50-247

RESPONSE TO NRC LTR DTD 4/20/78 forwarding addl info re subject facilities Fire Protection Program...w/att

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ENCLOSURE 1

Responses to Questions

Indian Point Unit No. 2

Docket No. 50-247

May, 1978

Question No. 1 - Reference IPFPR* - Page 9-1

Provide the criteria concerned with physical separation, equipment layout and work patterns that were used to separate fire areas into fire zones. Provide the basis for these criteria which assures that fires will not propagate from one zone to another. State whether cables were considered to present a pathway for fire to be transmitted between fire zones.

Response

Separation of the plant areas into Fire Zones was established by utilizing the following criteria:

a) Existing physical barriers such as walls, missile shields, floors and ceilings were considered as discrete barriers which logically could be used to establish specific divisional guidelines.

b) Equipment locations and established work patterns necessary for plant operation and maintenance. For example, Zones 49A and 51A (IPFPR Figure 9-2-16) are contiguous areas in the Turbine Building Heater Bay on the mezzanine floor and have no physical barrier between them. However, the heater bay complex was divided in half on the basis that periodic attendance during operation or major maintenance during an outage would occur in one area at a time with the probability of working in both areas simultaneously being extremely low.

c) Where there were large distances between equipment and the amounts of permanent and transient combustibles were low. In this case, a fire in one zone was not considered to spread to the adjacent zone. Propagation pathways were not considered

*Indian Point Fire Protection Report, Rev. 1, April, 1977.

to exist because of the non-combustible construction of the buildings and the low magnitude type of fire that could possibly be generated. As noted in Table 6-8c of the Fire Protection Handbook and referenced on page 9-4 of the IPFPR, Power Houses are in the slight or low fire severity category.

d) Areas that contained large amounts of combustible liquids. As an example, Zone 16 (IPFPR Figure 9-2-15) contains the Turbine Lube Oil Storage Tanks. In this type of fire zone a certain portion of the combustible was considered to spread to adjacent areas.

Electric cables were not considered to be a pathway between fire zones. The fire resistant properties of the cables are described in the response to Question No. 10.

Question No. 2 - Reference IPFPR - Page 9-2

Describe what quantities of grease and lube oil were considered as non-combustible and therefore not considered in the fire hazards analysis.

Response

All significant amounts of lubricants were considered to be flammable. As noted on page 9-5 of the IPFPR, pumps and motors were considered to contain and contribute 57,000 BTU to the area fire loading except for the following specific cases:

a) Small (fractional horsepower) motors were not included unless external combustibles were also present.

b) Large pumps and motors where it could be readily ascertained that the combustible loading would exceed the 57,000 BTU model. In this case the known specific quantities were utilized. Examples of equipment categorized in this manner would be:

1.	Charging Pumps:	Pumps - 20 gal oil
		Fluid Drive - 20 gal oil
		Motor - 1 pound grease
2.	Safety Injection Pumps:	Pumps - 7 gal oil
		Motor - 1 pound grease
3.	Component Cooling Pumps:	Pump - 1 qt oil
		Motor - 1/2 pound grease

In the cases where there were large quantities of lubricants, such information was specifically noted in the detailed descriptions of Table 9-2. As an example each Reactor Coolant Pump (Zones 70 and 71A) is shown to contain 250 gal of oil.

Question No. 3 - Reference IPFPR - Table 9-2

In the discussion of safety-related components for each safety-related fire zone, identify whether redundant components are in the zone.

Response

The areas which contain safety related components have been summarized in Table 3-1. The table has been formulated on the basis of the various modes of operation that can be used to achieve shutdown. The redundant components from the same system as well as from alternate systems, which could provide the same shutdown capability, have been listed under each function.

The alternate methods of shutdown, which would not be affected by a fire in the area under consideration, are also presented in the table.

TABLE 3-1 (Sheet 1 of 7)
REDUNDANT SHUTDOWN EQUIPMENT
(Ref. Table 9-2, Indian Point Fire Protection Program Plan)

ZONE NO.	ZONE NAME	REDUNDANT COMPONENTS	ALTERNATE METHOD OF SHUTDOWN
1	Component Cooling Pump Room	FUNCTION: Component Cooling COMPONENTS: All Component Cooling Pumps and associated electric cables	Cooling water for the Safety Injection (SI) Pumps and Residual Heat Removal (RHR) Pumps available from emergency connections to the Primary Water System and for the Charging Pumps from emergency connections to the City Water System.
1A	Electrical & Piping Penetration Area	FUNCTION: Primary System Makeup COMPONENTS: Power and Control Cables for all Charging Pumps. Power cables for all Safety Injection (SI), Residual Heat Removal (RHR) and Component Cooling Pumps	Use secondary side heat removal to maintain plant in the hot shutdown condition. Effect emergency repairs by routing electrical cables to provide primary system makeup and shutdown to the cold condition.
		FUNCTION: Secondary System Makeup COMPONENTS: Control cables for motor driven Auxiliary Boiler Feed (ABF) Pumps	Provide makeup using steam driven ABF Pump. Operate motor driven ABF Pumps from remote shutdown panel.
		FUNCTION: Heat dump from the Primary System COMPONENTS: Power and Control Cables for Pressurizer Relief and Spray Valves	Dump heat through secondary system. Spring loaded Pressurizer Safety Valves available for Primary System dump.
2	Containment Spray Pump Room	FUNCTION: Component Cooling COMPONENTS: Power cables for all Component Cooling Pumps	Emergency cooling water for the SI and RHR Pumps available from the Primary Water System and for the Charging Pumps from the City Water System.
2A	Primary Water Makeup Pump Room	FUNCTION: Primary System Makeup COMPONENTS: Power cables for all Component Cooling Pumps Control cables for all Charging Pumps	Provide primary system makeup using SI and RHR Pumps and/or operate charging pumps locally. Provide Component Cooling water as noted for Zone 2.

TABLE 3-1 (Sheet 2 of 7)

ZONE NO.	ZONE NAME	REDUNDANT COMPONENTS	ALTERNATE METHOD OF SHUTDOWN
3A	Corridor	FUNCTION: Residual Heat Removal COMPONENTS: Power cables for all RHR Pumps	Remove residual heat by operating with secondary side of Steam Generators flooded.
5	Charging Pump Room	FUNCTION: Primary System Makeup COMPONENTS: Power and Control cables for Charging Pump No. 21 Power cables for remaining two Charging Pumps	Provide makeup using SI and RHR Pumps.
6	Charging Pump Room	FUNCTION: Primary System Makeup COMPONENTS: Power and Control cables for Charging Pump No. 22 Power cables for Charging Pump No. 23 Remote operated valves - Refueling Water Storage Tank to Charging Pumps	Provide makeup using Charging Pump No. 21, SI and RHR Pumps. Water to Charging Pump provided through normal path in the Chemical and Volume Control System.
6A	Waste Storage and Drum Handling Area	FUNCTION: Primary System Makeup COMPONENTS: Power cables for all Charging Pumps	Provide makeup using SI and RHR Pumps.
7A	Corridor	FUNCTION: Primary System Makeup COMPONENTS: Control cables for all Charging Pumps	Provide makeup using SI and RHR Pumps and/or operate Charging Pumps locally.
8	Boric Acid Tank Area	FUNCTION: Primary System Makeup COMPONENTS: All Boric Acid Transfer Pumps and associated electrical cables	Provide borated makeup water from the Refueling Water Storage Tank.
9	Safety Injection Pump Room	FUNCTION: Primary System Makeup COMPONENTS: All SI Pumps and associated electrical cables	Provide makeup water using Charging and RHR Pumps.

TABLE 3-1 (Sheet 3 of 7)

ZONE NO.	ZONE NAME	REDUNDANT COMPONENTS	ALTERNATE METHOD OF SHUTDOWN
10	Diesel Generator Room	FUNCTION: Emergency power for shutdown equipment COMPONENTS: All Emergency Diesel Generators, Control Panel and associated electrical wiring	Power available to site from (2) 138kv feeders, (2) 13.8kv feeders and from gas turbines with black start capability.
11	Cable Spreading Room	FUNCTION: Primary System Makeup COMPONENTS: Power and Control cables for all Charging, SI and RHR Pumps	Provide primary makeup water as noted for Zone 1A.
		FUNCTION: Heat dump from the Primary System COMPONENTS: Power and control cables for Containment Spray Pumps, Containment Fan Coolers, and Pressurizer Relief Valves	Dump heat through the Secondary System.
		FUNCTION: Heat dump from the Secondary System COMPONENTS: Power and control cables for the Atmospheric Relief Valves	Operate valves locally using all pneumatic control system.
		FUNCTION: A-C Vital Power COMPONENTS: Inverter and associated electrical wiring	Normal 480 Volt power available to operate equipment on the vital buses.
13A	Valve Room	FUNCTION: Primary System Makeup COMPONENTS: Power cables for all SI and RHR Pumps	Provide makeup using Charging Pumps. Remove residual heat by operating with secondary side of Steam Generators flooded.
14	Switchgear Room	FUNCTION: Primary System Makeup COMPONENTS: Switchgear, Power and Control cables for all Charging, SI, RHR and Component Cooling Pumps	Provide primary side makeup as noted for Zone 1A.

TABLE 3-1 (Sheet 4 of 7)

ZONE NO.	ZONE NAME	REDUNDANT COMPONENTS	ALTERNATE METHOD OF SHUTDOWN
14 cont'd	Switchgear Room	FUNCTION: Secondary System Makeup COMPONENTS: Switchgear and power cables for motor driven ABF Pumps	Provide makeup using steam driven ABF Pump.
		FUNCTION: Heat dump from the Primary System COMPONENTS: Switchgear, Power and Control cables for Containment Spray Pumps and Containment Fan Coolers	Dump heat through Secondary System.
		FUNCTION: Instrument Air COMPONENTS: Instrument Air Compressors	Reserve of high pressure gas bottles and provisions for interconnecting the Station Air System.
15	Control Room	FUNCTION: All shutdown systems COMPONENTS: Control cables for all remote operated components Readout and control instrumentation Status annunciators and alarms	Shutdown using remote Pressurizer Pressure and Level Control Panel in the Primary Auxiliary Building and the remote Steam Generator Level Control Panel in the ABFP Building. Operate makeup equipment from local control panels.
18A	Valve Room and Corridor	FUNCTION: Residual Heat Removal COMPONENTS: Power cables for all RHR Pumps	Remove residual heat by operating with secondary side of Steam Generators flooded.
22	Screen Well Area	FUNCTION: Heat removal from the Component Cooling System COMPONENTS: All Service Water Pumps and associated electrical wiring	Provide once-thru cooling water as noted for Zone 2. Remove heat from the secondary side as noted for Zone 3A.
23	Aux. Boiler Feed Pump Room	FUNCTION: Secondary Side Makeup COMPONENTS: Three Auxiliary Feedwater Pumps and associated power and control cables	Let the steam generators boil dry and remove heat from primary system by blow-off through the pressurizer relief valves into containment.

TABLE 3-1 (Sheet 5 of 7)

ZONE NO.	ZONE NAME	REDUNDANT COMPONENTS	ALTERNATE METHOD OF SHUTDOWN
27A	Corridor	FUNCTION: Electric Supply for motor operated safety-related valves COMPONENTS: Motor Control Centers 26A and 26B and associated electrical wiring	Operate valves manually.
32A	Electrical Tunnel	FUNCTION: Primary System Makeup COMPONENTS: Power and Control cables for Charging Pumps. Power cables for SI, RHR and Component Cooling Pumps	Provide primary side makeup as noted for Zone 1A.
		FUNCTION: Secondary System Makeup COMPONENTS: Control cables for motor operated ABF Pumps	Provide makeup by using steam driven ABF Pump or local operation of motor ABF Pumps.
		FUNCTION: Heat dump from the Primary System COMPONENTS: Power and Control cables for Pressurizer Relief Valves. Power cables for Containment Fan Coolers and Containment Spray Pumps.	Dump heat through the Secondary System.
		FUNCTION: Heat dump from the Secondary System COMPONENTS: Power and Control cables for Atmospheric Relief Valves	Operate valves locally using all pneumatic control system.
60A	Chemical Addition Area	FUNCTION: Heat dump from the Secondary System COMPONENTS: Power and Control cables for Atmospheric Relief Valves	Operate valves locally using all pneumatic control system.
62A	Main Boiler Feedwater Regulator Area	FUNCTION: Secondary Side Makeup COMPONENTS: Main and two aux. feedwater regulators	Provide secondary side makeup using ABF Pumps and associated regulators.

TABLE 3-1 (Sheet 6 of 7)

ZONE NO.	ZONE NAME	REDUNDANT COMPONENTS	ALTERNATE METHOD OF SHUTDOWN
65A	Main Steam and Feed-water Valve Area	FUNCTION: Secondary System Heat Dump COMPONENTS: Atmospheric Relief Valves and Main Steam Safety Valves for: Steam Generator 21 and 22 (on Elev. 65') Steam Generator 23 and 24 (on Elev. 74')	Dump heat from alternate set of Relief and Safety Valves. (For fire on Elev. 65' use valves on Elev. 74' and the converse.)
71A	Reactor Coolant Pump Area	FUNCTION: Primary System Makeup COMPONENTS: Remote operated valves and associated electric cables for charging pumps and SI Pumps to the Primary System and for primary system to the RHR Pumps	Valves for SIS are in the safeguards position (open) during operation permitting use of the SI pumps for makeup.
72A	Outer Annulus	FUNCTION: Residual Heat Removal COMPONENTS: Remote operated valve and associated electric cables for primary system to RHR Pumps	Remove residual heat by operating with secondary side of Steam Generators flooded.
74A	Electrical Penetration Area	FUNCTION: Primary System Makeup COMPONENTS: Same as Zones 71A and 72A	Provide primary system makeup as noted for Zones 71A and 72A.
		FUNCTION: Secondary System Makeup COMPONENTS: Control cables for motor driven ABF Pumps	Provide makeup using steam driven ABF Pump. Operate motor driven ABF Pumps from remote shutdown panel.
		FUNCTION: Heat dump from the secondary side COMPONENTS: Power and control cables for the Atmospheric Relief Valves	Operate valves locally using all pneumatic control system.
		FUNCTION: Residual Heat Removal COMPONENTS: Same as Zone 72A	Remove residual heat by operating with secondary side of Steam Generators flooded.

TABLE 3-1 (Sheet 7 of 7)

ZONE NO.	ZONE NAME	REDUNDANT COMPONENTS	ALTERNATE METHOD OF SHUTDOWN
74A cont'd	Electrical Penetration Area	FUNCTION: Heat dump from the secondary system COMPONENTS: Power and Control for the Atmospheric Relief Valves	Operate valves locally using all pneumatic control system.
		FUNCTION: Heat dump from the Primary System COMPONENTS: Power and Control cables for the Pressurizer Relief Valves. Power cables for the Containment Fan Coolers	Dump heat through the secondary side.
75A	Outer Annulus	FUNCTION: Heat dump from the Primary System COMPONENTS: Power and Control cables for the Pressurizer Relief Valves. Power cables for the Containment Fan Coolers	Dump heat through the secondary side and RHR System.
77A	Outer Annulus	FUNCTION: Primary System Makeup COMPONENTS: Remote operated valves and associated cables for SI Pumps to the Reactor Coolant System	Valves are in the safeguards (open) position permitting use of the SI Pumps. Charging Pumps also available.
78A	Recirc. Pumps and RHR Heat Exchanger Area	FUNCTION: Residual Heat Removal COMPONENTS: Remote operated valves for RHR Pumps to Reactor Coolant System and for Component Cooling Water to RHR Heat Exchangers	Remove residual heat by operating with secondary side of Steam Generators flooded.
106A	Tank Farm	FUNCTION: Primary System Makeup COMPONENTS: Refueling Water Storage Tank Primary Water Storage Tank	Provide makeup from the Water Factory using Boric Acid Transfer Pumps, Storage and Batching Tanks for boron addition.

Question No. 4 - Reference IPFPR - Table 9-2

In describing the consequences of fire without fire protection for various safety-related zones, it is stated that there is "no effect on safe shutdown capability." Describe why there is no effect on safe shutdown, such as identifying how shutdown functions could be achieved and why the alternate components are not affected by the fire.

Response

The methodology used to determine the consequences of a fire was based on the grouping of safe shut-down equipment on a functional basis. The various systems which could be used to accomplish shutdown were detailed in Section 7 of the IPFPR.

The logic tree approach that was utilized to evaluate the effects of a fire in a zone consisted of:

1. Physically inspecting the plant to catalog all equipment and combustibles and to obtain an overview of each zone.
2. Selecting a zone for analysis.
3. Determining if the zone contained any shutdown components using the cataloged items as well as plant drawings.
4. Grouping components by shutdown function.
5. Evaluating the severity of a potential fire to determine if it could affect the components in the zone and if it could spread to adjacent zones taking into consideration:
   a) fixed and transient combustibles
   b) construction and location of equipment
   d) fire barriers
   d) pathways for fire propagation
6. Repeating item 5 for adjacent zones that could be affected by the fire.

7. Determining the total number of shutdown components that might be lost and what redundant components or alternate methods of shutdown would still be available.

8. Evaluating the consequences of the postulated fire using the following criteria:

   a) The fire would not have any effect if there were redundant equipment of alternate shutdown systems available.

   b) No credit would be taken for emergency repairs for any function which must be initiated in less than 12 hours (IPFPR page 6-1).

   c) Credit could be taken for the routing of emergency electrical cables for functions after the initial 12 hour period.

   d) No credit would be taken for fire suppression to mitigate the consequences of the fire (IPFPR page 9-2).

   e) The assumption that if redundant systems or components were in the same area, they would be lost in a single fire (IPFPR page 6-1) with the exception noted in item f below.

   f) A fire involving a specific piece of safety-related equipment would not necessarily force all equipment in that zone out of service. The partial or total loss of redundant system components would be determined on an individual basis for each zone . . . (IPFPR page 9-3)

Based on the above rationale, the results of the evaluation were

noted for each zone in Table 9-2 of the IPFPR. The alternate methods of shutdown which were considered to remain operational are shown in the response to Question No. 3 (Table 3-1).

Question No. 5 - Reference IPFPR - Page 9-49

a) In the fire zone discussions where the redundant emergency diesel generators are addressed, it is stated that these are "not required for safe-shutdown." Describe why these are not required for safe shutdown. Describe how safe shutdown conditions are achieved and maintained if offsite and station power is lost as a result of a fire.

b) In fire zone 10 of Unit 2, a fire may result in loss of all three diesels, yet it is stated that there is no effect on safe shutdown. For such a fire, indicate whether either normal or offsite power is required to maintain safe shutdown conditions. Provide an evaluation of the consequences of such a fire if both normal and offsite power are lost as a result of the fire. It is our position that credit for normal or offsite ac may not be taken for shutting down a unit during or following a fire. Identify where such credit may have been taken.

Response

In evaluating the consequences of a fire in the Diesel Generator Building, the simultaneous loss of offsite power was not considered to be a credible event. We do not agree with the Staff's position that credit for normal or offsite power may not be taken for shutting down the unit during or following a fire. The design of the system (Figure 5-1) is such that sufficient independence and isolation between the various sources of electrical power is provided in order to guard against concurrent loss of all auxiliary power. In addition, the guidelines for fire protection, as stated in Section A.4 of Branch Technical Position 9.5-1 Appendix A, does not require the consideration of a fire and the most severe natural phenomenon occurring concurrently. The dual event of a fire and loss of offsite power is contrary to this guideline.

Offsite power is supplied to Unit 2 by two 138kv overhead transmission lines and two 13.8kv underground feeders from the

Buchanan Sub-Station. Each of the 13.8kv feeders is backed up by a gas turbine with black start capability.

The Buchanan Sub-Station has two connections to the Con Ed Millwood Switching Station and a connection to the Buchanan 345kv yard. Power from the sub-station is supplied to the Unit No. 2 Station Auxiliary Transformer via Feeder No. 95332 or via Feeder 95331. Interconnection between the feeders is provided by an onsite switching station located adjacent to the Unit 1 Conventional Building.

During normal operation the Station Auxiliary Transformer provides power to two (No. 5 and 6) of six 6.9kv buses. The remaining four buses (No. 1, 2, 3, and 4) are supplied from the Unit Auxiliary Transformer. Buses 5 and 6 can also be supplied through the 13.8kv/6.9kv system. Bus tie breakers, connecting bus 5 to bus 1, bus 5 to bus 2, bus 6 to bus 3 and bus 6 to bus 4 are provided for start-up, shutdown, hot standby and emergency conditions.

Two 13.8kv underground feeders supply power to onsite sub-stations where it is stepped down to 6.9kv by individual transformers. While each of the feeds is normally assigned to one of the Units (No. 13W92 for Unit 2 and 13W93 for Unit 3), inter-ties at the sub-stations permit the crossfeeding from any line to any unit; again providing the diversity and independence between the various sources to guard against concurrent loss of all auxiliary power. A third 13.8kv underground feeder to Unit No. 1 (No. 13W94) can also be utilized to supply power to Units 2 and 3 through switching at the Buchanan Sub-Station.

Tied into each of the three 13.8kv feeders are three gas turbines rated at 20.2MW (Feeder 13W92), 24.2MW (Feeder 13W93), and 15.8MW (Feeder 13W94). Two of the turbines are located near the Buchanan Sub-Station while the third is onsite at Unit No. 1. All of the turbines have black start capability to permit usage even in the event of a total system failure.

Since the July 1977 black-out, Con Ed has embarked on an extensive program to improve the reliability of all of its gas turbine generating facilities. As part of this program one of the Indian Point units has been undergoing an extensive four-month overhaul which is scheduled to be completed June 1, 1978. Work on the remaining two units is scheduled to be started after the first unit is returned to service.

MILLWOOD 138 KV FDR 96952

MILLWOOD 138 KV FDR 96951

TIE TO 345 KV SYS. VIA "TA 5" BANK

SECT. 4 — SECT. 3 — SECT. 2 — SECT. 1

BANK 3 138/13.8

BANK 2 138/13.8

BANK 1 138/13.8

G.T.2 24.2 MW

G.T. 3 15.8 MW

BUCHANAN

13.8 KV FDR 13W93

L & P BUS SECT. 3

UNIT NO. 1

13.8 KV FDR. 13W92

UNIT NO 1

L & P BUS SECT 2

13.8 KV FDR 13W94

UNIT NO. 1

L & P BUS SECT 4

INDIAN POINT NO.1

INDIAN POINT NO.1

138/6.9 KV UNIT 2 STA AUX. XFMR.

138/6.9 KV UNIT 3 STA AUX. XFMR.

UNIT. NO. 1 GEN

TO UNIT NO. 3 6.9 KV BUSES

13.8/6.9 KV AUTO. XFMR.

G.T. 1 20.2 MW

13.8/6.9 KV AUTO XFMR

INDIAN POINT NO.2

TO UNIT NO. 3 6.9 KV BUSES

TO UNIT NO.2 MAIN XFMRS.

NO.2 UNIT AUX. XFORMER

22/6.9 KV

UNIT NO.2 GEN

BUS. NO.5 UNIT NO.2

BUS. NO.1 UNIT NO.2

BUS. NO 2 UNIT NO.2

BUS. NO. 3 UNIT NO.2

BUS NO. 4 UNIT NO.2

BUS. NO. 6 UNIT NO.2

STA. SERVICE XFMR. NO.5 6.9KV/48V

STA. SERVICE XFMR. NO. 2 6.9KV/480V.

STA. SERVICE XRMR. NO. 3 6.9KV/480V

STA. SERVICE XFMR. NO.6 6.9KV/480V

BUS. NO. 5A

BUS. NO. 2A

BUS. NO. 3A

BUS. NO. 6A

EMER. GEN. NO.21

480 VOLT DISTRIBUTION (TYPICAL)

480 VOLT DISTRIBUTION (TYPICAL)

EMER. GEN NO. 22

480 VOLT DISTRIBUTION (TYPICAL)

480 VOLT DISTRIBUTION (TYPICAL)

EMER. GEN NO. 23

FIGURE 5-1
INDIAN POINT STATION
ELECTRICAL ONE LINE DIAGRAM

Question No. 7 - Reference IPFPR - Pages 8-41 and 8-42

Verify that the ventilation duct and doorway penetrations of fire barriers are protected with dampers and doors that have a three-hour fire rating or a rating equivalent to that required of the fire barrier.

Response

Based on a review of the Indian Point Unit 2 ventilation drawings, the following duct penetrations, of fire barriers enclosing safety-related areas, do not have fire dampers:

Primary Auxiliary Building

El. 15' - Zone 3A: 18" x 28" duct in ceiling.

El. 59' - Zone 9: 24" x 30" & 22" x 10" ducts in east wall.

Zone 12A: 24" x 12" duct in north wall.

Zone 13A: 12" x 7" duct in west wall.

El. 80' - Zone 7A: 22" x 10" duct in north wall into Zone 6A.

Zone 7A: 46" x 26" duct in ceiling near Col. 6-C.

El. 98' - Zone 27A: 40" x 44" duct in floor near Col. 6-E.

Fan House

Zone 59A: 64" x 56" duct in north wall.

11' x 12' louver in west wall.

42" dia. duct in north wall.

52" x 46" duct in south wall.

Electrical Tunnel

Zone 32A: 30" x 60" duct in ceiling.

Control Building

El. 15' - Zone 14: Two 22" x 22" thru south wall from Unit No. 1 Battery Rooms.

5' x 12' louver in south wall.

Three 56" x 56" louvers in north wall.

El. 33' - Zone 11: 5' x 12' louver in south wall.

7" x 6" duct in south wall for Battery Room in Unit No. 1 (new installation).

18" x 18" duct in north wall from Unit No. 2 Battery Rooms.

12" x 12" duct in north wall from third Unit No. 2 Battery Room (new installation).

12" x 12" duct in north wall for Battery Room in Unit No. 1 (new installation).

Zone 12: 8" x 18" duct in north wall.

Zone 13: 8" x 18" duct in north wall.

----- : 7" x 4" duct in north wall of new Battery Room.

El. 53' ----- : Three ducts (26" x 10", 40" x 16" & 24" x 20") thru concrete ceiling of the Unit No. 1 portion of the Control Room for ventilation of the Unit No. 2 half & several openings for the Unit No. 1 ventilation.

The addition of fire dampers to the openings in the north wall and the two louvers in the south wall of the Control Building has been noted as a proposed change in the IPFPR.

The location of all doors will be shown on the drawings to be included in the response to Question No. 6. None of the doors carries an Underwriter's Label.

Question No. 9 - Reference IPFPR - Page 8-82

Provide drawings showing the installation of the oil collection system on the reactor coolant pumps. Sufficient detail should be provided to show how potential oil leakage or sprays from lube oil piping, lift pump, flange connections, oil cooler, bearing reservoirs, and reservoir sight glasses would be contained and drained away from the pump.

Response

The metal skirts and drip pans which were added to the Reactor Coolant Pumps of Units 2 and 3 are shown in the attached full-size Con Ed drawing (No. A210097-2).

Question No. 10 - Reference IPFPR - Page 9-2

The assumptions used in the fire hazards analysis include a statement that cable fires will not propagate due to the fire retardant capabilities of the cable. The effects of cable fires were not considered in the fire hazards analysis.

Credit for flame tests of Indian Point cables cannot be taken to demonstrate that a fire will not significantly propagate past its source. Whereas such tests may screen out highly combustible material, they in no way simulate the fire behavior of the cables in the configurations found in the Indian Point facilities.

We require additional information to update your fire hazards analysis. Throughout the plant, where redundant safe shutdown cables and or equipment are located in the same fire area, the consequences of unmitigated fires and consequences with protection should be described for cable fires. This analysis should consider: (1) cable as combustible material; (2) possible damage of safe shutdown cables in trays or conduit crossing over open cable trays of the redundant division or non-safety related cable trays; (3) possible damage due to combustible paths between redundant safe shutdown cables; and (4) possible damage to redundant safe shutdown systems due to room temperature buildup and radiant heat transfer. It should be noted that where cables for redundant safe shutdown systems are located in the same fire area, separation is not, of itself, sufficient assurance that redundant cables will not be involved in the postulated design basis fire. Possible involvement of redundant safe shutdown cables because of increased room temperature and radiant heat transfer or due to interposing combustible materials such as non-safety related cables in separate trays which provide a path between redundant trays must be considered.

Areas which may be excluded from the analysis are those fire areas: (1) in which only one division of safe shutdown cables and or equipment exists; or (2) for which an alternate safe shutdown capability exists without repairs during or following a fire.

Response

The analysis to determine the consequences of a fire was made with the assumption that all electrical cable in the same area would be lost. The results of the analysis for each zone were presented in Table 9-2 of the IPFPR and summarized in the response to Question No. 3 (Table 3-1).

The assumption of the total loss of all cable is a more severe case than could be reasonably expected, but was used to satisfy the

guidelines presented in Branch Technical Position 9.5-1. Con Ed still believes that its position on the flame retardant properties of the cable is justified because of the type used at Indian Point, the severe testing to which it is subjected and the minimal amounts of combustibles found in safety-related areas. Additional credence is given to this position when one considers the extraordinary and unrealistic measures that had to be taken by the Sandia Laboratory to produce a catastrophic cable tray fire.

Based on the testing to which the cable has been subjected, namely:

a) Standard vertical flame test which is in accordance with ASTM. D-470-59T, "Tests for Rubber and Thermoplastic Insulated Wire and Cable",

b) Five minute vertical flame test made with cable held in a vertical position and a 1750°F flame applied for 5 minutes, and

c) Bon-fire test which consists of exposing for 5 minutes, bundles of three or six cables to a flame produced by igniting transformer oil in a 12 inch pail with the cable supported horizontally over the center of the pail with the lowest cable 3 inches above the top of the pail,

we firmly believe that it will not support combustion without a sufficient amount of combustibles present to produce a significant and concentrated exposure fire. The areas of high cable concentration where safe shutdown cables are installed at

Indian Point Unit 2 are the Cable Spreading Room, the Electrical Tunnel and the Electrical Switchgear Room. Cable trays in these areas are of metallic construction with Unistrut or Binkley channel for support which is non-combustible. No PVC conduits or conduits made from other combustible materials are used. Fire loadings in these areas are low and there is no storage or accumulation of combustible materials present. It is, therefore, most improbable that a fire could occur which could generate the intense heating conditions necessary for total consumption and catastrophic type failure of all cable.

The cable used at Indian Point Unit 2 are of three general types:

a) PVC insulated with a closely woven glass braid and overall covering of lapped mylar tape and closely woven abestos braid saturated with a flame and moisture resistant finish.

b) EPR insulated with a neoprene or lead jacket.

c) Silicone rubber insulated with a lapped mylar tape separator and an overall braid of closely woven asbestos and finished with a flame and moisture resistant saturant.

With this type of fire resistant construction a fire will not propagate along the cable. This fact was demonstrated by the major fire which occurred in November 1971 during the plant construction. The fire was of such intensity that building structural steel and electrical equipment was damaged yet the cable was not damaged beyond the confines of the exposure area nor did it re-ignite after the external sources of combustion had been extinguished.

ENCLOSURE 2

Response to Staff Position

Indian Point Unit No. 2

Docket No. 50-247

May, 1978

Staff Position P-2

Manual hose stations should be provided so that all areas containing safety-related equipment may be reached and adequately covered with a maximum of 100 feet of fire hose.

Response

The staff position on fire hoses was considered and responded to in Paragraphs 8.31 and 8.66 of the IPFPR.

In Paragraph 8.31, which deals with the protection of roofs which do not meet Factory Mutual Class I requirements, Con Ed had proposed to add hose stations for the Fuel Handling and Primary Auxiliary Buildings as well as access to the roofs of other buildings to permit the use of existing stations.

In Paragraph 8.66, which deals with the location of hose stations, Con Ed has proposed to install stations in the Primary Auxiliary Building. The conceptual design for this modification consists of a standpipe system with the following hose stations:

Elevation 98' - 2 stations

Elevation 80' - 2 stations

Elevation 68' - 1 station

Elevation 15' - 1 station

Piping Penetration Area - 1 station

All of the stations would be equipped with 100 feet of 1-1/2 inch hose which would provide the required coverage throughout the building. The two elevations which do not have hose stations (59' and 42') can be reached by the hoses on Elevations 80' and 15', respectively.

With exception of the interior of containment (exempted by B.T.P.F.1 (b)), all areas containing safety-related equipment conform to the Staff's position.