2,200	BTU/sq. ft.

Fire Protection (Available)

Suppression: manually actuated spray system/charcoal filters

Detection: ionization/zone wide (early warning)

Portable Extinguishers: (1) Dry chemical

Hose Stations: (1) water

Fire Resistance Rating

Required: 0.25 hour

Actual: Walls -
- 3-hour rated/east, west
- exterior/south
- minimum 24" reinforced concrete/north

Floor/Ceiling - 12 inches reinforced concrete exterior ceiling

Fixed Openings - metal hatch/zone 13

Sealed Penetrations -
- 3-hour rated/through rated barriers
- Fire stops/cable trays penetrations through unrated barriers

Unsealed Penetrations in unrated barriers -
- piping
- conduit
- ventilation ducting

Doors -
- A/west stairwell
- unrated/Zone 14 (AB)

Attachment 2

Twelve Inch Concrete Block Walls

In the following auxiliary building areas, 12 inch concrete block walls were erected:

1) Zone 4 - Switchgear Room 2nd. Floor (Sketch 1)
2) Zone 6 - 2nd. Floor Miscellaneous Rooms (Sketch 1)
3) Zone 7 - Cables Spreading Room (Sketch 2)
4) Zone 8 - Cable Tray Area (Sketch 3 and 3A)
5) Zone 11 - 3rd. Floor Miscellaneous Room (Sketch 4)
6) Zone 12 - Switchgear Room 3rd. Floor (Sketch 5)
7) Zone 13 - Ventilation Equipment Room 4th. Floor (Sketch 6)
8) Zone 15 - Ventilation Equipment Room 5th. Floor (Sketch 7)

Sketches have been provided depicting where these walls are located. Detroit Edison has taken credit for 12 inch concrete blocks being a three hour rated wall in the Fire Hazard Analysis (Chapter 9B FSAR). Even though a specific design test is not available for this rating it is Edison's position that the 12 inch block will prevent any postulated fire from spreading and is equivalent to a 3 hour wall. The largest fire loading in the previously referenced zones is 86,000 BTU/ft^2 (Zone 4 Switchgear Room). In conclusion, Edison does not propose to change the FSAR to reflect where the 12 inch concrete block walls are located in the plant but will consider them equivalent to 3 hour rated walls.

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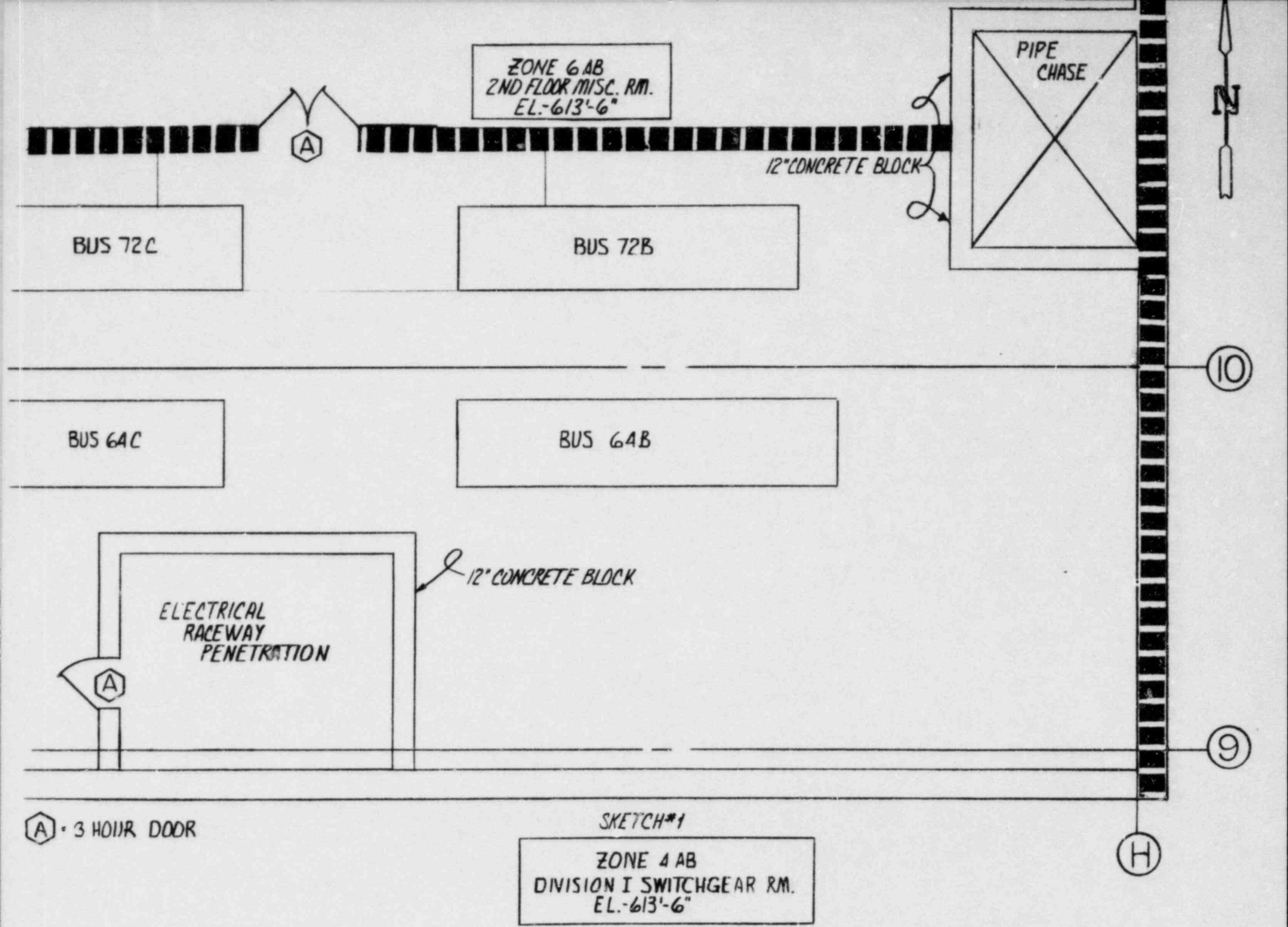
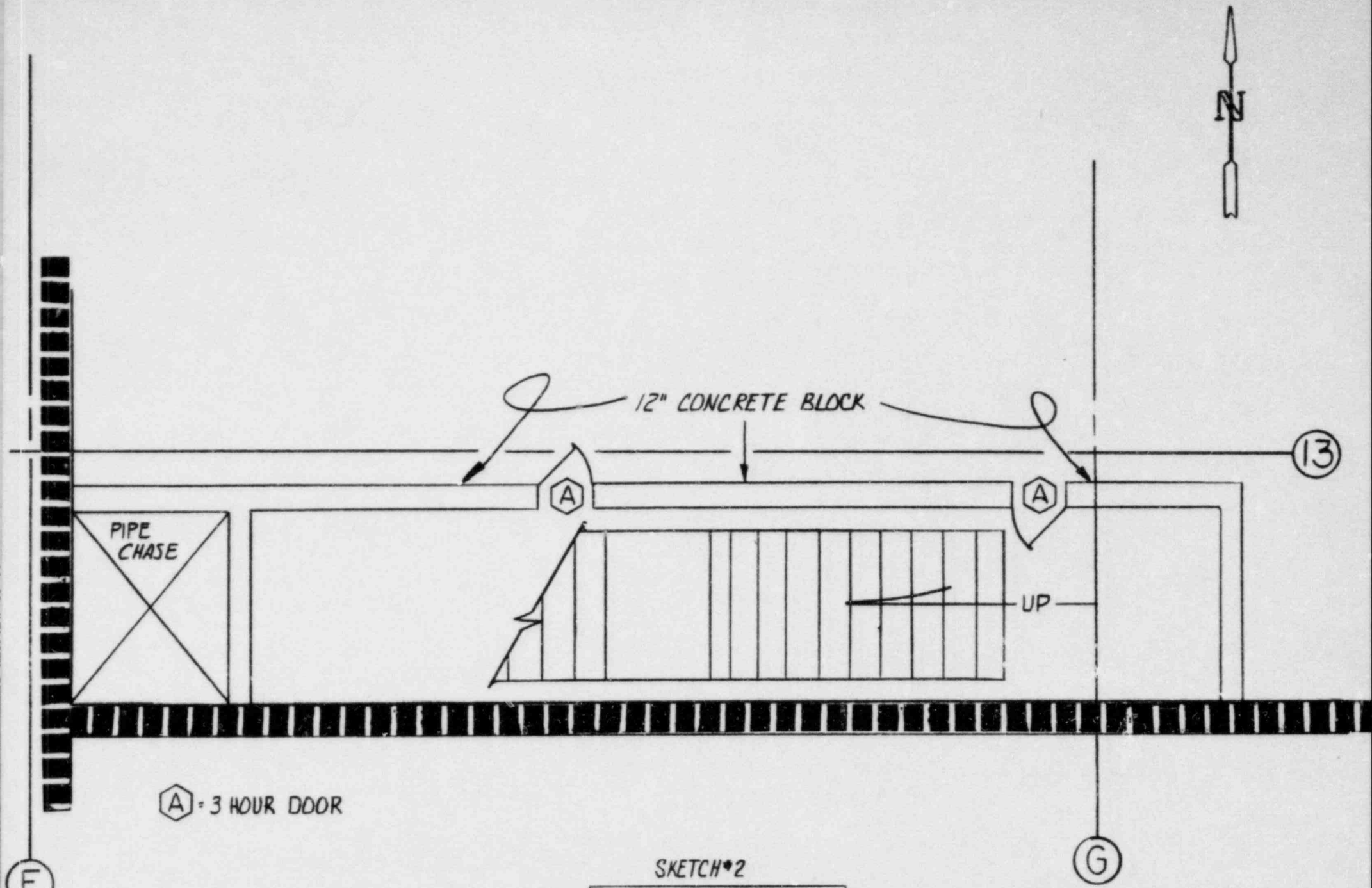
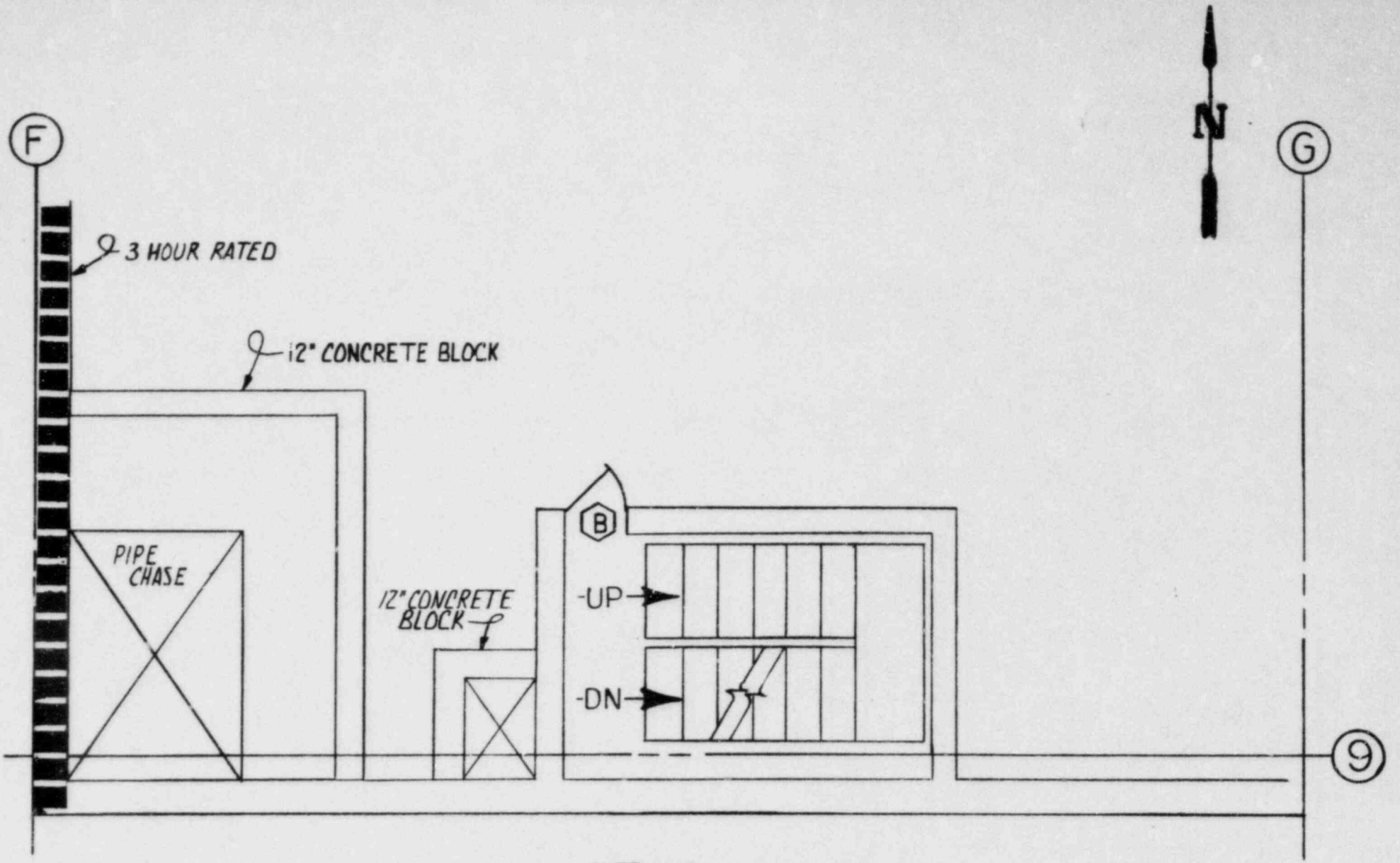

ZONE 6 AB
2ND FLOOR MISC. RM.
EL.-613'-6"
PIPE
CHASE
12" CONCRETE BLOCK
BUS 72C
BUS 72B
10
BUS 64C
BUS 64B
12" CONCRETE BLOCK
ELECTRICAL
RACEWAY
PENETRATION
A
9
A - 3 HOUR DOOR
H
SKETCH #1
ZONE 4 AB
DIVISION I SWITCHGEAR RM.
EL.-613'-6"



SKETCH #2

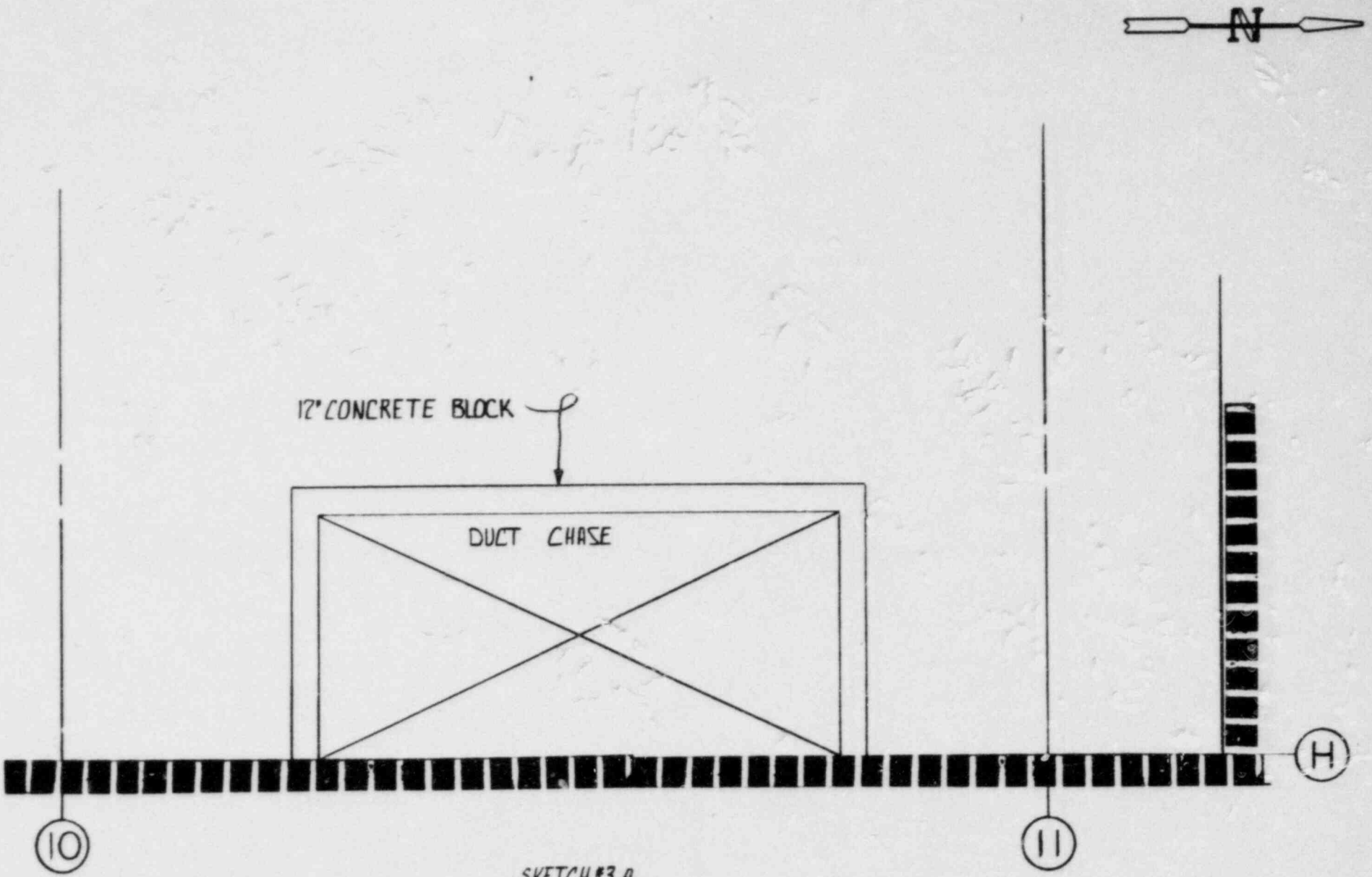
ZONE 7AB
CABLE SPREADING ROOM
EL. -630'-6"



B 1½ HOUR DOOR

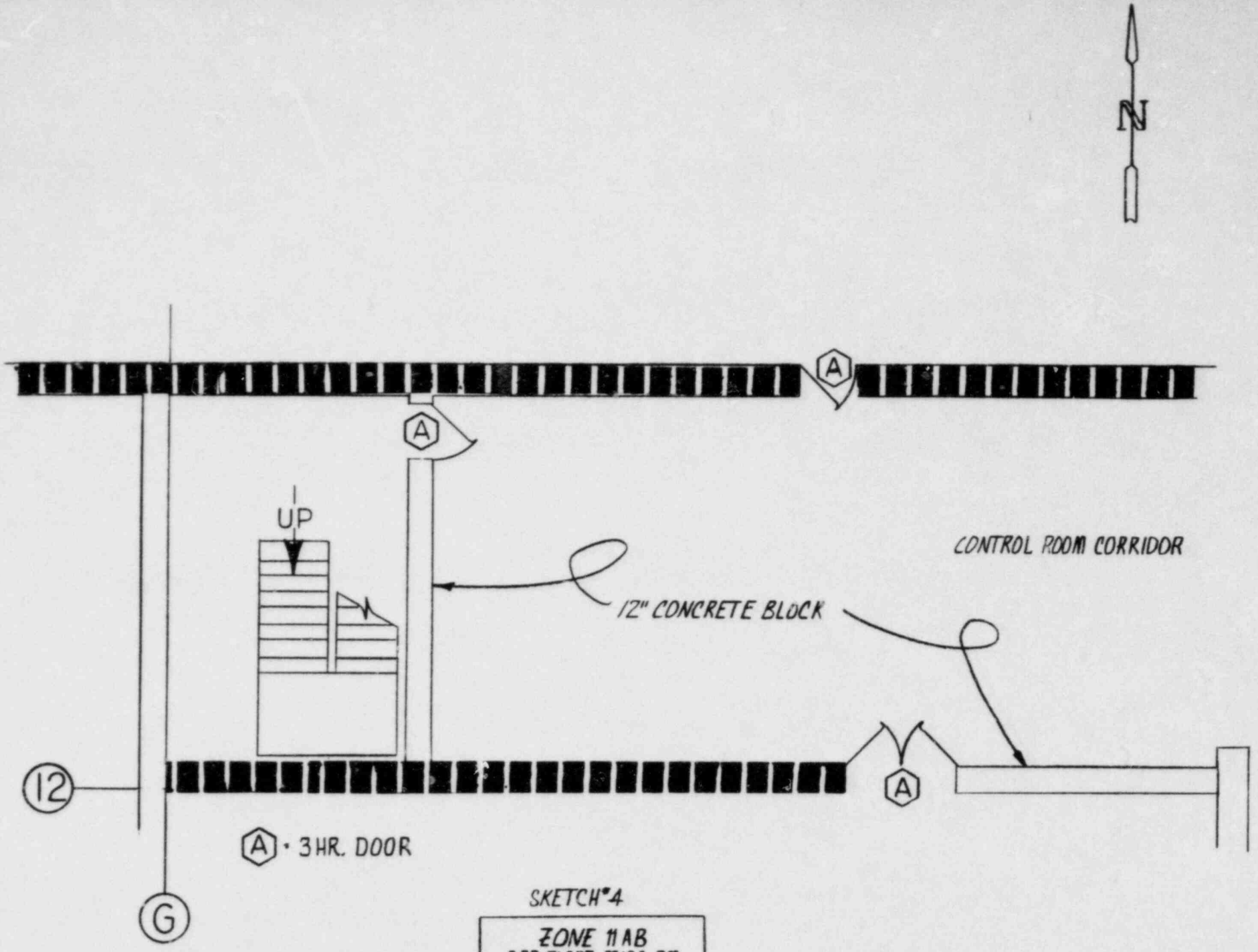
SKETCH #3

ZONE 8AB
AUX CABLE TRAY AREA
EL. 630'-6"



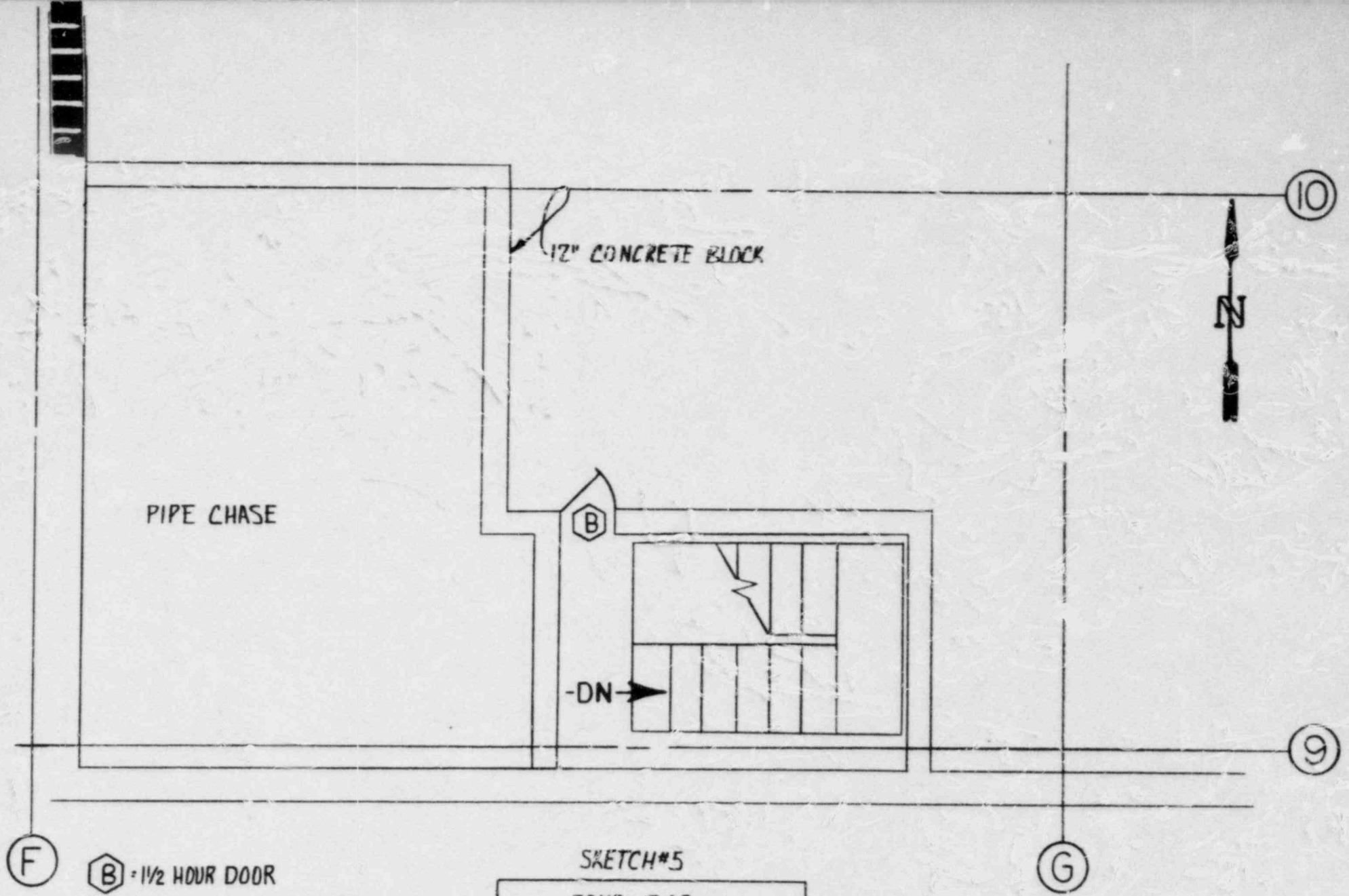
SKETCH #3 A

ZONE BAB
AUX. CABLE TRAY AREA
EL- 630'-6"



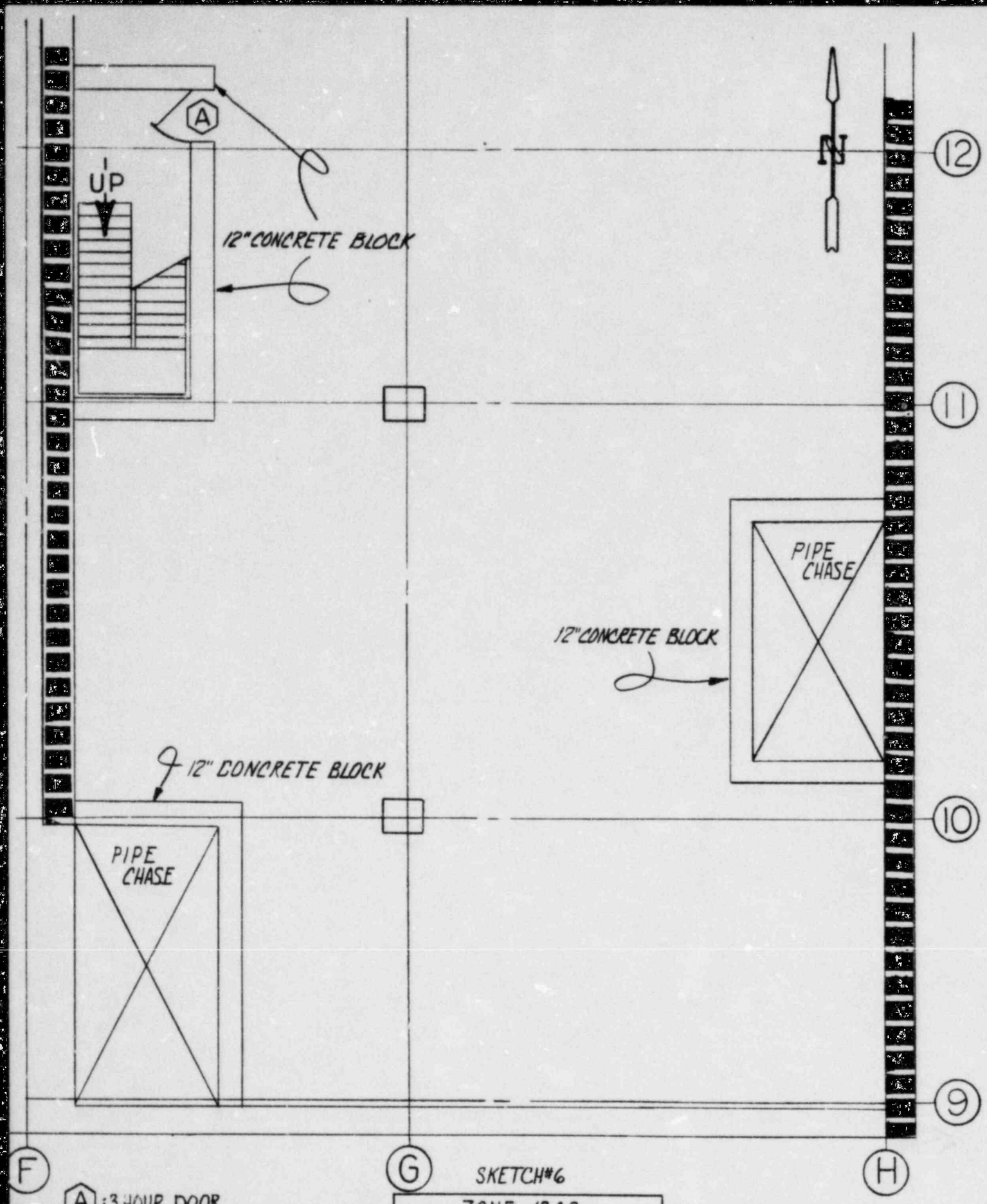
SKETCH #4

ZONE 11 AB
3RD FLOOR MISC. RM.
EL. - 643'-6"



SKETCH #5

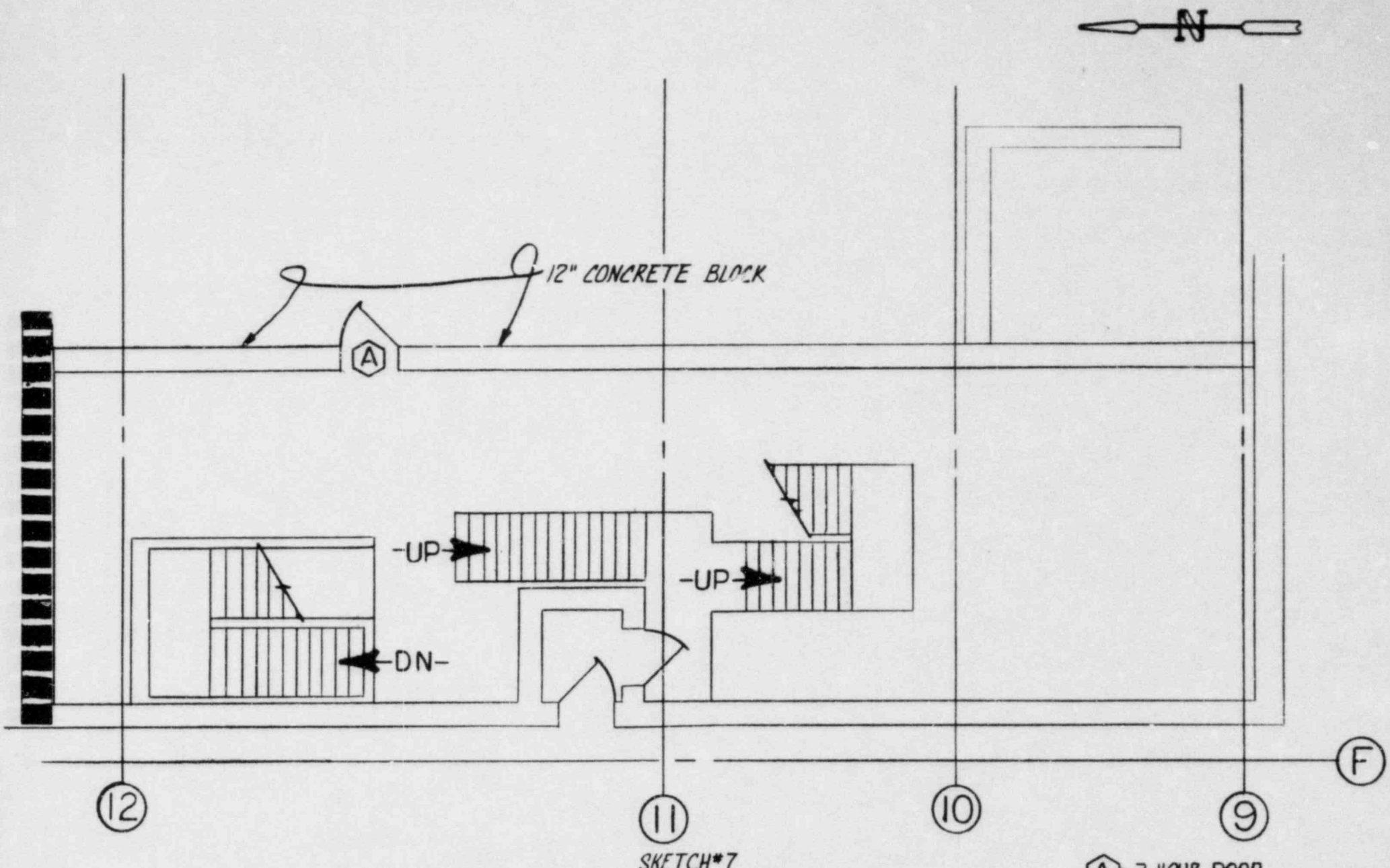
ZONE 12 AB
DIVISION II SWITCHGEAR ROOM
EL. -643'-6"



A : 3 HOUR DOOR

SKETCH #6

ZONE 13AB
VENTILATION EQUIP. AREA
EL. - 659'-6"



SKETCH#7

A = 3 HOUR DOOR

ZONE 15AB
VENTILATION EQUIP. AREA
EL-677'-6"