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John C. Brons
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January 3, 1986
IPN-86-03

Director of Nuclear Reactor Regulation
United States Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Mr. Steven A. Varga, Director
PWR Project Directorate No. 3
Division of PWR Licensing-A

Subject: Indian Point 3 Nuclear Power Plant
Docket No. 50-286
Fire Barrier and Penetrations Evaluations

References: (1) J.C. Brons letter to S.A. Varga, dated September 19, 1985.

Dear Sir:

Reference (1) provided information to support the NRC Staff's review of Indian Point 3 (IP-3) compliance to 10 CFR 50.48 and Appendix R. In Table 2-2 of Attachment 1, to Reference (1) the Authority described the characteristics of fire barriers at IP-3. The Table identifies three barriers which were evaluated in accordance with the interpretations of Generic Letter 85-01.

Copies of these three evaluations are attached for your information. This fulfills our commitment to provide these evaluations to the staff as outlined in Reference (1).

If you have any questions on this matter, please call Mr. P. Kokolakis of my staff.

Very truly yours,

John C. Brons
Senior Vice President
Nuclear Generation

A006
1/1

Attachment
cc: Resident Inspector's Office
Indian Point Unit 3
U.S. Nuclear Regulatory Commission
P.O. Box 66
Buchanan, NY 10511

ATTACHMENT
IPN-86-03
EVALUATIONS OF UNRATED
FIRE AREA BOUNDARY PENETRATIONS
IN ACCORDANCE WITH GENERIC LETTER 85-01

NEW YORK POWER AUTHORITY
INDIAN POINT # NUCLEAR POWER PLANT
DOCKET NO. 50-286

Fire Door Assembly Analysis
Cable Spreading Room to Turbine Building

Indian Point Nuclear Power Plant Unit No. 3
New York Power Authority

Fire Door Assembly Analysis
Cable Spreading Room to Turbine Building

1.0 Purpose

The purpose of this analysis is to justify the existence of a nonrated fire door frame in the fire barrier separating the Cable Spreading Room (Fire Zone 11 of Fire Area CTL-3) from the Turbine Building (Fire Zone 43A of Fire Area TBL-5 at elevation 33'. This analysis is being prepared in accordance with provisions of NRC Generic Letters 83-33 and 85-01.

2.0 References

(a) NRC Generic Letters 83-33 and 85-01.

(b) Re-evaluation of Appendix R Section III.G Requirements for Indian Point Plant Unit 3, Dated August 1984.

(c) NFPA 80 "Fire Doors and Windows".

(d) 1977 Fire Hazards Analysis - Indian Point Station.

3.0 Background

The Indian Point Nuclear Power Plant Unit No. 3 (IP3) has been divided into six (6) distinct fire areas and the yard area for the purpose of demonstrating compliance with Appendix R to 19CFR 50 Section III.G.

The Authority has identified a fire door frame assembly that is not labeled by an approved independent testing laboratory. It is therefore necessary to evaluate the assembly without benefit of a test by such a laboratory. The fire door assembly is located in the west wall of the Cable Spreading Room that forms the barrier separating the Turbine Building, Fire Area TBL-5, from the Control Building, Fire Area CTL-3. While the doors and associated hardware are three hour rated, the frames were field fabricated to form part of the reinforced concrete wall during the original construction of the plant. The assembly protecting the opening includes a three hour rated transom above the doors. Several penetrations have been made through the transom and these penetrations have been upgraded along with the transom to maintain a three hour fire rated barrier.

4.0 Evaluation

The unrated fire door frame is part of an assembly in the west wall of the Cable Spreading Room at the 33 ft. elevation that forms the barrier separating Fire Areas CTL-3 from TBL-5, (see

Fire Doore Assembly Analysis
Cable Spreading Room to Turbine Building

attached Figures 1 and 2). The fire door (Door 203) assembly consists of two three-hour rated swinging doors, a transom above the doors and a frame that supports the assembly. The wall in which this door frame and transom bar are made of six inch, 8 1/2 lb/ft. structural steel channel iron with a welded door jamb which was cast with and as part of the surrounding reinforced concrete wall. This existing frame construction is considerably stronger than a three-hour rated frame which is constructed of 16 gauge cold steel. Also since the existing frame is part of the reinforced concrete wall the thermal heat transfer through the frame to the cold side will be less. The entire existing door frame is seismically supported.

The equivalent fire severity in the Cable Spreading Room, Fire Zone 11, is 143 minutes and consists predominately of cable insulation which has been tested and qualified to the criteria of the Con Edison "bon fire test". A fire involving this type of cable is difficult to ignite due to the insulations fire resistant properties which also has a low flame spread rating. The Cable Spreading Room is protected by an early warning ionization-type smoke detection and an automatic total flooding CO_2 system, initiated by heat detectors.

The equivalent fire severity for Fire Zone 43A in Area TBL-5, due to fixed combustibles, is relatively low at 11 minutes. This fire zone is protected by automatic wet pipe sprinkler systems which provide full area coverage which have water flow annunciation to the Control Room.

The fire door assembly would not be expected to be subjected to a serious fire exposure for the following reasons:

(1) The Cable Spreading Room is protected by an automatic total flooding CO_2 system.

(2) The Cable Spreading Room has early warning ionization type smoke detection with alarms to the constantly attended Control Room.

(3) Prompt fire brigade response is anticipated for a fire in either area.

(4) Although the equivalent fire severity is over two hours in the Cable Spreading Room, the postulated fire is a slow burning cable insulation type fire.

(5) Transient fire hazards of the type required to ignite the cable insulation is effectively precluded from the Cable Spreading Room by administrative controls and the fact that access to the room is controlled by security.

(6) Fire Zone 43A in Turbine Building has automatic wet pipe sprinkler protection providing full area coverage.

(7) The fire loading in Fire Zone 43A is only 11 minutes and would not challenge the integrity of the door assembly even if there were no sprinkler protection.

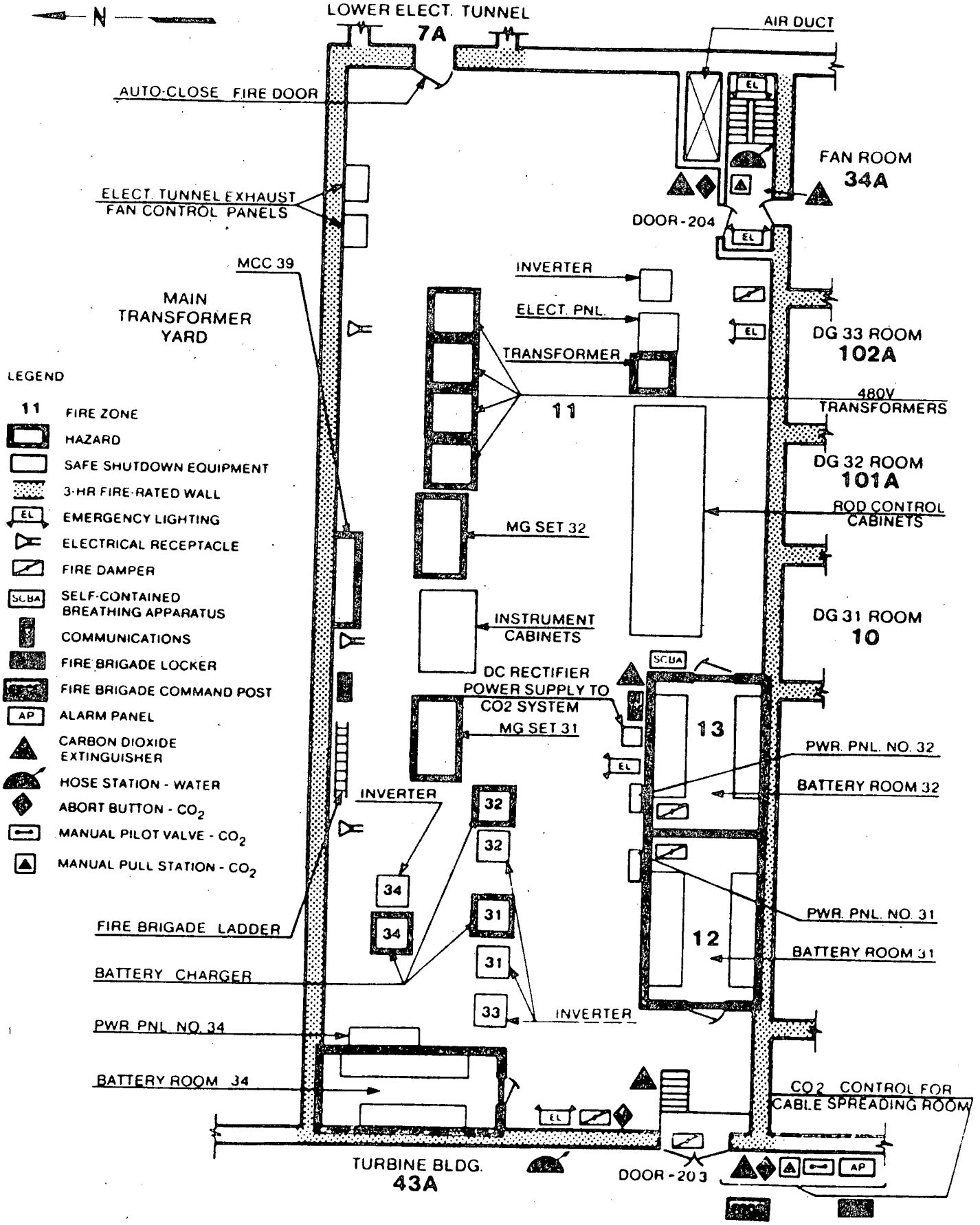
(8) Due to the arrangement of the doors and the traffic in the area, no appreciable amount of combustibles would be stored close to the doors.

5.0 Conclusion

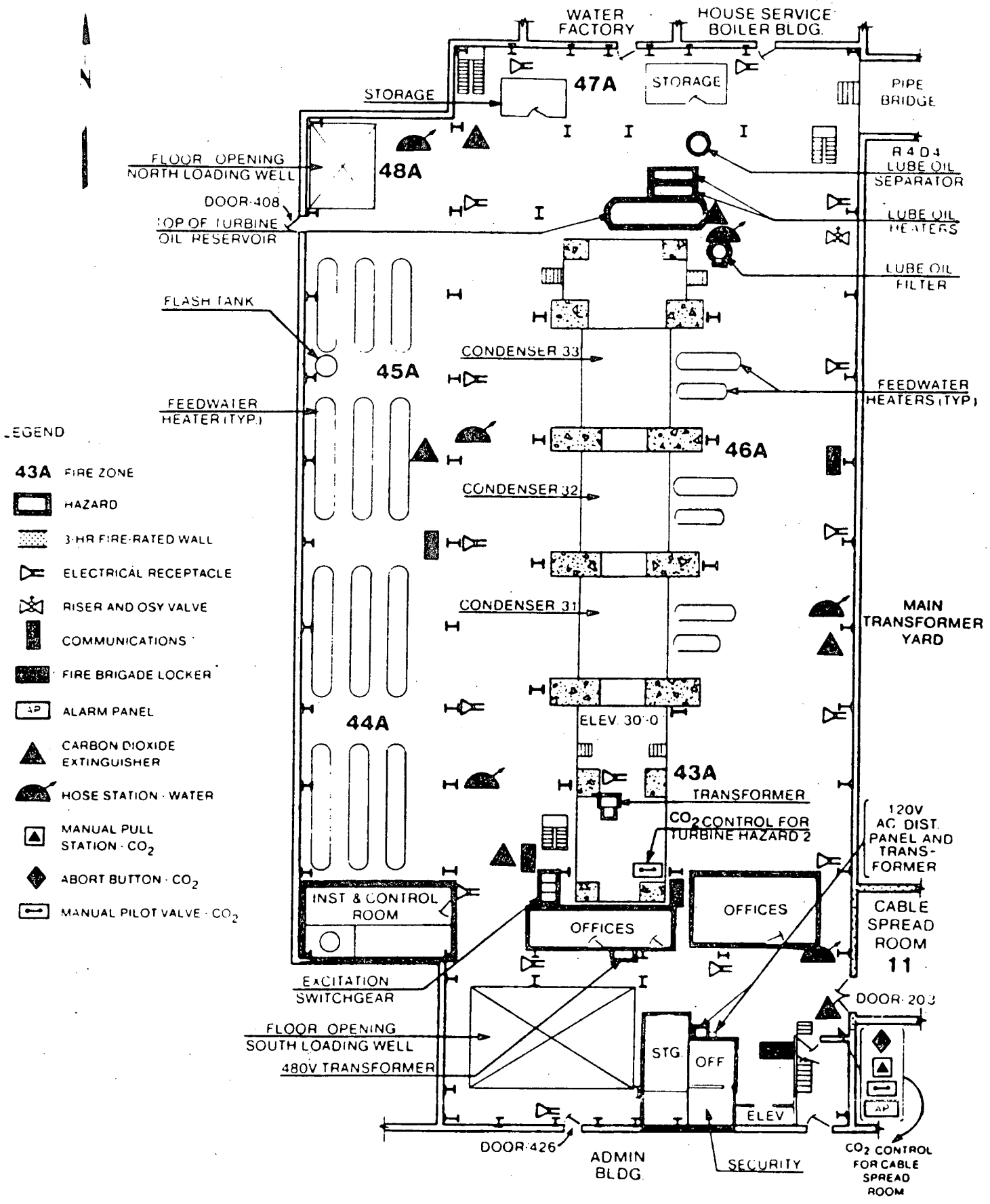
Due to the configuration of the fire door assembly and the fire protection and prevention measures taken by the plant, the fire door assembly is considered adequate. The construction of the frame is such that it possesses high structural stability and integrity. Postulated fires for either side of the door not present a severe fire exposure to the frame assembly.

Therefore, modifications to, or replacing the door frame, would be an unnecessary burden and would not significantly increase the level of fire protection in this area.

CABLE SPREAD ROOM/BATTERY ROOMS - CONTROL BLDG.
Elev. 33'-0" Fire Area CTL-3



GENERAL FLOOR PLAN - TURBINE BLDG.
Elev. 36'-9" Fire Area TBL-5



Fire Barrier Analysis
Auxiliary Boiler Feedwater Area AFW-6
to Turbine Building TBL-5

Indian Point Nuclear Power Plant Unit No. 3
New York Power Authority

Fire Barrier Analysis
AFW-6 to TBL-5

1.0 Purpose

The purpose of this analysis is to justify the existence of non-rated penetrations through the fire barrier between the Auxiliary Boiler Feedwater Pump Room (Fire Area AFW-6) and the Tubine Building (Fire Area TBL-5). This analysis is being prepared in accordance with provisions contained in NRC Generic Letters 83-33 and 85-01.

2.0 References

(a) "Re-evaluation of Appendix R Section III.G Requirements for Indian Point Nuclear Power Plant - Unit 3", Dated August 1984".

(b) NRC Generic Letters 83-33 and 85-01.

(c) National Fire Protection Association Fire Codes, NFPA-80.

3.0 Background

The Indian Point Nuclear Power Plant - Unit 3 (IP3) has been divided into six distinct fire areas and the yard in order to assure compliance with the requirements of Appendix R to 10CFR50 Section III.G.

The fire barrier separating the north wall of Fire Area AFW-6 from the south wall of Fire Area TBL-5 is a reinforced concrete wall with a three-hour fire rating which is penetrated by an unrated fire door assembly and a non-rated ventilation damper. All other penetrations have been sealed to achieve a three-hour fire rating. The existing door resembles a Class B fire door, however no label is present to confirm the doors rating.

4.0 Evaluation

The fire barrier in question, as shown in Figures 1 and 2 attached, separates Fire Area AFW-6 from Fire Area TBL-5 and is constructed of 14 inches of reinforced concrete. It is penetrated by a non-rated door assembly and an unrated ventilation damper. As shown in Figure 1, the door assembly and ventilation damper are enclosed by a tornado missile shield located on the TBL-5 side of the barrier. The missile shield is constructed of 14 inches of reinforced concrete and extends 3 feet beyond the edge of the door. That portion of the missile shield which encloses the ventilation opening extends 3 feet beyond the edge of the ventilation opening and connects directly to the plant exterior (yard) without accessing fire area TBL-5.

Fire Barrier Analysis
AFW-6 to TBL-5

The unrated ventilation opening is not considered further in this evaluation, based on the following:

- the construction of the missile shield around the ventilation opening
- no combustibles in the area between the shield and barrier or in the yard area.
- the missile shield is open to the plant exterior.

Fire Area AFW-6, also known as Fire Zone 23, contains two motor-driven and one steam turbine-driven auxiliary feed pumps and associated equipment. The fire zone adjacent to Fire Area AFW-6 in Fire Area TBL-5 is Fire Zone 54A which contains feedwater and main steam lines. Fire Zone 54A does not contain any safe shutdown equipment or systems. The equivalent fire severities for these zones are as follows:

AFW-6 (Fire Zone 23 - 6 Minutes

TBL-5 (Fire Zone 54A) - None

The fixed combustible fuel loading in a area AFW-6 consists of cable jacket insulation located in cable trays at the ceiling level. A fire involving the cable insulation would not present an exposure hazard to the unrated door assembly. The additional equivalent fire severity due to transient combustibles resulting from maintenance activities is 1.5 minutes.

In addition to the low combustible fuel loading and fire barrier construction, area AFW-6 has full area sprinkler (165^{o}F actuation) protection with specific coverage for each cable tray and early warning ionization type smoke detection with annunciation to the control room. Due to the design of the sprinkler system and prompt response of the plant fire brigade, a fire involving the cable insulation would be easily confined to its point of origin.

Fire zone 54A does not have any fixed combustibles and the postulated transient combustibles due to maintenance activities are also negligible. Thus, there is an extremely low possibility of the unrated door assembly being exposed to a fire. This coupled with the design of the missile shields would preclude the door from being exposed to a fire from zone 54A.

5.0 Conclusion

Therefore, fire propagation between areas AFW-6 and TBL-5 due to the presence of a non-rated door assembly is not considered to be a credible event based on the following:

(a) The fire loading, in terms of equivalent fire severity, in Fire Area AFW-6, is extremely low, being estimated at six minutes.

(b) There is no fixed fire loading in the adjacent Fire Area TBL-5 (Fire Zone 54A) and the amount of transient combustibles are negligible based on the equipment in the zone.

(c) There is full area automatic wet pipe sprinkler protection in Fire Area AFW-6.

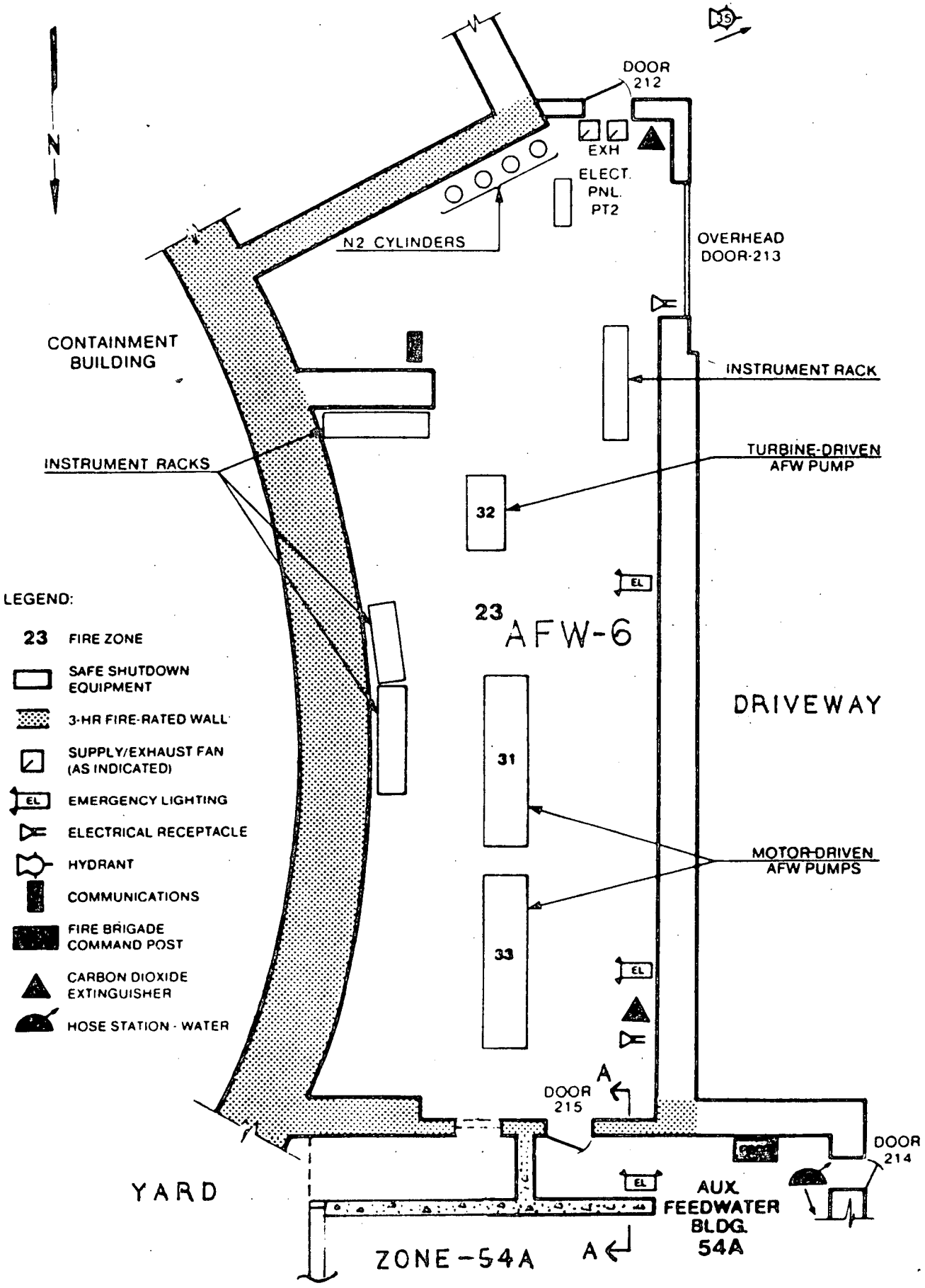
(d) Fire Area AFW-6 has full area fire detection, utilizing ionization type smoke detectors, with annunciation to the constantly attended Control Room.

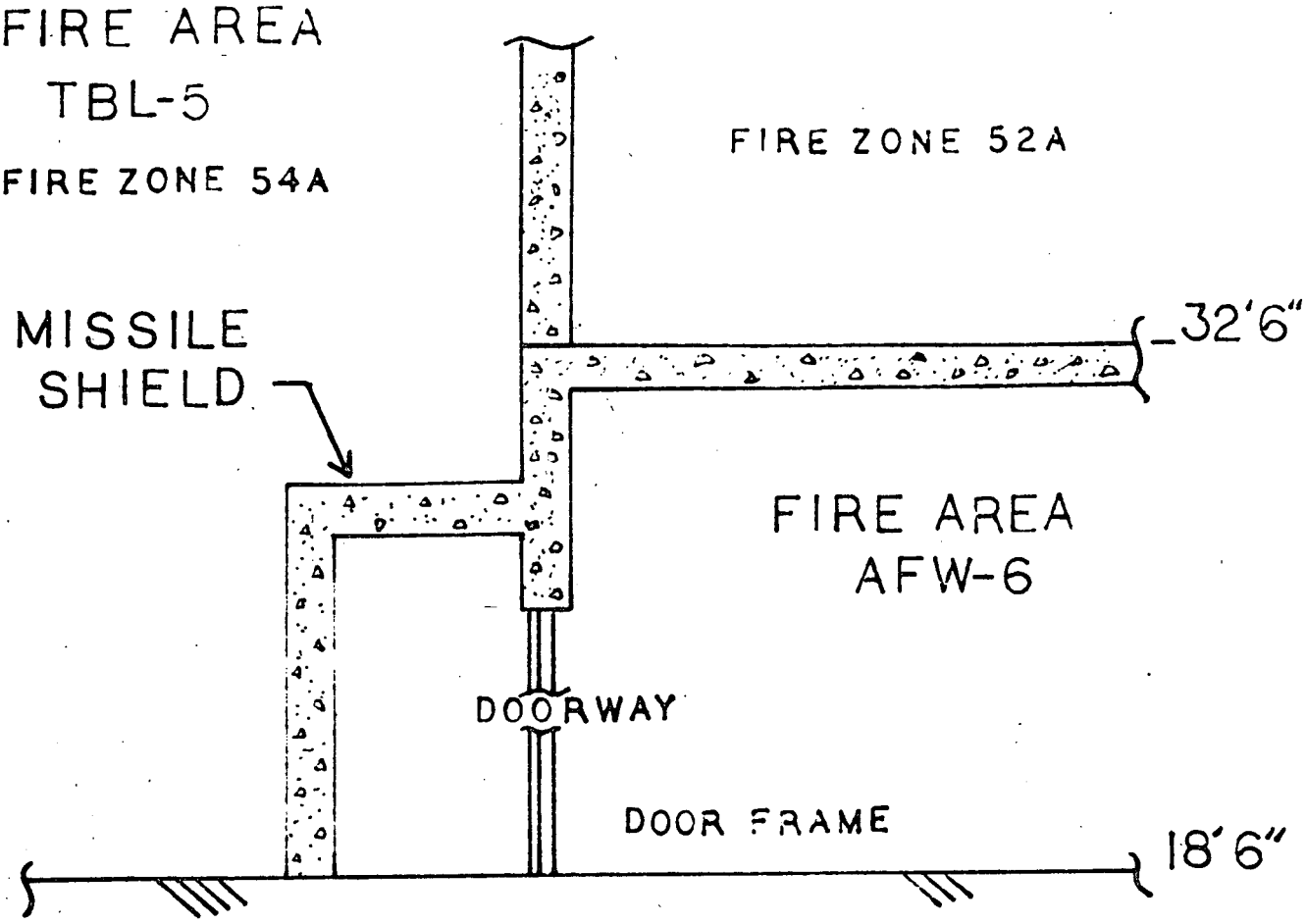
(e) The existing fire barrier and missile shield do provide a high degree of protection from the effects of an exposed fire in zone 54A.

Thus, the present configuration is considered adequate to prevent a fire involving the existing hazards or those involving transient combustibles from propagating through the existing fire barrier separating Fire Areas AFW-6 and TBL-5.

Modification to the existing door or ventilation opening would not enhance the capability of the fire barrier to resist the spread of fire or significantly increase the level of fire protection provided at the plant.

AFW PUMP ROOM - AUX. FEEDWATER BLDG.
Elev. 18'-6" Fire Area AFW-6





SECTION A-A
NO SCALE

FIG. 2

Fire Barrier Analysis
Cable Spreading Room to Electrical Tunnels

Indian Point Nuclear Power Plant Unit No. 3
New York Power Authority

Fire Barrier Analysis
Cable Spreading Room to Electrical Tunnels

1.0 Purpose

The purpose of this analysis is to justify the existence of a non-tested fire barrier which provides separation between the Cable Spreading Room (Fire Zone 11 of Fire Area CTL-3) from the Electrical Tunnels (Fire Zones 7A and 60A of Fire Area ETN-4) at elevation 33'-0". This analysis is being prepared in accordance with provisions of NRC Generic Letters 83-33 and 85-01.

2.0 References

(a) NRC Generic Letters 83-33 and 85-01.

(b) Re-evaluation of Appendix R Section III.G Requierments for Indian Point Nuclear Power Plant Unit 3, Dated August 1984.

(c) 1977 Fire Hazards Analysis - Indian Point Station.

(d) Burns & Roe Drawing A027, Rev. 4, "Fire Protection Part Plan and Elevation of Existing Control Building EL. 33'-0".

3.0 Background

The Indian Point 3 Nuclear Power Plant (IP3) has been divided into six (6) distinct fire areas and the yard area for the purpose of demonstrating compliance with Appendix R to 10CFR50, Section III.G.

The Authority has identified a fire barrier wall and its penetration seals which have not been tested by an approved independent testing laboratory to justify a fire rating. It is therefore necessary to evaluate the assembly without the benefit of a test by such a laboratory. This fire barrier wall was constructed as a result of the BTP 9.5-1, Appendix A, review of IP3 and separates the cable spreading room from the common area of the electrical tunnels as illustrated on attached Figure (1). The calculated fire loadings for the cable spreading room (Fire Area CTL-3, Zone 11) and the common area of the electrical

tunnels (Fire Area ETN-4, Zone 7A) are 143 and 119 minutes respectively. The cable spreading room is provided with early warning ionization type smoke detectors and an automatic total flooding carbon dioxide fire suppression system actuated by fixed temperature heat detectors or through manual action. The common area of the electrical tunnels is protected by early warning ionization type smoke detectors and a pre-action automatic sprinkler system actuated by fixed temperature type heat detectors. The pre-action sprinkler system provides protection for the the cable trays with nozzles located above and/or next to each tray. Remote annunciation of all alarms from the fire detection and suppression systems in both the cable spreading room and electrical tunnels is provided to the plant's main control room. Manual hose stations for use by the plants fire brigade are located in the control building stairway located within twenty-five feet of the subject barrier.

4.0 Evaluation

The fire barrier wall was constructed as illustrated in Figure (2), utilizing 3/16 inch steel plate supported by 13.8 lb/ft steel channels. The entire wall assembly was designed and constructed to resist the effects of a seismic event. The wall was coated with a minimum of two inches of a structural steel fire proofing material (Blaze-Shield DC/F) manufactured by U.S. Mineral Products inorder to achieve a fire rating. Based upon the results of fire testing done by U.S. Mineral Products a two inch coating of this material will provide a sufficient thermal barrier to prevent the propagation of a fire through the wall, as discussed below.

The testing conducted by U.S. Mineral Products was done utilizing their product Deck-Shield, which has a K factor of 0.31, on a structural steel wall assembly. The results of these tests indicated that a two(2) inch depth of the Deck-Shield will prevent the propagation of a fire thru a structural steel barrier, in accordance with the testing requirements of ASTM-E119, for 187 minutes (UL Test Report No. U804). The K

factor for Blaze-Shield is 0.29, therefore it provides a superior thermal barrier than a comparable depth of Deck-Shield. Also, the structural steel utilizied in the barrier, at IP3, has a greater overall mass than that which was utlizied in the Deck-Shield test assembly. Therefore, the Blaze-Shield "DC-F" structural fireproofing will, based upon its superior thermal properties, prevent the propagation of a fire through the structural steel barrier for the worst case fire scenario. This is based on the test results from U.S. Mineral Products on their "Deck-Shield C/F" fireproofing.

The penetration seals utilizied to seal the cable tray penetrations through the barrier vary from those detailed in the contractors test reports. These variances include use of silicone foam instead of the specified silicone elastomer for the inside of the cable trays and the installation of larger seals then tested.

The use of the silicone foam on the inside of the cable trays (as shown on Figure (3)) was done to facilitate the future installation of cables. The assembly as shown is a combination of two different tested seal designs. The tested and approved sealed designs utilizied six (6) inches of silicone elastomer or ten (10) inches of silicone foam to achieve a three hour fire rating. In the IP3 seal design, the damming material illustrated in Figure (C), is a permenant part of the seal construction.

The dimensions of the installed penetration seals (height and width) exceed those contained in the test reports. This was done due to the nature of the wall design and construction. In order to reduce this area each penetration seal was subdivided every other tray by the installation of a horizontal sheet of ceraboard which ran the full width of the penetration and for its full depth. This board increases the structural stability on the seal compared to the use of silicone elastomer. Also, the closeness with which the cable trays are installed (approxiamately six inch vertical separation) contributes greatly to the structural stability of the penetration seals.

Fire Barrier Analysis
Cable Spreading Room to Electrical Tunnels

Mitigating circumstances which would preclude the variances in the penetration seal installation and wall design from affecting the overall abliity of the assembly to prevent the propagation of a fire are as follows:

- The fire loading in both the cable spreading room and the common area of the electrical tunnel consists predominately of cable insulation which has been tested and qualified to the criteria of the Con Edison "bon fire test". This type of cable insulation is difficult to ignite and has a low flame spread rate due to the inherent fire resistance properties of the insulation. These properties have been recognized by the NRC staff based upon the approval of an exemption which precludes the need to consider the cables installed in the cable tunnels (Fire Area ETN-4) as intervening combustibles. These same type of cables are installed in the cable spreading room.

- The cable spreading room has early warning ionization type smoke detection with annunciation to the plants main control room.

- The common area of the electrical tunnels has early warning ionization type smoke detection with annuncaition to the main control room.

- The cable spreading room is protected by an automatic total flooding carbon dioxide fire suppression system.

- The common area of the electrical tunnels is provided with an automatic pre-action sprinkler system with nozzles located in and/or next to each cable tray which is activated by fixed temperature heat detectors.

0 A prompt fire brigade response is anticipated for a fire in either area due to the annunciation of all alarms to the control. Additonally, this area is

located below the control room such that fire brigade members would not have a long travel distance.

- Although the fire loading has an equivalent fire severity equal to 143 minutes for the cable spreading room, the postulated fire would be a slow burning insulation type fire.

- Transient fire hazards of the type required to ignite the cable insulation are effectively precluded from both the cable spreading room and the electrical tunnels by administrative controls and that access to these areas is controlled by security.

5.0 Conclusion

Due to the construction of the fire barrier wall and as a result of fire prevention and protection measures taken by the plant for the postulated fire in these areas, it is the Authority's position that the existing fire barrier wall will perform its intented function to prevent the spread of fire between the cable spreading room and the common area of the electrical tunnels. The overall construction of the wall is such that it possesses a high structural stability and a high fire resistance rating.

Therefore, modification to and/or replacement of the fire barrier wall, would be an unnecessary burden and would not significantly increase the level of fire protection in this area.

FIG-1

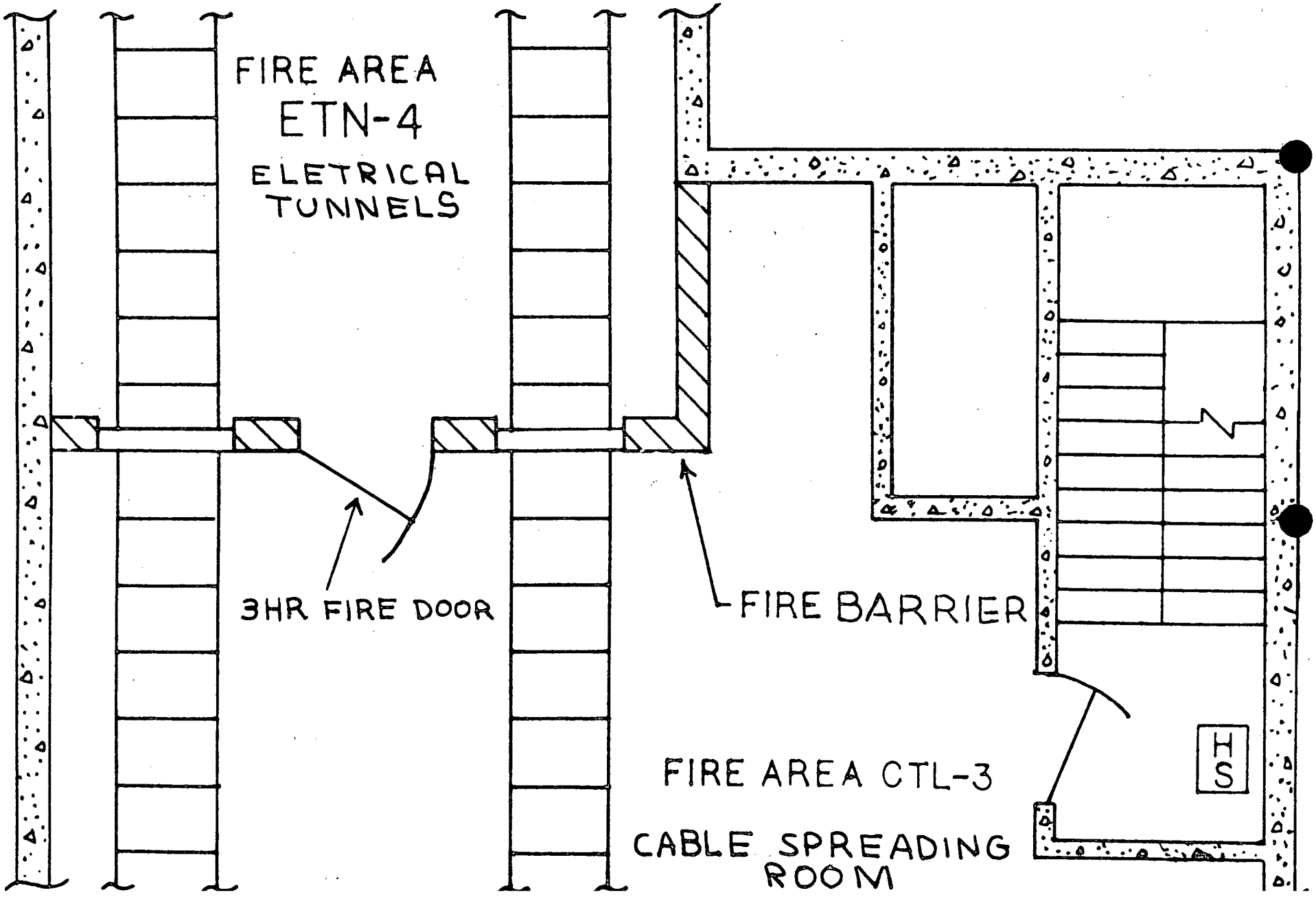

FIRE AREA
ETN-4
ELETRICAL
TUNNELS
3HR FIRE DOOR
FIRE BARRIER
FIRE AREA CTL-3
CABLE SPREADING
ROOM
HS

FIG-2

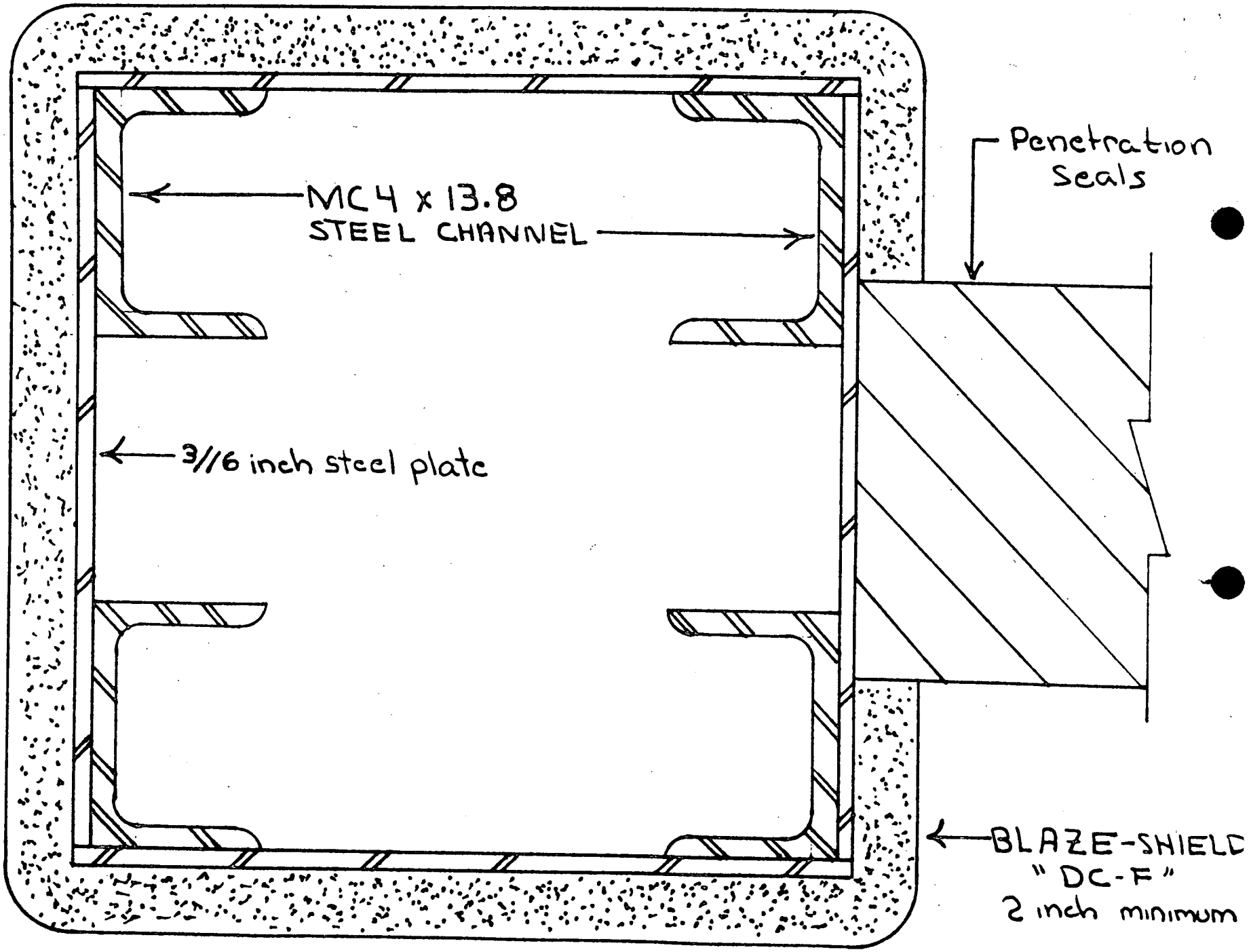

MC4 x 13.8
STEEL CHANNEL
3/16 inch steel plate
Penetration Seals
BLAZE-SHIELD
"DC-F"
2 inch minimum

FIG-3

CROSS-SECTION OF PENETRATION SEAL