JANUARY 3 1 1979

Docket No. 50-247

Mr. William J. Cahill, Jr.
Vice President
Consolidated Edison Company
of New York, Inc.
4 Irving Place
New York, New York 10003

Dear Mr. Cahill:

The Commission has issued the enclosed Amendment No. 46 to Facility Operating License No. DPR-26 for the Indian Point Nuclear Generating Plant, Unit No. 2, in response to your submittal dated December 15, 1976, as supplemented by letters dated March 3, 1977, April 15, 1977, May 17, 1978, September 18, 1978, October 31, 1978, November 16, 1978 and December 12, 1978.

This amendment adds license conditions relating to the completion of facility modifications and implementation of administrative controls for fire protection, and modifies the Technical Specifications to include additional limiting conditions for operation and surveillance requirements for existing fire protection systems that were relied upon in the fire protection program evaluation. These Technical Specifications have been discussed with and agreed to by your staff.

Certain items listed in Section 3.0 of the enclosed Safety Evaluation are marked with an asterisk or otherwise stated to require additional information in the form of design parameters, test results, or acceptance criteria to assure that the design is acceptable prior to actual implementation for these modifications. We request that you submit this information and propose revised Technical Specifications in accordance with the schedules provided in Section 3.1.

We have determined that no license amendment fee is required to accompany your response to the aforementioned request. This determination is limited to those applications or requests to incorporate our recommended Technical Specifications and those to add surveillance and other requirements for operable systems that have been added at our request. Any other unrelated changes or requests that you might choose to include in the fire protection requests would be subject to amendment fees in accordance with Section 170.22 of 10 CFR Part 170.

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SURNAME ▶					
DATE ▶					

Copies of the related Safety Evaluation and Notice of Issuance are also enclosed.

Sincerely,

Original Signed by
C M Trammell for

A. Schwencer, Chief
Operating Reactors Branch #1
Division of Operating Reactors

Enclosures:
1. Amendment No. 46 to DPR-26
2. Safety Evaluation
3. Notice of Issuance

cc: w/enclosures
See next page

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prevent loss of redundant charging pumps which may be required to maintain safe shutdown conditions.

5.3.6 Modifications and Recommendations

The licensee has proposed to install hose stations in this area and to provide smoke detectors in the corridors and charging pump rooms to afford prompt detection and suppression capability. In addition, the licensee has proposed to provide an independent shutdown capability that includes the capability for restoring power to the charging pumps (see Section 4.10) independent of fire damage in any of the charging pump cubicles or the waste storage and drumming area.

We find that, subject to implementation of the above described modifications, fire protection for elevations 80 and 98 feet of the primary auxiliary building conforms to the provisions of Appendix A to BTP 9.5-1 and is, therefore, acceptable.

5.4 Cable Spreading Room

5.4.1 Safety-Related Equipment

This area contains power, instrumentation and control cables for safety-related systems, some of which are required for safe shutdown. Equipment located in this area consists of RPS motor generator sets, D.C. inverters and chargers.

5.4.2 Combustibles

The significant combustible in this area consists of a large quantity of cable in open cable trays.

5.4.3 Consequences if No Fire Suppression

An unmitigated fire in this area could cause loss of control of safety-related systems from the control room and loss of power and control for some systems required for safe shutdown.

The steam-driven auxiliary feedwater pump could be operated independent of the cable spreading room by manual actuation of valves to provide decay heat removal under hot shutdown conditions. However, primary system makeup may not be available nor the necessary instrumentation to monitor safe shutdown.

5.4.4 Fire Protection Systems

Fire detection is provided by ionization type smoke detectors located at ceiling level. Fire extinguishment is provided by water hose stations and portable extinguishers.

5.4.5 Adequacy of Fire Protection

The fire detection and manual extinguishment capability could control fires in the area but may not be able to extinguish fires or prevent extensive damage to redundant systems required for safe shutdown due to the lack of a fire suppression system and due to the proximity of redundant safety-related cables.

5.4.6 Modifications and Recommendations

The licensee has proposed to protect the cable spreading room from an exterior transformer fire by providing fireproofing to protect the outside wall separating the room from the transformers, and to provide a 3-hour fire barrier between the cable spreading room and turbine building. In addition, the licensee has proposed to provide a capability independent of this area from which actions can be taken to achieve and maintain safe shutdown (see Section 4.10 for more detail). Furthermore, the licensee has proposed to provide a new exhaust fan in the north wall for smoke removal and a fixed manually actuated Halon total flooding suppression system in the cable spreading room in the event access to fight a fire in the area becomes difficult.

We find that, subject to implementation of these modifications, fire protection for the cable spreading room conforms to the provisions of Appendix "A" to BTP 9.5-1 and is, therefore, acceptable.

5.5 Battery Rooms

5.5.1 Safety-Related Equipment

The two redundant safety-related batteries which supply D.C. power to safe shutdown systems are housed each in its own individual enclosure. The rooms are adjacent to each other separated by a three-hour fire rated wall.

5.5.2 Combustibles

The significant combustibles in each battery room are the plastic battery cases and a very small amount of cable insulation. Hydrogen buildup is precluded by a continuously operating ventilation system.

5.5.3 Consequences if No Fire Suppression

An unsuppressed fire in one of the battery rooms could cause the loss of one, but not both, of the batteries due to the low fire hazard and the fire barrier between the rooms. There is a possibility, although unlikely, that hydrogen could build up on loss of ventilation flow and cause an explosion hazard with the potential for damaging both batteries. An unsuppressed fire in the cable spreading room could cause an exposure hazard to both batteries due to unrated fire doors and ventilation duct penetrations.

5.5.4 Fire Protection Systems

The primary extinguishing means is provided by water hose stations and portable extinguishers.

5.5.5 Adequacy of Fire Protection

Considering the limited quantity of combustibles, manual fire protection would be adequate to extinguish fires in these rooms. However, the lack of capability to detect loss of ventilation flow could allow creation of an explosion hazard.

Ventilation duct and door penetrations of the fire barriers between the cable spreading room and the battery rooms may not be adequate to prevent a cable spreading room fire from involving both batteries.

5.5.6 Modifications and Recommendations

The licensee has proposed to provide 3-hour fire rated ventilation duct dampers, fire doors and frames between the battery rooms and the cable spreading room and to provide a means to detect loss of battery room ventilation flow. Periodic checks will be performed of the ventilation flow monitoring system once per operating shift.

We find that, subject to implementation of these modifications, fire protection for the battery rooms conforms to the provisions of Appendix A to BTP 9.5-1 and is, therefore, acceptable.

5.6 Switchgear Room

5.6.1 Safety-Related Equipment

This area contains the 480 volt switchgear along with the power and control cables for both redundant divisions of safety-related equipment including safe shutdown equipment.

5.6.2 Combustibles

The significant combustibles in the area are lightly loaded cable trays stacked at most three high. The switchgear room also contains instrument air compressors which have a lube oil system with seven gallons of lube oil each.

5.6.3 Consequences if No Fire Suppression

The switchgear are in separate metal enclosures and separated such that an unmitigated fire in one switchgear would not affect the redundant switchgear. However, there are a few areas where redundant safety-related cables come in close proximity and could be affected by a cable fire at these locations. In addition, in the area of the compressor an oil fire could affect redundant cables in trays overhead which may affect safe shutdown.

5.6.4 Fire Protection Systems

Fire detection is provided by ionization smoke detectors located at the ceiling level throughout the room. Fire extinguishment capability is provided by water hose stations and portable extinguishers.

5.6.5 Adequacy of Fire Protection

The detection and manual suppression provided is adequate to detect and extinguish fires in the area. However, due to the proximity of redundant cable and the possibility of an oil fire affecting cables very rapidly, the manual capability may not be adequate to protect redundant safe shutdown systems. Also, the unrated wall between the switchgear room and the oil filled transformers may not be adequate to protect the switchgear room from a transformer fire.

5.6.6 Modifications and Recommendations

The licensee has proposed to protect the switchgear room from an exterior transformer fire by providing fireproofing to protect the outside wall separating the room from the transformer, and to provide a 3-hour fire barrier between the switchgear room and the turbine building. In addition, the licensee proposes to provide an alternate safe shutdown capability independent of this area as described in Section 4.10 of this report.

We find that, subject to implementation of these modifications, fire protection for the switchgear room conforms to the provisions of Appendix "A" to BTP 9.5-1 and is, therefore, acceptable.

5.7 Control Room

5.7.1 Safety-Related Equipment

The control room contains control cabinets and consoles within which are cables and components for safety-related systems including those systems required for safe shutdown of the plant.

5.7.2 Combustibles

The combustibles in the area consist mainly of electrical wiring insulation contained within the cabinets and consoles and a small amount of ordinary combustibles such as paper.

5.7.3 Consequences if No Fire Suppression

An unmitigated fire in the cabinets or consoles containing safe shutdown equipment would probably be limited to one section of the cabinet or console; however, due to the proximity of some safe shutdown controls and wiring within the panels, control of redundant safe shutdown equipment from the control room may be lost for localized fires. For localized fires, equipment for safe shutdown could be operated from the switchgear room and by manual operation of a few valves. In the event a larger fire

should occur, shutdown can be achieved by using instrumentation located outside the control room, operating equipment locally and from the switchgear room, and manually operating valves. Due to an unrated wall separating the control room from outside transformers, a transformer fire could cause loss of the control room through the wall.

5.7.4 Fire Protection Systems

Fire detection is provided in cabinets by ionization smoke detectors. Manual water hose stations and portable CO_2 extinguishers provide the fire extinguishment capability.

5.7.5 Adequacy of Fire Protection

Fire detection and manual extinguishment capability is adequate to control and suppress fires in this area; however, lack of an "A" rated fire extinguisher may allow fires to continue in cables until a fire hose is used, and control from the control room of some redundant safe shutdown systems may be lost due to their proximity to each other. The external wall protecting the control room from transformer fires is inadequate. Fires affecting safe shutdown equipment in the control room may cause a situation where a number of operators are needed to perform the shutdown functions in several locations which would take away resources needed to control and fight the fire.

5.7.6 Modifications and Recommendations

The licensee has proposed to protect the control room from an exterior transformer fire by providing fireproofing to protect the outside wall separating the room from the transformers, and to provide a 3-hour fire barrier between the control room and the turbine building. In addition, the licensee has proposed to provide a capability independent of this area from which actions can be taken to achieve and maintain safe shutdown (see Section 4.10 for more detail). The licensee has also proposed to (1) provide a portable fire extinguisher with a class "A" rating in the control room, (2) install a new range hood in the control room kitchen, (3) provide self-closing mechanisms on doors between the control room and adjacent kitchen and locker room areas, and (4) replace the wooden table and chart stand with metal units.

We find that, subject to implementation of these modifications, fire protection for the control room conforms to the provisions of Appendix "A" to BTP 9.5-1 and is, therefore, acceptable.

5.8 Cable Tunnel

5.8.1 Safety-Related Equipment

The cable tunnel which runs from the control building to the primary auxiliary building contains electrical cables for both divisions of safety-related equipment including safe shutdown equipment. Redundant safe shutdown cables are separated on either side of the tunnel with no crossovers within the tunnel.

5.8.2 Combustibles

The combustibles in this area consist of a large quantity of electrical cable insulation. Each cable is encased with an outer jacket of noncombustible asbestos or woven glass.

5.8.3 Consequences if No Fire Suppression

It is unlikely that an unmitigated cable fire would involve both divisions due to the incombustible nature of the cable sheath and due to the separation between divisions. However, should a larger fire occur involving both divisions, decay heat removal could still be accomplished by manual operation of the steam-driven auxiliary feedwater pump and steam generator blowdown.

At the cable spreading room end of the tunnel where cables enter the tunnel, redundant and safe shutdown cables could be damaged by a fire in the cable spreading room.

5.8.4 Fire Protection Systems

Fire detection is provided by ionization type smoke detectors and temperature sensors located throughout the tunnel. Fire extinguishment is provided by a closed head preaction sprinkler system to cover the cable trays at multilevels. Hose stations and portable extinguishers are located within access of the area. No automatic sprinkler protection is provided at the cable spreading room end of the tunnel to protect redundant safety-related cables required for safe shutdown.

5.8.5 Adequacy of Fire Protection

The fire protection within the tunnel is adequate to detect and extinguish fires and to prevent the involvement of redundant safe shutdown cables. The fire protection at the cable spreading room end of the tunnel is inadequate due to the proximity of redundant safe shutdown cables and due to the lack of automatic suppression at this location.

5.8.6 Modifications and Recommendations

The licensee has proposed to provide an alternate safe shutdown capability independent of this area as described in Section 4.10 of this report.

We find that, subject to implementation of these modifications, fire protection for the cable tunnel conforms to the provisions of Appendix A to BTP 9.5-1 and is, therefore, acceptable.

5.9 Turbine Building

5.9.1 Safety-Related Equipment

There is no safety-related equipment or electrical cables located within the building.

5.9.2 Combustibles

Significant combustibles in the turbine building include: turbine lube oil in the storage tanks, reservoir, conditioner and piping system; lube oil in the boiler feed pumps; hydrogen seal oil; hydrogen; and electrical cable insulation. The lube oil piping system is of the guarded double-pipe design.

5.9.3 Consequences if No Fire Suppression

An unsuppressed fire in the turbine building could cause significant damage to nonsafety-related systems and structures. A major fire in this area could also damage the control room, cable spreading room and switchgear room because of inadequately protected penetrations and a wall that is non-fire rated construction separating the turbine building from these areas.

5.9.4 Fire Protection Systems

Automatic foam systems are provided on the turbine lube oil storage tanks, reservoir and conditioner; the boiler feed pump lube oil reservoir and oil console; and the hydrogen seal oil unit. The foam systems have actuation alarms in the control room to provide fire notification to plant personnel. Foam hose stations and portable extinguishers are also provided near these hazards.

5.9.5 Adequacy of Fire Protection

The areas containing large quantities of combustible liquids are acceptably protected with automatic foam suppression systems. However, a lube oil piping break could result in a major fire beyond the area protected by the foam systems, with the result that protection of the control building would depend upon manual fire fighting efforts and the integrity of the fire barrier between the turbine building and the control building.

5.9.6 Modifications and Recommendations

The licensee has proposed to provide 3-hour rated wall construction, cable penetration seals, fire doors and dampers in the barrier between the turbine building and the control building. The licensee also proposes to lock fire doors between the turbine building and the control building.

We find that, upon completion of these modifications, fire protection for the turbine building will satisfy the objectives of Section 2.2 of this report and, is therefore, acceptable.

5.10 Intake Structure

5.10.1 Safety-Related Equipment

The six service water pumps are located in the open at the intake structure. At least one of these pumps may be required to achieve safe shutdown.

5.10.2 Combustibles

Each of the service water pumps contains about one quart of lube oil. Six circulating water pumps are also located in the open at the intake structure, and each of these pumps contains approximately 25 gallons of lubricating oil.

5.10.3 Consequences if No Fire Suppression

An unmitigated lube oil fire at one of the circulating water pumps could damage one or more of the service water pumps. However, considering the small amount of fuel and the outside location, it is very unlikely that all six of the service pumps would be rendered inoperative by such a fire.

5.10.4 Fire Protection System

No fire detection is provided at the service water pumps, dependence being placed upon discovery by personnel. Yard hydrants and hose are available for manual fire fighting.

5.10.5 Adequacy of Fire Protection

Manual protection is acceptable for this area because of the limited amount of fuel and the outside location which reduces heat damage potential and provides good access for fire fighting.

5.10.6 Modifications and Recommendations

We find that fire protection for the area satisfies the objectives of Section 2.2 of this report and is, therefore, acceptable.

5.11 Diesel Generator Building

5.11.1 Safety-Related Equipment

The three emergency diesel generators are located in this building, along with associated day tanks and control panels. At least one diesel generator would be required for safe shutdown if offsite power is interrupted.

5.11.2 Combustibles

The significant combustibles in this area are diesel fuel, lube oil, and a small amount of electrical cable insulation.

5.11.3 Consequences if No Fire Suppression

An unsuppressed fire in this area could cause loss of all three emergency diesel generators, and could prevent safe shutdown of the plant if offsite power were interrupted at the same time.

5.11.4 Fire Protection Systems

Heat detectors are provided in the building, and wet pipe automatic sprinklers are installed in the sump area beneath the diesel engines and on the day tanks. Manual fire hoses would be available from nearby fire hydrants outside the building.

5.11.5 Adequacy of Fire Protection

Coupled with the floor drains and curbs, the sprinklers as installed will minimize the damage potential from fuel or lube oil spills. However, existing fire protection is not adequate to prevent damage to adjacent diesel generators and the building structure from a pressurized fuel leak on one of the diesel engines.

5.11.6 Modifications and Recommendations

The licensee proposes to erect shields between the diesel generator units and to provide one-hour fire proofing on the building structure, and install backflow prevention check valves on drain lines.

We find that, subject to implementation of these modifications, fire protection for the diesel generators satisfies the objective of Section 2.2 of this report and is, therefore, acceptable.

5.12 Auxiliary Feed Pump Building

5.12.1 Safety-Related Equipment

This area contains the two motor-driven auxiliary feed pumps, the steam-driven auxiliary feed pump, associated valves and electrical cabling, power and control cables for the atmospheric relief valves, and one of the panels used for shutdown if the control room is not inhabitable. One steam-driven or motor-driven pump would be required for safe shutdown.

5.12.2 Combustibles

The significant combustible in this area is the lubricating oil associated with the auxiliary feedwater pumps.

5.12.3 Consequences if No Fire Suppression

Due to the limited amount of oil in the pumps, a postulated unsuppressed fire would not affect more than one auxiliary feed pump. Safe shutdown could be achieved using the unaffected pumps.

5.12.4 Fire Protection Systems

Fire suppression capability is provided by portable extinguishers, and by fire hose from nearby yard hydrants in proximity to the auxiliary feed pump building. No fire detectors are provided for this area.

5.12.5 Adequacy of Fire Protection

Manual fire suppression capability would be adequate to control and suppress fires in this area and limit damage to one pump as a result of the fire; however, lack of fire detectors may allow the fire to continue unnecessarily, and lack of adequate fire hose at yard hydrants may hamper fire fighting activities.

5.12.6 Modifications and Recommendations

To provide prompt fire detection capability and suppression capability for this area, the licensee has proposed to provide fire detectors in this area and additional fire hose at yard hose houses.

Subject to implementation of these modifications, fire protection for the auxiliary feed pump building conforms to the provisions of Appendix A to BTP 9.5-1 and is, therefore, acceptable.

5.13 Containment Building

5.13.1 Safety-Related Equipment

Safety-related equipment inside the containment building which is required for safe shutdown includes the reactor vessel, pressurizer and steam generator; primary system piping; steam and feedwater piping; residual heat removal heat exchanger and associated valves; control rod drives; and instrumentation for pressurizer pressure and level, and steam generator level.

5.13.2 Combustibles

The significant combustible materials in this area are the reactor coolant pump lube oil (approximately 250 gallons in each of the four pumps), electrical cable insulation, small amounts of lube and hydraulic oil in other equipment, and charcoal filters. The cable insulation is mostly concentrated at the penetration area.

5.13.3 Consequences if No Fire Suppression

An unmitigated fire in the electrical cable penetration area could cause loss of redundant instrumentation required for safe shutdown. An unmitigated reactor coolant pump lube oil fire could cause damage to safety-related equipment in the vicinity.

5.13.4 Fire Protection Systems

Smoke detectors are provided at the outer annulus and in one of the containment fan cooler areas. Charcoal filters in the containment cooling system have thermistor fire detection and manual water spray that can be actuated from outside containment.

Portable carbon dioxide fire extinguishers are available for manual fire suppression.

5.13.5 Adequacy of Fire Protection

The fire detection provided would not promptly detect all cable insulation and lube oil fires. Portable extinguishers would not be adequate to control all potential fires in the combustibles present.

5.13.6 Modifications and Recommendations

The licensee has proposed to make the following modifications inside containment:

(1) Install additional fire detectors in areas containing concentrations of electrical cable and on the reactor coolant pumps.

(2) Provide pneumatic indication of pressurizer pressure and level, and steam generator level indication independent of existing electrical indication systems.

(3) Improve the oil leak collection system on the reactor coolant pumps.

(4) Provide hose for manual fire fighting to reach the reactor coolant pumps and areas containing a significant amount of electrical cable.

We find that, subject to implementation of these modifications, the fire protection conforms to the provisions of Appendix "A" to BTP 9.5-1 and is, therefore, acceptable.

5.14 Fan House

5.14.1 Safety-Related Equipment

The fan house contains the electrical penetration area outside containment where redundant cables are located for certain instrumentation required for safe shutdown. Control cables for the auxiliary feedwater pumps also pass through this area. Containment penetration cooling fans and charcoal filters are located in the fan house, but these are not required for safe shutdown.

5.14.2 Combustibles

The combustibles in this area include insulation on electrical cables in open trays, and charcoal filters.

5.14.3 Consequences if No Fire Suppression

An unsuppressed fire in the electrical penetration area could damage instrumentation necessary for safe shutdown. Although remote control of the auxiliary feedwater pumps could also be lost, local operation of the pumps could be used to achieve safe shutdown.

5.14.4 Fire Protection Systems

Smoke detectors are provided in the electrical penetration area. Charcoal filters have thermistor fire detection and manual water deluge systems. Fire fighters have only portable extinguishers for manual fire suppression.

5.14.5 Adequacy of Fire Protection

With prompt fire detection, manual suppression should be able to control fires in the electrical penetration area. However, the lack of fire hose stations in the area would not permit effective fire fighting.

The fire detection and fixed manual water deluge systems on the charcoal filters provide acceptable protection for these units.

5.14.6 Modifications and Recommendations

The licensee has proposed to provide fire hose stations to serve the fan house.

We find that, subject to implementation of this modification, fire protection for the area satisfies the objectives of Section 2.2 of this report and is, therefore, acceptable.

5.15 Yard Area

5.15.1 Safety-Related Equipment

The yard area contains the service water pumps located at the intake structure and the buried fuel oil tanks for the emergency diesel generators.

5.15.2 Combustibles

The combustibles which were considered for their potential to expose safety-related systems include oil-filled transformers and three underground diesel fuel tanks.

5.15.3 Consequences if No Fire Suppression

An unsuppressed fire in the oil-filled transformers north of the control building could damage the exterior building wall, exposing the control room, cable spreading room, and 480-volt engineered safety features switchgear room to severe fire damage.

The diesel oil storage tanks are located adjacent to the emergency generators; however, since they are buried, there is no significant fire potential.

In other areas, an unsuppressed fire in the yard would not present a significant exposure to safety-related systems because of intervening distance or barriers.

5.15.4 Fire Protection Systems

The oil-filled transformers adjacent to the control building are protected by automatic water spray systems. Hydrants and hose are available for manual fire fighting in the yard area.

5.15.5 Adequacy of Fire Protection

The wall separating the oil-filled transformers from the control building is inadequate to prevent serious damage to safety-related systems if the transformer water spray systems should be impaired at the time of a fire.

Manual suppression should be adequate to control other yard area fires.

5.15.6 Modifications and Recommendations

The licensee has proposed to upgrade the north wall of the control building with fire resistive construction, and with fire doors or fire dampers protecting all openings. The hydrogen trailers containing hydrogen cylinders will be relocated a distance of at least 50 feet from any building containing safe shutdown equipment.

We find that, subject to implementation of this modification, fire protection for the yard area satisfies the objectives of Section 2.2 of this report and is, therefore, acceptable.

6.0 ADMINISTRATIVE CONTROLS

The administrative controls for fire protection consist of the fire protection organization, the qualifications and training for fire protection personnel, the controls to be exercised over combustibles and ignition sources, plans and procedures for fighting fires in the various plant areas, and the quality assurance provisions for fire protection. The licensee has provided a detailed description of proposed administrative controls. Plans and procedures stipulating the management and staff organization and its qualifications; the fire brigade training program; controls over combustibles and ignition sources; and the prefire plans for fighting fires are being revised or developed and implemented. The program, as provided in the Revision 1 comparison to BTP 9.5-1 submitted April 15, 1977 as supplemented by letter dated October 31, 1978, is found acceptable by the staff using items referenced in Sections 1.0(e) and 1.0(f) of this report.

We have evaluated the areas at Indian Point-2 to determine the minimum required fire brigade size to cope with fires that may occur, and have determined that a five man brigade is required. The licensee has proposed a five man fire brigade to be available on site during all shifts, and independent of demands placed on operating personnel and the security force in a fire situation.

We find that, subject to implementation of the above described programmatic changes, the administrative controls for the fire protection program satisfy the objectives identified in Section 2.2 of this report and are, therefore, acceptable.

7.0 TECHNICAL SPECIFICATIONS

The Technical Specifications have been modified to incorporate interim Technical Specifications which include limiting conditions for operation and surveillance requirements for existing fire protection systems and administrative controls. Following the implementation of the modifications of fire protection systems and administrative controls resulting from this review, the Technical Specifications will be similarly modified to incorporate the limiting conditions for operation and surveillance requirements for these modifications.

8.0 CONCLUSION

The licensee has performed a fire hazards analysis and has proposed certain modifications to improve the fire protection program. Additional modifications have been proposed by the licensee during the course of our review, which are based upon the fire hazards analysis and our onsite evaluation of the fire protection program. These proposed modifications are summarized in Section 3.1.

In summary, significant steps are being taken to provide additional assurance that safe shutdown can be accomplished and the plant can be maintained in a safe condition during and following potential fire situations. Upon implementation of the licensee's proposed modifications summarized in Section 3.1, we find that the provisions of Section 2.0 are satisfied and that:

(1) Combustibles in safety-related areas are limited to the extent practicable;

(2) Fire detection and suppression systems will minimize, consistent with other safety requirements, the effects of fire on safety-related systems and will not in themselves significantly impair the capability of safety-related systems;

(3) Redundant safe shutdown systems are separated from each other and, where practicable, from significant combustibles by barriers or distances, or are adequately protected by fire suppression systems, such that a fire in any fire area will not prevent safe shutdown of the plant;

(4) A fire in any fire zone will not damage safety-related structures such that they cannot perform their safety function;

(5) The fire protection organization has the professional qualifications to implement the fire protection program, and administrative controls are adequate to maintain control of combustibles, ignition sources, and the fire protection organization; and

(6) A fire in any fire zone will not cause the release of amounts of radioactive material in excess of those considered in previous safety evaluations.

We find that the licensee's proposed modifications described herein are acceptable both with respect to the improvements in the fire protection program that they provide and with respect to continued safe operation of the facility.

In the report of the Special Review Group on the Browns Ferry Fire (NUREG-0050) dated February 1976, consideration of the safety of operation of all operating nuclear power plants pending the completion of our detailed fire protection evaluation was presented. The following quotations from the report summarize the basis for the Special Review Group's conclusion that the operation of the facility need not be restricted for public safety.

> "Fires occur rather frequently; however, fires involving equipment unavailability comparable to the Browns Ferry fire are quite infrequent (see Section 3.3 of [NUREG-0050]). The Review Group believes that steps already taken since March 1978 (see Section 3.3.2) have reduced this frequency significantly.
>
> "Based on its review of the events transpiring before, during and after the Browns Ferry fire, the Review Group concludes that the probability of disruptive fires of the magnitude of the Browns Ferry event is small and that there is no need to restrict operation of nuclear power plants for public safety. However, it is clear that much can and should be done to reduce even further the likelihood of disabling fires and to improve assurance of rapid extinguishment of fires that occur. Consideration should be given also to features that would increase further the ability of nuclear facilities to withstand large fires without loss of important functions should such fires occur."

We recognize that the "Risk Assessment Review Group Report to the U. S. Nuclear Regulatory Commission" NUREG/CR-0400 (The Lewis Committee Report), states that this Review Group is unconvinced of the correctness of the WASH-1400 conclusion that fires contribute negligibly to the overall risk of nuclear plant operation.

However, it is our conclusion that the operation of the facility, pending the implementation of all facility modifications, does not present an undue risk to the health and safety of the public. This is based on our concurrence with the Browns Ferry Special Review Group's conclusions identified above as well as the significant improvements in fire protection already made at the facility since the Browns Ferry fire. These include establishment of administrative controls over combustible materials and use of ignition sources, training and staffing of a fire brigade, and issuance of technical specifications to provide limiting conditions for operation and surveillance requirements on fire protection systems.

We have determined that the license amendment does not authorize a change in effluent types or total amounts nor an increase in power level and will not result in any significant environmental impact. Having made this determination, we have further concluded that the amendment involves an action which is insignificant from the standpoint of environmental impact and pursuant to 10 CFR 51.5(d)(4) that an environmental impact statement, or negative declaration and environmental impact appraisal need not be prepared in connection with the issuance of this amendment.

We have concluded, based on the considerations discussed above, that: (1) because the amendment does not involve a significant increase in the probability or consequences of accidents previously considered and does not involve a significant decrease in a safety margin, the amendment does not involve a significant hazards consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (3) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

9.0 CONSULTANTS' REPORT

Brookhaven National Laboratory under contract to the NRC has provided the services of fire protection consultants who participated in the evaluation of the fire protection program. They have also participated in the preparation and review of this safety evaluation report. Their report, "Fire Protection in Operating Nuclear Power Stations, Indian Point Unit 2 Safety Evaluation Report Review," dated December 28, 1978, discusses many items which have been addressed in this report. The consultants' recommendations which we have not totally adopted are discussed in Appendix "B." Our basis for not adopting these recommendations is given therein.

Appendix A

CHRONOLOGY

In February 1976, the report by the NRC Special Review Group was issued as NUREG-0050, "Recommendations Related to the Browns Ferry Fire."

On May 1, 1976, Standard Review Plan (SRP) 9.5.1, "Fire Protection," was issued, incorporating the various recommendations contained in NUREG-0050.

By letter dated May 11, 1976, Consolidated Edison Company of New York (the licensee) was requested to compare the existing fire protection provisions at their facilities with NRC guidelines as set forth in SRP 9.5.1, "Fire Protection," dated May 1, 1976, and to describe (1) the implementation of the guidelines met, (2) the modifications or changes underway to meet the guidelines in the near future, and (3) the guidelines that will not be met and the basis therefor.

By letter of June 2, 1976, Consolidated Edison stated that the information requested in our May 11, 1976 letter would be supplied by December 15, 1976.

By letter of September 30, 1976, Consolidated Edison was requested to provide the results of a fire hazards analysis and propose Technical Specifications pertaining to fire protection. Consolidated Edison was also provided a copy of Appendix A which includes acceptable alternatives to the guidelines of SRP 9.5.1.

By letters of December 2, 1976, December 14, 1976, and June 16, 1977, we provided model Technical Specifications and requested submittal of fire protection Technical Specifications.

By letters of December 15, 1976, March 3, 1977 and April 15, 1977, Consolidated Edison provided submittals responding to our requests of May 11, 1976 and September 30, 1976.

By letter of January 11, 1977, we provided a description and agenda for our fire protection site visit.

By letters dated July 20, 1977, and August 2, 1977, Consolidated Edison provided proposed Technical Specifications for fire protecton.

By letter dated August 4, 1977, we provided a copy of "Nuclear Plant Fire Protection Functional Responsibilities, Administrative Controls and Quality Assurance."

By letter dated November 30, 1977, we issued Technical Specifications for fire protection.

On April 20, 1978, we requested additional information.

On May 17, 1978, Consolidated Edison submitted responses to our April 20, 1978 letter.

On June 13-16, 1978, the DOR fire protection team visited Indian Point 2. On June 16, 1978, a meeting was held at the plant during which the review team presented positions and requests for additional information.

By letter of August 31, 1978, we stated staff positions and requested additional information.

By letters dated September 18, 1978 and October 31, 1978, Consolidated Edison submitted responses to staff requests for additional information and positions requested August 31, 1978.

On November 2, 1978, we transmitted additional positions and requests for information in connection with the licensee's submittal of September 18, 1978.

By letter of November 16, 1978 and December 12, 1978, Consolidated Edison provided responses to our November 2, 1978 letter.

By letter of January 10, 1979, Consolidated Edison proposed Technical Specifications for the gas turbine generators.

Appendix B

DISCUSSION OF CONSULTANTS' REPORT

Under Contract to Nuclear Regulatory Commission, Brookhaven National Laboratory has provided the services of fire protection consultants who participated in the evaluation of the licensee's fire protection program and in the preparation of the Safety Evaluation Report (SER). Their report, "Fire Protection in Operating Nuclear Power Stations Indian Point Station, Unit 2 Safety Evaluation Report Review," Rev. 1, dated December 28, 1978, Indian Point 2, discusses several matters which have been addressed in the SER. The consultants' report contains recommendations which have, for the most part, been implemented during our evaluation. The consultants' recommendations which we have not adopted, along with our basis therefor, are identified herein.

1. Consultants' Comment: Valve Supervision

"SER Item 4.3.1.3 indicates that certain valves in the fire water piping system are electrically supervised such as the first gate valve upstream of control valves on water spray, sprinkler and foam systems, and suction and discharge valves at the fire pumps. Certain other valves are chained and locked in the open position. Electrical valve supervision should be provided on sectionalizing valves and on all valves controlling fire water systems. The present proposal of incorporating administrative controls and locks is unacceptable. See later dated July 13, 1977 to Mr. R. L. Ferguson from Mr R. E. Hall."

Staff Response:

The guidelines of Appendix A to BTP 9.5-1 allow electrical supervision, locking, or sealing with tamper proof seals with periodic inspection as a means of assuring that valves in fire protection water systems are in the correct position. Valves on other systems in the plant are presently under administrative control. The plant Technical Specifications require a monthly check of all valves in the flow path to fire suppression systems. A review by the staff of Licensee Event Reports on all plants using such periodic checks indicates that valves being in the incorrect position has not been a significant contributor to valve related failures. Additionally, standing water as a result of failure of suppression system piping will not damage safety-related equipment due to curbs, drains, mounting of equipment above floor level, grating, and doorways. To date, the staff has not found any data that indicate that electrical valve supervision will significantly improve the availability of fire suppression systems in nuclear power plants.

2. Consultant's Comment: Hose Coupling Gaskets

There is no provision in the Draft SER which satisfies the need to provide two spare hose coupling gaskets in the sizes used at each hydrant hose cabinet, and all applicable hose stations of the plant. This is an important need, and particularly so in a plant using adapters to achieve hose thread compatibility with the local fire departments.

Staff Response:

Although the SER does not specifically reference the provision of space hose coupling gaskets, it does note in Section 3.120 that the licensee has proposed to upgrade hydrant hose houses to include all equipment required by NFPA-24. Among the items required by NFPA-24 are two spare hose gaskets at each hose house. Since the licensee has committed to provide the equipment required by NFPA-24 we believe that the consultant's concern has already been adequately addressed by the licensee and does not represent a differing engineering point of view with the staff.

3. Consultant's Comment: Hose Stations

SER Item 3.1.7 is vague and the word "AREAS" as used is too broad. It is imperative that the hose line must have sufficient length that an effective hose stream can be brought to bear on any spot or burning object wherever it may be in the area; merely "reaching to the door" of a room or compartment will not satisfy this requirement. Therefore, it is suggested that this alternate wording be used: "Manual hose stations shall be so located that an effective fire stream, when using an approved nozzle attached to not more than 100 feet of hose, can be brought to bear on any portion of any area containing safety-related equipment."

Staff Response:

The consultant's concern that section 3.1.7 is "vague" or "too broad" is unwarranted. Section 3.1.7 merely summarizes the licensee's proposed changed. The wording of the actual commitment by the licensee is more detailed and extensive than section 3.1.7. The licensee's detailed commitment is contained in his submittal of May 17, 1978.

The licensee's commitment, including details on locations of proposed hose stations, demonstrates that all safety related areas can be adequately covered. This clearly does not mean only reaching the door. We believe that the licensee's commitment satisfies the consultant's concern and that section 3.1.7 does not represent a differing engineering point of view.

4. Consultants' Comment: Smoke Removal

"SER Item 4.4.1 indicates that portable fans and ducts will be accepted as the means for removing smoke from many plant areas. Fires in electrical insulation can generate copious amounts of dense smoke which hamper fire control efforts by rendering the atmosphere toxic and reducing visibility in the area. Properly used, self-contained breathing apparatus can minimize the problem of toxic atmosphere, but little can be done to improve visibility except to remove the smoke from the building.

"Massive changes will be required in most areas of this plant if effective permanent smoke removal systems are required, the design of which would also have to include consideration of radioactivity releases. While portable fans and ducts may be effective for smoke control in many instances, there is concern that they will not be sufficient for a major fire in some areas of the plant. It is recommended that this item be held open until better guidelines are developed for the evaluation of smoke generation potential and smoke removal system design."

Staff Response:

Additional information and improved equipment would provide some benefit in the design and construction of fixed ventilation systems to be used for smoke removal in future plants. However, a massive plant redesign of current plant ventilation systems is not warranted because portable smoke removal equipment can be used in those areas with inadequate fixed smoke removal systems. Portable smoke removal units have been used in fire service for a sufficient length of time so that the limits on their use are well understood.

In plants where smoke removal is dependent on such equipment, smoke removal is not generally initiated until the room atmosphere is cooled sufficiently, by fixed sprinkler operation or manual hose fogging to permit entry by fire fighting personnel. Ventilation prior to this time serves no purpose but to add oxygen to active fire sites. The current fire service portable smoke removal units have a sufficiently high temperature capability to remove smoke when the hot gases are cooled enough for fire brigade entry. The manual fire fighting consultants have made their evaluations of the fire fighting capabilities of a number of plants and have recommended use of the portable smoke exhaust systems. We require the licensees and applicants to develop prefire plans which include the proper use of ventilation equipment in each plant area of concern. This is addressed in our Administrative Controls review.

Consequently, there is adequate information available at this time to continue to evaluate plant smoke removal capability. The use of fire suppression equipment, fire barriers and other fire protection measures is evaluated based on the need for immediate access into an area and

the limitations imposed by the currently available portable smoke removal units. These concerns are evaluated on an area basis at each plant with due consideration of the advice of the manual fire fighting consultants.

5. Consultant's Comment: Turbine Building

SER Item 5.9 concludes that fire protection in the turbine building is acceptable. However, the licensee's fire hazard analysis does not adequately address the consequences of an unsuppressed lube oil fire in the turbine building (see October 24, 1977 letter from L. P. Herman to R. E. Hall on this subject). At this plant the turbine building is particularly critical, as compared to most other nuclear power plants, in that major portions of the building containing the lube oil piping system are not protected by automatic sprinklers.

Staff Response:

In the above mentioned letter, Mr. Herman states his belief that manual fire fighting would not provide an effective backup to automatic suppression systems in the turbine building, and that automatic suppression systems are not highly reliable. He suggests that all plants should be designed to sustain an unsuppressed turbine building fire that could result in collapse of the turbine building.

The staff does not deem such a design event assumption to be consistent with criteria used in evaluating other plant areas. In other areas such as in the cable spreading room, our conclusions are based on a defense in depth approach that includes administrative controls, effects of fires if automatic systems operate and effects of fires if combatted using manual suppression systems. We, therefore, have allowed the licensee to evaluate the effects of fires in the turbine building assuming the automatic suppression systems protecting major oil hazards function as designed.

We have determined that the oil hazards in the turbine building are protected as follows: automatic foam systems are provided on the turbine lube oil storage tanks, reservoir and conditioner, the boiler feed pump, lube oil reservoir and oil console, and the hydrogen seal oil unit; foam hose stations and portable extinguishers are provided near these hazards. In addition, manual hose stations and portable extinguishers are provided throughout the turbine building to supplement these automatic suppression systems.

We have found that these systems provide adequate protection to assure the integrity of the turbine building. The staff believes that the reliability of such systems is at least equivalent to suppression systems in other areas of the plant and does not warrant design of the turbine building to sustain an unsuppressed fire.

With respect to the consultant's concern with the lube oil piping, we believe that adequate protection is afforded by the guard piping for this system (i.e., pipe within a pipe where the inner pipe is the pressurized lube oil line and the outer pipe is the nonpressurized guard pipe that drains to the reservoir). With the guard pipe, we conclude that adequate protection is provided for leakage in lube oil piping, and that additional suppression systems are not required.

UNITED STATES NUCLEAR REGULATORY COMMISSION

DOCKET NO. 50-247

CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.

NOTICE OF ISSUANCE OF AMENDMENT TO FACILITY OPERATING LICENSE

The U. S. Nuclear Regulatory Commission (the Commission) has issued Amendment No. 46 to Facility Operating License No. DPR-26, issued to Consolidated Edison Company of New York, Inc. (the licensee), which revised Technical Specifications for operation of the Indian Point Nuclear Generating Unit No. 2 (the facility), located in Buchanan, Westchester County, New York. The amendment is effective as of its date of issuance.

The amendment adds a license condition relating to the completion of facility modifications to improve the fire protection program and modifies the Technical Specifications to include additional limiting conditions for operation and surveillance requirements for existing fire protection systems.

The application for the amendment complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations. The Commission has made appropriate findings as required by the Act and the Commission's rules and regulations in 10 CFR Chapter I, which are set forth in the license amendment. Prior public notice of this amendment was not required since the amendment does not involve a significant hazards consideration.

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The Commission has determined that the issuance of this amendment will not result in any significant environmental impact and that pursuant to 10 CFR §51.5(d)(4) an environmental impact statement, or negative declaration and environmental impact appraisal need not be prepared in connection with issuance of this amendment.

For further details with respect to this action, see (1) the application for amendment dated December 15, 1978, as supplemented by letters dated March 3, 1977, April 15, 1977, May 7, 1978, September 18, 1978, October 31, 1978, November 16, 1978 and December 12, 1978; (2) Amendment No. 46 to License No. DPR-26; and (3) the Commission's related Safety Evaluation. All of these items are available for public inspection at the Commission's Public Document Room, 1717 H Street, N.W., Washington, D. C. and at the White Plains Public Library, 100 Martine Avenue, White Plains, New York. A copy of items (2) and (3) may be obtained upon request addressed to the U. S. Nuclear Regulatory Commission, Washington, D. C. 20555, Attention: Director, Division of Operating Reactors.

Dated at Bethesda, Maryland, this 31st day of January, 1979.

FOR THE NUCLEAR REGULATORY COMMISSION

Charles M. Trammell

Charles M. Trammell, Acting Chief
Operating Reactors Branch #1
Division of Operating Reactors

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

January 31, 1979

Docket No. 50-247

Mr. William J. Cahill, Jr.
Vice President
Consolidated Edison Company
of New York, Inc.
4 Irving Place
New York, New York 10003

Dear Mr. Cahill:

The Commission has issued the enclosed Amendment No. 46 to Facility Operating License No. DPR-26 for the Indian Point Nuclear Generating Plant, Unit No. 2, in response to your submittal dated December 15, 1976, as supplemented by letters dated March 3, 1977, April 15, 1977, May 17, 1978, September 18, 1978, October 31, 1978, November 16, 1978 and December 12, 1978.

This amendment adds license conditions relating to the completion of facility modifications and implementation of administrative controls for fire protection, and modifies the Technical Specifications to include additional limiting conditions for operation and surveillance requirements for existing fire protection systems that were relied upon in the fire protection program evaluation. These Technical Specifications have been discussed with and agreed to by your staff.

Certain items listed in Section 3.0 of the enclosed Safety Evaluation are marked with an asterisk or otherwise stated to require additional information in the form of design parameters, test results, or acceptance criteria to assure that the design is acceptable prior to actual implementation for these modifications. We request that you submit this information and propose revised Technical Specifications in accordance with the schedules provided in Section 3.1.

We have determined that no license amendment fee is required to accompany your response to the aforementioned request. This determination is limited to those applications or requests to incorporate our recommended Technical Specifications and those to add surveillance and other requirements for operable systems that have been added at our request. Any other unrelated changes or requests that you might choose to include in the fire protection requests would be subject to amendment fees in accordance with Section 170.22 of 10 CFR Part 170.

Copies of the related Safety Evaluation and Notice of Issuance are also enclosed.

Sincerely,

for CM Trammell
A. Schwencer, Chief
Operating Reactors Branch #1
Division of Operating Reactors

Enclosures:
1. Amendment No. 46 to DPR-26
2. Safety Evaluation
3. Notice of Issuance

cc: w/enclosures
See next page

cc: White Plains Public Library
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.

DOCKET NO. 50-247

INDIAN POINT NUCLEAR GENERATING UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 46
License No. DPR-26

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Consolidated Edison Company of New York, Inc. (the licensee) dated December 15, 1976, as supplemented by letters dated March 3, 1977, April 15, 1977, May 17,1978, September 18, 1978, October 31, 1978, November 16, 1978 and December 12, 1978, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission"s regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

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2. Accordingly, Operating License No. DPR-26 is amended by changes to the Technical Specifications as indicated in this attachment to this license amendment, and by changing paragraph 2.C.(2) and by adding paragraph 2.I to read as follows:

   C.(2) The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 46 , are hereby incorporated in the license. The licensee shall operate the Facility in accordance with the Technical Specifications.

   I. The licensee may proceed with and is required to complete the modifications identified in Paragraphs 3.1.1 through 3.1.25 of the NRC's Fire Protection Safety Evaluation (SE) on the facility dated January 31, 1979. The modifications shall be completed in accordance with the schedule contained in Paragraph 3.1 of the SE and supplements thereto.

   The licensee is required to implement and maintain the administrative controls identified in Section 6 of the NRC's Fire Protection Safety Evaluation on the Facility dated January 31, 1979. The administrative controls shall be in effect by June 1, 1979.

3. This license amendment is effective as of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Charles M. Trammell

for A. Schwencer, Chief
Operating Reactors Branch #1
Division of Operating Reactors

Attachment:
Changes to the Technical
Specifications

Date of Issuance: January 31, 1979

ATTACHMENT TO LICENSE AMENDMENT NO. 46

FACILITY OPERATING LICENSE NO. DPR-26

DOCKET NO. 50-247

Replace the following pages of the Appendix "A" Technical Specifications with the enclosed pages. The revised page is identified by Amendment number and contains vertical lines indicating the area of change.

Remove	Replace
3.13-3	3.13-3
4.14-4	4.14-4

D. Fire Detection Systems

1. As a minimum, the fire detection instrumentation for each location shown in Table 3.13-1 shall be operable whenever equipment in that location is required to be operable.

2. With the number of operable fire detection instruments less than the minimum required by Table 3.13-1:

   a. A fire watch patrol shall be established within 1 hour where accessiblity permits to inspect the location(s) with less than the minimum operable instrumentation at a frequency of at least once per hour.

   b. The minimum operable instrumentation required in Table 3.13-1 shall be restored within 14 days or a Special Report shall be prepared and submitted to the Commission pursuant to specification 6.9.2.d within the next 10 days outlining the cause of the malfunction and the plans for restoring the instrumentation to operable status.

E. Fire Hose Stations

1. The following fire hose stations shall be operable whenever equipment in the area is required to be operable:

   a. Hose Station - Stairwell No. 3
      (Control Building: El. - 15')

   b. Hose Station - Stairwell No. 3
      (Control Building: El. - 33')

   c. Hose Station - Stairwell No. 3
      (Control Building: El. - 53')

   d. Hose Station - Stairwell - East End of Control Building
      (Control Building: El. - 53')

   e. Fire hydrant No. 27 and associated hose house with fire hose and nozzles to serve the diesel generator building.

   f. Fire hydrant No. 25 and associated hose house and nozzles to serve the auxiliary feedwater pump building.

2. If the requirements of 3.13.E.1. cannot be satisfied, an additional equivalent capacity hose shall be routed to the affected area from an operable hose station within one hour.

Basis

These specifications are established to assure the operability of fire protection and detection systems provided to protect equipment utilized for safe shutdown of the unit. The fire protection and detection systems are described in Revision 1 to "Review of the Indian Point Station Fire Protection Program" submitted to the NRC by letter dated April 15, 1977.

E. Fire Hose Station and Hydrant Testing:

1. Fire hose stations and hydrants described in specification 3.13.E.1 shall be demonstrated operable by the following surveillance testing requirements:

Item	Frequency
a. Visual Inspection Test--Visual inspection of the hose stations and hose houses to assure all required equipment is at the station or hosehouse.	once/month
b. Hydrant Inspection--	
1. Visually inspect each hydrant barrel to verify it is drained.	once/year (in the fall)
2. Flow test each hydrant to demonstrate its operability.	once/year (in the spring)
c. Hose Removal Check--Removal of the hose for inspection and replacement of all degraded gaskets in couplings.	once/18 months
d. Hose Flow Test--Partial opening of each hose station and hydrant valve to verify valve operability and no flow blockage.	once/3 years
e. Hose Hydrostatic Test--Conduct a hose hydrostatic test at a pressure at least 50 psig greater than the maximum pressure available at any hose station.	once/3 years for interior fire hose; once/year for outside fire hose.

Basis

These specifications establish the surveillance program for fire protection and detection systems provided to protect equipment utilized for safe shutdown of the unit. This surveillance program is intended to verify the operability of these systems and will identify for corrective action any conditions which could prevent any portion of the systems from performing its intended function.

The fire protection and detection systems are described in Revision 1 to "Review of the Indian Point Station Fire Protection Program" submitted to the NRC by letter dated April 15, 1977.

FIRE PROTECTION

SAFETY EVALUATION REPORT

BY THE

OFFICE OF NUCLEAR REACTOR REGULATION

U.S. NUCLEAR REGULATORY COMMISSION

IN THE MATTER OF

CONSOLIDATED EDISON COMPANY

INDIAN POINT UNIT NO. 2 PLANT

DOCKET NO. 50-247

January 31, 1979

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1.0 INTRODUCTION

Following a fire at the Browns Ferry Nuclear Station in March 1975, the Nuclear Regulatory Commission initiated an evaluation of the need for improving the fire protection programs at all licensed nuclear power plants. As part of this continuing evaluation the NRC, in February 1976, published a report by a special review group entitled, "Recommendations Related to Browns Ferry Fire," NUREG-0050. This report recommended that improvements in the areas of fire prevention and fire control be made in most existing facilities and that consideration be given to design features that would increase the ability of nuclear facilities to withstand fires without the loss of important functions. To implement the report's recommendations, the NRC initiated a program for reevaluation of the fire protection programs at all licensed nuclear power stations and for a comprehensive review of all new license applications.

The NRC issued new guidelines for fire protection programs in nuclear power plants which reflect the recommendations in NUREG-0050. These guidelines are contained in the following documents:

(a) "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," NUREG-75/087, Section 9.5.1, "Fire Protection," May 1976, which includes "Guidelines for Fire Protection for Nuclear Power Plants" (BTP APCSB 9.5-1), May 1, 1976.

(b) "Guidelines for Fire Protection for Nuclear Power Plants" (Appendix A to BTP APCSB 9.5-1), August 23, 1976.

(c) "Supplementary Guidance on Information Needed for Fire Protection Program Evaluation," September 30, 1976.

(d) "Sample Technical Specifications," May 12, 1977.

(e) "Nuclear Plant Fire Protection Functional Responsibilities, Administrative Controls and Quality Assurance," June 14, 1977.

(f) "Manpower Requirements for Operating Reactors," memo from E. Case to V. Stello, R. Boyd, and R. Mattson dated May 11, 1978.

All licensees were requested to: (1) compare their fire protection programs with the new guidelines; and (2) analyze the consequences of a postulated fire in each plant area.

We have reviewed the licensee's analyses and have visited the plant to examine the relationship of safety-related components, systems and structures with both combustibles and the associated fire detection and suppression systems. Our review was based on the fire protection review

team's site visit of June 13-16, 1978 and the licensee's proposed program for fire protection as described in the following docketed information:

(1) The Indian Point Unit 2 Safety Analysis Report;

(2) "Review of Indian Point Station Fire Protection Program," Rev. 1, dated April 15, 1977; and

(3) The licensee's responses dated May 17, 1978, September 18, 1978, October 31, 1978, November 16, 1978 and December 12, 1978 to requests for additional information and staff positions.

Our review has been limited to the aspects of fire protection related to the protection of the public from the standpoint of radiological health and safety. We have not considered aspects of fire protection associated with life safety of onsite personnel and with property protection, unless they impact the health and safety of the public due to the release of radioactive material.

This report summarizes the results of our evaluation of the fire protection program at Consolidated Edison Company's Indian Point Unit 2 Plant. The chronology of our evaluation is summarized in Appendix A of this report.

2.0 FIRE PROTECTION GUIDELINES

2.1 General Design Criterion 3 - "Fire Protection"

The Commission's basic criterion for fire protection is set forth in General Design Criterion 3, Appendix A to 10 CFR Part 50, which states:

> "Structures, systems, and components important to safety shall be designed and located to minimize, consistent with other safety requirements, the probability and effect of fires and explosions.
>
> "Noncombustible and heat resistant materials shall be used wherever practical throughout the unit, particularly in locations such as the containment and the control room.
>
> "Fire detection and protection systems of appropriate capacity and capability shall be provided and designed to minimize the adverse effects of fires on structures, systems, and components important to safety.
>
> "Fire fighting systems shall be designed to assure that their rupture or inadvertent operation does not significantly impair the safety capability of these structures, systems, and components."

2.2 Supplementary Guidance

Guidance on the implementation of General Design Criterion 3 for existing nuclear power plants has been provided by the NRC staff in "Appendix A" of Branch Technical Position 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants."

Appendix A provides for a comprehensive program assuring a substantial level of fire protection, beyond minimums that might be deemed to satisfy General Design Criterion 3.

The overall objectives of the fire protection program embodied in BTP 9.5-1 and Appendix A are to:

(1) Reduce the likelihood of occurrence of fires;

(2) Promptly detect and extinguish fires if they occur;

(3) Maintain the capability to safely shut down the plant if fires occur; and

(4) Prevent the release of a significant amount of radioactive material if fires occur.

We have used the guidance in Appendix A to BTP 9.5-1 as appropriate in our review. We have evaluated alternatives proposed by the licensee to various specific aspects of Appendix A to BTP 9.5-1 using the overall objectives outlined above to assure that these objectives are met for the actual relationship of combustibles, safety-related equipment, and fire protection features of the facility.

3.0 SUMMARY OF MODIFICATIONS

3.1 Modifications

The licensee plans to make certain plant modifications to improve the fire protection program as a result of both licensee and staff evaluations. Such proposed modifications are summarized below. The sections of this report which discuss the modifications are noted in parentheses following each item. Further detail is contained in the licensee submittals.

The following modifications have been completed: emergency lighting (3.1.8), battery room loss of ventilation detection (3.1.9), self-contained kitchen range hood applicance for control room (3.1.19.2), self-closing door mechanism on control room kitchen and locker room doors (3.1.19.4), equipment in hydrant hose house south of the diesel generator building (3.1.20.1), equipment in hose house south of the auxiliary feed pump building (3.1.20.2), and fire brigade equipment (3.1.22).

The halon gas suppression system in the cable spreading room (3.1.12.1) will be completed by December 31, 1979. The following modifications will be completed by end of the fourth refueling outage, presently scheduled for late 1980 or early 1981: alternate safe shutdown capability (3.1.11), reactor coolant pump oil collection (3.1.13) and fire detectors for the reactor coolant pumps (3.1.15), diesel generator protection (3.1.16), and containment hose stations (3.1.17).

The licensee is proceeding expeditiously on all pre-installation aspects of the remaining modifications and has committed to the installation of these modifications as soon as possible, contingent upon delivery of materials and the availability of the plant to safely make the modifications without requiring special reactor shutdown for that purpose, but no later than October 1980. A schedule for completion of these modifications will be submitted by April 1, 1979.

Proposed Technical Specifications are to be submitted at least 90 days prior to the implementation date for the following: roof protection (Section 3.1.2), water supply (3.1.4), hose stations (3.1.7), cable spreading room protection (3.1.12), fire detectors (3.1.15), and containment hose stations (3.1.17). Proposed Technical Specifications for the gas turbines (3.1.24) were submitted January 10, 1978.

Certain items listed below are marked with an asterisk to indicate that the NRC staff will require additional information in the form of design details to assure that the design is acceptable prior to actual implementation of these modifications. The balance of the other modifications has been described in an acceptable level of detail.

3.1.1 Hydrogen Trailer (5.1.5.6)

Hydrogen trailer containing H_2 cylinders will be relocated to a minimum of 50 feet from any building containing safe shutdown equipment.

3.1.2 Roof Protection (4.3.1.4, 4.16)

Hose station coverage will be provided for metal deck roofs on buildings which house safe shutdown systems or in which a fire could increase the potential for radioactive releases.

The roof of the control building will be rebuilt to meet Factory Mutual Class I requirements.

3.1.3 Identification of Loop Valves (4.3.1.3)

On the underground fire main loop, visible markings will be provided for all buried isolation valves to clearly denote their location.

*3.1.4 Water Supply (4.3.1.1, 4.3.1.2)

A diesel-driven fire pump will be installed in the fire protection water supply system. This pump will provide redundant capacity to the two existing electric pumps. Water supply for this pump will be taken from a new water tank to be built next to the pump. The new pump installation will comply with NFPA 20, "Standard for the Installation of Centrifugal Fire Pumps," and will be sized in accordance with the criteria of BTP E.2(e), but in no case will be smaller than 300,000 gallons. Deviations from NFPA 20 will be identified and justified by the licensee. The second water tank will be supplied by the 16-inch water main running between the 1.5 million gallon tank and the plant site.

Both the existing electric pumps and the proposed diesel pump will be able to take suction from both the existing and the proposed tank. Valving will be provided to allow the water in the new tank to flow back into the 16-inch main and thus supply the electric pumps also. A pipe will be installed between the outlet of the new tank and the 16-inch main. This pipe will be normally valved shut but could be opened to allow the diesel to draw water directly from the 1.5 million gallon tank outlet.

Design information should be provided on pump location, protection, capacity, and connection to the yard loop.

3.1.5 Cable Tunnel Protection (4.3.1.7)

Spray system drain baffles will be installed in the electrical tunnel cable trays to prevent water from entering the cable spreading room.

3.1.6 Breathing Apparatus (4.4.3)

A fire fighter's emergency breathing air capability sufficient to supply safe breathing air for 10 people for 6 hours will be provided. A sufficient

number of self-contained breathing units will be permanently located near the air lock.

3.1.7 Hose Stations (4.3.1.4)

Manual hose stations will 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.

3.1.8 Emergency Lighting (4.6)

Fixed battery packs will be provided for access lighting to safety-related areas and in the control room.

3.1.9 Battery Room Loss of Ventilation Detection (5.5.6)

Loss of battery room ventilation flow detection will be provided by flow indication in conjunction with a required periodic flow check.

3.1.10 Fire Water Valve Supervision (4.3.1.3)

All valves whose closure could cause loss of water to hose stations or sprinkler systems serving safety-related areas in the fire water system will be locked, electrically supervised or provided with tamper indication seals and periodic checks.

For stand pipe risers with no shutoff valves, outside-screw and yoke (OS&Y) valves will be installed in the risers at their connection to the header.

3.1.11 Alternate Safe Shutdown Capability(4.10)

A capability to reach and maintain hot shutdown for at least 72 hours without repairs to damaged cabling will be provided that is independent of the switchgear room, electrical control and power cables in containment, the electrical tunnel, the cable spreading room and control room. This capability will include instrumentation for pressurizer pressure and level and for steam generator level, control and power for auxiliary feedwater, and control and power for reactor coolant makeup and boration.

3.1.12 Cable Spreading Room Protection (5.4.6)

(1) A manually actuated fixed halon gas suppression system will be provided in the cable spreading room.

(2) An exhaust fan will be installed in the north wall for smoke removal.

*3.1.13 Reactor Coolant Pump Oil Collection System (5.13.6)

The reactor coolant pump oil collection system will be improved where required to provide capability for collecting leakage from the following points where they exist: flanged connections, drain plugs, fill points, upper and lower reservoirs, sight glasses, lift pump, and external oil

cooler. The leakage will be collected and drained to a closed container. Details should be provided on modifications to be made to the lube oil system and the oil collection system, and results of the evaluation of the existing oil collection system.

3.1.14 Floor Drains (4.5)

Backflow prevention devices will be provided in the floor drains for each diesel generator sump. Such devices will also be provided for drains for safety-related areas that are tied in to the turbine building drains.

*3.1.15 Fire Detectors (4.2)

Additional fire detectors are being provided so that each safety-related area with significant combustible loading, and each safety-related control room cabinet and console is provided with detection devices. Details on where detectors are to be located are provided in licensee submittals of May 26, 1978 and September 18, 1978. The fire detection and signaling systems will be connected to one of the buses intertied to the emergency diesel generators. Details should be provided on detector locations in containment.

*3.1.16 Diesel Generator Protection (5.11.6)

To protect the diesel generators against oil spray fires from failures in oil piping of the adjacent unit, a shield between the engine-generator units will be constructed to prevent a pressurized oil leak fire on one unit from damaging adjacent units, and one-hour fireproofing of the building structure will also be provided. Details should be provided on shield location, size and construction.

3.1.17 Containment Hose Stations (4.3.1.4, 5.13.6)

Manual hose stations will be provided inside containment for suppressing fires that may occur. Sufficient hose outlets, lengths of hose, and capacity will be provided to reach all areas containing electrical cables in trays and the reactor coolant pump areas with an effective fire fighting hose stream.

3.1.18 Fire Water Main Loop Valves (4.3.1.3)

(1) Two additional sectionalizing valves will be installed in the high pressure fire loop on either side of the takeoff for the header supplying diesel generator building sprinkler systems.

(2) All hydrants and post indicator valves vulnerable to motor vehicle damage will be barricaded.

(3) Obstructions to the rotation of the hydrant stem nut wrench through 360° will be removed or relocated, including those hydrants where snow sign standards are too close to the fire hydrant.

3.1.19 Control Room

(1) The combustible table and chart stand in the control room will be replaced with metal ones. (5.7.6)

(2) A self-contained kitchen range hood appliance with filters to collect fat vapors will be provided. (5.7.6)

(3) Existing carbon dioxide portable extinguishers may not be effective in extinguishing deep-seated fires in wiring or paper combustibles. To preclude having to use a manual fire hose in such a situation, a portable water fire extinguisher with "A" rated extinguishing capability will be provided for the control room. (4.3.3, 5.7.6)

(4) Self-closing door mechanisms will be installed on the control room kitchen and locker room doors. (5.7.6)

3.1.20 Yard Hose Houses (4.3.1.3)

(1) The hydrant hose house south of the diesel generator building will contain a 2-1/2-inch x 1-1/2-inch x 1-1/2-inch gated wye attached to the male end of 100 feet of 2-1/2-inch hose, at least 150 feet of 1-1/2-inch fire hose in two lengths, and two 1-1/2-inch spray nozzles.

(2) The hose house south of the auxiliary feed pump building at elevation 15 feet will contain at least 50 feet of 2-1/2-inch fire hose equipped with one 2-1/2-inch x 1-1/2-inch x 1-1/2-inch gated wye, 150 feet of 1-1/2-inch hose, and two 1-1/2-inch hose nozzles.

(3) Curb valves will be added in the lateral to each of the hydrants which presently do not have them.

(4) Two new hose houses will be added to the north loop and the specified auxiliary equipment specified by NFPA-24 will be added to the seven existing hose houses.

3.1.21 Hydrant Barrels (4.3.1.3)

All fire hydrants which may be used to fight fires in safety-related areas, or where isolation of the hydrant may cause loss of sprinkler or hose station water to safety-related areas, will be tested for proper drainage of their dry barrels each fall prior to freezing weather and again each spring for freeze damage after the freezing season.

3.1.22 Fire Brigade Equipment

A fire equipment and supply room accessible to fire brigade leaders on all shifts will be provided. Additionally, the following equipment will be available onsite for fire fighting activities:

(1) Ten (10) sealed beam hand held electric lanterns; (4.6)

(2) Three portable smoke exhausters with flexible ductwork, with a combined capacity of 17,500 to 20,000 cfm; (4.4.1) and

(3) Ten sets of fire fighter's protective clothing, including turnout coats and pants, and helmets.

The system will be improved to readily distinguish between the full and expended air storage bottles for use in the air mask bottle cascade refilling assembly.

3.1.23 Administrative Controls (6.0)

Procedures will be changed to include provisions of the fire plan describing how staff guidelines on fire protection administrative controls are met.

3.1.24 Technical Specifications for the Gas Turbines (4.10)

The gas turbines may be required to supply emergency power for the alternate shutdown system (3.1.19). The licensee has proposed Technical Specifications to assure availability of the gas turbines. These Technical Specifications will be reviewed and incorporated in a subsequent amendment.

3.1.25 Fire Barriers and Penetrations

(1) The pedestrian doors in the primary auxiliary building and control building that are within 50 feet of the transformers will be replaced with fire rated doors. (4.9.1)

(2) The wall separating the control building from the transformers in the yard will be upgraded to improve its fire resistance. In addition, to provide an adequate barrier to isolate control building areas from potential transformer fires, three-hour fire rated dampers will be provided in the ventilation openings in the new wall. Each opening in the wall will be fitted with an automatic closing device that will protect the opening in the event of a transformer fire. The closing devices for the wall will be automatically activated upon "trip" of the transformer fire protection water spray deluge valves. (4.9.2, 4.11)

(3) The ducts extending from the Unit 1 water treatment room through the switchgear room will be protected by rated fire dampers where the ducts penetrate the partition wall. (4.9.2)

(4) The double doors on the south wall of the switchgear room that provide access to the Unit 1 turbine building will be removed and the opening closed with fire rated construction. (4.9.1)

(5) The damper in the existing air inlet to the switchgear room from the turbine building will be replaced with a motor-operated fusible link fire door that will be activated by heat and/or smoke. (4.9.2)

(6) The existing fire damper at the transfer grille between the turbine building and the cable spreading room will be replaced with a fusible link, motor-operated fire door that will be activated by heat or smoke. (4.9.2)

* (7) The barrier between the control building and turbine building will be upgraded to be three-hour fire rated, including all doorway, ductwork and cable penetrations. Details will be provided describing required modifications to achieve a three-hour fire-rating for the wall. (4.9.1, 4.9.2, 4.11, 5.4.6)

(8) Three-hour fire doors, frames, and dampers will be provided in the walls between the battery rooms and the cable spreading room.

(9) Stairs 8 and 9 in the chemical systems building will be modified as follows:

(a) Eliminate ventilation openings through doors.

(b) Ducts penetrating the stairwells will be protected by fire rated enclosures.

(c) The ventilation openings and louvered openings into the stairwells will be removed and the openings closed off to match the existing wall construction.

(d) The supply registers serving the stairwells will be removed. New ducts, enclosed in fire rated construction, will be added to provide air flow.

(10) The outside air duct crossing stair No. 1 in the nuclear service building will be protected by a fire rated enclosure. The ventilation openings into the stairwell will be closed off.

(11) All openings around piping in fire barrier penetrations in the control building will be sealed to prevent entrance of smoke and fire.

(12) Cable penetration fire stops in critical fire barriers will be upgraded to a design that has satisfactorily passed the ASTM-E-119 fire exposure. This upgrading will include installation of "Marinite" collars and sleeves and mineral wool blanket and further application of a flame retardant coating at the fire stop. (4.9.3)

4.0 EVALUATION OF PLANT FEATURES

4.1 Safe Shutdown Systems

There are several arrangements of safe shutdown systems which are capable of shutting down the reactor and cooling the core during and subsequent to a fire. The exact arrangement available in a fire situation will depend upon the effects of the fire on such systems, their power supplies and control stations. To preclude a single event from affecting redundant systems, these systems are separated into safety divisions, any one of which would be capable of achieving safe shutdown.

During or subsequent to a fire, safe shutdown could be achieved using equipment such as the reactor trip system, charging pumps or the high pressure injection pumps, auxiliary feedwater system, service water system, low pressure injection system, and certain instrumentation. Supporting systems and equipment may also be required such as the emergency diesel generators, the engineered safety features batteries, and various valves to align required equipment and to isolate systems not required.

We have evaluated the separation between the various systems which can be used for safe shutdown to determine that they are either adequately separated or that adequate fire protection is provided such that a fire will not cause the loss of capability to perform the safe shutdown function. The adequacy of separation of safe shutdown equipment and of the fire protection provided is discussed in other sections of this report.

4.2 Fire Detection and Signaling Systems

The plant has a protective signaling system that transmits fire alarm and supervisory signals to the control room where audible and visual alarms are provided. The system includes signals for actuation of fire detectors; automatic sprinkler, water spray and foam systems; and fire pumps. Electrical supervisory signals are received from tamper switches on some of the fire water system control valves.

The signaling system does not have an emergency power supply and will not function on loss of normal AC. Otherwise, the system complies with those provisions of the NFPA Standards which are considered essential for a facility of this type. The licensee has proposed to provide the fire detection and signaling system with an emergency power supply.

Smoke detectors of the ionization type have been provided in many areas of the plant. Heat detectors are provided in the diesel generator building, and are also utilized to actuate water spray systems on yard transformers; foam systems on turbine building oil hazards; and pre-action systems in

the electrical tunnel. Thermistor-type heat detectors are provided in charcoal filters.

There are several areas containing significant combustible hazards and safety-related equipment and electrical cables that are not provided with fire detection. The licensee has proposed to install detectors in these areas.

We find that, subject to implementation of these modifications, the fire detection and signaling system satisfies the objectives identified in Section 2.2 of this report, and is, therefore, acceptable.

4.3 Fire Control Systems

4.3.1 Water Systems

4.3.1.1 Water Supply

Fire protection water, as well as sanitary and service water, is received from a 16-inch city main which supplies a 1.5 million gallon, ground level storage tank. Two electric fire pumps take suction from a low pressure line extending from the storage tank to the plant. A 20,000 gallon roof tank is also available, providing gravity flow to the fire water system. This does not provide two independent full capacity water supplies. To resolve this deficiency, the licensee has proposed to upgrade the fire water supply by the installation of a second independent source in the form of a storage tank of at least 300,000 gallons capacity supplying a diesel fire pump.

We find that, subject to implementation of this modification, the fire water supply system conforms to the provisions of Appendix A to BTP 9.5-1, and is, therefore, acceptable.

4.3.1.2 Fire Pumps

Two electric motor-driven centrifugal fire pumps, each having a rated capacity of 1500 gpm at 98 psi, are provided. Two small capacity electric jockey pumps are provided to maintain pressure on the fire water system. The fire pumps are arranged to start automatically when the fire loop pressure drops due to a large water demand.

Both fire pumps are located in the Unit 1 turbine building and could be subject to damage by a major fire in this area. Additionally, the pumps are supplied electrical power from the offsite power grid, the interruption of which would result in the loss of both pumps.

The pumps are not full redundant systems because the combined capacity of both existing fire pumps would be required to simultaneously supply the largest water spray system and potential hose stream demands. The licensee has proposed to provide a diesel fire pump taking suction from the new storage tank identified in Section 4.3.1.1; this pump will have sufficient capacity to provide 100% redundancy to the two electric fire pumps and would be available on loss of offsite power. Also, the diesel

fire pump will be located in a separate building not subject to damage from a turbine building fire.

We find that, subject to implementation of this modification, the fire pumps conform to the provisions of Appendix A to BTP 9.5-1 and are, therefore, acceptable.

4.3.1.3 Fire Water Piping System

The two electric fire pumps are supplied by a single suction line extending from the water storage tank, and therefore a single break in this line would remove both pumps from service. The new fire pump and tank to be installed as described in Sections 4.3.1.1 and 4.3.1.2 above will not rely on this suction line from the present large water storage tank. Therefore, the new pump could provide water to the loop if a break were to occur in the single line from the large water storage tank.

The fire pumps discharge through separate lines into the fire loop which presently supplies fixed water suppression systems, fire hose stations and exterior fire hydrants for Units 1, 2 and 3. With the addition of the diesel fire pump, the licensee also proposes to close valves which will isolate the Unit 3 fire water system from that serving Units 1 and 2.

Sectionalizing valves are provided to allow isolation of various sections of the fire loop for maintenance or repair. Some sectionalizing valves are of the buried box type. However, there is a portion of the piping system where a single break could eliminate both automatic suppression and manual fire hose capability at the diesel generator building. To resolve this deficiency, the licensee has proposed to add sectionalizing valves which will prevent a single pipe break from causing loss of both automatic and manual suppression at the diesel generator building.

Individual standpipe risers in the plant which supply hose stations do not have control valves at the fire loop connection. To allow isolation of an individual riser without affecting water supply to other risers or to suppression systems, the licensee has proposed to install control valves on fire hose standpipes at the header connections.

Fire hydrants are strategically placed around the exterior of the plant. However, not all of the hydrant laterals are equipped with an auxiliary gate valve to permit the hydrant to be removed from service for repair without shutting off a portion of the fire loop. Most hydrants are provided with a hose house; however, some of the hose houses lack sufficient hose and ancillary manual fire fighting equipment. Certain hydrants require vehicle guards to prevent damage from vehicular traffic.

To resolve these deficiencies the licensee has proposed to:

(1) Install an auxiliary gate valve on each hydrant lateral not so equipped;

(2) Provide two additional hose houses at hydrants;

(3) Provide additional hose at certain hose houses and other fire fighting equipment at all the hose houses;

(4) Provide vehicle guards for certain hydrants and post-indicator valves;

(5) Test fire hydrants for proper drainage in spring and fall;

(6) Remove obstructions to hydrant wrench rotation; and

(7) Add visible markings to identify the location of buried isolation valves.

Certain valves in the fire water piping system are electrically supervised such as the first gate valve upstream of control valves on water spray, sprinkler and foam systems, and suction and discharge valves at the fire pumps. Certain other valves are chained and locked in the open position. The licensee has proposed to provide tamper indication seals on any valves that are not locked or provided with electrical supervision, where closure of the valve could result in the loss of suppression water or a delay in its application.

We find that, subject to implementation of modifications described above, the fire water piping system conforms to the provisions of Appendix A to BTP 9.5-1 and is, therefore, acceptable.

4.3.1.4 Interior Fire Hose Stations

Interior stations with 100 feet of 1-1/2-inch fire hose have been provided in the turbine building and the fuel storage building. The turbine building hose stations are located so that they can also be used in some safety-related areas, including the switchgear room, cable spreading room, battery rooms, and control room. However, many other areas containing safety-related equipment and electrical cables, some of which could be required for safe shutdown, are not served by any interior hose station. There are no hose stations inside the containment building.

All interior hoses are equipped with nozzles suitable for use on electrical fires.

There are also fire hose stations supplied by the foam systems which protect oil hazards in the turbine building.

The licensee has proposed to install additional hose stations to serve all safety-related areas in the primary auxiliary building and in the fuel handling building, and to provide access so that hose from the stations can reach the roofs of other buildings. The licensee also proposes to provide 1-1/2-inch hose at a hydrant serving the diesel generator building so that prompt manual fire fighting can be accomplished at this location and to install manual hose stations inside containment to combat electrical cable fires. With these modifications, all safety-related areas will be reachable with 100 feet of 1-1/2-inch fire hose.

We find that, subject to implementation of these modifications, the interior fire hose installation satisfies the objectives of Section 2.2 of this report and is, therefore, acceptable.

4.3.1.5 Water Suppression Systems

Automatic wet pipe sprinklers are provided on the diesel generator building sumps and day tanks. An automatic preaction sprinkler system is provided in a portion of the electrical tunnel between the cable spreading room and the primary auxiliary building. Outside oil-filled transformers are protected by automatic water spray systems. Charcoal filters in the containment cooling system have manually operated deluge sprinklers. These suppression systems have been designed and installed to provide adequate coverage for hazards pretected.

We find that the water suppression systems will satisfy the provisions of Appendix A to BTP 9.5-1 and are, therefore, acceptable.

4.3.1.6 Foam

The plant has automatic fixed 3% mechanical foam deluge systems located in the turbine building protecting the turbine oil storage tanks, reservoir and conditioner; the boiler feed pump lube oil reservoir and oil console; and the hydrogen seal oil reservoir. The foam systems also supply the interior hose stations located near each protected hazard.

We find that the foam systems satisfy the provisions of Appendix A to BTP 9.5-1 and are, therefore, acceptable.

4.3.1.7 Effects of Suppression Systems on Safety Systems

Fixed fire suppression systems have not been installed where their operation or failure could cause unacceptable damage to safety-related equipment. Floor drains, sized to remove expected fire fighting water flow, have been provided to prevent flooding. The licensee proposes to install baffles in the electrical tunnel to prevent water spray from running along the cable trays into the cable spreading room.

We find that, subject to implementation of this modification, the protection provided to safety systems from the effects of suppression system water satisfies the objectives of Section 2.2 of this report and is, therefore, acceptable.

4.3.2 Gas Fire Suppression Systems

This plant has no gas fire suppression systems; however, adequate suppression capability is provided by other means as discussed in this report. BTP 9.5-1, Appendix A, does not require use of gas suppression systems.

4.3.3 Portable Fire Extinguishers

Portable carbon dioxide fire extinguishers have been provided throughout the plant in accordance with the requirements of the NFPA Standards. The licensee has proposed to provide, at the control room, a portable Class "A" rated extinguisher to combat deep-seated fires in electrical insulation and ordinary combustibles.

We find that, subject to implementation of this modification, the portable fire extinguisher installation conforms to the provisions of Appendix A to BTP 9.5-1 and is, therefore, acceptable.

4.4 Ventilation Systems and Breathing Equipment

4.4.1 Smoke Removal

The plant does not have exhaust systems designed specifically for smoke removal. However, the normal ventilation systems in most areas can be used for limited smoke removal. The effectiveness of these systems is limited because fans and other equipment may not be able to withstand high temperatures and could be rendered inoperative by heat from a significant fire, the capacity and configuration of the normal air handling systems may preclude effective smoke removal, heat actuated dampers in fire barriers may close, and some ventilation system power supply cables may be affected by a fire. To provide adequate smoke removal capability, the licensee has proposed to install a fan for smoke removal in the exterior wall of the cable spreading room, and to provide three portable smoke exhausters with flexible ductwork for fire brigade use with a combined capacity of 17,500 - 20,000 cfm.

We find that, subject to implementation of these modifications, the smoke removal capability satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

4.4.2 Filters

Charcoal filters are enclosed in substantial metal housings, and those in the containment cooling system and the boric acid evaporator building system are equipped with automatic fire detection and remotely operated manual water deluge systems. Charcoal filters not provided with suppression systems are not located in areas with safe shutdown equipment. Therefore, filter units do not present a significant fire exposure to safe shutdown systems.

We find that fire protection for the filters satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

4.4.3 Breathing Equipment

There are 45 self-contained breathing units on the site and a manifold-cylinder system for control room personnel emergency air supply. However, there are insufficient spare air bottles to maintain the breathing air

supply for the required 6 hours. The licensee has proposed to provide additional cylinders so that 10 men can be supplied for 6 hours on the basis of three air cylinders per man per hour, and to improve the method of distinguishing between full and empty replenishment cylinders in the bottle refill area.

We find that, subject to implementation of this modification, portable breathing equipment satisfies the objectives of Section 2.2 of this report and is, therefore, acceptable.

4.5 Floor Drains

The oil hazards in the turbine building and the diesel generator building are provided with curbs or trenches to direct any spills to the floor drain system, preventing the spread of oil to other areas.

The licensee has proposed to install backflow prevention devices in the drain lines from each diesel generator sump to prevent spread of fire via the drain system. In addition, the licensee has proposed to provide backflow prevention devices in turbine building drains where the drain system may provide a pathway for fire to be transmitted to safety-related areas.

We find that, subject to implementation of these modifications, protection provided to prevent spread of fire through the drain system satisfies the provisions of Appendix A to BTP 9.5-1 and is, therefore, acceptable.

4.6 Lighting Systems

Lighting in critical plant areas is supplied by the emergency diesel generators. However, a fire could cause loss of all lighting in the control room and certain areas providing access for fire fighting and safe shutdown. The licensee has proposed to install 8-hour battery operated lighting units in the control room and in areas providing access to areas with safe shutdown equipment. The licensee has also proposed to provide sealed beam electric hand lanterns for use by the fire brigade.

We find that, subject to implementation of these modifications, the lighting systems satisfy the objectives in Section 2.2 of this report and are, therefore, acceptable.

4.7 Communication Systems

In addition to the normal in-plant communications system, voice powered head sets are available for emergency communications. However, these are hardwired systems and as such are subject to damage in a fire. If the normal and voice powered communications systems are damaged in a fire, portable radio sets are available for use by the fire brigade and operators.

We find that the communications systems satisfy the objectives stated in Section 2.2 of this report and are, therefore, acceptable.

4.8 Electrical Cable Combustibility

Electrical cables used in the plant were required to pass the ASTM-D-470-59T vertical flame test, as well as certain other tests developed by the licensee. The data indicate that the cables used will not burn vigorously under the test conditions. We find that retest to the IEEE 383 criteria would not provide information that would change any of our recommendations or conclusions. Accordingly, we find the electrical cables used and the flame testing performed to be acceptable.

4.9 Fire Barrier Penetrations

4.9.1 Fire Doors

Doors in fire barriers throughout the plant are not rated fire doors. The licensee has proposed to provide locked, 3-hour fire-rated doors in certain barriers separating redundant safe shutdown systems or protecting safe shutdown systems from significant fire hazards. These are doors separating:

(1) The battery rooms from the cable spreading room;

(2) The control room, cable spreading room and switchgear room from the turbine building; and

(3) The control building and primary auxiliary building from the transformer area.

A door separating the switchgear room from the turbine building will be removed and the opening closed with fire rated construction.

We find that, subject to implementation of these modifications, the protection of doorway penetrations in fire barriers satisfies the objectives in Section 2.2 of this report and is, therefore, acceptable.

4.9.2 Ventilation Duct Penetrations

Ventilation ducts throughout the plant do not have fire dampers where the ducts penetrate fire barriers. The licensee proposes to provide fire rated dampers in ducts at certain locations:

(1) Between the battery rooms and the cable spreading room;

(2) Between the switchgear room and the turbine building;

(3) Between the cable spreading room and the turbine building;

(4) Between the switchgear room and the Unit 1 water treatment room; and

(5) In the north exterior wall of the control building which is exposed to yard transformers.

We find that, with these modifications, the protection of duct penetrations in fire barriers satisfies the objectives in Section 2.2 of this report and is, therefore, acceptable.

4.9.3 Electrical Cable Penetrations

Electrical cable penetrations in fire barriers are sealed with three types of construction utilizing ceramic fiber, asbestos sheet, glass fiber, and sprayed mastic. The licensee has not tested the designs to an ASTM E-119-type fire test to demonstrate the fire resistance of the seals. The staff has taken the position that test data be provided and that seals be replaced or upgraded if they do not meet the fire resistance required of the barrier in which they are installed. The licensee has proposed to modify the seals in critical barriers to a design that was tested by Florida Power & Light Co. using an ASTM-E-119 exposure fire. Modifications will include addition of "Marinite" sleeves and collars along with a "Cera-Felt" or equivalent mineral fiber blanket under the sleeves and application of a flame retardant coating over the fire stop.

We find that, subject to implementation of the above described modifications, protection for cable penetrations of fire barriers conforms to the provisions of Appendix A to BTP 9.5-1 and is, therefore, acceptable.

4.10 Separation Criteria

The licensee has stated that the separation of the reactor protection system and engineered safety system is accomplished as follows:

> "The reactor protection and engineered safety system cable circuits are divided into as many channels as is required to preserve the basic redundancy and independence of the systems. Channel separation is maintained as indicated below and is continuous from the sensors to the entrance to the receiver racks to logic cabinets to actuation devices in such a manner that failure within a single channel is not likely to cause the loss of the basic protection system or cause a failure which would prevent actuation of the minimum safeguards devices when called for.
>
> "In general this requires the use of four (4) instrument channels, three (3) power channels and three (3) control channels. In addition to such channels of separation, cables are also assigned to individual routing systems in accordance with voltage level, size and function category. Six (6) independent conduit and/or tray systems are used for such purposes and establish separation of:
>
> (1) 6900 volt power.
>
> (2) Heavy 125 V D-C power cables and heavy 480 V A-C (over 100 HP) power cables.
>
> (3) Lighting panel feeders and medium power (greater than No. 12 AWG wire size) 480 volt A-C cables.

(4) Control and small power cables.

(5) Instrument cables.

(6) Rod control cables.

"There is no mixing of the above categories within a tray or conduit. There is some mixing of non-vital cables with vital cables in channelized trays, but cables of different voltage classes are not mixed within a tray.

"Separation of channels is established wherever practical by the use of separate trays and conduits. In the cable spreading, tunnel and other congested areas multiple channels are run in a single ladder tray, but separation is maintained by the use of 16 gauge sheet metal barriers 4" high within the tray. Where such barriers are used in heavy power cable trays a double sheet metal barrier with approximately one (1) inch of space between is utilized. In addition, whenever a power tray is located beneath an instrument or control channel tray, or a different channel of heavy power cables, a 1/4" thick transite barrier is installed between the trays. Such barriers are considered to be redundant as the power cable insulation being used is fire retardant and will not support combustion without excitation."

In general, separation between redundant divisions is such that most fires would not cause functional loss of redundant safe shutdown equipment. The separation criteria does not preclude the crossing of such cables nor does it consider the possibility of heat buildup in a room. However, the licensee has performed a detailed fire hazards analysis for each area of the plant containing safety-related equipment to determine the possible effects of fires on safe plant shutdown. Each of these areas is discussed in more detail in Section 5.0 of this report. In various areas the licensee has proposed to reroute cables, provide thermal barriers, or install fire stops where the existing cable separation was found inadequate to preclude fire damage to redundant safe shutdown equipment.

In addition, the licensee has proposed to provide a capability to safely shut down the plant independent of fire damage in the charging pump rooms, cabling inside of containment, switchgear room, electrical cable tunnel and the cable spreading room and control room. This independent capability will provide a means to safely shut down the plant using the following equipment: charging pump, auxiliary feedwater pump, service water pump, containment purge system, and instrumentation for pressurizer level and pressure and steam generator level. The auxiliary feedwater system will only require a manual transfer switch prior to placing the pump in service. The charging pump and service water pump will require manual connection of contingency cable maintained offsite. For shutdown in a fire situation, adequate time is available to place this equipment in operation using the proposed methods. Postulated fires which may require use of the independent shutdown capability would not preclude access to areas for routing or connection of the contingency cable. Repairs to

charging pump and service water pump cables could be made in less than one hour. More than 7 hours would be available to effect cable connections for powering service water pumps to provide supply to auxiliary feedwater pump suction. The pressurizer inventory and available level instrumentation assure that adequate inventory will be maintained, and that excessive leakage such as through charging system letdown lines can be identified and isolated, until connections are made to power the charging pumps. We have also reviewed the separation between this proposed independent shutdown capability and present cabling in the areas identified above and find that a fire will not affect both. In using this alternate shutdown system, use of the gas turbines may be required to provide an emergency power source; however, technical specifications are not provided for these gas turbines. The licensee has proposed technical specifications to assure availability of at least one of the three gas turbines.

We find that, subject to implementation of the above described modification and other modifications as described in Section 5.0 of this report, separation provided is adequate to satisfy the objectives of Section 2.2 of this report and is, therefore, acceptable. The specific areas where additional protection is to be provided are identified in Section 5.0 of this report.

4.11 Fire Barriers

Substantial fire barriers have been provided throughout the plant. The licensee's fire hazards analysis concludes that the basic wall, floor and ceiling structures bounding each fire area have adequate fire resistance to prevent spread of an unsuppressed fire through the barriers. Barriers not having a 3-hour fire resistance rating are considered acceptable on the basis of the light combustible loading, or on the basis that redundant safe shutdown equipment will not be jeopardized if the barrier is breached.

The licensee has proposed to upgrade the walls between the control building and the turbine building to provide a 3-hour fire barrier and to upgrade the control building wall adjacent to outdoor transformers.

The critical fire barriers have been reviewed by the staff and it is concluded that, upon completion of the modifications and recommendations discussed above and in other sections of this report, barriers will be adequate to prevent redundant safe shutdown systems from being involved in the same fire incident. Therefore, we find the fire barriers satisfy the objectives of Section 2.2 of this report and are, therefore, acceptable.

4.12 Access and Egress

Most areas of the plant are reasonably accessible for manual fire fighting. Some safety-related pump rooms at lower elevations have only one stairway, but these areas have minimal fire loading. Delays could be experienced in entering containment; the adequacy of fire protection for this area is discussed in Section 5.0 of this report.

We find that existing access and egress capability satisfies the objectives in Section 2.2 of this report and is, therefore, acceptable.

4.13 Toxic and Corrosive Combustion Products

The products of combustion of many polymers are toxic to humans and corrosive to metals. Prompt fire detection and extinguishment is relied upon to minimize the generation of such products. Additionally, the licensee has proposed to provide portable smoke removal equipment and training of the fire brigade in the use of this equipment, and in the use of emergency breathing appliances.

We find that, subject to the implementation of the proposed modifications described in this report, the protection for limiting the development of toxic and corrosive combustion products satisfies the objectives in Section 2.2 of this report and is, therefore, acceptable.

4.14 Nonsafety-Related Areas

We have evaluated the separation by distance or by fire barriers of safe shutdown systems from nonsafety-related areas to determine that fires in such areas will not adversely affect the ability to safely shut down the plant. Nonsafety-related areas which potentially pose a fire hazard to safe shutdown equipment are addressed in Section 5.0 of this report.

The licensee has evaluated the effects of fires in radwaste areas as to the potential releases to the environment. We have reviewed the licensee's evaluation and find that the releases resulting from fires in these areas are acceptably low.

On this basis, we find the fire protection provided for radwaste areas acceptable.

4.15 Instrument Air

Loss of function of the instrument air system will not prevent safe shutdown of the plant.

4.16 Non-Combustible Roof Construction

Certain buildings that contain safety-related equipment or safe shutdown systems have built-up metal roof deck construction that is potentially combustible. The licensee has proposed to install additional hose stations to provide adequate protection for all of these roofs with the exception of the control building roof. The licensee has proposed to upgrade the control building roof to meet Factory Mutual Class I requirements. We find that, subject to implementation of these modifications, fire protection for built-up metal deck roofs conforms to the provisions of Appendix A to BTP 9.5-1 and is, therefore, acceptable.

5.0 EVALUATION OF SPECIFIC PLANT AREAS

5.1 Primary Auxiliary Building - Elevations 15 and 42 Feet

5.1.1 Safety-Related Equipment

Safety-related equipment at these elevations are the two residual heat removal pumps and associated valves and piping. One of these pumps would be required in bringing the reactor from hot shutdown to cold shutdown conditions.

5.1.2 Combustibles

Significant combustibles in these areas consist of a small amount of electrical cabling insulation and a small amount of lube oil associated with pumps. Most rooms at these elevations have no combustibles.

5.1.3 Consequences if No Fire Suppression

Unmitigated fires at this elevation would not affect safe shutdown capability. Fires in certain locations may potentially affect power cables for redundant residual heat removal pumps, but would not affect redundant pumps because the pumps are in separate rooms. However, since the reactor can be maintained in hot shutdown conditions indefinitely by using auxiliary feedwater to the steam generators and steam dump to the atmosphere, adequate time would be available to effect temporary repairs to cabling for the residual heat removal pumps so that cold shutdown conditions could be achieved, if desired. These repairs could be effected within 72 hours.

Fires which affect cabling associated with residual heat removal system valves would not affect safe shutdown capability since adequate time would be available to operate the valves manually.

5.1.4 Fire Protection Systems

Present fire suppression capability is provided by portable extinguishers. There is no detection capability or manual hose stations within reach of these areas.

5.1.5 Adequacy of Fire Protection

With the existing fire protection, potential fires would not affect safe shutdown capability. However, with lack of detection capability and manual fire hose suppression capability, fires may continue unnecessarily resulting in generation of smoke and heat that may be transferred to other areas and also resulting in further loss of equipment than would result if the fire were promptly detected and suppressed.

5.1.6 Modifications and Recommendations

To provide prompt detection and suppression capability for these areas, the licensee has proposed to install smoke detectors in the residual heat removal pump rooms and a hose station on elevation 15 feet of the primary auxiliary building. The hose station at elevation 15 feet will also provide adequate coverage for fires which may occur at elevation 42 feet.

We find that, subject to implementation of the modifications described above, fire protection for elevations 15 and 42 feet of the primary auxiliary building conforms to the provisions of Appendix A to BTP 9.5-1 and is, therefore, acceptable.

5.2 Primary Auxiliary Building - Elevations 59 and 68 Feet

5.2.1 Safety-Related Equipment

Safety-related equipment at these elevations includes the redundant component cooling water pumps, containment spray pumps, safety injection pumps and associated piping, valves, and electrical cabling. The component cooling pumps and safety injection pumps may be required for safe shutdown.

5.2.2 Combustibles

Significant combustibles at these elevations include a small amount of pump and motor lubricants and electrical cable insulation.

5.2.3 Consequences if No Fire Suppression

Unmitigated fires in any of the pump areas would not affect redundant pumps due to the separation between pumps and small amount of combustibles, but may potentially affect cabling for redundant pumps. If redundant component cooling pump cables are affected, safe shutdown capability would not be affected because repairs to these pump cables could be made in time to bring the reactor from hot shutdown conditions to cold shutdown within 72 hours using cable available on-site. If redundant safety injection pump cabling is affected, the charging pumps would be available for primary system makeup and boration. Thus, fires in these areas would not affect safe shutdown capability, although certain safety equipment could be affected.

5.2.4 Fire Protection Systems

Fire suppression capability is presently afforded by portable extinguishers in these areas. No fire detectors or manual hose stations are available.

5.2.5 Adequacy of Fire Protection

The existing protection is not adequate to control and suppress fires that may occur in these areas and limit the effects on safety systems. Lack of detection devices and manual fire hose capability may allow fires to continue unnecessarily; however, safe shutdown capability would not be affected.

5.2.6 Modifications and Recommendations

The licensee has proposed to provide hose stations within reach of these areas, and smoke detectors in the safety injection pump rooms, component cooling pump rooms, containment spray pump rooms, and the primary water makeup pump room. These modifications will allow prompt detection and suppression of fires which may occur.

We find that, subject to implementation of the above described modifications, fire protection for elevations 59 and 68 feet of the primary auxiliary building conforms to the provisions of Appendix A to BTP 9.5-1 and is, therefore, acceptable.

5.3 Primary Auxiliary Building - Elevations 80 and 98 Feet

5.3.1 Safety-Related Equipment

The safety-related equipment at these elevations includes the three charging pumps, each in separate rooms, with associated cabling and piping; component cooling heat exchangers; and redundant motor control centers for motor-operated safety-related valves.

5.3.2 Combustibles

Significant combustibles at these elevations include charging pump and motor lubricant and fluid drive oil and a moderate amount of electrical cable insulation in the corridor.

5.3.3 Consequences if No Fire Suppression

Unsuppressed fires in the zone 5 charging pump room or in the waste storage and drumming area may potentially cause loss of all three charging pumps which may be required for boration or makeup in performing shutdown and continued decay heat removal because cables for all three charging pumps are located in each of these areas. A fire in the zone 6 charging pump room could cause loss of two of the three charging pumps because cables for two of the charging pumps are located in this area. Fires in the corridors may cause loss of power for several valves from redundant safety divisions; however, adequate time would be available to operate these valves manually in performing shutdown operations and access to these valves would not be hampered by a fire in the corridors.

5.3.4 Fire Protection Systems

Ionization type detectors are provided in the boric acid tank area. No other detection devices are provided. Portable extinguishers are provided throughout the area. Hose stations are not presently provided for this area.

5.3.5 Adequacy of Fire Protection

The protection provided for this area would not be adequate to promptly detect and suppress fires which may occur, and would not be adequate to