MARCH 3 1978

Docket No. 50-219

Jersey Central Power & Light Company
ATTN: Mr. I. R. Finfrock, Jr.
Vice President - Generation
Madison Avenue at Punch Bowl Road
Morristown, New Jersey 07960

Gentlemen:

The Commission has issued the enclosed Amendment No. 29 to Provisional Operating License No. DPR-16 for the Oyster Creek Nuclear Generating Station. The amendment consists of changes to the license and is in partial response to your application dated September 30, 1977 and your letters dated December 3, 1976, August 11, 1977 and October 3, 1977.

The amendment adds license conditions relating to the completion of facility modifications for fire protection. Amendment No. 29 also revises the Technical Specifications to incorporate limiting conditions for operation and surveillance requirements for existing fire protection systems and administrative controls. The enclosed Technical Specifications have been modified from those proposed in your September 30, 1977 submittal. These changes have been discussed with and agreed to by your staff.

Enclosure 4 to this letter contains changes to the Technical Specifications which were not included in Amendment No. 29 with the associated Safety Evaluation Report. We have determined that these revisions to your submittal are needed and that the Technical Specifications should be implemented by an amendment to your facility license. We believe that it is important that fire protection requirements generally be consistent for all facilities and we are taking these steps to achieve consistent interim action with respect to fire protection for all plants. Since you have already discussed these revisions with the NRC staff and have not agreed with them please provide us in writing within 20 days, the basis for your objections, identifying the specifications that you

OFFICE ➤						
SURNAME ➤						
DATE ➤						

find objectionable. If you do not respond within 20 days from the date of this letter, your agreement will be assumed and the Oyster Creek Nuclear Generating Station license will be amended to incorporate the Technical Specification changes described in Enclosure 4.

Sincerely,

Original signed by

Dennis L. Ziemann, Chief
Operating Reactors Branch #2
Division of Operating Reactors

Enclosures:
1. Amendment No. 29
2. Safety Evaluation
3. FEDERAL REGISTER Notice
4. Additional Revisions to Technical Specifications and associated Safety Evaluation

cc w/enclosures:
See next Page

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DATE	3/3/78	2/22/78	2/28/78	3/2/78	3/3/78	

find objectionable. Please advise us accordingly if you no longer have objections to the specifications in Enclosure 4 within 20 days. If you do not respond within 20 days from the date of this letter, your agreement will be assumed and the Oyster Creek Nuclear Generating Station license will be amended to incorporate the Technical Specification changes described in Enclosure 4.

Sincerely,

Dennis L. Ziemann, Chief
Operating Reactors Branch #2
Division of Operating Reactors

Enclosures:
1. Amendment No.
2. Safety Evaluation
3. FEDERAL REGISTER Notice
4. Additional Revisions to Technical Specifications

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objectionable and specify your reasons and technical bases therefore. If you no longer have objections to the specifications in Enclosure 1, it is nonetheless important to let us know within 20 days. We plan to initiate steps to issue the changes to the Technical Specifications in Enclosure 1 for your facility in approximately 20 days following the date of this letter. If we do not hear from you, we will act to issue the specifications on the basis that assumes your agreement.

Sincerely,

Karl R. Goller, Assistant Director
for Operating Reactors
Division of Operating Reactors

Enclosures:
1. Additional Revisions to Technical Specifications
2. Amendment No.
3. Safety Evaluation
4. Notice

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DATE	2/21/78	2/22/78	2/28/78	3/ /78	3/ /78	3/ /78

portion that you find objectionable and specify your reasons and technical bases therefore. If you no longer have objections to the specifications in Enclosure 1, it is nonetheless important to let us know within 20 days. We plan to initiate steps to issue the changes to the Technical Specifications in Enclosure 1 for your facility in approximately 20 days following the date of this letter. If we do not hear from you, we will act to issue the specifications on the basis that assumes your agreement.

Sincerely,

Karl R. Goller, Assistant Director
for Operating Reactors
Division of Operating Reactors

Enclosures:
1. Additional Revisions to Technical Specifications
2. Amendment No.
3. Safety Evaluation
4. FEDERAL REGISTER Notice

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

JERSEY CENTRAL POWER & LIGHT COMPANY

DOCKET NO. 50-219

OYSTER CREEK NUCLEAR GENERATING STATION, UNIT NO. 1

AMENDMENT TO PROVISIONAL OPERATING LICENSE

Amendment No. 29
License No. DPR-16

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

   A. The application for amendment by Jersey Central Power and Light Company (the licensee) dated September 30, 1977 as supplemented by your letters dated December 3, 1976, August 11, 1977, and October 3, 1977, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;

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

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

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

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

2. Accordingly, Provisional Operating License No. DPR-16 is hereby amended by changes to the Technical Specifications as indicated in the attachment to this license amendment and by the following additional changes:

   A. Change paragraph 3.B. to read:

      B. Technical Specifications

      The Technical Specifications contained in Appendix A, as revised through Amendment No. 29 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

   B. Add paragraph 3.E. as follows:

      E. The licensee may proceed with and is required to complete the modifications identified in Paragraphs 3.1.1 through 3.1.23 of the NRC's Fire Protection Safety Evaluation (SE) on the facility dated March 3 , 1978. These modifications shall be completed as specified in Table 3.1 of the SE. In addition, the licensee shall submit the additional information identified in Table 3.2 of this SE in accordance with the scheduled contained therein. In the event these dates cannot be met, the licensee shall submit a report, explaining the circumstances, together with a revised schedule.

3. This license amendment becomes effective 30 days after the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Dennis L. Ziemann, Chief
Operating Reactors Branch #2
Division of Operating Reactors

Attachment:
Changes to the Technical
Specifications

Date of Issuance: March 3, 1978

ATTACHMENT TO LICENSE AMENDMENT NO. 30

TO THE TECHNICAL SPECIFICATIONS

PROVISIONAL OPERATING LICENSE NO. DPR-16

DOCKET NO. 50-219

Replace the following pages of the Appendix "A" Technical Specifications with the enclosed pages. Add page 3.11 through 3.12-6, pages 4.12-1 through 4.12-3 and page 6-2a. The revised page is identified by Amendment number and contains vertical lines indicating the area of change.

Remove	Replace
Table of Contents i	Table of Contents i
Table of Contents ii	Table of Contents ii
1.0-5	1.0-5
First page of Administrative Controls	First page of Administraitve Controls
6-26	6-26

TABLE OF CONTENTS

1.21 CORE ALTERATION

A core alteration is the addition, removal, relocation or other manual movement of fuel or controls in the reactor core. Control rod movement with the control rod drive hydraulic system is not defined as a core alteration.

1.22 MINIMUM CRITICAL POWER RATIO

The minimum critical power ratio is the ratio of that power in a fuel assembly which is calculated to cause some point in that assembly to experience boiling transition to the actual assembly operating power.

1.23 STAGGERED TEST BASIS

A Staggered Test Basis shall consist of:

a. A test schedule for n systems, subsystems, trains or other designated components obtained by dividing the specified test interval into n equal subintervals.

b. The testing of one system, subsystem, train or other designated component at the beginning of each subinterval.

1.24 FIRE SUPPRESSION WATER SYSTEM

A FIRE SUPPRESSION WATER SYSTEM shall consist of: a water source; pump; and distribution piping with associated sectionalizing control or isolation valves. Such valves shall include yard hydrant curb valves, and the first valve ahead of the water flow alarm device on each sprinkler, hose standpipe or spray system riser.

3.11

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3.12 Fire Protection

Applicability: Applies to the operating status of Fire detection/ suppression systems and associated instrumentation.

Objective: To assure that fires in safety related areas are detected and suppressed at an early stage so as to minimize fire damage to safety related equipment.

Specifications:

A. Fire Detection Instrumentation

1. As a minimum, the fire detection instrumentation for each fire detection area/zone shown in Table 3.12.1 shall be operable, except as otherwise specified in this section.

2. With the number of operable fire detection instruments less than required by Table 3.12.1;

   a. Within one hour, establish a fire watch patrol to inspect the area (s)/zone(s) with the inoperable instrument(s) at least once per 2 hours, and

   b. Restore the inoperable instrument(s) to operable status within 14 days or prepare and submit a special report to the commission within the next 30 days outlining the cause of the malfunction and the plans for restoring the instrument(s) to operable status.

B. Fire Suppression Water System

1. The Fire Suppression Water System shall be operable with:

   a. Two high pressure pumps with their discharge aligned to the fire suppression header.

   b. Automatic initiation logic for each fire pump.

2. With less than the above required equipment, restore the inoperable equipment to operable status within 7 days or prepare and submit a Special Report to the commission within the next 30 days outlining the plans and procedures to be used to provide for the loss of redundancy in this system.

3. With no Fire Suppression Water System operable, within 48 hours;

   a. Establish a backup Fire Suppression Water System and submit a Special Report to the Commission by telephone within 24 hours, and in writing no later than 10 days following the event, outlining the action taken, the cause of the inoperability and the plans and schedule for restoring the system to OPERABLE status, or

   b. The reactor shall be placed in the cold shutdown condition within 24 hours.

C. Spray and/or Sprinkler Systems

1. The spray and/or sprinkler systems listed in Table 3.12.2 shall be operable.

2. With a spray and/or sprinkler system inoperable establish a fire watch patrol to inspect the area/zone at least once per 2 hours.

3. Restore the system to operable status within 14 days or prepare and submit a Special Report to the Commission within the next 30 days outlining the cause of inoperability and the plans for restoring the system to operable status.

D. Fire Hose Stations

1. The Fire Hose Stations listed in Table 3.12.3 shall be operable.

2. With a hose station listed in Table 3.12.3 inoperable, within 2 hours provide additional fire suppression equipment in the affected area/zone.

E. Fire Barrier Penetration Fire Seals

1. All penetration fire barriers protecting safety related areas shall be intact except for periods of planned maintenance.

2. With a penetration fire barrier nonfunctional, within one hour establish a fire watch patrol to inspect both sides of the affected penetration at least once per every 2 hours.

Basis:

Fire Protection systems and instrumentation provide for early detection and rapid extinguishment of fires in safety related areas thus minimizing fire damage. These specifications will assure that in the event of inoperable fire protection equipment that corrective action will be initiated in order to maintain fire protection capabilities during all modes of reactor operation.

The pumps in the fire water suppression system have a capacity of 2000 GPM each assuring an adequate supply of water to fire suppression systems. Fire suppression water system operability as defined in 3.12.B.1 applies only as pertains to specification 3.12 and is not applicable to other specifications.

Hose stations are provided for manual fire suppression. In the event that a hose station becomes inoperable, additional fire suppression equipment should be provided such as portable extinguishers or other means of fire suppression.

TABLE 3.12.1

Fire Area	Location	Detector
11	Turbine Building	Water Flow Valve V-9-43
		Water Flow Valve V-9-45
		Supervised Valve V-9-46
8	Recirc. M-G Set room	Water flow switch

TABLE 3.12.2

Spray/Sprinkler System	Fire Area
Sprinkler System #2	11 (Turbine Building Cable Trays)
Sprinkler System #4	8 (Recirc M-G Set Room)
Deluge System #3	11 (Turbine lube oil tanks)

TABLE 3.12.3

Fire Area	Zone	No. of Hose Stations	Location
7		1	Outside door of Battery Room
9	2	1	2nd floor of office building
9	3	1	3rd floor of office building
11	1	12	Turbine operating floor, Lube Oil Storage Area, Pumping and oil purification area - south and west equipment areas.
11	2	2	Basement Turbine Building South End
11	3	4	Condenser Bay
12		1 hose house & hydrant	Main transformer and Condensate Areas
14		1 hose house & hydrant	Circulating Water intake structure
15, 16, 17		1 hose house & hydrant	Diesel Building

4.12 Fire Protection

Applicability: Applies to the surveillance requirements of the Fire Protection Systems in safety related areas/zones.

Objective: To specify the minimum frequency and type of surveillance to be applied to fire protection equipment and instrumentation.

Specifications:

A. Fire Detection Instrumentation

1. Each of the instruments in Table 3.12.1 shall be demonstrated operable by a channel functional test at least once per 6 months.

2. The circuitry associated with the detector alarms listed in Table 3.12.1 shall be demonstrated operable at least once per two months.

B. Fire Suppression Water System

1. The Fire Suppression Water System shall be demonstrated operable:

   a. At least once per month on a staggered test basis by starting each pump and operating it for at least 15 minutes on recirculation flow.

   b. At least once per month by verifying the valve lineup.

   c. At least once per 24 months by performance of a system flush.

   d. At least once per 3 years by performing flow tests of the system in accordance with Chapter 5, Section 11 of the Fire Protection Handbook, 14th edition published by the National Fire Protection Association.

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C. Spray and/or Sprinkler Systems

1 1. The spray and/or sprinkler systems listed in Table 3.12.2 shall be demonstrated operable:

a. At least once per 12 months by cycling each testable valve through one complete cycle.

b. At least once per 18 months:

(1) By performing a system functional test which includes simulated automatic actuation of the system and verifying that the automatic valves in the flow path actuate to their correct positions.

(2) By visual inspection of spray headers and nozzles to verify their integrity and that a clear flow path exists below nozzles.

(3) By inspection of each nozzle to verify no blockage.

D. Fire Hose Stations

1. Each fire hose station shall be verified OPERABLE:

a. At least once per 31 days by visual inspection of the station to assure all equipment is available.

b. At least once per 18 months by removing the hose for inspection and re-racking and replacing all gaskets in the couplings that are degraded.

c. At least once per 3 years, partially open each hose station valve to verify valve operability and no blockage.

d. At least once per 3 years by a Hydrostatic test of attached fire hose.

Basis:

Fire Protection systems are normally inactive and require periodic examination and testing to assure their readiness to respond to a fire situation. These specifications detail inspections and tests which will demonstrate that this equipment is capable of performing its intended function.

ADMINISTRATIVE CONTROLS

6.1 RESPONSIBILITY

6.1.1 The Station Superintendent shall be responsible for overall facility operation and shall delegate in writing the succession to this responsibility during his absence.

6.2 ORGANIZATION

OFFSITE

6.2.1 The offsite organization for facility management and technical support shall be as shown on Figure 6.2.1.

FACILITY STAFF

6.2.2 The facility organization shall be as shown on Figure 6.2.2 and:

a. Each on duty shift shall include at least the shift staffing indicated on Figure 6.2.2.

b. At least one licensed operator shall be in the control room when fuel is in the reactor.

c. Two licensed operators shall be in the control room during all reactor startups, shutdowns, and other periods involving planned control rod manipulations.

d. ALL CORE ALTERATIONS shall be directly supervised by a licensed Senior Reactor Operator who has no other concurrent responsibilities during this operation, or a licensed Reactor Operator will be assigned to manipulate the fuel grapple.

e. An individual qualified in radiation protection measures shall be on site when fuel is in the reactor

f. A Fire Bridgade of at last 5 members shall be maintained onsite at all times. The Fire Brigade shall not include the minimum shift crew necessary for safe shutdown of the unit or any personnel required for other essential functions during a fire emergency.

6.3 FACILITY STAFF QUALIFICATIONS

6.3.1 The members of the facility staff shall meet or exceed the following qualifications:

Station Superintendent

Requirements: Ten years total power plant experience of which three years must be nuclear power plant experience. Four years of academic training may fulfill four of the remaining seven years of required experience. The Station Superintendent must be capable of obtaining or possess a Senior Reactor Operator's License.

6.4.2 A training program for the Fire Brigade shall be maintained under the direction of the Training Administrator.

(b) If levels of radioactive materials in environmental media as determined by an environmental monitoring program indicate the likelihood of public intakes in excess of 1% of those that could result from continuous exposure to the concentration values listed in Appendix B, Table II, Part 20 estimates of the likely resultant exposure to individuals and to population groups, and assumptions upon which estimates are based shall be provided.

(c) If statistically significant variations of offsite environmental concentrations with time are observed, correlation of these results with effluent release shall be provided.

(d) Results of required leak tests performed on sealed sources if the tests reveal the presence of 0.005 microcuries or more of removable contamination.

d. Inoperable fire protection equipment (3.12)

FIRE PROTECTION

SAFETY EVALUATION REPORT

BY THE

OFFICE OF NUCLEAR REACTOR REGULATION

U.S. NUCLEAR REGULATORY COMMISSION

IN THE MATTER OF

JERSEY CENTRAL POWER AND LIGHT COMPANY

OYSTER CREEK NUCLEAR GENERATING STATION

DOCKET NO. 50-219

TABLE OF CONTENTS

1.0 INTRODUCTION

Following a fire at the Browns Ferry Nuclear Station in March 1975, the Nuclear Regulatory Commission initiated an evaluation of the need for improving the fire protection programs at all licensed nuclear power plants. As part of this continuing evaluation the NRC, in February 1976, published a report by a special review group entitled, "Recommendations Related to Browns Ferry Fire," NUREG-0050. This report recommended that improvements in the areas of fire prevention and fire control be made in most existing facilities and that consideration be given to design features that would increase the ability of nuclear facilities to withstand fires without the loss of important functions. To implement the report's recommendations, the NRC initiated a program for reevaluation of the fire protection programs at all licensed nuclear power stations and for a comprehensive review of all new 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 APCSB 9.5-1), May 1, 1976.

- "Guidelines for Fire Protection for Nuclear Power Plants" (Appendix A to BTP APCSB 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.

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

We have reviewed the licensee's analyses and have visited the plant to examine the relationship of safety-related components, systems and structures with both combustibles and the associated fire detection and suppression systems. Our review was based on the licensee's proposed program for fire protection as described in the following docketed information:

(1) The Oyster Creek Safety Analysis Report and Application for a Full Term License;

(2) "Fire Protection Program," dated December 3, 1976;

(3) The fire protection review team's site visit of August 2-5, 1977; and

(4) The licensee's response to requests for additional information and staff positions, dated October 3, 1977.

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.

In addition, by letter dated June 17, 1977, we requested JCP&L to submit Technical Specifications for presently-installed fire protection equipment at the Oyster Creek Nuclear Generating Station. JCP&L replied by letter dated July 5, 1977, that they expected to submit fire protection Technical Specifications by mid-August 1977. By letter dated September 30, 1977 JCP&L provided proposed interim Fire Protection Technical Specifications. Based on our review and consideration of the JCP&L response and the responses of other licensees, we modified certain action statements and surveillance requirements in order to provide more appropriate and consistent Specifications. This report summarizes the results of our evaluation of the fire protection program and interim Technical Specifications for Jersey Central Power and Light Company's (JCP&L) Oyster Creek Nuclear Generating Station. The chronology of our evaluation is summarized in Appendix A of this report.

2.0 FIRE PROTECTION GUIDELINES

2.1 Overall Objectives

The overall objectives of the fire protection program in a nuclear power plant are to:

(1) Reduce the likelihood of occurrence of fires;

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

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

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

2.2 General Design Criterion 3 - "Fire Protection"

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

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

Guidance on the implementation of General Design Criterion 3 for existing nuclear power plants is provided in Appendix A of Branch Technical Position 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants." We have used the guidance in Appendix A, where appropriate. We have also evaluated alternatives proposed by the licensee to assure that the overall objectives outlined in Section 2.1 are met for the actual relationship of combustibles, safety-related equipment and fire protection features.

3.0 SUMMARY OF MODIFICATIONS AND RECOMMENDATIONS

3.1 Modifications

The licensee plans to make certain plant modifications to improve the fire protection program as a result of both his and the staff's evaluations. The proposed modifications are summarized below. The implementation schedule for these modifications is in Table 3.1. The licensee has agreed to this schedule. The sections of this report which discuss the modifications are noted in parentheses.

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

3.1.1 Fire Barriers

The 4160V switchgear for each redundant division will be enclosed in three-hour fire rated vaults (5.8).

The south wall of the recirculation pump motor generator set room will be upgraded to a three-hour fire rating (5.13).

The south wall in the monitor and change room will be upgraded to a three-hour fire rating (5.14).

3.1.2 Fire Barrier Penetrations

In several areas of the plant, doors through fire barriers are being upgraded to a rating equivalent to that required of the fire barrier (4.9.2, 5.5, 5.9, 5.10, 5.11 and 5.17).

Unprotected cable penetrations and openings will be sealed so that the control room is separated from other areas of the plant by three-hour fire rated barriers (5.10).

Unprotected cable penetrations at elevation 51 feet of the reactor building will be sealed to provide a three-hour fire barrier (5.4).

The floor opening between the electric tray closet and the laundry will be sealed to a three-hour fire rating (5.14).

Floor hatch covers in the battery room (5.12), in the 480V switchgear room (5.11), and in the recirculation pump motor generator set room (5.13) will be upgraded to a three-hour fire rating.

TABLE 3.1

IMPLEMENTATION DATES FOR LICENSEE PROPOSED MODIFICATIONS

Item		Date
3.1.1	Fire Barriers	December 1979
3.1.2	Fire Barrier Penetrations	December 1979
3.1.3	Dampers	December 1979
3.1.4	Fire Detectors	December 1979
3.1.5	Halon Suppression Systems	December 1979
3.1.6	Waster Spray Systems	December 1979
3.1.7	Sprinkler Systems	June 1979
3.1.8	Carbon Dioxide Suppression System	December 1979
3.1.9	Hose Stations	June 1979
3.1.10	Aqueous Film Forming Foam	June 1978
3.1.11	Portable Extinguishers	June 1978
3.1.12	Emergency Breathing Apparatus	June 1978
3.1.13	Removal of Combustible Material	Completed
3.1.14	Transformer Dike	December 1979
3.1.15	Fuel Line Valve	December 1979
3.1.16	Ventilation System Changes	December 1979
3.1.17	Loss of Ventilation Alarm - Battery Room	July 1978
3.1.18	Suppression System Valve Control	June 1978
3.1.19	Portable Smoke Removal Equipment	June 1978
3.1.20	Alternate Water Supply to the Yard Loop	July 1980
3.1.21	Protection From Water Damage	December 1979
3.1.22	New Battery Room and Rerouting Battery Cables	*
3.1.23	Remote Shutdown Station	**

*end of 1978 refueling outage
**Schedule dependent on equipment availability (not to exceed end of 1980 refueling outage)

3.1.3 Dampers

Isolation dampers will be installed in the exhaust ductwork for the cable spreading room and control room ventilation systems to minimize the possibility of contaminating the intake air (4.4.1).

Fire dampers will be added in ventilation duct penetrations of fire barriers (4.9.1).

*3.1.4 Fire Detectors

A smoke detector will be provided in the control room ventilation intake (5.10).

Fire detection equipment will be provided in all safety-related areas to alarm locally and in the control room (4.2).

*3.1.5 Halon Suppression Systems

Automatic halon 1301 total flooding suppression systems are being installed in the cable spreading room (5.9), 480V switchgear room (5.11), battery room (5.12), electric tray room (5.15), and control panels in the control room (5.10).

*3.1.6 Water Spray Systems

The existing main transformer water spray systems will be extended to protect the outside of the west wall of the turbine building at the bus work opening (5.19).

Automatic water spray and detection systems will be provided to protect safety-related cabling on the 23-foot level (5.5) and the 51-foot level (5.4) of the reactor building, and safety-related cables below the 4160V switchgear vault (5.16).

*3.1.7 Sprinkler Systems

Automatic sprinkler systems will be added to the following areas:

(1) To protect the metal deck roof at the 119-foot level of the reactor building (5.1);

(2) To protect spent fuel pool cooling pumps (5.3);

(3) Above and below the suspended ceiling to protect cables above the ceiling in the monitor and change room (5.14);

(4) To protect the diesel-driven fire pumps and outside fuel oil storage tanks (5.18); and

(5) Above cable trays which are at the ceiling level of the condenser bay along the west wall of the turbine building (5.16).

Supervisory circuitry will be installed on sprinkler systems in the recirculation pump motor generator set room (5.13).

3.1.8 Carbon Dioxide Suppression System

A total flooding fixed manual CO_2 suppression system will be installed in each 4160V switchgear vault (5.8).

3.1.9 Hose Stations

Hose stations will be installed throughout the plant to provide coverage of all safety-related areas (4.3.1.4).

3.1.10 Aqueous Film Forming Foam

A foam nozzle and portable aqueous film forming foam equipment will be provided in a fire cabinet convenient to the diesel generator rooms (5.17).

3.1.11 Portable Extinguishers

Additional portable extinguishers are being installed to provide coverage throughout the plant (4.3.3).

3.1.12 Emergency Breathing Apparatus

Ten emergency breathing units with two spare air bottles each and a six-hour reserve breathing air supply will be established (4.4.3).

3.1.13 Removal of Combustible Material

The combustible light diffusers in the control room will be replaced with a noncombustible ceiling (5.10).

The combustible oil stored at the south end of the basement level of the turbine building will be removed (5.16).

3.1.14 Transformer Dike

A dike will be provided around the two oil-filled transformers at the circulating water intake structure (5.19).

3.1.15 Fuel Line Valve

A fuse link valve will be added in the fuel lines for each diesel generator at the floor penetration (5.17).

*3.1.16 Ventilation System Changes

Modifications will be made to ventilation ducting and control so that smoke exhausted from an area will not be drawn through the ventilation intake of another area (4.4.1).

3.1.17 Loss of Ventilation Alarm - Battery Room

The ventilation system for the existing battery room will be provided with a loss of ventilation flow alarm (5.12).

3.1.18 Suppression System Valve Control

Valves in the fire water system whose closure would cause loss of suppression water to an area will be locked open with periodic checks of valve positions (4.3.1.3).

3.1.19 Portable Smoke Removal Equipment

Portable smoke removal equipment and ductwork will be provided (4.4.1).

*3.1.20 Alternate Water Supply to the Yard Loop

An alternate supply of water to the yard loop will be provided (4.3.1.2).

*3.1.21 Protection From Water Damage

Water shields, dikes or other protection will be provided where breaks of suppression system piping may damage safety-related equipment (4.3.1.7).

*3.1.22 New Battery Room and Rerouting of Battery Cables

An additional battery room will be provided and DC cables rerouted away from the redundant division (4.10 and 5.12).

*3.1.23 Remote Shutdown Station

A remote shutdown station will be provided with adequate controls to shutdown the plant from one location if a fire causes loss of control of redundant safe shutdown equipment from the control room (4.10).

3.2 Incomplete Items

The licensee has committed to take action on incomplete items as noted below. The staff's review of the licensee's response to these items and any further proposed changes to the fire protection program will be addressed in a supplement to this report. The schedule for the completion of the licensee action on these imcomplete items is given in Table 3.2. The sections of this report which discuss these items are noted in parentheses.

3.2.1 Administrative Controls

We have recommended that the administrative controls for fire protection be improved with regard to the fire protection organization, fire brigade training, controls over combustibles and ignition sources, prefire plans, and quality assurance provisions for fire protection. The licensee will provide a revised description of his fire protection administrative controls. We will address the resolution of this incomplete item in a supplement to this report (6.0).

3.2.2 Radwaste Fires

We have recommended that the licensee evaluate the effects of fires in existing and proposed radwaste areas in terms of radioactive releases. The licensee is performing such an analysis and will propose modifications where required (4.1.4).

3.2.3 Fire Barrier Penetrations

The licensee is evaluating the need for upgrading all ventilation duct, doorway and electrical cabling penetrations of fire barriers to a rating equivalent to that of the fire barrier (4.9).

3.2.4 Communications Equipment

Using portable radio sets, communications may not be possible between buildings. The licensee is evaluating the adequacy of the communications system (4.7).

3.2.5 Fire Hazards Analysis

The licensee will provide additional information on safety related equipment and consequences of a fire in each area to supplement information already provided (S.O.).

TABLE 3.2

COMPLETION DATES FOR LICENSEE INCOMPLETE ITEMS

3.2	Incomplete Items.....	*
3.2.1	Administrative Controls.....	*
3.2.2	Radwaste Fires.....	August 1, 1978
3.2.3	Fire Barrier Penetraions.....	*
3.2.4	Communications Equipment.....	**
3.2.5	Fire Hazards Analysis Revision 1.....	

*30 days following receipt of this Safety Evaluation

**60 days following completion of all modifications

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 safety divisions, either of which would be capable of achieving safe shutdown.

During or subsequent to a fire, safe shutdown could be achieved using equipment such as: the reactor trip system; the isolation condensers (with condensate transfer or diesel-driven fire pumps); reactor water makeup (control rod drive, core spray, condensate transfer or diesel-driven fire pumps); the depressurization system; and condensate storage tank or the fire water pond. Supporting systems and equipment such as engineered safety features batteries would also be required. The emergency diesel generators are desirable but not absolutely necessary since the plant can be safely shut down and maintained with complete loss of AC power (both offsite and onsite) in a fire situation.

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

4.2 Fire Detection and Signaling Systems

The plant has a protective signaling system which provides an audible and visual water flow alarm at an annunciator panel in the control room for the deluge and wet pipe sprinkler systems. The manual shutoff valves on the deluge systems are electrically supervised to also alarm at this annunciator panel. Fire pump running and trouble signals are received in the control room on one of the operating panels.

The signaling system does not comply with NFPA-72D. Deficiencies include inadequate line supervision and the use of equipment which has not been tested by a recognized testing laboratory for protective signaling systems use. For those circuits which are not supervised, an increased frequency of testing of once per month will be required by the facility technical specifications.

The licensee has proposed a substantial enlargement of the fire detection and signaling system, which will include fire detectors for all safety-related areas including the 4160V switchgear room, reactor building, diesel generator building, auxiliary boiler building and radwaste building. Smoke detectors are to be provided in the ventilation systems of the control room and the office building. Actuation of proposed automatic suppression systems will also transmit an alarm on the new signaling system. Local alarms will be provided in the protected areas and a distinct and unique alarm signal will be provided in the control room. The new system will comply with applicable NFPA-72D requirements for a class A system.

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

4.3 Fire Control Systems

4.3.1 Water Systems

4.3.1.1 Water Supply

The fire protection water supply consists of two fire pumps taking suction from a pond whose volume is 7.2 million gallons. The pond is formed by a small dam on Oyster Creek. The two fire pumps are housed in a common pump house outside the main fenced area and supply the plant through a single 14-inch line approximately one-fourth mile in length.

A number of single events could interrupt the fire water supply, including a dam failure, damage to the pump house by fire, storm or vandalism, and a break in the single supply line extending to the plant yard loop. To resolve this concern, the licensee has proposed to provide a second water supply to the yard loop in the form of either: (1) running a second pipeline from the existing pump house to the yard loop, adding isolation valves in cross connections and between connections to the yard loop, and installing a fire barrier between the existing fire pumps; or (2) providing an electric motor-driven fire pump with its own water storage tank and separate connection to the yard loop. We find either of alternatives (1) or (2), above, acceptable. Additional protection measures are being taken for the fire pump house as described in Section 5.18 of this report. We find that, subject to implementation of the above described modifications, the water supply system conforms to the provisions of Appendix A to BTP 9.5-1 and is, therefore, acceptable.

4.3.1.2 Fire Pumps

Two vertical shaft centrifugal fire pumps are provided, each with a capacity of 2,000 gpm at 165 psi. The pumps are driven by separate diesel engines. Each engine has its own fuel supply located adjacent to the pump house. The pump house is a metal structure housing only the fire and jockey pumps and their associated control equipment. The fire pumps are arranged to start automatically if the pressure drops due to a large water demand. Either pump can be manually started from the control room or at the pump house.

Two automatic electric jockey pumps maintain pressure on the fire system; one has a capacity of 50 gpm and one 400 gpm.

The two fire pumps discharge into a common header and supply line which extends to the plant yard loop. A break in this pipe would eliminate the fire water supply. An alternate supply of water to the yard loop has been proposed by the licensee (see Section 4.3.1.1).

Measures have also been proposed by the licensee to protect the diesel-driven fire pumps and their fuel tanks from a fire (see Section 5.18).

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

4.3.1.3 Fire Water Piping System

The single supply line from the fire pumps extends to a 12-inch underground loop which encircles the plant. All yard fire hydrants, fixed pipe water suppression systems and interior fire hose lines are supplied by the fire loop. Sectionalizing valves of the post-indicator type are provided on the loop to allow isolation of the various sections for maintenance; however, there are locations where a single pipe break could affect both automatic sprinklers and interior fire hoses in areas containing safety-related systems. When proposed sprinkler systems and hose stations are installed, the licensee will arrange the piping system to prevent loss of both primary and backup fire suppression from a single failure.

As noted in Section 4.2, control valves on the deluge systems are electrically supervised. The position of other fire protection system valves whose closure would cause loss of water to systems protecting safety-related areas will be controlled by locks and periodic inspection.

Yard fire hydrants have been provided at approximately 250-foot intervals around the exterior of the plant. An auxiliary gate valve is provided on each lateral to permit hydrant maintenance without removing any portion of the fire loop from service. Four hose houses are provided in the yard area, each having 150 feet of 2-1/2 inch hose, 200 feet of 1-1/2 inch hose, and other manual fire fighting tools. The hydrant hose threads are compatible with local fire departments.

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

4.3.1.4 Interior Fire Hose Stations

Interior hose stations equipped with 1-1/2 inch fire hose and fog nozzles have been provided in the turbine building, machine shop, storeroom and office building. The battery room can be reached by one of the office building hose stations. Other safety-related areas can only be reached by stringing hose to outside hydrants.

The licensee has proposed to add hose stations in the reactor building and outside the cable spreading room so that all areas containing or exposing safety-related areas can be reached with a fire hose not over 100 feet in length. We find that, subject to implementation of the above described modifications, the interior hose stations conform to the provisions of Appendix A to BTP 9.5-1 and are, therefore, acceptable.

4.3.1.5 Automatic Sprinkler Systems

Automatic wet pipe sprinkler and deluge systems have been provided in the turbine building to protect the lube oil systems, the hydrogen seal oil system, and some electrical cable trays. Automatic sprinklers are also provided in the office building protecting the laundry and decontamination rooms and the recirculation pump motor generator set room. Oil-filled transformers located outside the plant on the west wall of the turbine building are protected by automatic water spray systems.

The licensee has proposed to install additional automatic sprinkler or water spray systems to protect hazards in the reactor building, including: all of the 119-foot elevation; the spent fuel pool cooling pumps; and electrical cable trays at the 51-foot and 23-foot elevations. Automatic sprinklers or water spray are also proposed for: the south end of the turbine building below the 4160V switchgear room containing safety-related electrical cables; safety-related cables in the turbine building condenser bay; the fire water pump house containing the diesel fire pumps and their adjacent fuel oil tanks; the outside west wall of the turbine building to protect the main bus opening; and above and below the ceiling in the monitoring, change and computer room areas to protect safety-related electrical cables.

The automatic suppression systems are designed and maintained in compliance with the provisions of NFPA-13, "Sprinkler Systems," and NFPA-15, "Water Spray Fixed Systems."

We find that, subject to implementation of the above described modifications, the design criteria for the sprinkler systems conform to the provisions of Appendix A to BTP 9.5-1 and are, therefore, acceptable.

4.3.1.6 Foam

At present, the plant has no fire fighting foam. However, the licensee has proposed to provide a portable aqueous film forming foam unit at the diesel generator building. We find that, subject to implementation of the above described modifications, the foam system conforms to the provisions of Appendix A to BTP 9.5-1 and is, therefore, acceptable.

4.3.1.7 Effects of Suppression Systems on Safety Systems

We have reviewed the effects of: (1) breaks in fire protection piping that may result in water flooding damage to safety-related equipment; (2) cracks in fire protection piping that may result in water spray damage to safety-related equipment; and (3) inadvertent fire protection system actuation that may result in damage to safety-related equipment.

In most areas, curbs, drains and the mounting of equipment above floor level minimizes the potential for flooding damage. In other areas, water will drain out of doors or through grating to lower elevations, such that the standing water would not affect safety-related equipment. In addition, valves are available to isolate sections of suppression piping inside buildings to preclude the buildup of water and thus prevent equipment from being incapacitated due to flooding.

There are no safety-related systems which could be disabled by direct interlock with the existing fire suppression systems.

The licensee has proposed to provide protection where water from suppression system piping breaks resulting in sprays or flooding may damage safety-related equipment.

We conclude that with the proper implementation of the changes proposed, the potential for damage by fire protection system actuation or failure is minimal and is, therefore, acceptable.

4.3.2 Gas Fire Suppression Systems

The plant does not presently have any gas fire suppression systems. However, the licensee has proposed to provide both carbon dioxide and halon 1301 systems to protect certain areas.

The proposed total flooding carbon dioxide system will protect the safety-related 4160V switchgear, which will be enclosed in a fire resistant vault. The carbon dioxide system will be manually actuated.

The proposed halon 1301 systems will protect the cable spreading room, 480V switchgear room, electric tray room, battery room, and panels in the control room. Automatic actuation will be provided in each area.

The gas suppression systems will comply with the requirements of NFPA-12 and 12A, as applicable. The adequacy of the gas suppression systems to protect against the hazards they are designed for is discussed in Section 5.0 of this report in the areas where these systems will be installed. We find that, subject to implementation of the above described modifications, the design criteria for the gas suppression system conform to the provisions of Appendix A to BTP 9.5-1 and are, therefore, acceptable.

4.3.3 Portable Fire Extinguishers

Dry chemical, carbon dioxide and pressurized water fire extinguishers have been distributed throughout the plant in accordance with NFPA guidelines. In addition, a fixed pipe manual dry chemical system utilizing wheeled portable extinguishers has been provided for the turbine bearings.

The licensee has proposed to provide portable fire extinguishers in the drywell, certain other areas of the reactor building, and at the circulatory water intake area. Water type portable extinguishers will be provided for the control room.

We find that, subject to implementation of the above described modifications, the complement of portable extinguishers conforms to the provisions of Appendix A to BTP 9.5-1 and is, therefore, acceptable.

4.4 Ventilation Systems and Breathing Equipment

4.4.1 Smoke Removal

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

The licensee has proposed to:

(1) Provide manual operation of ventilation systems to facilitate smoke removal;

(2) Install isolation dampers in the exhaust ductwork for the cable spreading and control room ventilation system to minimize the possibility of recirculation or drawing in smoke or contaminated air;

(3) Review the potential that smoke from fires in other areas could be drawn into the 480V and 4160V switchgear rooms, and to make necessary modifications to prevent this; and

(4) Provide portable smoke ejectors and collapsible ductwork.

We find that, subject to implementation of the above described modifications, the smoke removal capability conforms to the provisions of Appendix A to BTP 9.5-1 and is, therefore, acceptable.

4.4.2 Filters

Fires in standby gas treatment charcoal filters or in radwaste filters will not result in excessive releases to the environment.

Charcoal filters are not located in proximity to safety-related equipment and thus do not present a hazard to safe shutdown. We find that fire protection for charcoal filters conforms to the provisions of Appendix A to BTP 9.5-1 and is, therefore, acceptable.

4.4.3 Breathing Equipment

A total of nine self-contained breathing units and at least one extra bottle for each unit has been provided, although three of the units are located at the emergency control center across the intake canal from the plant.

The licensee has proposed to provide ten breathing units for use by operators and fire brigade personnel, two spare bottles for each unit, and a six-hour reserve supply. We find that, subject to implementation of the above described modifications, the portable breathing equipment conforms to the provisions of Appendix A to BTP 9.5-1 and is, therefore, acceptable.

4.5 Floor Drains

Floor drains are provided in various areas to drain off suppression water. In other areas water is directed by curbs or flows out of doors or through grating to lower elevations such that standing water would not affect safety-related equipment. We find that adequate floor drains are provided for removal of suppression water and that floor drains conform to the provisions of Appendix A to BTP 9.5-1. Accordingly, we find the floor drains acceptable.

4.6 Lighting Systems

In addition to the normal plant lighting, fixed emergency lighting units with a minimum four-hour battery supply are located throughout the plant in rooms and accessways. Sealed beam battery operated handlights will be provided for use during fire emergencies. We find that, subject to the addition of portable handlights, adequate lighting systems will be provided to support fire fighting activities.

4.7 Communication Systems

Normal communication within the plant is provided by a fixed paging system. An additional communication method is provided by a sound-powered phone system with jacks at various key locations throughout the plant.

Presently, three portable radio units are available in the control room for fire brigade use. The licensee has proposed to provide eight additional units for emergency use. However, communication between buildings using the portable radio units is not always possible. Accordingly, the licensee is performing an evaluation of the adequacy of the communication systems to support fire fighting efforts. We will address the acceptability of the communication systems in a supplement to this report.

4.8 Electrical Cable Combustibility

The licensee has stated that 98% of all the cables used in the facility are vulkene-jacketed (cross-linked polyethylene). These cables have been subjected to and passed the Underwriter's Laboratory horizontal flame test indicating some degree of flame retardance. In our fire protection reviews, all organic insulated cables are treated as combustible. Tests have shown that such cables burn when the test conditions are made conducive by appropriate arrangement, tray loading and ignition sources. The cables have not been subjected to the IEEE-383 flame test; however, in areas containing significant quantities of exposed cables, the licensee proposed to protect safety-related cables with automatic suppression systems actuated by early warning smoke detection systems. We find that retest to the IEEE-383 procedure and criteria would not provide information that would alter our recommendations or conclusions. Accordingly, we find the electrical cables used at the Oyster Creek plant acceptable.

4.9 Fire Barrier Penetrations

Fire barriers are penetrated by doorways, ventilation ducts, electrical cables, piping and conduit. The means of preventing a fire from crossing a fire barrier through these various penetrations is discussed below.

4.9.1 Electrical Cable, Conduit and Piping Penetrations

Seals using silicon foam have been provided for penetrations in most areas where electrical cable trays and conduit pass through fire barriers. The test information provided by the licensee substantiates that the design of and material used in fire barrier penetrations of cables, conduit and piping installed in the plant is qualified to a three-hour fire rating. The licensee has proposed to replace unsuitable cable penetrations at the 51-foot level of the reactor building, and to seal a penetration between the control room and computer room cable closet. No seals have been installed where cables pass between levels in the reactor building or in turbine building fire barriers; however, the staff concurs with the licensee's fire hazards analysis which indicates that seals are not required at these locations. During the site survey it was noted that at least one cable tray penetration between the turbine building and the hallway outside the cable spreading room is not adequately sealed. We have recommended that all cable, conduit and piping penetrations of fire barriers be upgraded to a rating equivalent to that required of the fire barrier. The licensee is analyzing the need for upgrading all penetrations. We will address the acceptability of protection provided cable, conduit and piping penetrations in a supplement to this report.

4.9.2 Fire Doors and Hatches

The licensee has proposed to upgrade certain fire doors and floor hatches to a three-hour fire resistance rating. During the site survey, it was noted that additional doors and frames in some fire barriers were not rated. We have recommended that doorway and hatch penetrations of fire barriers be upgraded to a rating equivalent to that required of the fire barrier. The licensee is evaluating the need for upgrading all penetrations. The licensee has proposed to control the proper position of fire doors protecting safety-related areas by locking doors in low traffic areas and periodic inspection of doors in heavily traveled areas. We will address the acceptability of protection provided doorway and hatch penetrations in a supplement to this report.

4.9.3 Ventilation Duct Penetrations

We have recommended that ventilation duct penetrations of fire barriers be upgraded to a three-hour fire rating by the installation or upgrading of dampers, as necessary. The licensee is evaluating the need to upgrade all ventilation duct penetrations of fire barriers. We will address the acceptability of protection provided ventilation duct penetrations in a supplement to this report.

4.10 Separation Criteria

No separation criteria for redundant circuits were established for the original routing of electrical cable at the Oyster Creek plant. Subsequent modification of the emergency core cooling system provided separation of redundant cabling required for emergency core cooling to meet existing criteria, although in some cases even this separation is not adequate to assure that redundant cabling would not be involved in a fire.

As a result of I&E inspections which noted that redundant battery cables were located in the same cable tray, the licensee has proposed to provide a second battery room housing the redundant engineered safety features battery. DC cables will be rerouted such that:

(1) Cable separation for all DC cabling will, as a minimum, comply with Regulatory Guide 1.75, "Physical Independence of Electric Systems (Rev. 1)," and

(2) As much as practicable, redundant cables will be routed in separate fire areas. Where this is not practicable, cables will remain separated by distance, and away from a common fire hazard, so that fires will not involve redundant DC cabling. Where redundant DC cables must be routed in proximity to each other as allowed by Regulatory Guide 1.75, adequate barriers, fire retardant coating, and fire detection and suppression systems will be provided to prevent loss of function of both redundant batteries. In these cases sprinkler heads and detection devices will be located in the area of the crossing rather than at the ceiling level.

Despite the above described modifications to DC cabling, fires in various areas may still cause loss of control of redundant safe shutdown equipment. Although control from the control room may be lost under such situations, safe shutdown can still be achieved by manually closing breakers and manually manipulating valves. However, such methods of shutting down the plant may require as many as five operators. Sufficient personnel may not be available to perform shutdown of the plant using such methods, as well as fighting a fire. Accordingly, the licensee has proposed to provide a remote shutdown station with cabling independent of cabling used for control from the control room. Cabling for the remote shutdown station will be routed away from other cabling and provided with adequate fire protection so that a fire will not cause loss of control from both the control room and the remote shutdown station. Only one operator will be required to perform the shutdown operations from the remote shutdown station. The remote shutdown station will be located adjacent to panels RK-01 or RK-02 at elevation 51 feet of the reactor building. The remote shutdown station will have the capability to:

(1) Remotely scram the reactor;

(2) Remotely actuate valves in return lines to the reactor from the isolation condenser to put the isolation condenser into operation;

(3) Remotely monitor water level on the shell side of the isolation condenser; and

(4) Remotely control makeup to the shell side of the isolation condenser through use of condensate transfer pumps taking suction on the condensate storage tank.

The capability to remotely monitor reactor level and pressure is provided at the adjacent RK-01 or RK-02 panel. Additionally, if AC power is not available for the condensate transfer pumps, valves in the vicinity of the remote shutdown station may be used to provide fire suppression water for makeup to the shell side of the isolation condenser using the automatically started diesel-driven fire pumps. Available water in the isolation condenser would allow up to one hour and forty-five minutes before suppression system water must be valved in.

We find that, subject to implementation of the above described modifications and other modifications proposed by the licensee and described in other sections of this report, adequate separation will be provided so that fires will not prevent the safe shutdown of the plant. Accordingly, we find the criteria for the separation of redundant circuits to be acceptable. We will require additional information in the form of design details to assure that the design is acceptable prior to actual implementation of these modifications.

4.11 Fire Barriers

Fire areas are enclosed by walls, floors and ceilings which have three-hour fire resistance ratings with a few exceptions. In two areas (the recirculation pump motor generator set room and the control room/computer room area), the licensee proposes upgrading of walls to a three-hour fire rating. In addition, the licensee proposes to provide a three-hour fire resistant vault to enclose the 4160V switchgear located in the turbine room and a fire barrier within the vault between the redundant switchgear. Other barriers not having a three-hour fire rating are found acceptable on the basis of the nature of the fire exposure or that redundant safety-related equipment will not be jeopardized.

We find that, subject to implementation of the above described modifications, the fire barriers for the plant satisfy the objectives identified in Section 2.1 of this report and are, therefore, acceptable.

4.12 Access and Egress

Most safety-related areas are reasonably accessible for manual fire fighting; however, two areas present some difficulty. These are the drywell and the cable tunnel between the battery room and the cable tray room. Further detail can be found in the sections addressing these areas.

4.13 Toxic and Corrosive Combustion Products

The products of combustion of many polymers are toxic to humans and corrosive to metals. Prompt fire detection and extinguishment is relied upon to minimize the quantity of such products. Additionally, means for smoke removal are provided or will be added as discussed in Section 4.4 of this report. The fire brigade will also be provided with and trained in the use of emergency breathing apparatus for fighting fires involving such materials. We find that, subject to implementation

of the modifications described in this report and resolution of the incomplete items, the means to control toxic and corrosive products of combustion satisfy the objectives identified in Section 2.1 of this report and are, therefore, acceptable.

4.14 Nonsafety-Related Areas

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

The licensee has not evaluated the effects of fires in radwaste areas in terms of radioactive releases. The licensee has been requested to provide the results of an analysis of radwaste fires and propose modifications where required. We will address the acceptability of fire protection in radwaste areas in a supplement to this report.

4.15 Instrument Air

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

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, to identify the consequences of fires in safety-related and adjoining nonsafety-related areas, and to evaluate the adequacy of existing and proposed fire protection systems. Further information will be provided by the licensee to supplement the fire hazards analysis. It is not expected that this information will affect our conculsions; however, we will discuss this information in a supplement to this report. 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 areas is discussed in the following sections.

5.1 Reactor Building - Elevation 119 Feet

5.1.1 Safety-Related Equipment

There is minimal safety-related equipment at the 119-foot elevation of the reactor building other than the new fuel and spent fuel pools and the fuel handling crane. None of this equipment would be required for safe shutdown in a fire situation.

5.1.2 Combustibles

Combustibles at this elevation include lube oil associated with fuel handling equipment, plastic sheeting and other materials used during refueling operations, and roof construction materials.

5.1.3 Consequences If No Suppression

Postulated fires at this elevation would not affect safe shutdown; however, undesirable combustion products and possible loss of secondary containment due to moderate structural damage may result.

5.1.4 Fire Protection Systems

Fire protection in this area consists of portable fire extinguishers. There are no automatic suppression systems in this area.

5.1.5 Adequacy of Fire Protection

The existing manual fire suppression equipment would not be adequate for fires in transient combustibles or roof construction materials.

5.1.6 Modifications and Recommendations

The licensee has proposed to install fixed hose stations and fire detectors in this area. Additionally, the licensee has proposed to install an automatic closed head sprinkler system to protect the class II roof. We find that, subject to implementation of the above described modifications, fire protection for the 119-foot elevation of the reactor building conforms to the provisions of Appendix A to BTP 9.5-1 and is, therefore, acceptable.

5.2 Reactor Building - Elevation 95 Feet

5.2.1 Safety-Related Equipment

The safety-related equipment at the 95-foot elevation of the reactor building are liquid poison pumps and storage tank, emergency condensers with associated valves, various motor-operated valves, and electrical cable from both divisions. The emergency condensers and associated valves would be required for safe shutdown.

5.2.2 Combustibles

The significant combustible is electrical cable insulation.

5.2.3 Consequences If No Fire Suppression

Fires at this elevation may involve redundant divisions and cause loss of control of valves for the emergency condensers.

5.2.4 Fire Protection Systems

Fire protection at this elevation consists of portable extinguishers.

5.2.5 Adequacy of Fire Protection

The existing fire protection would not be adequate to control fires in this area and prevent loss of control of redundant safe shutdown equipment.

5.2.6 Modifications and Recommendations

The licensee has proposed to add fire detectors, fixed hose stations, and additional portable extinguishers to this area. Additionally, as noted in Section 4.10, the licensee has proposed to provide a remote shutdown station independent of cabling used for control of the equipment from the control room. The cabling for the remote station will be routed so that fires at elevation 95 feet of the reactor building, as well as fires in other areas, will not cause loss of control from both the control room and the remote shutdown station.

We find that, subject to implementation of the modifications described above, the fire protection for the 95-foot elevation of the reactor building satisfies the objectives identified in Section 2.1 of this report and is, therefore, acceptable.

5.3 Reactor Building - Elevation 75 Feet

5.3.1 Safety-Related Equipment

The safety-related equipment at this elevation includes reactor protection system instrument racks, fuel pool cooling heat exchangers and pumps, and electrical cabling. The electrical cabling may be required for safe shutdown.

5.3.2 Combustibles

The significant combustibles at this elevation include a moderate amount of electrical cable insulation and transient combustibles.

5.3.3 Consequences If No Fire Suppression

Postulated fires would cause damage to electrical cables and fuel pool cooling components. Due to the poor cable separation, damage may be sustained by redundant safe shutdown systems.

5.3.4 Fire Protection Systems

Fire protection currently is limited to portable fire extinguishers.

5.3.5 Adequacy of Fire Protection

Existing fire protection would not be adequate to suppress fires and prevent damage to redundant equipment.

5.3.6 Modifications and Recommendations

The licensee has proposed to:

(1) Provide fire detection equipment;

(2) Install fixed hose stations at this elevation;

(3) Provide an automatic sprinkler system for the spent fuel pool cooling pumps;

(4) Install additional portable extinguishers; and

(5) Provide a remote shutdown station independent of cabling used for control of equipment from the control room. The cabling for the remote station will be routed so that fires at elevation 75 feet of the reactor building, as well as fires in other areas, will not cause loss of control from both the control room and remote shutdown station (see Section 4.10).

We find that, subject to implementation of the above described modifications, fire protection for the 75-foot elevation of the reactor building satisfies the objectives identified in Section 2.1 of this report and is, therefore, acceptable.

5.4 Reactor Building - Elevations 38 and 51 Feet

5.4.1 Safety-Related Equipment

Safety-related equipment at the 51-foot elevation includes core spray booster pumps from one safety division, reactor instrumentation racks, and electrical cabling. The electrical cabling and reactor instrumentation racks would be required to achieve safe shutdown in a fire situation. The elevation 38 feet is an intermediate level which is separated from the 51-foot elevation by concrete floors, walls, and ceilings. It contains no safety-related equipment. The shutdown cooling equipment at this elevation would not be required for safe shutdown.

5.4.2 Combustibles

Significant combustibles at the 51-foot elevation consist mainly of electrical cable insulation and transient combustibles, with a small amount of lube oil in core spray booster pumps. Significant combustibles at the 38-foot elevation is a moderate amount of cabling associated with the shutdown cooling systems.

5.4.3 Consequences If No Fire Suppression

Postulated fires may cause loss of key reactor monitoring equipment. Due to the poor cable separation, damage may be sustained by redundant safe shutdown systems.

5.4.4 Fire Protection Systems

Existing fire protection consists only of several portable fire extinguishers.

5.4.5 Adequacy of Fire Protection

Existing fire protection would be inadequate to detect and control fires at these elevations and prevent damage to redundant equipment.

5.4.6 Modifications and Recommendations

The licensee has proposed to:

(1) Install fixed hose stations in these areas;

(2) Provide additional portable fire extinguishers;

(3) Remove foam from cable penetrations and replace with silicone foam fire seals (see Section 4.9.1);

(4) Install automatic water spray suppression systems over cable trays actuated by fast-acting detectors; and

(5) Provide a remote shutdown station independent of the cable spreading room and control room. The remote station will be located at elevation 51 feet of the reactor building. The cabling for equipment controlled from this station will be routed away from other cabling and protected so that fires at elevation 51 feet of the reactor building, as well as fires at other locations, will not cause loss of control from both the remote station and the control room (see Section 4.10).

We find that, subject to implementation of the above described modifications, fire protection for elevations of 38 & 51 feet of the reactor building satisfies the objectives identified in Section 2.1 of this report and is, therefore, acceptable.

5.5 Reactor Building - Elevation 23 Feet

5.5.1 Safety-Related Equipment

The safety-related equipment at this elevation includes two core spray booster pumps, containment spray heat exchangers, motor control centers, and electrical cabling. The motor control centers and electrical cabling may be required for safe shutdown in a fire situation.

5.5.2 Combustibles

Combustibles at this elevation consist mainly of a significant amount of electrical cable insulation in open cable trays, with some transient combustibles and pump lube oil.

5.5.3 Consequences If No Fire Suppression

Postulated fires at this elevation of the reactor building may result in loss of core spray cooling capability, as well as ability to safely shut down the plant from the control room due to poor cable separation.

5.5.4 Fire Protection Systems

Fire protection at this elevation is limited to several portable fire extinguishers.

5.5.5 Adequacy of Fire Protection

Existing fire protection would be inadequate to control and suppress fires at this elevation and prevent damage to redundant equipment.

5.5.6 Modifications and Recommendations

The licensee has proposed to:

(1) Install fixed hose stations at this elevation of the reactor building;

(2) Install a three-hour fire rated door between elevation 23 feet of the reactor building and the corridor outside the 480V switchgear room;

(3) Install automatic water spray suppression systems over cable trays, actuated by fast-acting detectors; and

(4) Provide a remote shutdown station independent of the control room and cable spreading room. The cabling for equipment controlled from this station will be routed away from other cabling so that fires at elevation 23 feet of the reactor building, as well as fires at other locations, will not cause loss of control from both the remote station and the control room (see Section 4.10).

We find that, subject to implementation of the above described modifications, fire protection for elevation 23 feet of the reactor building satisfies the objectives identified in Section 2.1 of this report and is, therefore, acceptable.

5.6 Reactor Building - Elevation (-)19 Feet

5.6.1 Safety-Related Equipment

The safety-related equipment at this elevation includes two core spray pumps in each of two corner rooms, two containment spray pumps in each of two corner rooms, associated valves and electrical cabling, and the torus. The torus is the only item likely to be required for safe shutdown.

5.6.2 Combustibles

The significant combustible at this elevation is the lube oil associated with the pumps. Most of the electrical cabling is in conduit. Transient combustibles may also be introduced into this area.

5.6.3 Consequences If No Suppression

Postulated fires at this elevation would be limited to one corner room and cause loss of core spray pumps or containment spray pumps within one safety division.

5.6.4 Fire Protection Systems

Fire protection is limited to portable fire extinguishers at this elevation.

5.6.5 Adequacy of Fire Protection

Existing fire protection would not be adequate to rapidly detect and suppress a fire to minimize the effects of the fire. Existing protection would be adequate to prevent loss of redundant safety equipment due to intervening fire barriers.

5.6.6 Modifications and Recommendations

The licensee has proposed to:

(1) Install fire detectors in this area to alarm locally and in the control room;

(2) Provide fixed hose stations within reach of all safety-related equipment at elevation (-)19 feet of the reactor building; and

(3) Upgrade hatch covers to three-hour fire rating in ceiling of corner rooms.

We find that, subject to implementation of the above described modifications, fire protection for the (-)19-foot elevation of the reactor building satisfies the objectives identified in Section 2.1 of this report and is, therefore, acceptable.

5.7 Reactor Building - Drywell

5.7.1 Safety-Related Equipment

Safety-related equipmemt in the drywell includes isolation valves, electrical cabling, piping, and the reactor vessel. Piping and valves would be required for safe shutdown of the plant.

5.7.2 Combustibles

The significant combustibles in the drywell are electrical cable insulation and lube oil for the reactor recirculation pumps. Each of the five recirculation pumps contains approximately 35 gallons of lube oil. Most electrical cables are run in conduit.

5.7.3 Consequences If No Fire Suppression

An unmitigated lube oil fire in the drywell could generate sufficient heat to damage electrical cabling. Loss of electrical cables due to a cable insulation or lube oil fire would not preclude safe shutdown since valves would be in the proper position.

5.7.4 Fire Protection Systems

For periods when operating with a nitrogen inerted containment drywell, the inerting serves as protection by preventing the initiation of fires. For fire protection during operations with a deinerted containment, suppression capability is currently provided by portable extinguishers outside the area or by containment sprays. Fire detectors are not provided; however, containment temperature monitors are provided which indicate in the control room, and recirculation pump temperature monitors alarm in the control room.

5.7.5 Adequacy of Fire Protection

The nitrogen inerting is considered an acceptable means of protection against fires during plant operation. For periods when deinerted, temperature monitors will provide indication prior to significant damage of equipment. Containment sprays would be able to adequately suppress a fire. Safe shutdown capability would not be affected.

5.7.6 Modifications and Recommendations

To improve manual fire fighting capability, the licensee has proposed to provide fixed hose stations outside the drywell that are within reach of combustibles in the drywell, and to install portable fire extinguishers.

We find that, subject to implementation of the above described modifications, fire protection for the drywell satisfies the objectives identified in Section 2.1 of this report and is, therefore, acceptable.

5.8 4160 Volt Switchgear Room

5.8.1 Safety-Related Equipment

The 4160V switchgear room contains redundant engineered safety features 4160V switchgear. These switchgear are separated by a distance of 10 feet horizontally.

5.8.2 Combustibles

The combustibles in this area consist of cable insulation and a lube oil line. The amount of cable insulation is small.

5.8.3 Consequences If No Fire Suppression

A large fire from the combustion of lube oil in this area is possible although unlikely. It would require a passive failure of the piping and a substantial energy source to cause ignition such as a faulted 4160V cable. This type of event is very unlikely; however, should such a fire occur, the result could be the total loss of AC power to the plant. This would not prevent the safe shutdown of the plant.

5.8.4 Fire Protection Systems

Fire protection in this area is provided by portable CO_2 extinguishers. Yard hose stations can be used to fight fires manually in this area. No fire detection devices are provided for the area.

5.8.5 Adequacy of Fire Protection

Due to the lack of installed detection devices, a fire in this area could cause loss of the redundant switchgear. The fire suppression capability is inadequate to cope with a lube oil fire in time to prevent the loss of all AC power.

5.8.6 Modifications and Recommendations

The licensee proposes the following modifications to prevent the loss of redundant switchgear for postulated fires in this area:

(1) Provide a three-hour fire rated vault around the safety-related switchgear with a three-hour rated barrier between redundant panels;

(2) Install a fixed, manually-actuated total flooding CO_2 system for these vaults;

(3) Install automatic smoke detection systems in the vaults and in the surrounding area to alarm locally and in the control room; and

(4) Install a water sprinkler system on the outside of the west wall of the turbine building to protect the main bus opening from transformer oil fires outside the building.

We find that, subject to implementation of the above described modifications, fire protection for the 4160V switchgear room conforms to the provisions of Appendix A to BTP 9.5-1 and is, therefore, acceptable.

5.9 Cable Spreading Room

5.9.1 Safety-Related Equipment

The cable spreading room is located at elevation 36 feet directly below the control room. The cable spreading room contains redundant cabling associated with equipment for safe shutdown and other safety-related equipment. The room also contains the reactor protection system power supplies and their batteries.

5.9.2 Combustibles

The combustibles in this area consist of a moderate amount of organic cable insulation. Cable trays were predominantly stacked three deep and were light to moderately loaded. Other combustibles were a small amount of lube oil and a small amount due to battery cases.

5.9.3 Consequences If No Fire Suppression

An unmitigated fire in this area could become large enough to involve redundant divisions due to heat generation and potentially due to combustible materials in the separation space between the trays of redundant divisions. The complete loss of the cable spreading room presently would cause loss of control of certain safe shutdown equipment.

The plant could still be safely shutdown by remote manual action to place the isolation condenser systems into operation. However, operators presently would be required in several locations to perform such actions; hence, most of the operating crew would be involved in shutdown operations with little or no manpower available to fight the fire.

5.9.4 Fire Protection Systems

The primary means of fire suppression is provided by portable CO_2 extinguishers. No fire detection capability is provided.

5.9.5 Adequacy of Fire Protection

Although there is only one doorway into the cable spreading room, there is reasonably good access within the room to fight fires manually. However, the existing portable means is not adequate to control and extinguish fires in the cable spreading room. Also, due to the lack of installed detection capability a fire could become large prior to its detection, causing a considerable amount of smoke and heat generation. In such a fire, control of redundant safe shutdown equipment from the control room would almost certainly be lost.

5.9.6 Modifications and Recommendations

The licensee has proposed the following modifications:

(1) The provision of a smoke detection capability;

(2) The provisions of an automatic total flooding halon system;

(3) The upgrading of the door and ventilation system duct penetrations to three-hour fire rating;

(4) The installation of a fixed water hose station outside the cable spreading room; and

(5) The provision of a remote shutdown panel at which the actions necessary to accomplish safe shutdown can be performed by one operator. This capability will be separate and independent of the cable spreading room such that fires in this area will not cause loss of the remote shutdown capability. Section 4.10 of this report discusses this subject in more detail.

We find that, subject to implementation of these modifications, the likelihood of any extensive fire is low so that fires in the cable spreading room can be extinguished prior to the onset of any extensive fire and the likelihood of the loss of control of the safe shutdown capability from the control room is minimized. In the unlikely event that a large fire should occur, safe shutdown of the plant can still be accomplished with a minimum number of personnel at the remote shutdown panel. Accordingly, we find that fire protection for this area will be acceptable.

5.10 Control Room

5.10.1 Safety-Related Equipment

The control room contains safety-related control cabinets and consoles. At the present time, certain of these cables and control cabinets would be required for safe shutdown of the reactor from the control room. However, the licensee has proposed to provide a remote shutdown panel independent of the control room from which safe shutdown can be achieved by the action of one operator, even if the control room is functionally lost due to a postulated fire.

5.10.2 Combustibles

The combustibles in the area consist of electrical cable insulation, electrical components in panels and consoles, and a small amount of class A combustibles such as log books, drawings, etc. Additional combustibles exist in the drop ceiling consisting of a plastic grid material. The cables enter the control room into the cabinets from the cable spreading room below through floor slots which are provided with a penetration fire stop seal.

5.10.3 Consequences If No Fire Suppression

A fire in control panels could cause loss of control from the control room of redundant safe shutdown components due to the lack of cable separation within panels. This could require manual action of most of the operating crew outside the control room to accomplish shutdown.

5.10.4 Fire Protection Systems

No automatic detection or suppression systems are installed in the cabinets or the control room. The primary fire protection is provided by portable CO_2 extinguishers.

5.10.5 Adequacy of Fire Protection

Due to the lack of an automatic fire detection system and due to the close proximity of cables, the present fire extinguishing means may not be sufficient to prevent the loss of control of redundant safe shutdown components from the control.

5.10.6 Modifications and Recommendations

In addition to the proposed modifications to permit safe shutdown at a centralized location from outside the control room (see Section 4.10), the licensee proposes the following improvements in fire protection for this area:

(1) Install an automatic total flooding halon 1301 system within the panels in the control room;

(2) Replace the plastic grid ceiling diffusers with a noncombustible type;

(3) Seal the opening between the control room and cable closet in the computer room;

(4) Isolate the control room from the computer room by a three-hour fire rated door and barrier;

(5) Modify the ventilation system to prevent recirculation of smoke in the control room and to prevent smoke from other areas entering the control room, including the addition of a smoke detector; and

(6) Add portable class A extinguishers to the control room.

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

5.11 480 Volt Switchgear Room

5.11.1 Safety-Related Equipment

The switchgear room contains redundant 480V switchgear panels, motor control centers and 480V transformers. The transformers are filled with noncombustible oil.

5.11.2 Combustibles

The significant combustibles consist of cable insulation and a small amount of oil in the circuit breakers. The transformers, motor control centers and the switchgear are separated by a concrete block wall.

5.11.3 Consequences If No Fire Suppression

An unsuppressed fire in this area could cause the loss of 480V AC power to loads supplied by these transformers and switchgear. The loss would not prevent safe shutdown of the plant.

5.11.4 Fire Protection Systems

The fire suppression is provided by portable CO_2 and dry chemical extinguishers.

5.11.5 Adequacy of Fire Protection

Due to the lack of automatic detection and suppression in this area, the total loss of 480V AC power could occur for a fire in this area. The loss of 480V AC power would not prevent the safe shutdown of the plant.

5.11.6 Modifications and Recommendations

The licensee proposes the following modifications to prevent the loss of redundant 480V AC power supplies:

(1) Install automatic fire detection and a total flooding halon 1301 system;

(2) Pipe transformer vents to the outside;

(3) Install three-hour fire rated doors in the corridor; and

(4) Upgrade hatch to corner room to a three-hour fire rating.

We find that, subject to implementation of the above described modifications, fire protection for the 480V switchgear room satisfies the objectives identified in Section 2.1 of this report and is, therefore, acceptable.

5.12 Battery Room

5.12.1 Safety-Related Equipment

The two safety-related redundant battery banks are located within the one room. The room also contains the battery chargers and safety-related cables.

5.12.2 Combustibles

The significant amounts of combustibles in the battery room are presented by the battery cases and electrical cable insulation. Hydrogen buildup is precluded by continuously operating supply and exhaust ventilation fans. The fans are on redundant power supplies.

5.12.3 Consequences If No Fire Suppression

An unsuppressed fire in the battery room could cause the loss of the redundant batteries due to heat buildup in the room from a cable or battery fire. A cable fire could also cause loss of redundant batteries due to proximity of redundant cables associated with the batteries.

5.12.4 Fire Protection Systems

There are no installed fixed suppression or fire detection systems in this area. The protection available is provided by portable CO_2 extinguishers.

5.12.5 Adequacy of Fire Protection

The fire protection for this area is not adequate to prevent the loss of redundant battery systems. This would not prevent the safe shutdown of the plant but would cause increased difficulty and manpower requirements due to the manual actions required for both shutdown and fire fighting.

5.12.6 Modifications and Recommendations

The licensee has proposed the following modifications to eliminate the possibility for a battery room fire to cause the loss of redundant batteries:

(1) Provide a new battery room independent of the existing one with the new cable runs separated from the redundant cables;

(2) Install automatic fire detection and suppression systems (halon 1301 total flooding);

(3) Upgrade a floor hatch to a three-hour fire rating; and

(4) Provide a means of detecting loss of ventilation air flow, to alarm in the control room.

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

5.13 Motor Generator Set Room

5.13.1 Safety-Related Equipment

The only safety-related equipment in this room is a small amount of electrical cabling.

5.13.2 Combustibles

The combustibles in the motor generator set room consist of a large quantity of lubricating oil in the motor generator sets and a small amount of electrical cabling.

5.13.3 Consequences If No Fire Suppression

A fire in this room could cause the loss of power to all recirculation pumps, some safety-related instrumentation, and core spray pumps. The loss of this equipment would not prevent the safe shutdown of the plant. The south wall does not presently have a three-hour fire rating; however, no safety-related equipment is located on the other side of the wall. The hatches in the floor and ceiling are not three-hour fire rated and an unmitigated fire in the motor generator set room could possibly affect the core spray pumps of one division. The loss of these pumps would not prevent the safe shutdown of the plant.

5.13.4 Fire Protection Systems

The primary protection for this area is provided by an automatic sprinkler system. Portable CO_2 extinguishers are also available.

5.13.5 Adequacy of Fire Protection

The operations crew would not be immediately notified of a fire in this area upon actuation of the sprinkler system, due to the lack of supervisory circuitry.

The sprinkler system is adequate to control fires in the area.

5.13.6 Modifications and Recommendations

The licensee proposes to make the following modifications to the fire protection for this area:

(1) Install supervisory circuitry on the sprinkler heads to indicate and alarm in the control room; and

(2) Upgrade the ceiling hatch, the hatch to the corner room, and the south wall to a three-hour fire rating.

We find that, subject to implementation of the above described modifications, fire protection for the motor generator set room satisfies the objectives identified in Section 2.1 of this report and is, therefore, acceptable.

5.14 Monitor and Change Room
5.14.1 Safety-Related Equipment

The monitor and change room contains cables from the core spray system and the neutron monitoring system. The electric tray closet adjacent to this area contains the same cables but not the other combustibles.

5.14.2 Combustibles

The major combustibles in this area consist of a significant amount of electrical cable insulation. The room also contains lesser amounts of clothing, wood and miscellaneous (paper, plastics and rags). The cables are located in an above ceiling area.

5.14.3 Consequences If No Fire Suppression

An unmitigated fire in this area could cause the loss of one division of the core spray system and the neutron monitoring system. These losses would not affect the safe shutdown of the plant.

5.14.4 Fire Protection Systems

The fire protection for this area is provided by portable water extinguishers.

5.14.5 Adequacy of Fire Protection

The fire protection for this area is inadequate since no detection is provided and a fire could become large causing large quantities of smoke to be generated making manual fire fighting difficult. Manual hose stations with smoke detection would be adequate for the electric tray room because of easy access.

5.14.6 Modifications and Recommendations

The licensee proposes the following modifications to upgrade fire protection for this area:

(1) Upgrade the south wall and doors to a three-hour fire rating and seal a floor opening (this will make the entire enclosure three-hour fire rated);

(2) Install an automatic sprinkler above and below the ceiling in the monitor and change room (access to the cables in the above ceiling space would be difficult due to a fixed ceiling);

(3) Install a manual hose station accessible to the monitor and change room and the electric tray closet;

(4) Seal the floor opening between the cable closet (adjacent to the control room) and the laundry area; and

(5) Install smoke detection devices.

We find that, subject to implementation of the above described modifications, fire protection for the monitor and change room and electric tray closet satisfies the objectives identified in Section 2.1 of this report and is, therefore, acceptable.

5.15 Electric Tray Room

5.15.1 Safety-Related Equipment

Cables for equipment required for emergency core cooling and safe shutdown systems are located in this room.

5.15.2 Combustibles

A significant quantity of electrical cable insulation is located in this small area.

5.15.3 Consequences If No Fire Suppression

A fire in this area could cause loss of control of the safety-related equipment (stated above) from the control room. The loss of this area would inhibit, but not prevent, the safe shutdown of the plant. Manual action by a major part of the operating crew would be necessary.

5.15.4 Fire Protection Systems

Portable extinguishers are the means of protecting this area.

5.15.5 Adequacy of Fire Protection

Due to the lack of detection and automatic suppression, the fire protection for this area is not sufficient to prevent the involvement of redundant safe shutdown systems. In addition, it is doubtful that the available manpower could perform fire fighting activities in conjunction with the shutdown of the plant due to the requirement for dispersing operators to various locations to perform the shutdown actions.

5.15.6 Modifications and Recommendations

The licensee has proposed the following modifications to upgrade the fire protection for this area:

(1) Install a safe shutdown panel independent of damage in this area from which one operator can perform the shutdown actions (refer to Section 4.10 for more detail); and

(2) Install an automatic fire detection system which actuates a total flooding halon suppression system.

We find that, subject to implementation of the above described modifications, fire protection for the electric tray room satisfies the objectives identified in Section 2.1 of this report and is, therefore, acceptable.

5.16 Turbine Building

5.16.1 Safety-Related Equipment

Safety-related equipment in the turbine building consists of the 4160V switchgear, and electrical cables between this switchgear and safety-related equipment in other areas of the plant.

5.16.2 Combustibles

The significant combustibles in the turbine building include cable insulation, lubricating oils, hydrogen seal oil, and hydrogen.

5.16.3 Consequences If No Fire Suppression

A large fire could occur in the turbine building, especially as a result of a major leak in the bearing lube oil piping. An unmitigated fire could cause the loss of all AC power to the plant resulting in the incapacitation of some equipment normally used for the safe shutdown of the plant. The loss of this equipment would not prevent safe shutdown by manual means; however, all the operating crew would be required to perform the actions necessary (refer to Section 4.10 for detail).

5.16.4 Fire Protection Systems

Major sources of combustible materials such as the turbine lube oil reservoirs and purification equipment, and the hydrogen seal oil unit, have been protected by automatic sprinklers or water spray. Automatic sprinklers are also provided in the condenser bay, which contains lube oil piping and safety-related electrical cable trays from the 4160V switchgear.

Manual hose stations are provided throughout the turbine building.

5.16.5 Adequacy of Fire Protection

The major source of combustibles is protected with automatic suppression systems with the exception of the switchgear area (discussed in Section 5.8) and the south end turbine building basement which contains redundant power cables for safe shutdown loads. The fire protection for these areas is inadequate to prevent the loss of AC power.

5.16.6 Modifications and Recommendations

The licensee has proposed the following modifications to prevent the loss of all AC power:

(1) Modify sprinklers for cables along the west wall of the condenser bay in the turbine building to spray directly on cables;

(2) Install automatic water spray protection for the entire south end of the turbine building basement to protect safety-related cables;

(3) Remove unnecessary oil storage from the basement; and

(4) Provide protection for 4160V switchgear (refer to Section 5.8 for detail).

We find that, subject to implementation of the above described modifications and those described in Sections 4.10 and 5.8 of this report, fire protection for the turbine building satisfies the objectives identified in Section 2.1 of this report and is, therefore, acceptable.

5.17 Diesel Generator Building

5.17.1 Safety-Related Equipment

Safety-related equipment in the diesel generator building consists of two redundant emergency diesel generators with their associated controls, switchgear and electrical cables, and the diesel fuel storage tank. The diesel generators are connected to the 4160V switchgear in the turbine building by electrical cables with the redundant cables in separate underground duct banks.

5.17.2 Combustibles

The major combustible in the diesel generator building is the diesel fuel oil; there are also small amounts of lubricants and electrical insulation.

5.17.3 Consequences If No Fire Suppression

The two diesel generators and the fuel tank are separated from each other by three-hour rated firewalls. The door in the firewall between the two diesel generators is not a three-hour fire rated door; therefore, a fire in either diesel generator could possibly spread to the redundant diesel through the inadequately protected opening. It is very unlikely that a fire in one diesel room would spread through the unrated door because of existing drains in the room to drain oil away and the large ducts in the roof through which the heat would be liberated. Even so, the loss of both diesel generators would not prevent the safe shutdown of the plant (refer to Section 4.10 for details).

An unsuppressed fire in the diesel fuel tank could destroy the tank and its contents. The fire would be confined to the tank room by the three-hour fire rated barrier between the tank room and the adjacent generator room.

5.17.4 Fire Protection Systems

There is no automatic fire detection or suppression in the diesel generator building. A fire would have to be suppressed manually using portable extinguishers and hose lines from exterior fire hydrants.

5.17.5 Adequacy of Fire Protection

The lack of automatic fire detection could result in delayed fire fighting activity with the possible consequent loss of at least one diesel generator and the remote possibility that both might be affected due to the unrated doors.

The loss of the fuel tank and its contents might result from a fire in this room; however, safe shutdown of the plant would not be affected by a fire in this location.

5.17.6 Modifications and Recommendations

The licensee has proposed the following modifications to the diesel generator building:

(1) Install an automatic fire detection system for the diesel generator room and the fuel tank room;

(2) Provide a three-hour fire rated door between the diesel generator rooms;

(3) Provide portable aqueous film forming foam nozzle and concentrate for manual fire fighting in this area; and

(4) Install thermally-actuated valves in each of the diesel generator fuel supply lines to automatically cut off the supply of oil to the diesel generator experiencing fire.

We find that, subject to implementation of the above described modifications, fire protection for the diesel generator building satisfies the objectives identified in Section 2.1 of this report and is, therefore, acceptable.

5.18 Fire Water Pump House

5.18.1 Safety-Related Equipment

There is no safety-related equipment in the fire water pump house. However, the pumps located here provide the water for fire suppression in all areas of the plant, including safety-related areas.

5.18.2 Combustibles

The significant combustible in the fire water pump house is diesel fuel for the fire pump engines which is supplied by gravity from two 550-gallon tanks adjacent to the building. There is also a limited quantity of electrical insulation and lubricants.

5.18.3 Consequences If No Fire Suppression

An unsuppressed fire in this structure could disable both fire pumps, eliminating the fire water supply to the plant.

5.18.4 Fire Protection Systems

There are no automatic fire detection or suppression systems in this building. Portable extinguishers are the only fire suppression equipment available.

5.18.5 Adequacy of Fire Protection

The existing fire protection is not adequate to detect and suppress a fire rapidly enough to prevent loss of both fire pumps.

5.18.6 Modifications and Recommendations

The licensee has proposed to install automatic sprinklers in the fire water pump house and on the adjacent fuel tanks located outside of the building. In addition, the licensee has proposed an alternate source to the yard loop by one of the following means:

(1) Running a second line from the existing pump house to the yard loop; or

(2) Providing an electric motor-driven pump with its own water storage tank and connection to the yard loop.

If alternative (1) is chosen, isolation valves to isolate the pump and a fire barrier between the existing pumps will also be provided. We find either of the alternatives (1) or (2), above, acceptable.

We find that, subject to implementation of the above described modifications, fire protection for the fire water pump house satisfies the objectives identified in Section 2.1 of this report and is, therefore, acceptable.

5.19 Yard Area

5.19.1 Safety-Related Equipment

The safety-related equipment in the yard area includes the emergency service water and circulating cooling water pumps, and underground power cables from the emergency diesel generators to the 4160V switchgear in the turbine building.

5.19.2 Combustibles

The combustibles which were considered for their potential exposure to safety-related systems include several oil-filled transformers, a 75,000-gallon aboveground diesel fuel tank, an oil-fired auxiliary boiler, and a hydrogen cylinder bank.

5.19.3 Consequences If No Fire Suppression

An unsuppressed fire in the yard area would not present a significant fire exposure to safety-related systems because of intervening distance or barriers.

5.19.4 Fire Protection Systems

Yard hydrants and hose lines stored in hose houses are available for manual fire suppression as discussed in Section 4.3.1.3 of this report. The oil-filled transformers and hydrogen cylinders are protected by automatic water spray systems. The diesel fuel oil tank is diked to prevent the combustible liquid from flowing into other areas.

5.19.5 Adequacy of Fire Protection

The fire protection for the yard areas is considered adequate inasmuch as a fire in these areas will not prevent the safe shutdown of the plant.

5.19.6 Modifications and Recommendations

The licensee proposes to:

(1) Provide automatic fire detection in the auxiliary boiler house;

(2) Provide additional portable fire extinguishers;

(3) Provide a dike around two oil-filled transformers in the circulatory water intake area; and

(4) Extend the transformer water spray system to provide coverage of bus penetrations of the turbine building west wall.

We find that fire protection for the yard area satisfies the objectives identified in Section 2.1 of this report and is, therefore, acceptable.

6.0 ADMINISTRATIVE CONTROLS

The administrative controls for fire protection consist of the fire protection organization, the fire brigade's training, the controls over combustibles and ignition sources, the prefire plans and procedures for fighting fires, and the quality assurance provisions for fire protection.

The licensee's description of the administrative controls is not adequate to permit a conclusion by the staff. We have recommended that the licensee's administrative controls follow the guidelines set forth in "Nuclear Plant Fire Protection Functional Responsibilities, Administrative Controls and Quality Assurance." Our evaluation of the administrative controls for fire protection will be issued in a supplement to this report.

7.0 TECHNICAL SPECIFICATIONS

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

8.0 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 or improvements 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 Oyster Creek facility will satisfy the provisions of BTP 9.5-1 and Appendix A thereto, 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 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.

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

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

9.0 CONSULTANTS REPORT

Under contract to Nuclear Regulatory Commission, Brookhaven National Labratory 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 this report. Their report, Fire Protection in Operating Nuclear Power Stations - Oyster Creek Nuclear Generating Station, BNL NUREG 23875, dated January 1978, discusses several matters which have been addressed in this report. These elements of the consultants recommendations which we have not adopted are identified in Appendix B along with our bases therefor.

APPENDIX A

CHRONOLOGY

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

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

By letter dated May 11, 1976, Jersey Central Power and Light Company (JCP&L) 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 September 27, 1976, Jersey Central Power and Light Company was requested to provide the results of a fire hazards analysis and propose Technical Specifications pertaining to fire protection. JCP&L was also provided a copy of Appendix A which includes acceptable alternatives to the guidelines of Standard Review Plan 9.5.1.

By letter of December 2, 1976, we provided model Technical Specifications and requested submittal of fire protection Technical Specifications.

On December 3, 1976, Jersey Central Power and Light Company provided a submittal responding to our requests of May 11, 1976 and September 27, 1976.

By letter dated June 17, 1977, we requested JCP&L to submit Technical Specifications (interim) for presently installed fire protection equipment and we provided additional guidance and revised model Technical Specifications.

By letter dated July 5, 1977, JCP&L proposed a schedule for submittal of their Fire Protection Interim Technical Specifications.

On August 2 to 5, 1977, the DOR fire protection review team visited the Oyster Creek facility. On August 5, 1977 a meeting was held at Oyster Creek at which the review team presented positions and requests for additional information.

By letter dated August 8, 1977, we provided JCP&L a copy of "Nuclear Plant Fire Protection Functional Responsibilities, Administrative Controls and Quality Assurance" to be used as guidance.

On August 31, 1977, a telecon between JCP&L personnel and NRC staff members was conducted to discuss review group concerns and positions, and to discuss items not resolved at the August 5, 1977 meeting.

By letter dated September 2, 1977, we requested additional information to enable us to complete our review of the Fire Protection Plan.

By letter dated September 30, 1977, JCP&L proposed interim Technical Specifications.

By letter dated October 3, 1977, JCP&L provided responses to our letter dated September 2, 1977, and proposed a date for the completion of all fire protection modifications.

On October 21, 1977, a telecon between JCP&L personnel and NRC staff members was conducted to discuss concerns and positions regarding the proposed interim Technical Specifications.

Several telecons between JCP&L personnel and NRC staff members were conducted between October 21, 1977 and November 22, 1977 to resolve concerns and positions regarding the proposed interim Technical Specifications.

Jersey Central Power and Light Company has submitted the additional information requested and responses to staff positions taken during the site visit and the telecon of August 31, 1977, with the exception that JCP&L has yet to submit additional information describing their administratve controls for fire protection.

APPENDIX B

DISCUSSION OF CONSULTANT'S REPORT

Under Contract to Nuclear Regulatory Commission, Brookhaven National Laboratory has provided the services of fire protection consultants who participated in the evaluation of the licensee's fire protection program and in the preparation of the safety evaluation report (SER). Their report, "Fire Protection in Operating Nuclear Power Stations- Oyster Creek," NBL NUREG-23875, dated January 1978, discusses several matters which have been addressed in the SER. The consultant's report contains recommendations which have, for the most part, been implemented during our evaluation. The consultant's recommendations which we have not adopted, along with our basis therefor, are identified herein.

1. Consultant's Comment: Fire Hazards Analysis Revision

"In the NRC Staff Request for Additional Information, certain revisions to the licensee's fire hazards analysis have been requested which include identification of the safe shutdown equipment and potential consequences of a fire in each fire area. The licensee has agreed to provide this analysis, however no mention is made of it in the SER. This information could have an effect on the fire protection requirements for certain areas."

Staff Response:

The licensee has proposed to provide an alternate shutdown method consisting of a remote shutdown station that employs cabling which is independent of the existing control cabling. The cabling for the remote shutdown station will be routed away from other cabling in the plant and adequate fire protection will be provided so that a fire will not cause loss of control from both the control room and the remote shutdown station. Only one operator will be required to perform the shutdown operation from the remote station. The addition of this system minimizes the need to specifically identify the location of existing safe shutdown equipment, and thus the consequences of a fire.

The staff has made conclusions in the SER based on the information received regarding the safety related equipment in an area, the consequences of a design basis fire in an area and the consequences of a fire, in terms of safe shutdown, after modifications are made, recognizing the capability of the alternate shutdown system. These conclusions are based upon the licensee's submittal, our direct observations during the site visit, discussions with the licensee and conservative assumptions about the safety related equipment that would be involved in a fire where sufficient detailed information was not available.

Nonetheless, the licensee will provide the information requested and should additional modifications be required as a result of this information, they will be addressed in a supplement to this report. This ongoing evaluation is identified in SER Section 5.0.

2. Consultants Comment: Damage Limits

"SER Item 8.0 (2) concludes that fire detection and suppression will minimize the effects of fire on safety-related systems. The consultant does not concur in this conclusion. There are usually several protective approaches that can be utilized for a given fire hazard, with each approach offering certain advantages and disadvantages in terms of limiting the fire extent, damage due to the fire suppression agents employed, system reliability, and cost-effectiveness. In most cases, it is technically possible to reduce the damage potential to a very low level, but cost penalties often become severe. The fire protection systems that are being provided and recommended are to assure safe shutdown capability and will not necessiarly minimize fire damage to all safety-related systems."

Staff Response:

We agree with the consultants' comments and realize that additional steps could always be taken to reduce physical damage to structure systems and components important to safety. In Appendix A to BTP 9.5-1 the term minimize, as found in GDC3 means fire protection systems that are being provided and recommended are to assure safe shutdown capability and will not necessarily reduce physical damage to all safety related systems.

3. Consultants Comment: Turbine Building

"SER Item 5-16 concludes that fire protection in the turbine building is acceptable. However, the licensee's fire hazard analysis does not adequately address the consequences of an unsuppressed lube oil fire in the turbine building (see October 24, 1977 letter from L. P. Herman to R. E. Hall on this subject.)"

Staff Response:

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

The staff does not deem such a design basis event assumption to be consistent with criteria used in evaluating other plant areas. In other areas such as in the cable spreading room, we have evaluated the effects of fire with automatic and manual suppression systems. We, therefore, have allowed the licensee to evaluate the effects of fires in the turbine building assuming the automatic suppression systems protecting major oil hazards function as designed. We have determined that all of the major sources of combustibles such as lube oil reservoirs, purification equipment and hydrogen seal oil are protected by automatic sprays or sprinklers. The condenser bay which contains the lube oil piping and safety-related electrical cable

trays is also provided with sprinkler protection. Manual hose stations are provided throughout the turbine building. Additionally, modifications are proposed to provide protection for switchgear and safety-related cables as addressed in the SER. The staff feels that adequate protection is being provided in the turbine building and that further analysis will not provide information which will alter our conclusions or the protection provided and therefore is not required.

4. Consultants Comment: Control Valves

"SER Item 4.3.1.3 indicates that the position of fire protection system valves will be controlled by locks or seals with periodic inspections. Locking or sealing programs depend upon ongoing administrative controls that are subject to human failure. Locks can also prevent prompt water shut off if piping ruptures. It is recommended that electrical supervision be required on all control valves for fire protection systems protecting areas containing or exposing safety-related equipment".

Staff Response:

The guidelines of Appendix A to BTP 9.5-1 allow electrical supervision, locking, or sealing with tamper proof seals with periodic inspection as means of assuring that valves in the fire protection water system are in the correct position. Valves on other systems in the plant are presently under administrative control. A review by the staff of Licensee Event Reports indicates that valves being in the incorrect position has not been a problem. Additionally an analysis by the licensee has shown that standing water as a result of failure of suppression system piping will not damage safety-related equipment due to curbs, drains, mounting of equipment above floor level, grating, and doorways. The licensee has also proposed to provide shields or other protection where water spray may result from cracks in suppression system piping. On this basis, a significant increase in plant safety would not result from the use of electrical supervision of all valves in the fire protection water systems.

5. Consultants Comment: Charcoal Filters

"SER Item 4.4.2 indicates that charcoal filters are acceptably protected against fire. The consultant recommends that further guidance be developed as to when and what type of protective systems are required for various charcoal filters."

Staff Response:

Charcoal filters in power plants fall into two categories: (1) those in ventilation systems; and (2) those in off-gas removal systems. Charcoal filters in ventilation systems contain insignificant amounts of activity, and, consequently, do not pose a safety hazard in a fire.

Also, these filters do not have the inherent capability to become an ignition source because of the low heat generation from radioactive decay due to the insignificant amount of contained radioactive material. Where fire in these filters presents an exposure hazard to safe-shutdown systems, fire protection is provided to assure safe shutdown of the plant.

The off-gas charcoal filters are of concern due to the quantity of contained radioactive material and the inherent possibility for ignition. This generic problem is currently under review by the NRC staff. Guidelines which may result from this review will be implemented following development of the guidelines.

6. Consultants Comments: Seismic Damage

"The SER does not consider the effect of seismic damage on primary and back-up fire protection systems, although Branch Technical Position 9.5-1 addresses this item for new plants. It is recommended that the potential that a seismic event could cause both a fire and damage to the protective features provided to cope with the fire be further evaluated. This should include fires started in non-seismically qualified systems or areas that spread to safety-related systems because protective systems are damaged."

Staff Response:

The guidelines of Appendix A to BTP 9.5-1 do not require seismic design criteria for fire protection systems. To the extent that our systematic evaluation program shows a need to look more thoroughly into overall seismic qualification for all plants we will do so. Seismic qualification of the fire protection system was not a part of this evaluation.

7. Consultant Comment: Smoke Removal

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

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

Staff Response:

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

In plants where smoke removal is dependent on such equipment, smoke removal is not generally initiated until the room atmosphere is cooled sufficiently, by fixed sprinkler operation or manual hos fogging to permit entry by fire fighting personnel. Ventilation prior to this time serves no purpose but to add oxygen to active fire sites. The current temperature capability to remove smoke when the hot gases are cooled enough for fire brigade entry. The manual fire fighting consultants have made their evaluations of the fire fighting capabilities of a number of plants, and we have considered their recommendations in determining acceptable smoke removal means. We require the licensees to develop pre-fire plans which include the proper use of ventilation equipment in each plant area of concern.

Consequently, there is adequate information available at this time to continue to evaluate plant smoke removal capability. The use of fire suppression equipment, fire barriers and other fire protection measures are evaluated based on the need for immediate access into an area and the limitations imposed by the currently available portable smoke removal units. These concerns are evaluated on an area basis at each plant with due consideration of the advice of the manual fire fighting consultants.

8. Consultants Comment: Protective Signaling System

"SER Item 4.2 indicates that portions of the protective signaling system utilize unsupervised wiring and equipment that has not been tested by a recognized testing laboratory such as Underwriters Laboratories, Inc. or Factor Mutual. The NRC has required an increased frequency of testing for this system. As outlined in an October 24, 1977 letter from L. P. Herman to R. E. Hall on this subject, it is recommended that supervised circuits and tested equipment be required instead."

Staff Response:

The staff considered the need for requiring electrical supervision of this part of the fire detection system. The wiring from the fire detection device to the local control panel is electrically supervised. The portion of the system which is unsupervised consists only of the electrical wiring from the local control panel to the control room. The components which are likely to fail, i.e., the detection devices, are supervised. On this basis it was concluded that the likelihood of failure of this portion of the system in comparison with failures elsewhere was small and that the increased periodic testing frequency is sufficient to assure an adequate level of availability.

9. Consultants Comment: Water Spray Design Criteria

"SER Item 4.3.1.5 indicates that water spray systems are to be provided on certain electrical cable trays. However, the design criteria of 0.1 gpm per square foot proposed by the licensee does not meet the current requirements of 0.15 gpm per square foot in NFPA 15-1977. It is recommended that compliance with NFPA criteria be required."

Staff Response:

The licensee has committed to design the spray systems in accordance with NFPA 15. We understand that this means compliance with NFPA 15-1977. The licensee has also informed us that in designing the spray systems, design densities of 0.15 gpm per square foot were designed into the systems. Additionally, as noted in section 3.1.6 of the SER, the staff will be reviewing the design details of these water spray systems to assure that the designs are acceptable.

10. Consultants Comment: Drywell Protection

"SER Item 5.7 indicates that acceptable drywell fire protection has been provided by the combination of inerting, plus temperature monitoring and containment spray during deinerted periods. No oil leak collection system is being required on the recirculation pumps and it is recommended this be provided.

The drywell could not be entered during the site visit; therefore, no direct observation could be made of the layout and equipment within. The proposed fire detection and suppression during deinerted periods does not utilize proven fire protection design or hardware.

If no oil leak collection system is to be provided, it is recommended that a physical inspection be made of the drywell to establish that the containment spray can indeed function effectively as a fire suppression system. Also, a thorough review of the equipment layout, and circuitry for the proposed fire detection scheme is required (see letter of October 24, 1977 from L. P. Herman to R. E. Hall which discusses this concern).

Staff Response:

Appendix A to BTP 9.5.1, which applies to operating reactors, does not require automatic suppression for containments that are inerted during normal operation. The reason for this is that during operation the containment is inerted with a nitrogen atmosphere which serves as protection to prevent the initiation of fires by the elimination of oxygen. The reactor is allowed to operate for short periods of time on startup and shutdown in a deinerted condition.

For fire protection during operations with a de-inerted containment, the suppression capability currently provided by hose stations and portable extinguishers outside the area or by containment sprays will be relied on. The only combustible of any consequence in the drywell is the oil in the recirculation pumps and a very small amount of electric cabling. We evaluated the location of the containment spray headers with respect to the cables and the pumps and found the spray headers will provide water spray coverage of the pumps and cables. The containment spray system is a completely redundant system designed to reduce the vapor in containment after a LOCA. To be effective in accomplishing this, the spray must be designed to cover the volume of the bulb of the drywell to condense the vapor.

The water spray density provided by the containment spray system exceeds the NFPA requirement for oil hazards. We do not feel that a system needs to be titled a fire suppression system to be given credit for mitigating effects of a fire. We therefore feel that drywell protection is adequate.

11. Consultants Comment: Sprinkler Coverage

"SER Items 4.3.1.5 and 5.14 indicate that automatic sprinklers are to be installed to protect safety-related electrical cables above the monitor and change room ceiling. Sprinklers should also be extended to protect the same cables above the adjacent hallway ceiling and in the cable tray closet".

Staff Response

The basis for installing an automatic water suppression in the above ceiling space was not due to a requirement to protect safe shutdown equipment; safe shutdown capability would not be affected by a fire in this or the other mentioned area. It was done due to the inaccessability of the above ceiling space in the monitor and change room which has a fixed ceiling without removable panels. However, the hallway ceiling space has push out removable ceiling panels, and the electric tray closet and hallway ceiling space are both readily accessible to manual hoses. Therefore, smoke detection, manual hose stations, and portable extinguishers are considered adequate protection for these areas.

12. Consultants Comment: Items of Clarification

"There are certain items in the SER which should be revised for greater accuracy or completeness.

a. Elevation 38 feet

The SER does not cover Elevation 38 feet of the reactor building.

b. Fire Door Alarm

Contrary to SER Item 4.9.2, the licensee has made no formal committment to install alarms on any fire doors to help maintain them in a closed position.

c. Interior Fire Hose

SER Items 3.1.9 and 4.3.1.4 should specify that sufficient interior fire hose stations be provided so that all areas requiring this protection be within reach of a hose not over 100 feet in length.

d. Cable Penetration Seals

The statement in SER Item 4.9.1 indicating that silicone foam cable penetration seals have been "qualified to a 3-hour rating according to the ASTME 119 test" is technically incorrect because this test is not applicable to penetration seals."

Staff Response:

a. This SER does address elevation 38 feet in section 5.4.

b. The SER has been changed to read correctly. The incorrect statement was in a draft copy.

c. The SER has been changed to more specifically reflect the licensee's committments.

d. The SER has been changed to read correctly. The incorrect statement was in a draft copy. The tests results were reviewed and we determined that they meet the staff's criteria.

UNITED STATES NUCLEAR REGULATORY COMMISSION

DOCKET NO. 50-219

JERSEY CENTRAL POWER & LIGHT COMPANY

NOTICE OF ISSUANCE OF AMENDMENT

TO PROVISIONAL OPERATING LICENSE

The U. S. Nuclear Regulatory Commission (the Commission) has issued Amendment No. 29 to Provisional Operating License No. DPR-16 issued to Jersey Central Power & Light Company which revised Technical Specifications for operation of the Oyster Creek Nuclear Generating Station, located in Ocean County, New Jersey. The amendment is effective 30 days after the date of issuance.

This amendment adds a license condition relating to the completion of facility modifications for fire protection. It also revises Technical Specifications to incorporate limiting conditions for operation and surveillance requirements for existing fire protection systems and administrative controls. Additional operating and surveillance requirements for the modifications being performed will be added to the Technical Specifications after the modifications are completed.

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

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

For further details with respect to this action, see (1) the application for amendment dated September 30, 1977, as supplemented by letters dated December 3, 1976, August 11, 1977 and October 3, 1977, (2) Amendment No. 29 to License No. DPR-16, 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 Ocean County Library, Brick Township Branch, 401 Chambers Bridge Road, Brick Town, New Jersey 08723. 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 3rd day of March 1978.

FOR THE NUCLEAR REGULATORY COMMISSION

Dennis L. Ziemann

Dennis L. Ziemann, Chief
Operating Reactors Branch #2
Division of Operating Reactors

ENCLOSURE 4

ADDITIONAL REVISIONS TO TECHNICAL SPECIFICATIONS

AND ASSOCIATED SAFETY EVALUATION REPORT

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

Remove	Replace
3.12-1	3.12-1
3.12-2	3.12-2
3.12-3	3.12-3
4.12-1	4.12-1
4.12-2	4.12-2
4.12-3	4.12-3
6.2-a	6.2-a
6-3	6-3
6-4	6-4
6-8	6-8
	6-8a

3.12 Fire Protection

Applicability: Applies to the operating status of Fire detection/ suppression systems and associated instrumentation.

Objective: To assure that fires in safety related areas are detected and suppressed at an early stage so as to minimize fire damage to safety related equipment.

Specifications:

A. Fire Detection Instrumentation

1. As a minimum, the fire detection instrumentation for each fire detection area/zone shown in Table 3.12.1 shall be operable, except as otherwise specified in this section.

2. With the number of operable fire detection instruments less than required by Table 3.12.1;

   a. Within one hour, establish a fire watch patrol to inspect the area (s)/zone(s) with the inoperable instrument(s) at least once per 1 hour, and

   b. Restore the inoperable instrument(s) to operable status within 14 days or prepare and submit a special report to the commission within the next 30 days outlining the cause of the malfunction and the plans for restoring the instrument(s) to operable status.

B. Fire Suppression Water System

1. The Fire Suppression Water System shall be operable with:

   a. Two high pressure pumps with their discharge aligned to the fire suppression header.

   b. Automatic initiation logic for each fire pump.

2. With less than the above required equipment, restore the inoperable equipment to operable status within 7 days or prepare and submit a Special Report to the commission within the next 30 days outlining the plans and procedures to be used to provide for the loss of redundancy in this system.

3. With no Fire Suppression Water System operable, within 24 hours;

   a. Establish a backup Fire Suppression Water System and submit a Special Report to the Commission by telephone within 24 hours, and in writing no later than 10 days following the event, outlining the action taken, the cause of the inoperability and the plans and schedule for restoring the system to OPERABLE status, or

   b. The reactor shall be placed in the cold shutdown condition within 24 hours.

C. Spray and/or Sprinkler Systems

1. The spray and/or sprinkler systems listed in Table 3.12.2 shall be operable.

2. With a spray and/or sprinkler system inoperable establish a fire watch patrol to inspect the area/zone at least once per 1 hour.

3. Restore the system to operable status within 14 days or prepare and submit a Special Report to the Commission within the next 30 days outlinging the cause of inoperability and the plans for restoring the system to operable status.

D. Fire Hose Stations

1. The Fire Hose Stations listed in Table 3.12.3 shall be operable.

2. With a hose station listed in Table 3.12.3 inoperable, within 1 hour provide additional fire suppression equipment in the affected area/zone.

E. Fire Barrier Penetration Fire Seals

1. All penetration fire barriers protecting safety related areas shall be intact except for periods of planned maintenance.

2. With a penetration fire barrier nonfunctional, within one hour establish a fire watch patrol to inspect both sides of the affected penetration at least once per every 2 hours unless work is being performed or other fire hazards exist then 3.12.E.3 applies.

3. With a penetration fire barrier nonfunctional and work is being performed in the area or other fire hazards exist, within one hour establish a continuous fire watch on at least one side of the affected penetration.

Basis:

Fire Protection systems and instrumentation provide for early detection and rapid extinguishment of fires in safety related areas thus minimizing fire damage. These specifications will assure that in the event of inoperable fire protection equipment that corrective action will be initiated in order to maintain fire protection capabilities during all modes of reactor operation.

The pumps in the fire water suppression system have a capacity of 2000 GPM each assuring an adequate supply of water to fire suppression systems. Fire suppression water system operability as defined in 3.12.B.1 applies only as pertains to specification 3.12 and is not applicable to other specifications.

Hose stations are provided for manual fire suppression. In the event that a hose station becomes inoperable, additional fire suppression equipment should be provided such as portable extinguishers or other means of fire suppression.

4.12 Fire Protection

Applicability: Applies to the surveillance requirements of the Fire Protection Systems in safety related areas/zones.

Objective: To specify the minimum frequency and type of surveillance to be applied to fire protection equipment and instrumentation.

Specifications:

A. Fire Detection Instrumentation

1. Each of the instruments in Table 3.12.1 shall be demonstrated operable by a channel functional test at least once per 6 months.

2. The circuitry associated with the detector alarms listed in Table 3.12.1 shall be demonstrated operable at least once per month.

B. Fire Suppression Water System

1. The Fire Suppression Water System shall be demonstrated operable:

a. At least once per month on a staggered test basis by starting each pump and operating it for at least 15 minutes on recirculation flow.

b. At least once per month by verifying the valve lineup.

c. At least once per 24 months by performance of a system flush.

d. At least once per 12 months by cycling each testable valve in the flow path through at least one complete cycle of full travel.

f. At least once per 18 months by cycling each valve in the flow path that is not testable during plant operation through at least one complete cycle of full travel.

g. At least once per 18 months by verifying that each pump develops at least 2000 gpm at a system pressure of 150 spig.

h. At least once per 18 months by verifying that each high pressure pump starts automatically to maintain the fire suppression water system pressure $\geq$165 psig.

h. At least once per 31 days verify that the fuel storage tank of each fire pump diesel engine contains at least 275 gallons of fuel and at least once per 92 days verify that a sample of diesel fuel from the fuel storage tank, obtained in accordance with ASTM-D270-65, is within the acceptable limits specified in Table 1 of ASTM D975-74 with respect to viscosity, water content, and sediment.

i. At least once per 18 months, during shutdown, by subjecting the diesel to an inspection in accordance with procedures prepared in conjunction with its manufacturer's recommendations for the class of service.

j. At least once per 7 days verify for the fire pump diesel starting battery bunk that the electrolyte level of each battery is above the plates, and the overall battery voltage is $\geq$ 24 volts. At least once per 92 days by verifying that the specific gravity is appropriate for continued service of the battery.

At least once per 18 months by verifying that:

The batteries, cell plates and battery racks show no visual indication of physical damage or abnormal deterioration, and the battery-to-battery and terminal connections are clean, tight, free of corrosion and coated with anti-corrosion material.

C. Spray and/or Sprinkler Systems

1 1. The spray and/or sprinkler systems listed in Table 3.12.2 shall be demonstrated operable:

a. At least once per 12 months by cycling each testable valve through one complete cycle.

b. At least once per 18 months:

(1) By performing a system functional test which includes simulated automatic actuation of the system and verifying that the automatic valves in the flow path actuate to their correct positions.

(2) By visual inspection of spray headers and nozzles to verify their integrity and that a clear flow path exists below nozzles.

(3) By inspection of each nozzle to verify no blockage.

D. Fire Hose Stations

1. Each fire hose station shall be verified OPERABLE:

a. At least once per 31 days by visual inspection of the station to assure all equipment is available.

b. At least once per 18 months by removing the hose for inspection and re-racking and replacing all gaskets in the couplings that are degraded.

c. At least once per 3 years, partially open each hose station valve to verify valve operability and no blockage.

d. At least once per 3 years by a Hydrostatic test of attached fire hose at a pressure at least 50 psig greater than the maximum available at that hose station.

Basis:

Fire Protection systems are normally inactive and require periodic examination and testing to assure their readiness to respond to a fire situation. These specifications detail inspections and tests which will demonstrate that this equipment is capable of performing its intended function.

6.4.2 A training program for the Fire Brigade shall be maintained under the direction of the Training Administrator and shall meet or exceed the requirements of Section 27 of the NFPA Code-1975, except that the meeting frequency may be quarterly.

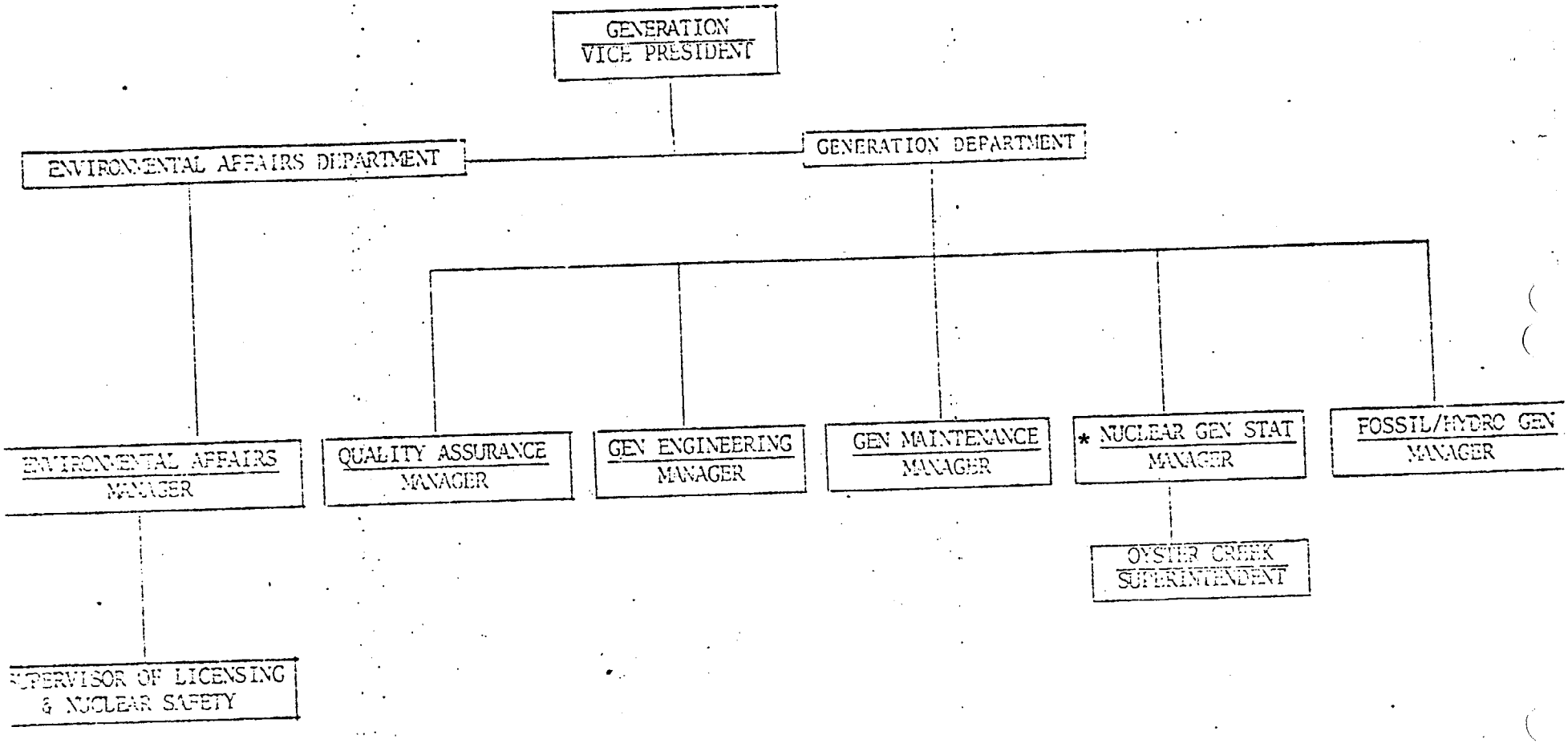

FIGURE 6.2.1

OYSTER CREEK STATION

MANAGEMENT ORGANIZATION CHART

*Ultimate responsibility for Fire Protection Program

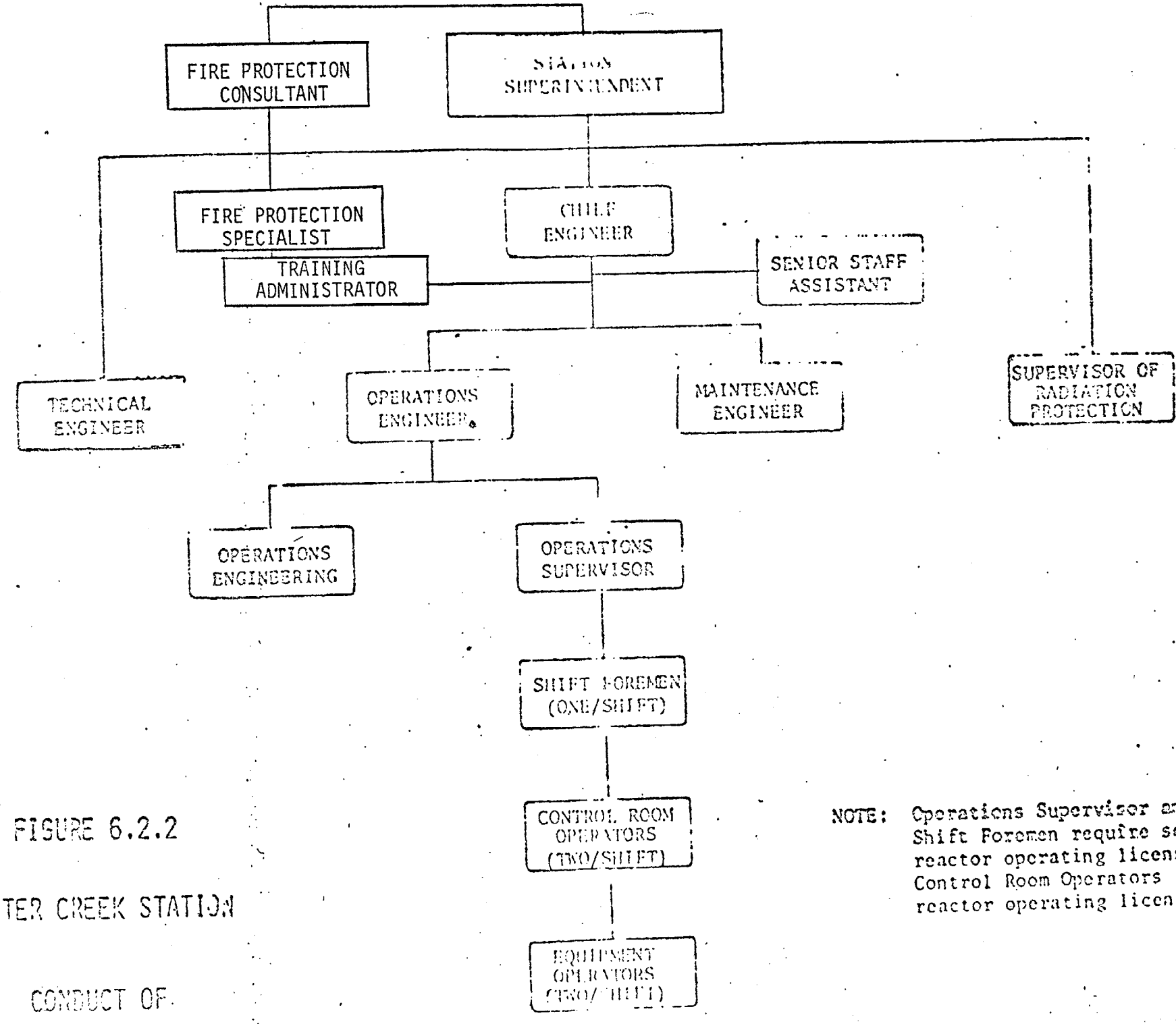

FIGURE 6.2.2

OYSTER CREEK STATION

CONDUCT OF OPERATIONS CHART

NOTE: Operations Supervisor and Shift Foremen require senior reactor operating licenses. Control Room Operators require reactor operating licenses.

RESPONSIBILITIES

6.5.3.3 The specific responsibility to ensure accomplishment of independent safety review of the plant superintendent's determinations involving safety questions is assigned to the ISRG Coordinator and is accomplished by utilizing, as necessary, the full scope of expertise available in the generation department staff, consultants, contractors and vendors as appropriate. Table 6.5-1 defines the specific independent safety review responsibilities.

AUTHORITY

6.5.3.4 The ISRG advises the Vice President-Generation. It has the authority to conduct reviews and investigations, which will be documented.

AUDITS

6.5.3.5 Audits of facility activities shall be performed under the cognizance of the Manager, Operational Quality Assurance. These audits shall encompass:

a. The conformance of facility operation to all provisions contained within the Technical Specifications and applicable license conditions at least once per year.

b. The training and qualifications of the entire facility staff at least once per year.

c. The results of all actions taken to correct deficiencies occurring in facility equipment, structures, systems or method of operation that affect nuclear safety at least once per six months.

d. The Facility Emergency Plan and implementing procedures at least once per two years.

e. The Facility Security Plan and implementing procedures at least once per two years.

f. Any other area of facility operation considered appropriate by the GORB or the Vice President - Generation.

g. The Facility Fire Protection Program and implementing procedures at least once per 24 months.

h. An independent fire protection and loss prevention program inspection and audit shall be performed at least once per 12 months utilizing either qualified offsite licensee personnel or an outside fire protection firm.

i. An inspection and audit of the fire protection and loss prevention program shall be performed by a qualified outside fire consultant at least once per 36 months.

RECORDS

6.5.3.6 Written documentation of all independent safety reviews and investigations will be forwarded to the Station Superintendent, Vice President - Generation and the Chairman of the General Office Review Board. In addition, any reportable occurrence or item involving an unreviewed safety question which is identified by the ISRG will be documented and reported immediately to the above mentioned persons.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING THE TECHNICAL SPECIFICATION CHANGES IN ENCLOSURE 4

DOCKET NO. 50-219

INTRODUCTION

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

We have issued new guidelines for fire protection programs in nuclear power plants. These guidelines 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 APCSB 9.5-1), May 1, 1976.

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

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

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

Jersey Central Power & Light Company (JCP&L) has submitted a description of the fire protection program for the Oyster Creek Nuclear Generating Station by letter dated December 3, 1976. This program has undergone detailed review by the NRC. As a result of our review the licensee has agreed to implement many modifications at Oyster Creek. In the interim, we have concluded that it is appropriate to implement operability and surveillance requirements for the existing fire protection equipment and systems at Oyster Creek by incorporating these requirements in the Technical Specifications. In addition to these equipment specifications, we are also including administrative requirements for the implementation of the fire protection program.

By letter dated September 27, 1976, we requested JCP&L to submit Technical Specifications for presently-installed fire protection equipment at Oyster Creek. By letters dated December 2 and December 16, 1976, we provided sample Technical Specifications and additional guidance. Based on our review and consideration of the responses of other licensees, we modified certain action statements and surveillance frequencies in order to provide more appropriate and consistent specifications. These specifications were forwarded to JCP&L by letter dated June 17, 1977. This letter also requested that JCP&L submit appropriate specifications.

By letter dated September 30, 1977, JCP&L submitted proposed Technical Specifications. We have reviewed the JCP&L submittal and made several modifications to assure conformance to the fullest extent practicable with our requirements as set forth in the sample Technical Specifications pending completion of our ongoing detailed review of fire protection at this facility.

DISCUSSION AND EVALUATION

The guidelines for Technical Specifications that we developed and sent to all licensees are based on assuring that the fire protection equipment currently installed for the protection of safety related areas of the plant is operable. This assurance is obtained by requiring periodic surveillance of the equipment and by requiring certain corrective actions to be taken if the limiting conditions for operation cannot be met. These guidelines also include administrative features for the overall fire protection program such as interim fire brigade requirements, training, procedures, management review and periodic independent fire protection and loss prevention program inspections.

The equipment and components existing at these facilities and included in the scope of these Technical Specification requirements are fire detectors, the fire suppression systems, the hose stations, and penetration fire barriers for piping and cabling penetrations. Operability of the fire detection instrumentation provides warning capability for the prompt detection of fires, to reduce the potential for damage to safety related equipment by allowing rapid response of fire suppression systems. In the event that the minimum coverage of fire detectors cannot be met, hourly fire patrols are required in the affected area until the inoperable instrumentation is restored to operability. The operability of the fire suppression systems provides capability to confine and extinguish fires. In the event that portions of the fire suppression systems are inoperable, alternate backup fire fighting equipment is required to be made available in the affected areas until the inoperable equipment is returned to service. In the event that the fire suppression water system becomes inoperable, a backup fire protection water system is required within 24 hours and a report to the NRC is required within 24 hours to provide for prompt evaluation of the acceptability of the corrective measures for adequate fire suppression capability. The functional integrity of the penetration fire barriers provides protection to confine or retard fires from spreading to adjacent portions of the facilities. During periods of time when a fire barrier is not functional, a continuous fire watch is required to be maintained in the vicinity of the affected barrier to provide fire prevention methods and prompt detection and suppression in the event of a fire.

We have reviewed the licensee's proposed interim Technical Specifications against our requirements as implemented in the sample Technical Specifications. We have made some modifications to the Specifications that were proposed by the licensee in order to make them conform to our requirements. One of the proposed specifications that we changed involves the minimum size of the on-site fire brigade. In our previous sample Technical Specifications we did not identify the number of members on a fire brigade that we would find acceptable. We have now concluded that minimum number for a typical commercial nuclear power plant to be five (5). The basis for this conclusion is presented in an attachment to this SER entitled "Staff Position Minimum Fire Brigade Shift Size."

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 our conclusion that the operation of the plants, until we complete our review, does not present an undue risk to the health and safety of the public.

> "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 straight-forward measures, such as may already exist at other nuclear plants, can significantly reduce the likelihood of a potential core melt accident that might result from a large fire'. The Review Group agrees.
>
> "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."

Subsequent to the Browns Ferry fire and prior to the Special Review Group's investigation, the Office of Inspection and Enforcement took steps with regard to fire protection. Special bulletins were sent to all licensees of operating power reactors on March 24, 1975, and April 3, 1975, directing the imposition of certain controls over fire ignition sources, a review of procedures for controlling maintenance and modifications that might affect fire safety, a review of emergency procedures for alternate shutdown and cooling methods, and a review of flammability of materials used in floor and wall penetration seals. Special inspections covering the installation of fire stops in electrical cables and in penetration seals were completed at all operating power reactors in April and May 1975. Inspection findings which reflected non-compliance with NRC requirements resulted in requiring corrective action by licensees. Follow-up inspections have confirmed that licensees are taking the required corrective actions and that administrative control procedures are in place.

Since these inspection activities and the subsequent Special Review Group recommendations in the 1975 to 1976 time period, there has been no new information to alter the conclusions of the Special Review Group, and the ongoing fire protection program flowing from those conclusions is still adequate.

Therefore, we have found these specifications acceptable on an interim basis until such time that our overall review is complete, required equipment is installed and operable, and final specifications have been developed and issued.

ENVIRONMENTAL CONSIDERATION

We have determined the 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.

CONCLUSION

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 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.

Attachment: Staff Position - Minimum Fire Brigade Shift Size

Date: March 3, 1978

Staff Position

Minimum Fire Brigade Shift Size

INTRODUCTION

Nuclear power plants depend on the response of an onsite fire brigade for defense against the effects of fire on plant safe shutdown capabilities. In some areas, actions by the fire brigade are the only means of fire suppression. In other areas, that are protected by correctly designed automatic detection and suppression systems, manual fire fighting efforts are used to extinguish: (1) fires too small to actuate the automatic system; (2) well developed fires if the automatic system fails to function; and (3) fires that are not completely controlled by the automatic system. Thus, an adequate fire brigade is essential to fulfill the defense in depth requirements which protect safe shutdown systems from the effects of fires and their related combustion by-products.

DISCUSSION

There are a number of factors that should be considered in establishing the minimum fire brigade shift size. They include:

1) plant geometry and size;
2) quantity and quality of detection and suppression systems;
3) fire fighting strategies for postulated fires;
4) fire brigade training;
5) fire brigade equipment; and
6) fire brigade supplements by plant personnel and local fire department(s).

In all plants, the majority of postulated fires are in enclosed windowless structures. In such areas, the working environment of the brigade created by the heat and smoke buildup within the enclosure, will require the use of self-contained breathing apparatus, smoke ventilation equipment, and a personnel replacement capability.

Certain functions must be performed for all fires, i.e., command brigade actions, inform plant management, fire suppression, ventilation control, provide extra equipment, and account for possible injuries. Until a site specific review can be completed, an interim minimum fire brigade size of five persons has been established. This brigade size should provide a minimum working number of personnel to deal with those postulated fires in a typical presently operating commercial nuclear power station.

If the brigade is composed of a smaller number of personnel, the fire attack may be stopped whenever new equipment is needed or a person is injured or fatigued. We note that in the career fire service, the minimum engine company manning considered to be effective for an initial attack on a fire is also five, including one officer and four team members.

It is assumed for the purposes of this position that brigade training and equipment is adequate and that a backup capability of trained individuals exist whether through plant personnel call back or from the local fire department.

POSITION

1. The minimum fire brigade shift size should be justified by an analysis of the plant specific factors stated above for the plant, after modifications are complete.

2. In the interim, the minimum fire brigade shift size shall be five persons. These persons shall be fully qualified to perform their assigned responsibility, and shall include:

   One Supervisor - This individual must have fire tactics training. He will assume all command responsibilities for fighting the fire. During plant emergencies, the brigade supervisor should not have other responsibilities that would detract from his full attention being devoted to the fire. This supervisor should not be actively engaged in the fighting of the fire. His total function should be to survey the fire area, command the brigade, and keep the upper levels of plant management informed.

   Two Hose Men - A 1.5 inch fire hose being handled within a windowless enclosure would require two trained individuals. The two team members are required to physically handle the active hose line and to protect each other while in the adverse environment of the fire.

   Two Additional Team Members - One of these individuals would be required to supply filled air cylinders to the fire fighting members of the brigade and the second to establish smoke ventilation and aid in filling the air cylinder. These two individuals would also act as the first backup to the engaged team.