

7/27/79

Docket Nos. 50-254
and 50-265

Mr. Cordell Reed
Assistant Vice President
Commonwealth Edison Company
P. O. Box 767
Chicago, Illinois 60690

REGULATORY DOCKET FILE COPY

Dear Mr. Reed:

The Commission has issued the enclosed Amendment Nos. 52 and 49 to Facility Operating License Nos. DPR-29 and DPR-30 for the Quad Cities Nuclear Power Station, Units Nos. 1 and 2. The attached Safety Evaluation addresses your submittals dated March 29 and August 3, 1977, June 6, July 6, July 27, and November 30, 1978, March 29, April 5, and April 23, 1979, and our observations at the Quad Cities Station during the visit of August 21-25, 1978.

The amendments add license conditions relating to the completion of facility modifications and implementation of administrative controls for fire protection.

We have discussed the contents and conditions of these license amendments with members of your staff and we understand that you have agreed to these license amendments. Nevertheless, you understand that by the provisions of 10 CFR Part 2 paragraph 2.204, you may demand a hearing with respect to all or any part of the amendments within twenty (20) days from the date of this letter. If you do not demand a hearing these amendments will become effective on the expiration of that twenty (20) day period.

By letter dated March 22, 1978, we issued Technical Specifications to incorporate limiting conditions for operation and surveillance requirements for existing fire protection systems and administrative controls. You are requested to propose revised Technical Specifications related to facility modifications described herein and submit them for our review no later than 90 days before the modifications are implemented. Certain items listed in Section 3.0 of the enclosed Safety Evaluation are marked with an asterisk to indicate that the NRC staff will 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 of these modifications. We request that you submit this information no later than 90 days before the modifications are scheduled to be implemented.

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Comdr CCP

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...

OFFICE				
SURNAME				
DATE				

Mr. Cordell Reed

- 2 -

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.

A copy of the Notice of Issuance is also enclosed.

Sincerely,

Thomas A. Ippolito, Chief
Operating Reactors Branch #3
Division of Operating Reactors

Enclosures:

- 1. Amendment Nos. 52 and 49
- 2. Safety Evaluation
- 3. Notice

} See rpt JACKET

cc w/enclosures:
See next page

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7/9/79

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Mr. Cordell Reed
Commonwealth Edison Company

- 3 -

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

50-254/265
Lr 7-27-79
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COMMONWEALTH EDISON COMPANY
AND
IOWA-ILLINOIS GAS AND ELECTRIC COMPANY

DOCKET NO. 50-254

QUAD CITIES UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 52
License No. DPR-29

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The filings by Commonwealth Edison Company (the licensee) dated August 3, 1977, as supplemented, 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 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.
2. Accordingly, operating license No. DPR-29 is hereby amended by adding paragraph 3.F. to read as follows:
 - 3.F. The licensee may proceed with and is required to complete the modifications identified in Paragraphs 3.1.1 through 3.1.13 of the NRC's Fire Protection Safety Evaluation (SE), dated July 27, 1979 for the facility. These modifications will be completed in accordance with the schedule in Table 3.1 of the SE and supplements thereto.

In addition, the licensee shall submit the additional information identified in Table 3.2 of this SE in accordance with the schedule contained therein. In the event these dates for submittal cannot be met, the licensee shall submit a report, explaining the circumstances, together with a revised schedule.

RETURN TO REACTOR DOCKET
FILES

The licensee is required to implement the administrative controls identified in Section 6 of the SE. The administrative controls shall be in effect immediately, except for those modifications indicated in Section 3.1 of the SE, which shall become effective on the dates indicated in Table 3.1 of the SE.

3. This license amendment becomes effective as of August 16, 1979.*

FOR THE NUCLEAR REGULATORY COMMISSION


Thomas A. Ippolito, Chief
Operating Reactors Branch #3
Division of Operating Reactors

Date of Issuance: July 27, 1979

*Provided no hearing is requested under 10 CFR Part 2 paragraph 2.204.



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

COMMONWEALTH EDISON COMPANY
AND
IOWA-ILLINOIS GAS AND ELECTRIC COMPANY

DOCKET NO. 50-265

QUAD CITIES UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 49
License No. DPR-30

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The filings by Commonwealth Edison Company (the licensee) dated August 3, 1977, as supplemented, 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 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.
2. Accordingly, operating License No. DPR-30 is hereby amended by adding paragraph 3.F. to read as follows:
 - 3.F. The licensee may proceed with and is required to complete the modifications identified in Paragraphs 3.1.1 through 3.1.13 of the NRC's Fire Protection Safety Evaluation (SE), dated July 27, 1979 for the facility. These modifications will be completed in accordance with the schedule in Table 3.1 of the SE and supplements thereto.

In addition, the licensee shall submit the additional information identified in Table 3.2 of this SE in accordance with the schedule contained therein. In the event these dates for submittal cannot be met, the licensee shall submit a report, explaining the circumstances, together with a revised schedule.

The licensee is required to implement the administrative controls identified in Section 6 of the SE. The administrative controls shall be in effect immediately, except for those modifications indicated in Section 3.1 of the SE, which shall become effective on the dates indicated in Table 3.1 of the SE.

3. This license amendment is effective as of August 16, 1979.*

FOR THE NUCLEAR REGULATORY COMMISSION


Thomas A. Ippolito, Chief
Operating Reactors Branch #3
Division of Operating Reactors

Date of Issuance: July 27, 1979

*Provided no hearing is requested under 10 CFR Part 2 paragraph 2.204.



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

FIRE PROTECTION
SAFETY EVALUATION REPORT
BY THE
OFFICE OF NUCLEAR REACTOR REGULATION
U. S. NUCLEAR REGULATORY COMMISSION
IN THE MATTER OF
COMMONWEALTH EDISON COMPANY
QUAD CITIES NUCLEAR POWER STATION UNITS 1 AND 2
DOCKET NOS. 50-254/265

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1.0 INTRODUCTION

Following a fire at the Brown's 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 the 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 licensee 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:

- "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 APCS 9.5-1), May 1, 1976.
- "Guidelines for Fire Protection for Nuclear Power Plants" (Appendix A to BTP APCS 9.5-1), August 23, 1976.
- "Supplementary Guidance on Information Needed for Fire Protection Program Evaluation," September 30, 1976.
- "Sample Technical Specifications," May 12, 1977.
- "Nuclear Plant Fire Protection Functional Responsibilities, Administrative Controls and Quality Assurance," June 14, 1977.
- "Manpower Requirements for Operating Reactors," June 5, 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 Commonwealth Edison Company'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 licensee's proposed program for fire protection as described in the following docketed information:

- (1) Information Relevant to Fire Protection Systems and Programs, Parts 1, 2, and 3, dated October 1976, January 1977 and April 1977, respectively;
- (2) The fire protection review team's site visit of August 21 to 25, 1978;
- (3) The licensee's response to 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 result of our evaluation of the fire protection program at Commonwealth Edison Company's Quad Cities Station, Units 1 and 2. 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 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 GDC-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 guidance on the preferred and, where applicable, acceptable alternatives to fire protection design for those nuclear power plants for which applications for construction permits were docketed prior to July 1, 1976.

Although this appendix provides specific guidance, alternatives may be proposed by licensees. These alternatives are evaluated by the NRC staff on a case-by-case basis.

Additional guidance which provides clarification of Fire Protection matters has been provided by the NRC staff in the following documents:

"Supplementary Guidance on Information Needed for Fire Protection Program Evaluation," October 21, 1976.

"Sample Technical Specifications," May 12, 1977.

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

"Manpower Requirement for Operating Reactors," June 5, 1978.

When the actual configuration of combustibles, safety-related structures, systems or components, and the fire protection features are not as assumed in the development of Appendix A or when the licensee has proposed alternatives to the specific recommendations of Appendix A, we have evaluated such unique configurations and alternatives using the defense-in-depth objectives outlined below:

- (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 materials if fires occur.

In our evaluation, we assure that these objectives are met for the actual relationship of combustibles, safety-related equipment and fire protection features of the facility.

Our goal is a suitable balance of the many methods to achieve these individual objectives; increased strength, redundancy, performance, or reliability of one of these methods can compensate in some measures for deficiencies in the others.

3.0. SUMMARY OF MODIFICATIONS AND INCOMPLETE ITEMS

3.1 Modifications

The licensee plans to make certain plant modifications to improve the fire protection program as a result of the licensee's and the staff's evaluation. The proposed modifications are summarized below. Further detail is provided in the licensee's submittals. The sections of this report which discuss the modifications are noted in parentheses. The schedule for implementation of these modifications is given in Table 3.1.

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

3.1.1 Fire Detection Systems

Early warning fire detection systems will be provided in the following areas:

- * (1) Control room area (5.1).
- (2) Make up air supply to the control room (5.1).
- (3) Auxiliary electrical equipment room (5.3).
- (4) Battery and DC equipment rooms (5.4).
- (5) Reactor building refueling floor (5.5).
- (6) The reactor building mezzanine floor in the area of motor control centers and cable penetrations to the turbine building (5.8).
- (7) The reactor building ground floor in the area of motor control centers and cable penetrations to the turbine building (5.9).
- (8) Unit 1 and Unit 2 cable tunnels (5.15), (5.16).
- (9) 4 kV switchgear on the turbine building ground floor (5.17).
- (10) 4 kV switchgear on the turbine building mezzanine floor (5.18).
- (11) High pressure heater bays for the cable penetrations to the reactor building and for the ceiling cable penetrations to the switchgear located above this area (5.18).

(12) Cable penetrations to the reactor building which are adjacent to the MG set oil coolers (5.18).

(13) 4 kV switchgear and 480-Volt switchgear on the turbine building main floor (5.19).

3.1.2 Fire Water Supply

A system will be provided to detect excessive make up to the fire water system from the service water system (4.3.1.2).

A separate feed to the underground loop, with isolation valves, will be provided from the fire pumps (4.3.1.4).

3.1.3 Yard Hydrants

Modifications will be made to eliminate the interference with the operation of yard hydrants and post-indicator valves (4.3.1.3).

A fire hydrant will be installed adjacent to the cooling canal lift station (4.3.1.3).

A hydrant inspection program will be established to check yard hydrants for proper drainage in the fall and for freeze damage in the spring (4.3.1.3).

A 2½-inch gate valve will be provided for the unused hydrant port (4.3.1.3).

Two hose carts with 300 feet of 2½-inch hose, 150 feet of 1½-inch hose, and additional fire fighting equipment (4.3.1.3).

3.1.4 Interior Hose Stations

Additional hose will be provided on hose stations adjacent to the cable tunnels to insure adequate coverage for all areas of the cable tunnels (4.3.1.4).

One-inch booster hose reels with low flow capacity nozzles and shut-off valves will be provided with sufficient reach for all areas of the control room and auxiliary electrical equipment room (4.3.1.4).

3.1.5 Water Suppression Systems

The suppression chamber drywell air pack units will be protected by an automatic sprinkler system (5.9).

The turbine building sprinkler system will be extended to provide protection for the RHR service water and diesel generator cooling water pump rooms (5.13).

The turbine building sprinkler system will be extended to provide protection for the control rod drive pumps (5.14).

- * The sprinkler systems in the Unit 1 and 2 cable tunnels will be modified to prevent fire propagation between trays (5.15), (5.16).

A water suppression system will be provided for the turbine electro-hydraulic control oil reservoirs and the adjacent cable riser area (5.17).

- * Water suppression system will be provided in the Unit 1 and Unit 2 trackway areas (5.17).

The manual pull station for the Unit 2 hydrogen seal oil unit deluge system will be relocated outside the fire area (5.18).

A sprinkler system will be installed to protect the diesel driven fire pumps (5.21).

A water spray system will be provided to protect the bus duct that penetrates the west turbine building within 15 feet of the transformers. The water feed for the water spray will be independent of the feed that supplies the transformer deluge systems (5.22).

- * An automatic water suppression system will be provided in the cable spreading room (5.2.6).

- * Sprinkler protection will be provided in the oil storage locations in the turbine building and in the crib house (5.17)(5.21).

3.1.6 Foam Suppression Systems

Foam concentrate and pickup tubes will be provided for manually combating combustible liquid fires (4.3.1.6).

- * An automatic foam suppression system actuated by flame or infrared detectors will be provided for each MG set fluid coupling and its curbed area. The feed for the foam deluge system will be independent of the feed to the sprinkler system protecting this area (4.3.1.6), (5.19).

3.1.7 Portable Extinguishers

Two Halon 1211 portable extinguishers will be provided in the control room (5.1).

3.1.8 Fire Barriers

The fire barriers between the electrical equipment room and the adjacent areas will be upgraded to provide 3-hour rated barriers for doors, dampers, and electrical penetrations to the computer room, cable tunnels, cable spreading room, and service building (5.3).

The doors to the DC equipment rooms will be replaced with Class A fire doors (5.4).

The doors between the Unit 1 and 2 reactor buildings will be replaced with Class A fire doors (5.8).

The door between the Units 1 and Unit 2 HPCI rooms will be replaced with a Class A fire door (5.11).

The exhaust vents for the reactor feed pump areas which face the outdoor transformers will be relocated and the opening sealed to provide a 3-hour rating (5.17).

Fire dampers will be provided in the HVAC penetrations to the clean and dirty oil storage room in the turbine building (5.17).

The diesel generator room penetrations including ventilation, pipe, electrical, and doors will be ungraded to a 3-hour rating. The door to the diesel generator rooms will be electrically supervised. The structural steel in the diesel generator rooms will be protected to provide a 3-hour rating (5.20).

3.1.9 Cable Tray Protection

Where cable trays of different divisions are closer than 3 feet horizontally or 5 feet vertically from each other, the cables will be coated with a flame retardant coating for the length of the tray until the 3 feet/5 feet separations are achieved. Other flame retardant barriers may be used in place of flame retardant coatings (4.10).

3.1.10 Water Damage Protection

The top of electrical cabinets, switchgear, and motor control centers will be protected to reduce the potential for water damage from hose streams used to combat cable fires as noted in the referenced sections for the following areas:

- (1) Auxiliary electrical equipment room (5.3).
- (2) Reactor building mezzanine floor (5.8).
- (3) Reactor building ground floor (5.9).
- (4) Turbine building mezzanine floor (5.18).
- (5) Turbine building main floor (5.19).

3.1.11 Control of Combustibles

The floor carpeting in the control room will be replaced with a UL listed floor covering (5.1).

Air flow supervision will be provided for the battery room exhaust with an alarm in the control room (5.4).

Wood storage boxes in the area of the control rod storage room will be removed (5.7).

The drywell air pack units will be curbed to prevent the spread of an oil spill (5.9).

Oil dispensing stations will be replaced with NFPA approved flammable liquid storage cabinets in the following areas. The maximum oil storage container size will be limited as noted:

- (1) Reactor building ground floor, 5-gallon (5.9).
- (2) Turbine building basement floor, 30-gallon (5.13).
- (3) Turbine building ground floor, 55 gallon (5.17).
- (4) Crib house, 55-gallon (5.21).

Curbs will be provided around the hydrogen seal oil units and the MG set oil cooler and pump assembly (5.18).

Curbs will be provided around the MG sets on the turbine building main floor (5.19).

Curbs and drains will be provided around flammable liquid storage areas in the crib house and on the turbine building ground floor (5.21) (5.17).

3.1.12 Protective Clothing

Turn out coats will be provided for the fire brigade (4.12).

3.1.13 Air Breathing Equipment

Air breathing facilities will be provided capable of supplying ten (10) men for six hours at a usage rate of three bottles per hour per person (4.4.2).

3.2 Incomplete Items

In addition to the licensee's proposed modifications, several incomplete items remain, as discussed below. The licensee will complete the evaluations necessary to resolve these items in accordance with the schedule contained in Table 3.2. This schedule has been established such that should these evaluations identify the need for additional modifications, they can be implemented on a schedule consistent with completion of the modifications identified in Section 3.1. We will address the resolution of these incomplete items in a supplement to this report.

3.2.1 Smoke Detection System Tests

In situ tests will be conducted with a suitable smoke generation device to verify that the products of combustion from a fire would be promptly

detected by installed smoke detectors and that ventilation air flow patterns in the area do not significantly reduce or prevent detection response. Bench tests will be conducted to verify that smoke detectors will provide prompt response and have adequate sensitivity to the products of combustion for the combustibles in the area where smoke detectors are or will be installed. If any fire detection systems are found to be inadequate, appropriate modifications will be made to provide adequate detection system performance (4.2).

3.2.2 RCIC Analysis

Analysis of the capability of the RCIC to maintain hot shutdown conditions will be provided, including an evaluation of the 250 vdc system to support this mode of operation (4.1).

TABLE 3.1

Implementation Dates for Proposed Modifications

1.	Fire Detection Systems	12/30/79
2.	Fire Water Supply	12/30/79
3.	Yard Hydrants	9/30/79
4.	Interior Hose Stations	12/30/79
5.	Water Suppression Systems	12/30/79
6.	Foam Suppression Systems	1/30/80
7.	Portable Extinguishers	7/30/79
8.	Fire Barriers	12/30/79
9.	Cable Tray Protection	12/30/79
10.	Water Damage Protection	12/30/79
11.	Control of Combustibles	12/30/79
12.	Protective Clothing	7/30/79
13.	Air Breathing Equipment	9/30/79

TABLE 3.2

Dates for Licensee Submittals

1.	Smoke Detection System Tests	10/1/79
2.	RCIC Analysis	1/1/80

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 two or more safety divisions either of which would be capable of achieving safe shutdown.

During of subsequent to a fire, safe shutdown could be achieved using safety-related equipment or normal shutdown systems. The major safety-related components required for safe shutdown are separated to prevent damage to redundant equipment due to a fire. However, there are areas of the plant where the physical separation for essential supporting systems or electrical cables does not provide assurance that redundant systems would not be damaged by a major fire under the most unfavorable limiting conditions assumed. Although modifications have been proposed to improve the fire protection in these areas under these conditions, there is a potential for fire damage to redundant systems. The licensee has determined the consequences of fire damage in such areas and has determined that the capability for safe shutdown exists which is independent of systems which would be damaged by a fire in such areas. However, this is held open as an incomplete item pending further consideration by the staff whether RCIC has sufficient capability to maintain hot shutdown conditions.

We find that, subject to the implementation of modifications to upgrade the fire protection program and pending favorable outcome of the further RCIC analysis, adequate assurance has not been provided to mitigate the impact of potential fires on shutdown systems and that major fires in critical areas will not prevent safe shutdown. We will report on the outcome of the RCIC analysis in a supplement to this report.

4.2 Fire Detection and Signaling Systems

Fire detection and signaling systems are provided which transmit alarm and supervisory signals to the control room. Control room alarms are similar to other panel alarms. The systems are supplied from the plant's 125 Volt DC power supply via the battery chargers to the station's AC power supply. Visual and audible annunciation is provided in the control room for detection systems, deluge systems, waterflow and supervisory systems.

Fire detection systems other than in the control room, computer room, and cable spreading room are only provided in conjunction with fire extinguishing. Due to the lack of complete fire detection coverage, many areas containing or exposing safety-related systems do not have detection systems. To protect these areas, smoke detectors will be provided as indicated in Section 5.0 of this report.

In situ tests will be conducted with a suitable smoke generation device to verify that the products of combustion from a fire would be promptly detected by installed smoke detectors and that ventilation air flow patterns in the area do not significantly reduce or prevent detection response. Bench tests will be conducted to verify that smoke detectors will provide prompt response and have adequate sensitivity to the products of combustion for the combustibles in the area where smoke detectors are or will be installed. If any fire detection systems are found to be inadequate, appropriate modifications will be made to provide adequate detection system performance.

We find, subject to the implementation of the above described modifications, the fire detection systems will provide prompt response to fires. This 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

Water for fire protection is obtained directly from the Mississippi River at a single intake structure. Two vertical shaft fire pumps take suction directly from the forebay. Water is pumped from the intake structure to the underground mains.

We find that the fire water supply is adequate to meet the site fire water needs for potential fires. This satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

4.3.1.2 Fire Pumps

Two vertical shaft centrifugal fire pumps are located in the main area of the crib house. Each pump has a design capacity of 2000 gpm at 137 psig. Both pumps are diesel engine driven with right angle drives. Each pump is provided with an approved fire pump controller with automatic pump start on low system pressure.

An 8-hour fuel supply is provided by the day tanks located adjacent to each pump. The system pressure is maintained at 90 psig by a 10-inch connection to the service water system. A system will be provided to detect excessive make up to the fire water system from the service water system for a failure in the fire water piping system.

We find that, subject to the implementation of the above described modification, the fire water pumps have adequate capacity to supply fixed suppression systems and hose stations. This satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

4.3.1.3 Fire Water Piping System

Each fire pump has a separate 10-inch discharge line which joins into a common 10-inch line before it connects to the 10-inch yard loop. The underground loop encircles the plant with two feeds supplying the main cross connection from this loop. A direct 10-inch feed supplies the main cross connection through the turbine and reactor building. The cross connection supplies an interior loop in the turbine building; both the manual and automatic suppression systems are supplied from the interior loop. A single break in the north section of the loop will completely isolate the fire pumps except for the cross-connection back feeding the south section of the exterior loop. A separate feed to the underground loop with isolation valves will be provided to eliminate this condition.

All yard fire hydrants are supplied by the exterior loop. All fire hydrants have a post-indicator valve to isolate the hydrants for repair or maintenance. Yard fire hydrants have been provided at intervals not in excess of 400 feet. Hose cabinets with 100 feet of 1-1/2-inch hose are piped to each hydrant. The unused hydrant port will be provided with a 2 1/2-inch gate valve. The location of a few hydrants adjacent to the buildings or post-indicator valves results in an interference with the operation of the appliance. Modifications will be made to eliminate the interference with the operation of hydrants and post-indicator valves. Two hose carts will be provided with 300 feet of 2 1/2-inch hose, 150 feet of 1 1/2-inch hose, and other additional fire fighting equipment since hose houses have not been provided for yard hydrants. A fire hydrant will be installed adjacent to the cooling canal lift station to assure a hydrant every 400 feet on the exterior underground loop. To insure proper hydrant operation during an emergency, a hydrant inspection program will be initiated.

We find that, subject to the implementation of the above described modifications, the fire water piping system is adequate to supply fire water to the water suppression systems. This satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

4.3.1.4 Interior Hose Stations

Interior hose stations are strategically located throughout most areas of the plant. Hose stations are of the reel type and are generally equipped with 75 feet of 1-1/2-inch woven jacket lined fire hose. Some stations have 100 feet of 1-1/2-inch hose. Additional hose will be provided on hose stations adjacent to both cable tunnels to insure adequate coverage for all areas of the cable tunnel. One-inch booster hose reels with low capacity nozzles and shut-off valve will be provided with sufficient reach for all areas of the auxiliary electrical equipment room and control room.

The hose reels have been reracked to provide adequate slack in the hose attached to the angle valve thus providing 180 degree movement of the hose reel.

We find that, subject to implementation of the above described modifications, the interior fire hose stations are adequate to provide manual fire water suppression capability. This satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

4.3.1.5 Water Suppression Systems

Automatic water suppression systems protect a number of specific hazards in various parts of the plant and a number of general areas in the plant. Automatic deluge systems protect the yard transformers and oil system equipment in the turbine building. Automatic sprinkler systems protect certain areas of the turbine building and the cable tunnel. Modifications and additions to existing sprinkler systems will be provided as noted in Section 5.0 of this report. The design of the automatic sprinkler and water spray systems comply with the requirements of NFPA standards 13 and 15.

We find that, subject to the implementation of the modifications noted herein, the water suppression systems are adequate to suppress fires for the hazards where provided. This satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

4.3.1.6 Foam Suppression Systems

An automatic foam suppression system will be provided to protect the fluid drive oil system for the motor generator sets. Foam concentrate and pickup tubes will be provided to provide an additional effective means for manually combating combustible liquid fires.

We find that, subject to the implementation of the above described modifications, the foam suppression systems will provide an effective means to control and extinguish oil spill fires. This satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

4.3.1.7 Effects of Suppression Systems on Safety Systems

The presently installed suppression systems will not have an adverse effect on equipment if the system is actuated accidentally or by failure of the equipment. There are areas where the application of water from hose streams to extinguish a fire involving electrical cables in cable trays may result in water damage to safety-related electrical equipment. Where such conditions exist, protection will be provided to prevent water damage to safety-related electrical equipment as identified in Section 5.0 of this report.

We find that, subject to the implementation of the modifications noted herein, adequate measures have been taken to protect electrical equipment from water damage. This satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

4.3.2 Gas Suppression System

An automatic total flooding carbon dioxide system protects the three diesel generator rooms and the day tank storage room. Each generator room has four carbon dioxide nozzles, except the Unit 1/2 generator has six nozzles, while the day tank rooms have one each. The system can be manually actuated by a pushbutton at the various generator room entrances or by the Fenwall thermostats located within the room. The detection systems provide both local and control room alarms.

The exciters for both generators are protected by a total flooding carbon dioxide system. Carbon dioxide hose stations, some equipped with 200 feet of hose, are located in the turbine building.

We find that the gas suppression systems are adequate to suppress fires for the hazards where provided. This satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

4.3.3 Portable Fire Extinguishers

Portable dry chemical and carbon dioxide extinguishers have been distributed throughout the plant. The fire extinguishers meet the requirements of the National Fire Protection Association. The extinguisher selection was made in accordance with the type of hazard to be protected.

We find that the portable fire extinguishers provide an adequate initial fire suppression capability for small fires. This satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

4.4 Ventilation Systems and Breathing Equipment

4.4.1 Ventilation Systems

The plant does not have exhaust systems designed specifically for smoke removal. The normal air handling systems in most areas can be used for smoke removal; however, their effectiveness may be limited. The fans and other equipment in the air handling systems are not designed to withstand high temperature, and can be rendered inoperative by the heat from a significant fire. The capacity and configuration of the normal air handling systems may be inadequate for effective smoke removal.

Three fire service, explosion proof smoke ejectors with a combined capacity of 15,000 to 20,000 CFM and portable ducting will be provided to vent heat and smoke from fire areas. Electrical supervision of the ventilation systems for battery rooms will be installed to provide an alarm on the loss of air flow to preclude the buildup of hydrogen.

We find that, subject to implementation of the above described modifications, the capability for smoke and heat venting is adequate to permit fire fighting access. This satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

4.4.2 Breathing Equipment

Self-contained air breathing equipment is strategically located throughout the plant. Two air packs are located in the radwaste building and four air packs are located at the reactor building grade elevation for each unit. There are a total of 30 air packs onsite with 60 additional air bottles on order. A cascade air recharging system is provided consisting of six 300 cubic foot bottles. Air breathing facilities will be provided capable of supplying 10 men for six hours at a usage rate of three bottles per hour per person.

We find that, subject to the implementation of the above described modification, the air breathing equipment is adequate to insure that fire fighting access can be provided in a hostile environment. This satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

4.5 Lighting Systems

The normal lighting system receives its power from the station auxiliary transformers and a backup source of power is provided by the station diesel generators. Emergency lighting is also provided which is powered from the 125-Volt DC station batteries. The licensee has insured the availability of adequate lighting by providing seal beam self-contained battery operated lights at strategic locations throughout the plant. Portable hand lanterns are provided for emergency use.

We find that the emergency lighting is adequate for both operating personnel and the fire brigade to deal with emergency conditions. This satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

4.6 Communication Systems

Normal communication is provided by a telephone system with extension handsets at various locations throughout the plant. A page and answer system is also provided which is connected to an emergency bus which is supplied power from a diesel generator. A number of voice-powered headset stations provided for maintenance use would be available under emergency conditions. Portable radio communications are also available for emergency use.

We find that the communication equipment is adequate to coordinate fire fighting safe shutdown activities during a fire situation. This satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

4.7 Electrical Cables

The cable insulation used in the plant consists of mainly butyl rubber insulated conductors with polyvinylchloride jackets for power and control cables. The flame test standard for cables, IEEE Std 383, was not in effect at the time cables were purchased and installed. The majority of the cable trays are of solid pan construction. Ladder rung trays are used primarily where cables enter motor control centers and switchgear. The fire protection system, including proposed modifications, gives due consideration to the combustibility of electrical cables.

We find that the fire protection measures for electrical cables as identified herein are adequate to satisfy the objectives identified in Section 2.2 of this report and are, therefore, acceptable.

4.8 Fire Barrier Penetrations

Fire barriers are penetrated by doorways, ventilation ducts, electrical cables, piping and conduit. The licensee has conducted a test program to test electrical penetration seals for fire resistance based on typical plant arrangements and designs. The staff has reviewed the test program and has found it to be satisfactory. The test results have indicated that the fire barrier penetrations are adequate. Fire doors protecting safety-related areas such as the diesel generator rooms are electrically supervised. Other fire doors are either locked closed or administratively controlled to insure that they will be effective in limiting fires from spreading between fire areas.

We find that, based upon the results of the above noted test program, the fire barrier penetrations satisfy the objectives identified in Section 2.2 of this report and are, therefore, acceptable.

4.9 Separation Criteria

The licensee's separation criteria rely upon vertical separation of five feet and horizontal separation of three feet for cable trays. The criteria relies upon that protection afforded by conduit and sheet metal barriers.

The separation criteria did not limit the routing of nonsafety-related cables to a single separation division. In some locations a single tray changes classification from one safety-related division to another and nonsafety-related cables are routed to provide a continuity of combustibles between divisions. Fire stops will be installed in all such cable trays to prevent a fire in one division from propagating to the other division. In other situations, nonsafety-related trays join or are routed below two divisions of safety-related trays. Fire stops will be installed in all such cable trays which form a continuity of combustibles such that fire could spread between two divisions of safety-related trays. Where cable trays of different safety divisions are found to be closer than 3 feet horizontally or 5 feet vertically from each other, the cables will be coated with a flame retardant coating for the length of the tray until the 3 feet/5 feet separations are achieved. Other flame retardant barriers may be used in place of the flame retardant coating.

We conclude that the physical separation criteria in themselves are inadequate to provide protection for redundant safety-related systems from the standpoint of potential fires. Subsequent sections of this report address existing fire protection measures and the licensee's modifications for upgrading of fire protection in specific areas.

We find that, subject to implementation of the modifications identified in Section 3.0 of this report, adequate measures have been taken to compensate for the inadequacies of physical separation. This satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

4.10 Fire Barriers

Fire areas are enclosed by floors, walls and ceilings which have a 3-hour rating with few exceptions. In some areas barriers have been installed to assure integrity of separation between safety-related equipment and fire hazards. Areas not having a 3-hour rating are found acceptable on the basis of a light combustible loading or that redundant safety-related equipment will not be jeopardized. Further detail is provided in Section 5.0 of this report as to which areas will be upgraded.

We find that the fire barriers are adequate to prevent the spread of fire between different areas or equipment. This satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

4.11 Access and Egress

Adequate access is provided for manual fire fighting in most safety-related areas. In the Unit 1 reactor building two open stairs at opposite corners provide access to all elevations above grade. One set of stairs continues to the RHR area, while the other terminates at grade. An additional set of stairs originates at grade and continues to the RHR area.

In the Unit 2 reactor building there is only one set of stairs that service all elevations above grade. A second set originates at grade and services the RHR area. An access door between units also provides accessibility to all floors above grade. This is the second access to the various elevations of the Unit 2 reactor building.

The most difficult areas for access are the Unit 1 and Unit 2 cable tunnels. Trap doors are provided along the lengths of both tunnels. Modification will be made to existing sprinklers to provide better coverage of the cable trays. Portable smoke ejectors will also be provided to remove smoke in a fire situation. The areas will also be provided with smoke detection. Turn out coats will be provided for the fire brigade to provide protection in hostile environments as may result in combating combustible oil fires in confined areas.

We find that subject to the implementation of the above fire protection modifications, access to and from safety-related areas satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

4.12 Toxic and Corrosive Combustion Products

The products of combustion from many plastic materials, most common being cable insulation and jacket materials, are toxic to humans and corrosive to metals. Prompt fire detection and extinguishment are relied upon to minimize the quantities of such products. Additional means of smoke removal will be provided as an aid in fire fighting access as noted in Section 4.4. The fire brigade is provided with and trained in the use of emergency breathing apparatus for fighting fires involving such materials.

We find that the precautions taken to minimize the effects of toxic and corrosive products satisfy the objectives identified in Section 2.1 of this report and are, therefore, acceptable.

5.0 EVALUATION OF SPECIFIC PLANT AREAS

The licensee has performed a fire hazards analysis of the facility to determine the fire loading of various plant areas and to evaluate the adequacy of existing and proposed fire protection systems. The results of the fire hazards analysis, other docketed information, and site visit observations were used in the staff's evaluation of specific plant areas. The staff's evaluation of specific plant areas is discussed in the following sections.

5.1 Control Room

5.1.1 Safety-Related Equipment

The control room contains the controls for normal station operation and for shutdown of the plant under abnormal conditions. Operating indications, controls, and alarms are mounted on two L-shaped, free-standing walk-through control boards.

5.1.2 Combustibles

The combustibles in the area include electrical cable and wire insulation, and a small quantity of Class A combustibles such as log books and operating procedures.

5.1.3 Consequences if No Fire Suppression

An unmitigated fire in the control room could damage redundant divisions of safety-related systems required for safe shutdown.

5.1.4 Fire Protection Systems

Smoke detectors are provided in the return air path from the control room. Portable extinguishers are provided in the area and a hose station and additional extinguishers provided in adjacent areas. Modifications are being implemented to replace access doors with Class A fire doors and to install 3-hour fire dampers in ventilation penetrations.

5.1.5 Adequacy of Fire Protection

The lack of a complete fire detection system prevents a prompt response to fires in the area.

5.1.6 Modifications

The licensee has proposed the following modifications. Two 17-pound Halon 1211 portable extinguishers will be provided in the control room. An engineered fire detection system will be provided in the control room area. A smoke detector will be provided in the makeup air supply to the

control room. A low flow capacity booster fire hose station will be provided for use in the control room. The floor carpeting will be replaced with a UL listed floor covering.

We find that, subject to the implementation of the above described modifications, the fire protection for the control room satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

5.2 Cable Spreading Room
5.2.1 Safety-Related Equipment

The cable spreading room is used solely for the routing of instrument and control cables. The area is located directly below the control room and above the auxiliary electrical equipment room.

5.2.2 Combustibles

The only combustibles in the area consist of electrical cable insulation.

5.2.3 Consequences if No Fire Suppression

An unmitigated fire in the cable spreading room could result in the loss of redundant systems used for safe shutdown. The spread of cable tray fires is limited to some extent by the use of solid bottom cable trays. Shutdown capability is provided by the RCIC system independent of fire damage in this area.

5.2.4 Fire Protection Systems

Fire detection consists of a smoke detector in the return air ventilation duct from the cable spreading room. Hose stations and portable extinguishers are provided at each entrance to the area.

5.2.5 Adequacy of Fire Protection

The fire protection for this area is adequate with the modifications described above.

5.2.6 Modifications

Modifications are in process to provide an automatic water suppression system and smoke detectors in the cable spreading room. Other modifications in process for this area include the installation of a drainage system, upgrading the fire resistance of structural steel to provide a 3-hour rating, the installation of 3-hour rated fire dampers in ventilation penetrations, and the replacement of access doors with 3-hour fire rated doors.

We find that, subject to the completion of the above described modifications which are in process of being implemented, the fire protection for the cable spreading room satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

5.3 Auxiliary Electrical Equipment Room
5.3.1 Safety-Related Equipment

The equipment in the area consists of switch centers and relay cabinets associated with the reactor protection system, emergency core cooling systems, and the essential service and reactor protection motor generator sets and associated equipment. The plant computer room is located within the boundary of the electrical equipment room.

5.3.2 Combustibles

The major combustibles in the area consists of electrical insulation materials for wire and cables. Paper associated with computer operation and ventilation duct insulation materials account for a small portion of the total fire loading in the area.

5.3.3 Consequences if No Fire Suppression

An unmitigated fire in the area could damage redundant safety-related systems used for safe shutdown. Cables are routed through the area from the cable spreading area to the Unit 1 and 2 cable tunnels. Alternate shutdown capability is provided by the RCIC system. The licensee will provide an analysis of the RCIC system to assure the capability to shut down.

5.3.4 Fire Protection Systems

Smoke detectors are provided in the return air path from the computer room. Fire hose stations are located in close proximity to both entrances to the area. Portable extinguishers are provided in the area and in adjacent areas.

5.3.5 Adequacy of Fire Protection

The lack of an installed detection system prevents prompt detection of fires in the area. The computer room is an exposure fire hazard to the electrical equipment room. Electrical equipment is inadequately protected to prevent water damage. The entrances to the cable tunnels are inadequately protected.

5.3.6 Modifications

The licensee has proposed the following modifications. An early warning fire detection system will be provided in the area. The fire barriers between the auxiliary electrical equipment room and the adjacent areas will be upgraded to provide 3-hour rated barriers for doors, dampers, and electrical penetrations to the computer room, cable tunnels, cable spreading room, and service building. The top of electrical cabinets will be protected to prevent water damage from hose streams. A low flow capacity booster hose station will be provided in the vicinity of the room.

We find that, subject to the implementation of the above described modifications and satisfactory resolution of whether the RCIC system is adequate to shut down the plant, we will provide a conclusion on this subject in a supplement to this report.

5.4 Battery and DC Equipment Rooms

5.4.1 Safety-Related Equipment

A DC switchgear room is located on each end of the turbine building. Battery chargers and distribution buses for the 250, 125 and the 48/24 volt systems are located in the equipment rooms. The battery rooms are located directly above the DC equipment rooms.

5.4.2 Combustibles

The combustibles in the equipment rooms consist of electrical cable and wire insulation. The combustibles in the battery rooms consist of the plastic battery cells and wood supports.

5.4.3 Consequences if No Fire Suppression

An unmitigated fire in these areas would result in the loss of one DC power system for each unit. The redundant DC system is provided by the other unit since these systems are shared between units.

5.4.4 Fire Protection Systems

Hose stations provide both water and CO₂ suppression capability for the battery and equipment rooms. Portable fire extinguishers are provided in close proximity to each room.

5.4.5 Adequacy of Fire Protection

The lack of fire detection prevents prompt response to fires in these areas. Measures have not been provided to monitor the ventilation for the battery rooms to preclude the potential for hydrogen accumulation.

5.4.6 Modifications

The licensee has proposed the following modifications. Early warning fire detection will be provided in the battery and DC equipment rooms. Air flow supervision will be provided for the battery room exhaust with an alarm in the control room. The doors to the DC equipment rooms will be replaced with Class A fire doors.

We find that, subject to the implementation of the above described modifications, the fire protection for the battery and DC equipment rooms satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

5.5 Reactor Building Refueling Floor
5.5.1 Safety-Related Equipment

The fuel pool and reactor building cranes are located on this elevation.

5.5.2 Combustibles

Combustibles on this elevation include small quantities of wood, cable insulation and plastic decontamination materials.

5.5.3 Consequences if No Fire Suppression

An unmitigated fire in the area would not involve systems required for safe shutdown.

5.5.4 Fire Protection Systems

Hose stations and portable extinguishers are provided for this area.

5.5.5 Adequacy of Fire Protection

The lack of fire detection prevents prompt response to fires in this area.

5.5.6 Modifications

Early warning fire detection will be provided in this area.

We find that, subject to the implementation of the above described modification, the fire protection for the refueling floor satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

5.6 Reactor Building Reactor Floor
5.6.1 Safety-Related Equipment

The safety-related equipment located on this elevation include the standby liquid control system pumps and the standby gas treatment system. Redundant divisions of safety-related cables are routed through the area.

5.6.2 Combustibles

The combustibles in the area consist of a small quantity of cable insulation, 10 gallons of oil in the standby liquid control system pumps, and about 500 pounds of charcoal in the standby gas treatment system.

5.6.3 Consequences if No Fire Suppression

An unmitigated fire in this area could damage components of the standby liquid control system or standby gas treatment system.

5.6.4 Fire Protection Systems

Hose stations and portable extinguishers are provided in the area.

5.6.5 Adequacy of Fire Protection

The fire protection for this area is adequate.

5.6.6 Modifications

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

5.7 Reactor Building Main Floor

5.7.1 Safety-Related Equipment

The fuel pool cooling pumps and heat exchangers and the reactor building cooling water expansion tanks are located in the area. Cable trays for both divisions of safety-related cables are routed through the area.

5.7.2 Combustibles

The combustibles in the area consist of electrical cable insulation, wood crates and decontamination materials.

5.7.3 Consequences if No Fire Suppression

An unmitigated fire in the area could result in the loss of both fuel pool cooling pumps and both divisions of safety-related cables.

5.7.4 Fire Protection Systems

Hose stations and portable extinguishers are provided in the area.

5.7.5 Adequacy of Fire Protection

Wood boxes stored in the area are an exposure hazard to equipment and cables in the area.

5.7.6 Modifications

Wood storage boxes in the area of the control rod storage room will be removed.

We find that, subject to the implementation of the above described modification, the fire protection for the reactor building main floor satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

5.8 Reactor Building Mezzanine Floor
5.8.1 Safety-Related Equipment

The reactor building closed cooling water pumps and heat exchangers are located in the area. Both divisions of safety-related cables are routed through the area to motor control centers and reactor instrument racks.

5.8.2 Combustibles

The combustibles consist of electrical cable insulation and a small quantity of lubricants associated with pumps.

5.8.3 Consequences if No Fire Suppression

An unmitigated fire in the area could result in the loss of the reactor building closed cooling water system and the services associated with redundant motor control centers.

5.8.4 Fire Protection Systems

Hose stations and portable extinguishers are located in the area.

5.8.5 Adequacy of Fire Protection

The lack of detection would prevent prompt response to fires in the area. Protection has not been provided to prevent damage to electrical equipment from water from hose streams used to combat cable fires.

5.8.6 Modifications

The licensee has proposed the following modifications. Early warning fire detection will be provided in the area of the motor control centers and at the cable penetrations to the turbine building. The motor control centers will be protected for water damage from hose streams used for cable tray fires located above the equipment. A Class A fire door will be provided in the wall separating Unit 1 and Unit 2 at this and at the other elevations of the building.

We find that, subject to the implementation of the above described modifications, the fire protection for the reactor building mezzanine floor satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

5.9 Reactor Building Ground Floor
5.9.1 Safety-Related Equipment

The control rod hydraulic control units, motor control centers, instrument racks, and associated electrical cables are located in the area.

5.9.2 Combustibles

The combustibles in the area consist of electrical cable insulation and 75 gallons of lubricating oil for suppression chamber dry well air pack units. An oil dispensing station consisting of several 55-gallon drums of oil is located in Unit 1.

5.9.3 Consequences if No Fire Suppression

An unmitigated fire in the area could damage redundant divisions of cables for shutdown systems.

5.9.4 Fire Protection Systems

Hose stations and portable extinguishers are provided in the area.

5.9.5 Adequacy of Fire Protection

The lack of detection prevents prompt response to fires in this area. The oil dispensing station is an exposure hazard to safety-related systems. Automatic fire suppression should be provided for the drywell air pack units and a curb provided to prevent the spread of an oil spill fire. Motor control centers could be damaged by water from hose streams.

5.9.6 Modifications

The licensee has proposed the following modifications. Early warning fire detection will be provided in the area of the motor control centers and at the cable penetrations to the turbine building. The suppression chamber drywell air pack units will be curbed and protected by an automatic sprinkler system. Waste oil will be removed from the area and NFPA approved flammable liquid storage cabinets will be provided. Lube oil storage will be limited to a maximum container size of five gallons. The motor control centers will be protected from fire water damage.

We find that, subject to the implementation of the above described modifications, the fire protection for the reactor building ground floor satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

5.10 Reactor Building Corner Rooms

5.10.1 Safety-Related Equipment

Separate corner rooms are provided for redundant components of the residual heat removal (RHR) systems and core spray pumps. The reactor core isolation cooling (RCIC) system is located in one of the core spray pump rooms.

5.10.2 Combustibles

The combustibles in the corner rooms consist of lubricating oil associated with pumps: 5 gallons for each core spray pump and 12 gallons for each residual heat removal pump.

5.10.3 Consequences if No Fire Suppression

An unmitigated fire could result in damage to equipment in the corner rooms which would be limited to a single division of redundant systems.

5.10.4 Fire Protection Systems

A hose station and a portable extinguisher is provided in each RHR room. A hose station and portable extinguishers are located in the torus area with access to the other two corner rooms.

5.10.5 Adequacy of Fire Protection

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

5.11 High Pressure Coolant Injection Rooms

5.11.1 Safety-Related Equipment

The high pressure coolant injection (HPCI) pumps are located on the lower level of the turbine building adjacent to the reactor building torus area.

5.11.2 Combustibles

The major combustible in the area consists of 1000 gallons of lubricating oil associated with the HPCI turbine.

5.11.3 Consequences if No Fire Suppression

An unmitigated fire in the area could result in the loss of the HPCI system and could threaten the fire barrier separating this area from adjacent areas.

5.11.4 Fire Protection Systems

An automatic water deluge system is provided over the HPCI turbine and pump. A portable extinguisher is provided in each room and hose stations in the torus area of the reactor building provide backup suppression capability.

5.11.5 Adequacy of Fire Protection

A nonrated door provides access between the HPCI rooms which would permit a fire to spread between adjacent areas.

5.11.6 Modifications

The licensee has proposed to replace the door between adjacent HPCI rooms with a Class A fire door.

We find that, subject to the implementation of the above described modification, the fire protection for the HPCI rooms satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

5.12 Primary Containment

5.12.1 Safety-Related Equipment

The safety-related equipment in this area includes control rod drives, containment isolation valves and safety/relief valves.

5.12.2 Combustibles

Combustibles in this zone include 50 gallons of lubricating oil for each recirculation pump and cables routed in the conduit.

5.12.3 Consequences if No Fire Suppression

During normal plant operation the primary containment has an inert atmosphere which would prevent initiation of a fire. During refueling operations, the plant is shutdown and fires would not result in damage to prevent maintaining the plant in a safe condition.

5.12.4 Fire Protection System

Fire protection for the containment is provided by hose stations and portable extinguishers located near the containment entrance. Drains are provided to mitigate the consequences of an oil spill fire. The containment sprays would be adequate to suppress an oil spill fire.

5.12.5 Adequacy of Fire Protection

The fire protection for the containment is adequate to minimize the potential fire damage to equipment and cables in the containment.

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

5.13 Turbine Building - Basement Floor
5.13.1 Safety-Related Equipment

The basement area contains four residual heat removal service water (RHRSW) pumps, two diesel generator cooling water pumps, four RHR emergency coolers, and two emergency coolers.

5.13.2 Combustibles

The combustibles in this area consist of a small amount of electrical cabling, duct insulation, and lubricating oil for the condensate booster pumps. Transient combustibles such as waste oil and lubricating oil are stored in the area.

5.13.3 Consequences if No Fire Suppression

An unmitigated fire in the condensate pump area could disable all four condensate pumps. A fire in a RHR service water pump cubicle could disable two of four pumps.

5.13.4 Fire Protection Systems

An automatic sprinkler system protects the condensate pump areas. Waterflow annunciation is in the control room. Portable extinguishers and hose stations are provided for this area.

5.13.5 Adequacy of Fire Protection

The lack of automatic protection in the pump area and an adequate fire rating on the cubicle doors could cause the loss of adjacent equipment.

5.13.6 Modifications

The licensee has proposed the following modifications. The existing automatic sprinklers will be extended to protect the safety-related pump areas. Waste oil will be removed from the area and NFPA approved flammable liquid storage cabinets will be provided. Lube oil storage will be limited to a maximum container size of thirty gallons.

We find that, subject to implementation of the above described modifications, the fire protection for the turbine basement satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

5.14 Turbine Building - Upper Basement Floor
5.14.1 Safety-Related Equipment

Both divisions of safety-related cables and the control rod drive pumps are located in this area.

5.14.2 Combustibles

The combustibles consist of 10 gallons of lubricating oil in the rod drive feed pumps and cable insulation.

5.14.3 Consequences if No Fire Suppression

An unmitigated fire could adversely affect both divisions of safety-related cables.

5.14.4 Fire Protection Systems

Automatic sprinklers provide protection for most of the area except over the control rod drive feed pumps. Portable extinguishers and hose stations are provided for all areas.

5.14.5 Adequacy of Fire Protection

The lack of automatic sprinklers over the rod drive feed pumps could cause the loss of both divisions of safety-related cables.

5.14.6 Modifications

The existing automatic sprinklers will be extended to protect the rod drive feed pumps.

We find that, subject to implementation of the above modification, the fire protection for turbine building upper basement satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

5.15 Turbine Building - Unit 1 Cable Tunnel

5.15.1 Safety-Related Equipment

One division of safety-related cables is routed in the Unit 1 cable tunnel.

5.15.2 Combustibles

Cable insulation is the only combustible in this area.

5.15.3 Consequences if No Fire Suppression

An unmitigated fire in this area could damage one division of safety-related cables.

5.15.4 Fire Protection System

This tunnel is protected by an area automatic sprinkler system.

5.15.5 Adequacy of Fire Protection

Due to the lack of early warning fire detection, a fire could progress undetected until substantial damage is done to a number of cables. The sprinkler system does not provide adequate protection to prevent fire propagation between trays. Existing hose is not adequate to reach all areas in the cable tunnel.

5.15.6 Modifications

The licensee has proposed the following modifications. The sprinkler system will be modified to prevent fire propagation between trays. Additional hose will be provided on existing hose stations to reach any area in the cable tunnel. An early warning fire detection system will be installed in the tunnel.

We find that, subject to the implementation of the above described modifications, the fire protection for the Unit 1 cable tunnel satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

5.16 Turbine Building - Unit 2 Cable Tunnel

5.16.1 Safety-Related Equipment

Both divisions of safety-related cables are routed through the tunnel.

5.16.2 Combustibles

Cable insulation is the only combustible in this area.

5.16.3 Consequences if No Fire Suppression

An unmitigated fire in this area could damage redundant division of safety related cables.

5.16.4 Fire Protection Systems

The tunnel is protected by an area automatic sprinkler system.

5.16.5 Adequacy of Fire Protection

Due to the lack of early warning fire detection, a fire could progress undetected until substantial damage is done. The sprinkler system does not provide adequate protection to prevent fire propagation between cable trays. Existing hose is not adequate to reach all areas in the cable tunnel.

5.16.6 Modifications

The licensee has proposed the following modifications. The sprinkler system will be modified to prevent fire propagation between trays. Additional hose will be provided on existing hose stations to reach any area in the cable tunnel. An early warning fire detection system will be installed in the tunnel.

We find that, subject to the implementation of the above described modifications, the fire protection for the Unit 2 cable tunnel satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

5.17 Turbine Building - Ground Floor

5.17.1 Safety-Related Equipment

Two diesel generators are located in separate rooms within the turbine building. Both divisions of cable trays and conduit are routed through areas of the ground floor.

5.17.2 Combustibles

The combustibles in this area includes 300 gallons of lubricating oil in each reactor feed pump, lubricating oil in compressors, transient oils in the trackway area, and electrical cable insulation.

5.17.3 Consequences if No Fire Suppression

An unmitigated fire in a number of areas could cause the loss of redundant divisions of cables. A fire involving the various lubricating oil could cause damage to the unprotected steel structural members in such areas.

5.17.4 Fire Protection Systems

An extra-hazard pipe schedule wet pipe sprinkler system protects the feed water pumps. The feedwater heater bays and turbine oil storage room are protected by automatic sprinklers. Portable extinguishers and hose stations are provided for all areas.

5.17.5 Adequacy of Fire Protection

Due to the lack of automatic protection in a number of areas a fire could cause damage to redundant divisions of cables or cause structural damage before manual firefighting could be brought to bear on the fire. The lack of early warning detection in a number of areas of high cable concentration could allow a fire to progress to a stage where both divisions of cables could be endangered.

5.17.6 Modifications

The licensee has proposed the following modifications. Automatic water suppression will be provided for the Unit 1 and Unit 2 trackway areas and for the turbine EHC oil reservoirs and adjacent cable riser area. Fire detection will be provided above the 4 Kv switchgear adjacent to the diesel generator rooms. The exhaust vents for the reactor feed pump areas which face the outdoor transformers will be relocated and the opening sealed to provide a 3-hour rating. Fire dampers will be provided in the ventilation penetrations to the turbine oil storage room. NFPA approved flammable liquid storage cabinets will be provided for storing lubricants in quantities of five gallons or less. The storage space will be curbed, drained, and provided with spinkler protection.

We find that, subject to the implementation of the above described modifications, the fire protection for the turbine building ground floor satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

5.18 Turbine Building - Mezzanine Floor

5.18.1 Safety-Related Equipment

Motor control centers and 4 kV switchgear are located at the north and south areas of the building. Redundant divisions of cables are routed throughout the area.

5.18.2 Combustibles

The combustibles in this area consist of turbine lube oil reservoirs, hydrogen seal oil units, MG set oil cooler and pumps, cable insulation, and transient combustibles.

5.18.3 Consequences if No Fire Suppression

Due to the large quantity of oil, an unmitigated fire could cause structural damage to the turbine building and damage redundant switchgear and motor control centers.

5.18.4 Fire Protection Systems

Automatic deluge systems are provided for the turbine lube oil reservoirs and the hydrogen seal oil units. Area automatic sprinkler protection is provided for the heater bays, MG set oil coolers, and hydrogen seal oil area. Portable extinguishers and hose stations are provided for all areas.

5.18.5 Adequacy of Fire Protection

Due to the lack of early warning detection at the switchgear, areas of high cable concentrations, and cable penetrations, a fire could develop and cause damage to redundant divisions of cables.

5.18.6 Modifications

The licensee has proposed the following modifications. Fire detection will be provided in the high pressure heater bays for the cable penetrations to the reactor building and for the ceiling cable penetrations to the switchgear located above this area. Fire detection will be provided in the area of cable penetrations to the reactor building which are adjacent to the MG set oil coolers. The top of the 4 kV switchgear will be protected to prevent water damage due to the use of hose streams to combat cable tray fires. Curbs will be provided around the hydrogen seal oil units and the MG set oil coolers and pump assembly. The manual pull station for the Unit 2 hydrogen seal oil unit deluge system will be relocated outside the fire area.

We find that, subject to implementation of the above described modifications, the fire protection for the turbine mezzanine floor satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

5.19 Turbine Building - Main Floor 5.19.1 Safety-Related Equipment

Essential 480 volt and 4 kV switchgear are located on the main floor adjacent to the reactor building.

5.19.2 Combustibles

The major combustibles which could affect safety-related equipment are the MG set fluid coupling units, each containing 1200 gallons of lubricating oil.

5.19.3 Consequences if No Fire Suppression

An unmitigated fire in the MG set area could cause extensive damage to both divisions of switchgear for both units. The structural steel in this area could be damaged by the high temperatures due to a fire.

5.19.4 Fire Protection Systems

The MG set area is protected by an automatic sprinkler system with water-flow annunciated in the control room. Portable extinguishers and hose stations are provided for all areas.

5.19.5 Adequacy of Fire Protection

Due to the close proximity of the switchgear to the MG sets, a failure of the sprinkler system could cause extensive damage to the redundant switchgear and building structural steel supports. The lack of early warning detection at the switchgear prevents prompt response to the fires in this area.

5.19.6 Modifications

The licensee has proposed the following modifications. An early warning fire detection system will be provided over the safety-related switchgear. A protective canopy will be provided over each kV switchgear to prevent water damage. The top of the 480 volt switchgear will be protected to prevent water damage due to hose streams used to combat cable fires. A curb will be provided around each MG set to contain an oil spill. Drains will be provided for the enclosed area. An automatic foam deluge system actuated by flame or infrared detectors will be provided for each MG set fluid coupling and curbed area. The water feed for the foam deluge system will be independent of the sprinkler system protecting this area.

We find that, subject to implementation of the above described modifications, the fire protection for the turbine building main floor satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

5.20 Diesel Generator Rooms 5.20.1 Safety-Related Equipment

Each diesel generator and associated equipment are located within a separate room.

5.20.2 Combustibles

The 350 gallons of lubricating oil in the diesel generator crankcase makes up the majority of the combustibles within the room. A 750-gallon diesel day tank is located in a 3-hour rated enclosure within the diesel generator room.

5.20.3 Consequence if No Fire Suppression

An unmitigated fire in the diesel generator room could cause the loss of the diesel generator unit and could cause the collapse of the unprotected steel within the room. The steel supports the turbine building. The fire could seriously threaten the integrity of the rated fire barrier wall and penetrations.

5.20.4 Fire Protection Systems

Thermostats are located in each diesel generator room which actuate local and control room alarms. The thermostats also actuate a total flooding carbon dioxide system supplied from the 7½-ton low pressure storage tank. The day tank room has a thermostat that also actuates the carbon dioxide system. This room is also protected by automatic sprinklers. Portable extinguishers and hose stations provide manual fire protection for these areas.

5.20.5 Adequacy of Fire Protection

The diesel generator rooms within the turbine building are not adequately isolated from the turbine building proper. The structural steel within the room is not protected from the effects of a fire within the room. The doors to the rooms are not electrically supervised to insure the doors are closed when the carbon dioxide system is actuated.

5.20.6 Modifications

The licensee has proposed the following modifications. All penetrations including doors, ventilation, pipe and cable trays will be upgraded to a 3-hour fire rating. The structural steel within the rooms will be protected by an assembly providing a 3-hour rating. The doors to diesel generator rooms in the turbine building will be electrically supervised.

We find that, subject to implementation of the above described modifications, the fire protection for the diesel generator rooms satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

5.21 Crib House 5.21.1 Safety-Related Equipment

There is no safety-related equipment in the crib house. The two diesel fire pumps are located in the crib house.

5.21.2 Combustibles

Lubricating oil in the various pumps amounts to 500 gallons. Each fire pump has a 250-gallon diesel day tank associated with it. Nine 55-gallon drums of lubricating oil is stored at a dispensing station in a corner of the room.

5.21.3 Consequences if No Fire Suppression

An unmitigated fire in the diesel fire pump area or lubricating oil storage area could impact both diesel fire pumps.

5.21.4 Fire Protection System

The area is protected by portable extinguishers and hose stations.

5.21.5 Adequacy of Fire Protection

The diesel fire pumps are not adequately protected from a diesel oil fire or spill. The drums of lubricating oil present an exposure to the fire pumps.

5.21.6 Modifications

The licensee has proposed the following modifications. An automatic sprinkler system will be provided over each diesel fire pump. Flammable liquid storage cabinets will be provided for lubricating oils in 55 gallon quantities. The storage location will be curbed, drained and provided with sprinkler protection.

We find that, subject to the implementation of the above described modifications, the fire protection for the crib house satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

5.22 Yard Area

5.22.1 Safety-Related Equipment

The safety-related equipment in the yard area includes the condensate storage tanks and buried diesel generator oil tanks.

5.22.2 Combustibles

Combustibles in the yard area include the oil filled transformers adjacent to the turbine buildings, hydrogen storage, buried diesel oil storage tank, trailers and miscellaneous storage.

5.22.3 Consequences if No Fire Suppression

An unmitigated fire in the reserve and auxiliary transformer would expose safety-related cabling within the turbine building through unprotected louvered openings and through bus ducts that penetrate the wall.

5.22.4 Fire Protection Systems

The transformers are protected by automatic deluge systems. The condensate tanks are not exposed by exterior fire hazards. The yard is protected by manual fire protection.

5.22.5 Adequacy of Fire Protection

The unprotected louvered openings in the turbine building adjacent to transformers provides fire a ready access to the turbine building and the safety-related cables adjacent to the wall.

5.22.6 Modifications

The licensee has proposed the following modifications. The louvered opening in the turbine wall adjacent to the auxiliary transformer will be relocated and the opening sealed to a 3-hour rating. A water spray will be provided for the bus ducts that penetrate the west turbine wall within 15 feet of the transformers. The water feed for the water spray will be independent of the feed that supplies the transformers deluge systems.

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

6.0 ADMINISTRATIVE CONTROLS

General

The Administrative Controls for Nuclear Plant Fire Protection consist of the fire protection organization and its qualifications, fire brigade training, the controls over combustibles and ignition sources, methods for assuring the availability of the fire protection systems and equipment; procedures for fighting fires, fire watch, and quality assurance provisions for the fire protection program. The licensee has provided a description of proposed administrative controls for fire protection by submittals dated April 24, 1978, July 27, 1978 and November 30, 1978. Our review is based on this information and our understanding that the licensee meets or will meet the specific guidance found in "Nuclear Plant Fire Protection Functional Responsibilities, Administrative Controls, and Quality Assurance."

We find that the control of nuclear plant fire protection functional responsibilities, administrative controls and Quality Assurance conforms to the provisions of Appendix A to BTP 9.5-1 and is, therefore, acceptable.

6.1 Fire Protection Organization

The licensee's fire protection organization contains the organizational responsibilities and lines of communication between the various positions through the use of organizational charts and functional descriptions of each position's responsibilities. Upper level offsite management positions are designated which have management responsibility for the formulation, implementation, and assessment of the effectiveness of the Nuclear Plant Fire Protection Program. The results of these assessments are reported to the upper level management position responsible for fire protection with recommendations for improvements or corrective actions as deemed necessary. The organizational responsibilities are delineated through onsite management positions for design, installation, testing, maintenance, modification, and review of fire protection systems and for fire brigade training. Qualification requirements have been established for fire brigade members, the fire protection engineer, and the position responsible for formulating and implementing the fire protection program. Satisfactory completion of a physical examination including periodic screening for performing strenuous activity is required for all fire brigade members.

We find that the control of fire protection organization conforms to the provisions of Appendix A to BTP 9.5-1 and is, therefore, acceptable.

6.2 Fire Brigade Training

The Fire Brigade Training Program consists of an initial classroom instruction program followed by periodic classroom instruction, practice in fire fighting and fire drills. Practice sessions are held for fire brigade members on the proper method of fighting various types of fires that could occur in a nuclear plant considering such factors as the magnitude of the

fire, and the complexity and difficulty of fire fighting. These sessions are designed to provide members with experience in actual fire extinguishment and the use of emergency breathing apparatus under strenuous working conditions. The Fire Brigade Training Program includes planned meetings, periodic practice in actual fire fighting, repeated instructions, periodic fire drills, and critiques to assess brigade effectiveness. Records of training are provided and available for review including drill critiques.

We find that the control of Fire Brigade Training conforms to the provisions of Appendix A to BTP 9.5-1 and is, therefore, acceptable.

6.3 Control of Combustibles

Administrative controls have been established to minimize the amount of combustibles that a safety-related area may be exposed to, and to assure that these items are not stored in safety-related areas and an assessment of the need for additional suppression equipment for transient fire loads. Station procedures have been established to ensure that fire retardant lumber of good abrasion resistance is used inside buildings containing safety-related systems.

We find that the control of combustibles conforms to the provisions of Appendix A to BTP 9.5-1 and is, therefore, acceptable.

6.4 Control of Ignition Sources

The control of ignition sources instituted are to protect safety-related equipment from fire damage or loss resulting from work involving ignition sources, such as welding, cutting, grinding, or open flame work. Administrative controls established require review and approval by a responsible supervisor prior to performing cutting, welding, grinding, or open flame work; proper removal or covering of combustible material; use of trained and equipped fire watches; signature concurrence; acceptable methods of leak testing; and restrictions on smoking in safety-related areas.

We find that the control of ignition sources conforms to the provisions of Appendix A to BTP 9.5-1 and is, therefore, acceptable.

6.5 Fire Fighting Procedures

The licensee has provided an adequate description of its current fire fighting procedures, those under development and those planned to be developed in the near future. Fire fighting procedures/plans are established to cover such items as notification of a fire, fire emergency procedures, coordination of fire fighting activities with offsite fire departments, strategies for fighting fires in all safety-related areas and areas presenting a hazard to safety-related equipment. Provisions have been made for including offsite fire fighting organizations in fire brigade drills and training as required.

We find that the control of fire fighting procedures conforms to the provisions of Appendix A to BTP 9.5-1 and is, therefore, acceptable.

6.6

Quality Assurance

The design, procurement, installation, testing and administrative control activities for the fire protection Quality Assurance (QA) program criteria of Appendix A to BTP 9.5-1 will be controlled in accordance with an approved QA program under 10 CFR Part 50 Appendix B. Audits will be performed annually, as defined in Technical Specification 6.1.6.H, to provide an overall assessment of conformance to fire protection requirements.

We find that the control of Quality Assurance conforms to the provisions of Appendix A to BTP 9.5-1 and is, therefore, acceptable.

7.0 TECHNICAL SPECIFICATIONS

The Technical Specifications to include limiting conditions for operation and surveillance requirements for existing fire protection systems and administrative controls were issued on March 22, 1978. The Technical Specifications have been revised to include requirements on sprinkler systems and hose stations which provide protection for safety-related systems based on this review.

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 CONCLUSIONS

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 addition, we have concluded that the licensee should implement certain evaluations related to the fire protection program. These are summarized in Section 3.2. 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. Additional evaluation of incomplete items, discussed in the preceding sections, will be necessary before we can conclude that the overall fire protection at the facility will satisfy the objectives identified in Section 2.2 of this report which the staff has established for satisfactory long-term fire protection.

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, while the remaining items are completed.

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:

"A probability assessment of public safety or risk in quantitative terms is given in the Reactor Safety Study (WASH-1400). As the result of the calculation based on the Browns Ferry fire, the study concludes that the potential for a significant release of radioactivity from such a fire is about 20% of that calculated from all other causes analyzed. This indicates that predicted potential accident risks from all causes were not greatly affected by consideration of the Browns Ferry fire. This is one of the reasons that urgent action in regard to reducing risks due to potential fires is not required. The study (WASH-1400) also points out that 'rather straightforward measures, such as may already exist at the other nuclear plants, can significantly reduce the likelihood of a potential core melt accident that might result from a large fire.'

"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 1975 (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. In the Commission's Policy Statement dated January 18, 1979, "NRC Statement on Risk-Assessment and the Reactor Safety Study Report (WASH-1400) in Light of the Risk-Assessment Review Group Report", the Commission indicated on page 3 that it "accepts the Review Group Report's conclusion that absolute values of the risks presented by WASH-1400 should not be used uncritically either in the regulatory process or for public policy purposes and has taken and will continue to take steps to assure that any such use in the past will be corrected as appropriate. In particular, in light of the Review Group conclusions on accident probabilities, the Commission does not regard as reliable the Reactor Safety Study's numerical estimate of the overall risk of reactor accident."

In summary, it is our conclusion that the operation of the facility, pending resolution of the incomplete items and the implementation of all facility modifications, does not present an undue risk to the health and safety of the public based on our concurrence with the Browns Ferry Special Review Group's conclusions identified above, giving due consideration to the Commission Policy Statement, 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 for 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 STAFF RESPONSE TO 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 letter, "Fire Protection in Operating Nuclear Power Stations - Quad Cities Units 1 & 2 Safety Evaluation Report Review," dated April 13, 1979, concurs with the staff conclusions noted in the Safety Evaluation Report.

The consultants' recommendation which we have not adopted, along with our basis therefor, is as follows:

Consultants' Recommendation:

"Electrical valve supervision should be provided on all valves controlling fire water systems and sectionalizing valves. The present proposal of administrative controls or locks is unacceptable."

Staff Response:

The NRC guidelines on valve supervision are given in Appendix "A" of Branch Technical Position (BTP) 9.5-1 of the Standard Review Plan. These guidelines permit, as an alternative to electrical supervision, an administrative program to assure that valves are maintained in the proper position. Such a program includes locking valves with strict key control or sealing valves with tamper-proof seals. Periodic inspections are to be performed to verify that the method of securing the valve is intact.

These measures are consistent with the requirements imposed for supervising valves in safety-related systems, and provide adequate assurance that valves are maintained in the appropriate position. The licensee's program for valves supervision is consistent with NRC guidelines. In addition, the plant technical specifications were revised to require a monthly check of all valves in the flow path to fire suppression systems. We find that a significant increase in plant safety would not result from the use of electrical supervision of all valves controlling fire water systems and sectionalizing valves.

Other consultants' recommendations are as follows:

Consultants' Recommendation:

"It is felt that this section does not adequately describe the needs of the fire brigade. We recommend that ten units of protective clothing be provided which will include as a minimum fire fighters coats and helmets. The helmets can be approved OSHA hard hats."

Staff Response:

The staff concurs with the consultants' recommendation and the licensee has agreed to implement it.

Consultants' Recommendation:

"It is felt that the existing requirement for air breathing equipment for five men is inadequate in case of a significant fire. We recommend that fire fighter's emergency breathing air supply be called out for ten men for six hours."

Staff Response:

The staff concurs with the consultants' recommendation and the licensee has agreed to implement it.

Consultants' Recommendation:

"There is no mention of hose nozzles in this SER. In areas where high voltage electrical systems may be encountered, we recommend that variable nozzles with the selection mode of off, spray stream, solid stream be used. We also recommend that training in the use of these nozzles be provided for all brigade members. An alternative recommendation for these areas is spray type shut-off nozzles."

Staff Response:

The staff concurs with the consultants' recommendation and the licensee has agreed to implement it.

APPENDIX A

CHRONOLOGY

In February 1976, the report by the NRC Special Review Group was issued as NUREG-0500, "Recommendations Related to the Browns Ferry Fire."

On May 1, 1976, Standard Review Plan 9.5.1, "Fire Protection," was issued, incorporating the various recommendations contained in NUREG-0500.

By letter dated May 11, 1976, the licensee was requested to compare the existing fire protection provisions at their facilities with new NRC guidelines as set forth in Standard Review Plan 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 that will be met in the near future, and (3) the guidelines that will not be met and the basis therefor.

By letter of October 4, 1976, the licensee was requested to provide the results of a fire hazards analysis and proposed Technical Specifications pertaining to fire protection. The licensee was also provided a copy of Appendix A to BTP 9.5-1 which includes acceptable alternatives to the guidelines of SRP 9.5-1.

By letter dated March 29, 1977 the licensee transmitted to the staff their report titled, "Information Relevant to Fire Protection Systems and Programs, Part 3, Quad Cities Nuclear Power Station Units 1 and 2 dated April 1977.

By letter dated August 3, 1977 the licensee forwarded to the staff an amendment to license DPR-29 and DPR-30 Appendix A technical specifications. The purpose of this letter was to incorporate fire protection technical specifications.

By letter dated August 25, 1977, the licensee submitted errata sheets for the report "Information Relevant to Fire Protection Systems and Programs."

By letter dated January 24, 1978, the licensee was requested to submit information which would resolve issues where a direct similarity existed between Dresden Units 2 and 3 and Quad Cities.

By letter dated March 22, 1978 the changes to the Quad Cities technical specifications to include fire protection were issued.

By letter dated April 13, 1978 the licensee submitted a list of the items committed to in the Dresden 2 and 3 reviews and similarly committed to in the Quad Cities review.

By letter dated May 1, 1978 the staff requested that the licensee submit an analysis of the plants capability to shutdown following the consequences of fire damage in areas where redundant shutdown systems are located.

By letter dated June 6, 1978 the licensee requested a change to operating license No DPR-29 and DPR-30, Appendix A, Technical Specifications changes.

By letter dated July 6, 1978 the licensee submitted revisions to the report titled, "Information Relevant to Fire Protection Systems and Programs."

By letter dated July 27, 1978, the licensee submitted Commonwealth Edison Company responses to the request for additional information on Administrative Controls.

By letter dated July 31, 1978, the licensee submitted the Quad Cities, Fire Protection Safe Shutdown Analysis.

On August 21-25, 1978, the fire protection review team visited the Quad Cities site to evaluate the fire protection systems and programs.

By letter dated November 30, 1978, the licensee submitted information relevant to Administrative Controls.

By letter dated December 27, 1978, the licensee submitted his reply to the site visit staff positions which were presented to the licensee on August 25, 1978 at the conclusion of the staff's site visit.

On January 31, 1979, a meeting was held with the licensee in Bethesda to resolve our concerns on the fire protection programs.

By letter dated March 29, 1979, the licensee submitted additional responses to NRC staff positions for the Fire Protection Evaluation.

By letter dated April 3, 1979, the licensee submitted additional information and administrative controls for fire protection.

By letter dated April 23, 1979, the licensee submitted clarification of Staff Position 57 and concern about fire brigade training.

UNITED STATES NUCLEAR REGULATORY COMMISSIONDOCKETS NOS. 50-254 AND 50-265COMMONWEALTH EDISON COMPANYANDIOWA-ILLINOIS GAS AND ELECTRIC COMPANYNOTICE OF ISSUANCE OF AMENDMENTS TO FACILITY
OPERATING LICENSES

The U. S. Nuclear Regulatory Commission (the Commission) has issued Amendment Nos. 52 and 49 to Facility Operating License Nos. DPR-29 and DPR-30 issued to Commonwealth Edison Company (acting for itself and on behalf of the Iowa-Illinois Gas and Electric Company), which revised the licenses for operation of the Quad Cities Nuclear Power Station Units Nos. 1 and 2 (the facility) located in Rock Island County, Illinois. The amendments will become effective twenty days after issuance, unless a hearing has been requested.

The amendments add license conditions relating to the completion of facility modifications and implementation of administrative controls for fire protection.

The licensee's submittals comply 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 amendments. Prior public notice of the amendments was not required since the amendments do not involve a significant hazards consideration.

The Commission has determined that the issuance of the amendments will not result in any significant environmental impact and that pursuant to

10 CFR Section 51.5(d)(4) an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared in connection with issuance of the amendments.

For further details with respect to this action, see (1) the licensee's submittals dated March 29, August 3, 1977, June 6, July 6, July 27, November 30, 1978, March 29, April 5, and April 23, 1979, (2) Amendment Nos. 52 and 49 to License Nos. DPR-29 and DPR-30, 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 Moline Public Library, 504 - 17th Street, Moline, Illinois 61265. 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 27 day of July 1979.

FOR THE NUCLEAR REGULATORY COMMISSION


Thomas A. Ippolito, Chief
Operating Reactors Branch #3
Division of Operating Reactors