April 17, 1978

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POOR ORIGINAL

Docket No. 50-289

Metropolitan Edison Company
ATTN: Mr. J. G. Herbein
Vice President
P. O. Box 542
Reading, Pennsylvania 19603

Gentlemen:

By letter dated May 16, 1977, you submitted a Fire Hazards Analysis Report for Three Mile Island Nuclear Station, Unit No. 1 (TMI-1). Based on our review of this submittal we find we need additional information to continue our review. A list of the specific information needed is given in Enclosure 1. You should be prepared to respond verbally to these questions at the time of the Site Visit of the Fire Protection Review Team (scheduled for the week of May 22, 1978). Based on your response at that time certain of the questions in Enclosure 1 may be deleted. Written answers to the balance of the questions should be submitted in time to be received by us no later than June 5, 1978.

A list of drawings which should be available at TMI-1 for the use of the Fire Protection Review Team during and following the Site Visit is given in Enclosure 2. Note that five copies of each of the drawings are needed.

Additional staff positions relating to fire protection developed in the course of our review of other facilities and subsequent to the development of BTP 9.5-1 and Appendix A thereto, are given in Enclosure 3. You should indicate in the submittal which transmits your responses to the questions in Enclosure 1, your commitment to conform to these positions.

Sincerely,

Robert W. Reid, Chief
Operating Reactors Branch #4
Division of Operating Reactors

Enclosures and cc:
See next page

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OFFICE	ORB#4:DOR	~~G-ORB#4:DOR~~				
SURNAME	GZwetzig:dn	RWReid				
DATE	4/17/78	4/17/78				

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Enclosures:
1. Request for Additional Information
2. List of Drawings
3. Additional Staff Positions

cc w/enclosures: See next page

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Government Publications Section
State Library of Pennsylvania
Box 1601 (Education Building)
Harrisburg, Pennsylvania 17126

ENCLOSURE 1

THREE MILE ISLAND NUCLEAR STATION, UNIT 1

DOCKET NO. 50-289

REQUEST FOR ADDITIONAL INFORMATION

1. Instrument Air System

   Verify that the effects of a fire on the instrument air system will not cause a transient more severe than those already analyzed in the FSAR, or prevent safe shutdown.

2. Failure Analysis

   Provide a failure analysis which verifies that a single failure does not simultaneously impair the primary and backup fire suppression capabilities. The analysis should include consideration of failures in the suppression system, the fire detection system or the power sources for such systems.

3. Lightning Effects

   Describe the means provided to prevent lightning from initiating fires which could damage safety-related equipment. Describe the means provided to prevent lightning from damaging the fire protection system.

4. Effects of Extinguishing Systems

   Provide the results of an analysis which shows that rupture or inadvertent operation of a fire fighting system will not subsequently cause damage or failure of safety-related equipment required for safe shutdown.

5. Safety-Related Systems Interlocked with Fire Fighting Systems

   Identify any safety-related systems or their auxiliaries which are interlocked to and could be disabled by operation of a fire fighting system.

6. Fire Barrier

   For all barriers, describe the fire resistance rating of the associated floors, ventilation dampers and seals for cable, pipe and ventilation duct penetrations. Identify the fire barriers, enclosing separate fire areas, that do not have minimum fire rating of three hours.

7. Steel Structures

Describe the type of fire protection, if any, applied to steel structures. Evaluate the possibility of fire damage to protected and unprotected steel structures and the effect of such damage on the safe plant shutdown capability.

8. Safety Areas Without Fire Protection

Identify all areas that contain safety-related equipment and/or cables in open cable trays that are not provided with either fire detection or automatic fire suppression. Justify the lack of either of the above.

9. Drains

(1) Provide the results of an analysis which shows that drains have sufficient capacity, and/or equipment pedestals have sufficient height to prevent standing water from sprinklers and fire hoses from damaging safety-related equipment or supporting systems necessary for safe shutdown of the plant.

(2) Identify the areas containing safe shutdown equipment that are not provided with floor drains. Describe the drainage path for those areas without drains.

(3) Identify the areas containing combustible liquids that are not provided with floor drains. Describe the drainage path and provisions for containing or diverting the combustible liquids in those areas without drains. Where applicable, provide the results of an analysis that shows that curbed areas surrounding combustible liquid tanks have sufficient capacity to contain the full contents of the tanks plus the quantity of water required for extinguishment of a fire involving the combustible liquid. In those areas with drains, state the capacity and location of the drain reservoirs and describe the provisions to prevent the spread of flammable liquid fires via the drain system to areas which may jeopardize safety-related equipment.

10. Pipe and Ventilation Duct Penetrations

Provide the results of an analysis that shows that the fire barrier penetration seals for pipe penetrations and ventilation ducts are adequate to prevent the spread of smoke and fire through the barrier considering the fire hazard and possible air pressure differential.

11. Piping Containing Combustibles

Identify all piping containing flammable or combustible gas or liquid which is routed through areas containing safety-related equipment, safety-related cables or through which personnel must pass to reach safety-related equipment for local operation. Provide an analysis to show that a fire involving the liquid or gas will not prevent safe shutdown or result in the loss of function of a safety-related system.

12. Laboratories and Storage Areas

Identify all hazardous materials located in the laboratories and chemical storage areas. Provide the results of an analysis of the consequences of a fire or explosion involving these hazards on safety-related equipment.

13. Combustible Fluid Reservoirs and Storage

Provide a listing of all fixed tanks and pumps which contain oil or other flammable or combustible fluid and indicate the location of the container and quantity and name of fluid contained. Describe the fire protection provisions associated with each such location.

14. Interface Between Safety and Non-Safety Equipment

Certain cables electrically connected to equipment necessary for safe shutdown may be used for functions designated as non-safety-related and, therefore, classified as non-safety-related. Examples of these might be remote indicating lights for valves, breakers, etc. Describe whether such cables are kept with the safety division to which they were originally connected and if not, describe the effects on the safe shutdown equipment due to shorts to these cables as a result of fire.

15. Cable Insulation Materials

Identify all types and quantities of cable used in or adjacent to areas containing safety-related equipment or in cable trays containing safety-related cables. For each type of cable, identify the materials used for insulation and jacketing.

16. Method of Heat and Smoke Venting

Describe the methods which would be used for heat and smoke removal using either fixed or portable air handling equipment. If the plant HVAC systems are proposed for such service, provide design data to show that these systems are rated for the conditions (temperature and capacity) required when used for this service.

17. Prevention of Fire and Smoke Spread

Describe the manner in which fire and smoke are prevented from spreading from area to area via the normal and emergency ventilation systems in all parts of the plant areas. Describe the location, actuation method and all fire rating of dampers used for fire and smoke control in both air supply and return air systems. Describe the details of interlocks for ventilation system shutdown or mode change that can be utilized for fire and smoke control. Describe the reliability of such systems and the consequences of system failure.

18. Ventilation System Power and Control

Identify areas where power and control cables of ventilation systems are routed through the fire area they serve. Provide the basis for leaving ventilation systems power and control cables within the area they serve.

19. Automatic Operation of Fire Dampers/Doors

Discuss the provisions for automatic closure of ventilation fire dampers and fire doors in all areas protected by total flooding gas suppression systems and provisions for re-opening the fire dampers remotely for post fire smoke venting.

20. Proximity of Regular and Emergency Lighting Wiring

Provide the results of an evaluation of the potential for a fire to cause damage to electrical wiring which would result in the loss of both regular and emergency lighting to areas needed for safe shutdown and other areas providing access to safe shutdown equipment or the fire area. Verify that AC emergency lights that are used in lieu of 8-hour sealed beam DC units are supplied from vital AC buses.

21. Requirements for Manual Hose Stations

Verify that all points of safety-related areas and other areas with major fire hazard can be reached with the hose line stored at the manual hose stations.

22. Fire Hazard at the Containment Cable Penetration

Identify the consequences on safe shutdown of a fire at the cable penetration area on either side of containment.

23. Portable Extinguisher Rating

Verify that at least one portable extinguisher in the control room has a Class A rating.

24. Fire hazards Associated with the Plant Computer

Provide the results of an analysis which demonstrates that a fire within the computer area will neither expose any safety-related equipment nor affect the safe plant shutdown. Verify that the barrier around the area is compatible with the combustible loading in the area.

25. Remote Shutdown Panels

Identify the location of all remote shutdown panels and provide the results of analysis to demonstrat that no fire which could impair the control from the control room could also prevent the control from these areas.

26. Radiological Consequences of a Fire

Evaluate the radiological consequences of a fire in radwaste areas and other areas containing contaminated material such as filter cartridge, spent resin, etc.

27. Diesel Fuel Transfer Shut-off

Describe the means provided to automatically and/or manually stop the transfer of diesel oil from the bunker tanks to the diesel generator day tanks in the event of a fire in the area housing the day tank, or through which the fuel oil transfer piping is routed.

(Referenced page(s) in TMI-1's submittal are indicated in the parenthesis following the questions.)

28. Fire Detection System Design

Provide design data for the automatic fire detection system in each fire area, including such items as type, number and location of the detectors; and signaling, power supply and supervision of the system, and identify any deviations from NFPA 72D. (Pg. 5-35) Describe tests which may have been conducted, or other means proposed, to verify the adequacy of the detection system design considering the air flow pattern and other relevant factors.

29. Fire Suppression System Design

Provide the design data for all automatic suppression systems (both existing and proposed), including such items as design densities, soak times, power supplies, and associated alarms. Identify areas of non-compliance with appropriate NFPA Standards. (Pg. 5-30)

30. For each fire area, describe the type and maximum quantity of transient combustible material which might be found during each mode of plant operation. Include, as a minimum: (Pg. 2.2-4)

Protective clothing and equipment both clean and used (including contaminated);

Solvents and other cleaning materials used in maintenance, decontamination or other operations;

Lubricating oils and other fluids which might be added to motors, pumps or other equipment from time to time;

Wood, paper and other construction materials;

Plastic sheets and bags, used for transport, storage or protection of materials.

Describe the effect the presence of such materials will have on fires postulated in each area of the plant, including areas of the plant through which they are transported on the way to or from their point of use in or out of the plant.

31. Identify the ventilation systems which are not designed to isolate upon receipt of a fire signal, and the areas which they serve. (Pg. 2.3-2 and 5-21)

32. Identify combustible pipe and duct insulating materials in the plant, including locations, quantities, and type. Verify that they were included in the fire hazard analysis. (Pg. 5-14)

33. Describe the acoustical ceiling material used in the control room. State the flame spread classification, fuel contribution, and smoke development properties of this tile. (Pg. 5-14).

34. Describe the floor drains modifications noted on Pg. 5-15. (Pg. 5-15)

35. Provide the rates at which the cascade system can replenish exhausted air bottles for various periods of time from one hour to six hours. (Pg. 5-23)

36. Provide 2 copies of cable test reports actually performed on cables which verify that cables in TMI-1 have passed IEEE 383 test. (Pg. 2.2-5)

37. Describe the minimum separation between redundant cables, including interposing combustibles, in all areas where both divisions of cables in systems required for safe shutdown are routed in the same area.

38. Specify for the Control Room, the actual minimum separation between redundant channels without barriers. (Pg. 2.3-9)

39. Provide documentation which verifies that the Johns Manville Marinite 65 insulation is qualified as a fire barrier. (Pg. 2.3-6 and 2.3-7)

40. Describe the criteria that classifies the fire loading (in BTU/sq.ft.) as "minimal." (Pg. 2.3-13)

41. Describe separation of redundant communication cables at penetrations to Containment. (Pg. 5-24)

42. Provide the results of the most recent test of each of the fire pumps, and include the pump discharge/pressure curves. (Pg. 5-26)

43. State the pump discharge pressure associated with the maximum system flow rate of 2575 gpm. (Pg. 5-27) Considering the maximum possible losses due to system friction, routing, and differences in elevations, verify that the pressure available at the point of 2575 gpm flow requirement is adequate for proper operation of the suppression system.

44. Describe the special adapters required for compatibility of the plant fire hydrant threads with the threads of the local fire departments. Describe how many adapters are provided and where they are kept. (Pg. 5-28)

45. Identify the make and model of the electrically safe hose nozzles used in the plant. (Pg. 5-36)

46. Describe the smallest fires in the Containment which can be detected by the installed detectors in their present locations, providing the results of any tests which may have been conducted. (Pg. 5-33)

47. Verify that the insulation on control cable and wiring was included as a combustible material in the fire hazards analysis. If not, justify this omission or revise the fire hazards. (Pg. 5.5-1 and 4.4-2)

48. Provide basis for stating the provisions of F.3(b) of Appendix A to BTP 9.5-1 concerning the cable spreading room are not applicable. (Pg. 5-37)

49. Indicate the fire resistance rating of the barriers between redundant make-up and purification pumps, including the ratings of any penetrations of these barriers. (Pg. 5-41)

50. Verify that "safe shutdown" means "cold shutdown" in all cases. (Pg. 5-45)

51. State the assumptions used in your fire hazards analysis regarding loss of function of cables enclosed in conduit and interlocked armor as a result of a fire. (FSAR Pg. 8-5a)

ENCLOSURE 2

THREE MILE ISLAND NUCLEAR PLANT, UNIT 1

DOCKET NO. 50-289

REQUEST FOR DRAWINGS

Metropolitan Edison is requested to have 5 copies of the following drawings on hand when the review team visits the plant site.

1. Dimensioned plan drawing of fire service water system marked with valve supervision and proposed modification(s) in the system.

2. Ventilation and one-line drain diagrams of various areas in the plant.

3. Electrical one-line distribution diagrams.

4. Electric tray layout drawings.

5. Control logic diagram for each of the 4-2500 gpm fire pumps.

6. General arrangement of the plant, especially of containment.

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ENCLOSURE 3

THREE MILE ISLAND NUCLEAR PLANT, UNIT 1

DOCKET NO. 50-289

STAFF POSITIONS

P1 Electrical Cable Penetration Qualification

P2 Fire Water Valve Supervision

P3 RC Pump Lube Oil Collection System

P4 Fire Detector in Control Room Cabinets and Consoles

P5 Fire Door Supervision

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P1 Electrical Cable Penetration Qualification

The cable penetration fire barriers should be tested to demonstrate a three-hour rating, as is required for fire barriers. The test should be performed or witnessed by a representative of a qualified independent testing laboratory, and should include the following:

(1) The tests should be performed in accordance with ASTM E-119 and the following conditions.

(2) The cables used in the test should include the cable insulation materials used in the facility.

(3) The test sample should be representative of the worst case configuration of cable loading, cable tray arrangement, anchoring and penetration fire barrier size and design. The test sample should also be representative of the cable sizes in the facility. Testing of the penetration fire barrier in the floor configuration will qualify the fire stop for use in the wall configuration also.

(4) Cables penetrating the fire barrier should extend at least three feet on the unexposed side and at least one foot on the exposed side.

(5) The fire barrier should be tested in both directions unless the fire barrier is symmetrical.

(6) The fire barrier should be tested with a pressure differential across it that is equivalent to the maximum pressure differential a fire barrier in the plant is expected to experience.

(7) The temperature levels of the cable insulation, cable conductor, cable tray, conduit, and fire stop material should be recorded for the unexposed side of the fire barrier.

(8) Acceptance Criteria - The test is successful if:

(a) The cable penetration fire barrier has withstood the fire endurance test without passage of flame or ignition of cables on the unexposed side for a period of three hours, and

(b) The temperature levels recorded for the unexposed side are analyzed and demonstrate that the maximum temperature is sufficiently below the cable insulation ignition temperature, and

(c) The fire barrier remains intact and does not allow projection of water beyond the unexposed surface during the hose stream test.

If previous tests can be shown to meet the above position, the licensee should provide the results of the tests to show that the above position is met.

P2 Fire Water Valve Supervision

All valves in the fire water systems should be either electrically supervised, or locked open or provided with a tamper proof seal, and administratively controlled.

P3 RC Pump Lube Oil Collection System

Each reactor coolant pump should be provided with an oil collection system to contain lube oil leakage and drain the leaked oil to a safe place.

P4 Fire Detector in Control Room Cabinets and Consoles

Each of safety-related cabinets and consoles in the control room should be provided with a fire detector.

P5 Fire Door Supervision

All fire doors should be electrically supervised with time delayed alarm in a constantly occupied area, or locked closed.