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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the Matter of

SOUTHERN CALIFORNIA EDISON CO. Docket No. 50-206

(San Onofre Nuclear Generating Station Unit 1)

> SUPPLEMENTAL APPLICATION FOR EXEMPTION FROM DEADLINE TO SUBMIT FIRE SAFETY PLANS AND SCHEDULES

On March 19, 1981, Southern California Edison Company ("Applicant") requested an exemption from the schedular requirements of 10 C.F.R. §50.48(c)(5), pursuant to 10 C.F.R. §50.12, and indicated that this supplemental application would follow. The requested exemption is

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necessary in order to permit the coordinated development of plans and schedules for installation of fire safety equipment designed to provide a safe shutdown capability at Applicant's San Onofre Nuclear Generating Station Unit 1 ("SONGS 1"). This exemption will not result in a permanent relaxation of the Nuclear Regulatory Commission's ("Commission's") standards, but will permit Applicant to perform extensive engineering and design work that will form the basis for the next phase of fire protection improvements at SONGS 1.

Implementation of fire safety retrofits at SONGS 1 has proceeded expeditiously. Extensive fire safety measures have been installed in recent years and the fire safety of SONGS 1 has been substantially enhanced. Applicant has obtained NRC concurrence in implementing yet additional fire safety improvements, specifically including the installation of a safe shutdown capability, following the integrated assessment of required plant backfit as part of the Systematic Evaluation Program (SEP). However, on February 17, 1980, Commission rules became effective that required submission within 30 days of plans and schedules for achieving such capability. 10 C.F.R. 50.48(c)(5), 45 Fed. Reg. 76602 (November 19, 1980). $\frac{1}{}$ Although Applicant made

^{1/} A petition to review these requirements was filed by a number of other utilities in the United States Court of Appeals for the District of Columbia Circuit on January 16, 1981. <u>Connecticut Light and Power Co. v. Nuclear Regulatory</u> Comm'n, No. 81-1050.

its best efforts to meet this deadline, and submitted a conceptual scheme on that date, design work performed to date demonstrates that the required modifications will be quite extensive. Moreover, substantial duplication and unnecessary work will occur if these fire safety measures are not coordinated with the ongoing SEP. Additional time will therefore be necessary to develop the required plans. The revised timetable proposed by Applicant will not endanger life or property or the common defense and security and is otherwise in the public interest.

I. BACKGROUND

Applicant has upgraded fire safety measures at SONGS 1 over the course of a number of years. During 1978 and the first half of 1979, Applicant and Commission Staff engaged in extensive discussions, analysis and correspondence culminating on July 19, 1979 with the issuance of Amendment No. 44 to Provisional Operating License No. DPR-13, attached hereto as Appendix A. Amendment No. 44 incorporated a list of modifications to the facility summarized in the Staff's Fire Protection Safety Evaluation Report (FPSER) dated July 19, 1979. The FPSER specified 17 categories of modifications required to be made to the facility, as well as setting forth areas for further study including safe shutdown capability.

The FPSER at page 3-2 set forth an implementation schedule for the required modifications. Many of the

modifications were implemented by the end of Core 8 refueling, with the balance to be integrated with the SEP. At the time of the FPSER, the methods to achieve alternate shutdown capability were to be analyzed further by the Applicant and Commission Staff. The FPSER concluded that:

> We find that, from a review of the recent modifications for insuring the capability for safe shutdown and with the improvements implemented for the fire protection program, an adequate basis has been provided to assure that the plant can be maintained in a safe condition during the interim period until final fire protection modifications have been completed. With respect to safe shutdown capability following this interim period, the licensee will propose further alternate methods for safe shutdown following ongoing investigations. We will address the resolution of this subject in a supplement to this report.

FPSER at page 4-1. (Emphasis added.)

In response to Amendment No. 44, Applicant engaged in rapid and extensive installation of fire safety equipment. Fire detection equipment was installed in a number of additional locations. Water supply was upgraded, including yard hydrants, hose stations and other equipment. Water, foam and gas suppression equipment was installed. Fire doors, barriers and dampers were installed in a number of locations in the facility. Certain emergency lighting, isolation devices and combustibles control measures were implemented. To date, Applicant has invested a total of \$9 million in response to those Amendment No. 44 measures which were implemented by the end of Core 8 refueling. In

addition, the company has invested a significant amount on other measures specified in Amendment No. 44, and on measures instituted prior to Amendment No. 44.

The Commission based Amendment No. 44 upon the following findings:

- A. The facility will operate in conformity with the license amendment, the provisions of the Atomic Energy Act of 1954, as amended (the Act), and the rules and regulations of the Commission;
- B. 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;
- C. 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
- D. 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.

(Amendment No. 44 at page 1). Thus, the Commission clearly found that operation of SONGS 1 with interim measures instituted at the facility would not endanger life or property or the common defense and security. Those measures found by the Commission to adequately protect public health and safety, until a safe shutdown approach could be resolved, have already been installed.

On December 1, 1980, Applicant received notice of final Commission rules setting forth revised fire safety requirements, including those relating to safe shutdown capability, in a new Appendix R to 10 C.F.R. Part 50 ("Appendix R"). 45 Fed. Reg. 76602 (November 19, 1980). The rules stated that plans and schedules for achieving a safe shutdown capability were to be submitted by March 19, 1981, unless an exemption were approved by the Commission. 10 C.F.R. §50.48(c)(5). By this request, Applicant seeks such tailoring of the §50.48(c)(5) timetable to its facility through the exemption process.

> II. AN EXTENSION OF THE COMMISSION'S TIMETABLE WILL PERMIT COORDINATION OF SAFE SHUTDOWN AND SEP MODIFICATIONS AND WILL PREVENT WASTEFUL AND DUPLICATIVE EXPENDITURES

Applicant is currently in the midst of SEP at SONGS 1. SEP is a comprehensive review of certain older nuclear plants to determine necessary backfit measures. The SEP review has a number of safety goals related to safe shutdown capability. The fire protection backfit program covered by Appendix R addresses some of the same issues and involves much of the same equipment as SEP. The potential for unnecessary, duplicative and conflicting backfit requirements resulting from the overlap between these two programs is clear. Unless the SEP and the backfit requirements of Appendix R are coordinated, Applicant will likely face seriously inconsistent requirements which will

require extensive expenditures without any benefit to the public health and safety. This situation is contrary to that envisioned by the Commission when it encouraged licensees to "be aware of the status of the SEP so that the requirements resulting from SEP can be effectively integrated with those relating to fire protection to the extent possible." 45 Fed. Reg. 76607 (November 19, 1980).

Due to the relative schedules of SEP and the Appendix R requirements, the potential for duplicative and inconsistent requirements is particularly acute. SEP review is expected to be complete in mid-1982. Under the schedule contemplated by the November 19 rules for implementation of Appendix R, purchase orders for many major pieces of equipment would need to be placed before the completion of SEP, even though the SEP requirements might be inconsistent with the Appendix R requirements and render obsolete and unnecessary many items of purchased equipment. Moreover, substantial duplication of engineering effort and diversion of engineering resources from other important safety design projects will occur unless the SEP and Appendix R backfit programs are coordinated.

The Commission has specified three general approaches to achieving a safe shutdown capability in Appendix R. The first involves various combinations of separation and fire suppression. If adequate separation and fire suppression cannot be provided, an alternative or

dedicated safe shutdown capability independent of the fire area is required. Alternative shutdown measures involve utilization of existing equipment to provide a second shutdown train independent of the control room, cable spreading room, switchgear rooms and cable riser areas. Where existing alternative shutdown equipment is insufficient to provide the capability, a dedicated system, which involves addition of new redundant equipment to provide a minimum capability safe shutdown train, may be provided.

Applicant's proposed approach to a safe shutdown capability at SONGS 1 involves a combination of separation of existing equipment and/or utilization of alternative or dedicated shutdown equipment, which will encompass extensive modifications to SONGS 1 estimated to cost close to \$40 million. These measures were outlined in a letter from K.P. Baskin to the Director, Office of Nuclear Reactor Regulation, dated March 19, 1981.

SEP addresses a large number of safety-related issues, including seismic withstand capability, separation of safety-related circuits and power supply to safety-related equipment, in addition to safe shutdown. The breadth of the SEP effort makes it quite likely that significant overlap will occur between SEP and the Appendix R improvements. Many of the circuits that may be relocated or added as a result of Appendix R may also be affected by SEP. Failure to coordinate the two sets of improvements will lead to

substantial duplication of effort, since the same circuits will need to be modified twice with no incremental benefit in public health and safety. In addition, any inconsistencies between SEP and Appendix R requirements will result in the making of unnecessary expenditures under current schedules.

Under Appendix R, separation and fire suppression measures must be undertaken during the first refueling outage, 60-day planned outage or 120-day unplanned outage commencing after August 16, 1981. Alternative shutdown systems requiring plant shutdown must be completed before start-up after the earliest refueling outage, 60-day planned outage or 120-day unplanned outage commencing 180 days after Commission approval.^{2/} Dedicated shutdown systems are to be installed within 30 months after Commission approval.

Due to long supply lead-times, the Appendix R dedicated shutdown improvements will require the full 30 months after Commission approval allocated to their installation. In order to meet this 30 month schedule, the equipment with longer lead-times will need to be ordered within the first few months after Commission approval. Unless this effort is coordinated with the improvements in response to SEP, and if ordering of Appendix R equipment is necessary before the SEP requirements are known, duplicative

2/ Modifications not requiring a plant shutdown must commence 6 months after Commission approval.

and wasteful purchases of equipment will likely be required in this \$40 million effort.

The Appendix R and SEP improvements are on a schedule that now differs by only 6 to 12 months. Since the Appendix R improvements may be undertaken on a schedule extending 30 months after Commission approval, the Commission clearly continues to view the currently implemented interim measures as adequately protecting public health and safety. A delay of 6 to 12 months in the Appendix R timetable will not compromise public health and safety.

Applicant is continuing its expedited review of conceptual design approaches to Appendix R compliance. This current effort will permit rapid implementation of the Appendix R requirements after a determination of the scope of modifications to be made under SEP. Applicant proposes to submit comprehensive engineering design to the Commission approximately six months after determination of the SEP requirements. Applicant accordingly requests an exemption from the requirement to submit safe shutdown plans on March 19, 1981, to allow submission of a comprehensive plan in coordination with the SEP backfit program.

> III. ADDITIONAL TIME TO SUBMIT APPENDIX R PLANS WILL PERMIT A MORE COMPREHENSIVE ENGINEERING ANALYSIS THAT WILL BETTER PROTECT PUBLIC HEALTH AND SAFETY

The accelerated schedule contained in the November 19 regulations will not best serve public health and

safety at SONGS 1, where extensive modifications have been identified. As Commissioners Hendrie and Kennedy commented when the fire protection rules were proposed, "[w]e are concerned that the short implementation schedule proposed here for fire safety provisions, together with the large work load associated with the Three Mile Island requirements, may make it impossible for licensees to complete all of these measures in a carefully considered and thorough fashion." 45 Fed. Reg. at 36083 (May 29, 1980). As discussed above, the fire protection modifications to respond to Appendix R are quite extensive and will involve expenditures approaching \$40 million. The engineering work required to implement those measures initially identified in connection with Appendix R will be substantial. Undertaking this work on a crash basis will not best serve the public interest. The 6 to 12 month delay necessary to coordinate Appendix R requirements with SEP will serve the additional purpose of permitting a thorough review of the various options available for compliance with Appendix R. The additional time will help ensure a well-designed system that will best protect public health and safety.

> IV. AN EXEMPTION FROM THE COMMISSION'S TIMETABLE IS APPROPRIATE IN THIS CASE

A specific exemption from the March 19 deadline for submission of safe shutdown plans is appropriate under 10 C.F.R. §50.12(a), which provides that:

The Commission may, upon application by any interested person or upon its own initiative, grant such exemptions from the requirements of the regulations in this part as it determines are authorized by law and will not endanger life or property or the common defense and security and are otherwise in the public interest.³/

The introductory comments to the November 19 regulations suggested use of the exemption process to tailor the timetable contained in §50.48(c)(5) to the situations faced by specific facilities. 45 Fed. Reg. 76603.

3/ Three general approaches to exemptions or exceptions from the Commission's regulations have been recognized in the decisions. Washington Public Power Supply System (WPPSS Nuclear Project Nos. 3 and 5), Docket Nos. STN 50-508 and 50-509, CCH Nuclear Regulation Reporter ¶30,170 (April 1, 1977); Kansas Gas & Electric Company, (Wolf Creek Generating Station) Docket No. STN 50-482, CCH Nuclear Regulation Reporter ¶30,132 (January 12, 1977). Direct application to the Commission under §50.12 is particularly appropriate in those circumstances, such as here, where an operating license has already been issued and no Board currently retains jurisdiction over the license. See WPPSS, supra. This case also satisfies the requirements for waivers of the Commission's regulations in those cases still under the jurisdiction of the Atomic Safety and Licensing Board:

> A party to an adjudicatory proceeding involving initial licensing subject to this subpart may petition that the application of a specified Commission rule or regulation or any provision thereof . . . be waived or an exemption made for the particular proceeding. The sole ground for a petition for waiver or exception shall be that special circumstances with respect to the subject matter of the particular proceeding are such that application of the rule or regulation (or provision thereof) would not serve the purposes for which the rule or regulation was adopted.

10 C.F.R. §2.758(b).

Applicant's proposed approach to provision of safe shutdown capability in accordance with Appendix R will involve extensive modifications to the facility. Because of site-specific factors and the need to coordinate improvements with SEP, the comprehensive design and engineering measures will require substantially more time than contemplated under the current Commission rules. Coordination of safe shutdown and SEP measures will ensure an efficient and consistent retrofit program. Design of the required equipment on an accelerated basis will not further the goal of enhancing public health and safety.

As discussed above, the Commission found in 1979 that the measures then implemented at SONGS 1 were sufficient so as not to endanger life or property or the common defense and security. Most of these interim measures have already been installed and the public accordingly protected. The requested exemption is in the public interest since it will allow installation of a well-designed alternative shutdown capability with fewer probable outages of the facility.

As the Commission recently found:

Extensive fire protection measures have already been implemented at all operating plants. . . No public health and safety interest would be served by forcing only those licensees unable to meet deadlines preceding the effectiveness of the final [fire protection] rule to shut down for the brief interim. To the contrary, the fire protection measures already implemented give reasonable assurance that all operating nuclear plants may continue to operate safely even though the

final [fire protection] rule will require additional fire protection measures at many plants.

45 Fed. Reg. 71569 (October 29, 1980) (emphasis added). Given the Commission findings that interim measures instituted at SONGS 1, and at nuclear facilities in general, adequately protect the public health and safety, a temporary delay that will allow necessary engineering efforts and coordination with SEP will best serve the public interest and protect the public health and safety.

Where, as here, strict application of the language of the regulations would not serve the purpose of those regulations and would not promote public health and safety, an exemption is clearly proper.

IV. CONCLUSION

Applicant accordingly requests that the deadline for submission of plans and schedules for a safe shutdown capability at SONGS 1, contained in 10 C.F.R. §50.48(c)(5), be adjusted to approximately six months after completion of SEP.

DATED: ____NOV 0 9 1981 _____

Respectfully submitted,

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

SOUTHERN CALIFORNIA EDISON COMPANY AND

SAN DIEGO GAS AND ELECTRIC COMPANY

DOCKET NO. 50-206

SAN ONDFRE NUCLEAR GENERATING STATION, UNIT 1

AMENDMENT TO PROVISIONAL OPERATING LICENSE

Amendment No. 44 License No. DPR-13

- 1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The facility will operate in conformity with the license amendment, the provisions of the Atomic Energy Act of 1954, as amended (the Act), and the rules and regulations of the Commission;
 - B. 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;
 - C. 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
 - D. 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.
- Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and by changing paragraph 3.B and adding paragraph 3.H to Provisional Operating License No. DPR-13 to read as follows:

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Technical Specifications Β.

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 44, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

Fire Protection Η.

The licensee may proceed with and is required to complete the modifications identified in Paragraphs 3.1.1 through 3.1.17 of the NRC's Fire Protection Safety Evaluation (SE), dated July 19, 1979 for the facility. These modifications will be completed in accordance with the schedule in Table 3.1 of the SE and supplements thereto.

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

The licensee is required to implement the administrative controls identified in Section 6 of the SE. The administrative controls shall be in effect within 90 days from the date of issuance of this amendment.

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

FOR THE NUCLEAR REGULATORY COMMISSION

Dennie & Ziemannie

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

Attachment: Changes to the Technical Specifications

APPENDIX A

TLLOLL NORDYRBZ DPR-13 A 44

Date of Issuance. 7/19/79

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ATTACHMENT TO LICENSE AMENDMENT NO. 44

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PROVISIONAL OPERATING LICENSE NO. DPR-13

DOCKET NO. 50-206

Revise Appendix A Technical Specifications and Bases by removing the pages identified below and inserting the enclosed pages. The revised pages are identified by the captioned amendment number and contain vertical lines indicating the area of change.

REMOVE	INSERT
39i	39i
39j	39j
60Ľ	60L
60m	60m
72	72

3.14

Fire Protection Systems Operability

policability:

Applies to the operating status of the fire detection and extinguishing systems and equipment at all times.

Objective:

Specifications:

A. As a minimum, the following fire detection and extinguishing systems and equipment shall be operable:

To ensure availability of fire protection systems.

- (1) The Fire Suppression Water System¹ with:
 - a. Any two of the following four pumps operable each with a capacity of 1000 gallons per minute with their discharge aligned to the fire main:
 - San Onofre Unit 1 fire water pumps (2)
 - 2. San Onofre Units 2 and 3 motordriven fire water pumps (2)
 - b. With San Onofre Unit 1 fire water pumps satisfying the pump requirement, the San Onofre Unit 1 service water reservoir supply available containing a minimum of 300,000 gallons reserved for fire fighting.
 - c. With San Onofre Units 2 and 3 fire pumps satisfying the pump requirement, the San ... Onofre Units 2 and 3 service and fire water storage tanks available with 300,000 gallons reserved for fire fighting.
 - d. With a combination of the four pumps satisfying the pump requirement, the separate water supplies for each pump(s) available as indicated in A(1)b, and A(1)c above.

Amendment No. 37, 44

- e. An OPERABLE flow path capable of taking suction from the separate water supplies per A(1)b, or A(1)c, above and transferring the water through distribution piping with OPERABLE sectionalizing control or isolation valves to the yard hydrant curb valves and the first valve upstream of each sprinkler, hose standpipe or spray system riser required to be OPERABLE per Specification 3.14.A.(2) and 3.14.A.(3).
- (2) The Spray and/or Sprinkler Systems located in the following areas:
 - a. Containment sphere. This includes a refueling water pump, 240,000 gallens of water in the Refueling Water Storage Tank and associated system valves. During refueling operations, when the Refueling Water Storage Tank water has been transferred to the refueling cavity, backup fire suppression equipment shall be provided.
 - b. Lube oil reservoir and conditioner.
 - c. Hydrogen seal oil.
 - d. Diesel generator building.
- (3) The Fire Hose Stations indicated in Table 3.14.1.
- (4) The Fire Detection Instrumentation for each fire detection area or zone indicated in Table 3.14.2.
- 5. In the event of a limiting condition for operation for the fire detection and extinguishing systems and equipment indicated in A above is not met, the following corrective measures shall be taken:
 - (1) The Fire Suppression Water System
 - a. With less than the required equipment indicated in A(1) above, restore the inoperable equipment to operable status within seven days or in lieu of any other report required by Specification 6.9 prepare and submit a Special Report to the Commission pursuant to Technical Specification 6.9.3.c within the next thirty days outlining the plans and procedures to be used to provide for the loss of redundancy in this system.

Fire Protection Systems Surveillance

Applicability:

Jective:

4.15

Specifications:

: Applies to the surveillance of fire detection and extinguishing systems and equipment.

To ensure the operability of fire detection and extinguishing systems and equipment.

- ions: A. The Fire Suppression Water System¹ shall be demonstrated to be operable.
 - (1) With the San Onofre Unit 1 fire water pumps satisfying the pump requirements of Technical Specification 3.14.A(1), at least once per seven days by verifying the water supply volume in the San Onofre Unit 1 Service Water Reservoir. With the San Onofre Units 2 and 3 fire water pumps satisfying the pump requirements of Technical Sepcification 3.14.A(1), by initially verifying the water supply volume in the San Onofre Units 2 and 3 service and firewater storage tanks and at least once per seven days thereafter.
 - (2) At least once per 31 days on a staggered test basis by starting each pump satisfying the pump requirements of Technical Specification 3.14.A(1) and operating it for at least fifteen minutes.
 - (3) At least once per thirty one days by verifying that each valve (manual, power operated or automatic is in its correct position. For valves located inside the containment sphere, verification shall be made consistent with the 31-day requirement when possible during available plant outages or during containment entrances for other reasons.
 - (4) At least once per 12 months by cycling each testable valve through one complete cycle of full travel.
 - (5) At least once per 18 months by performing a system functional test which includes simulated actuation of the system, and:
 - a. Verifying that each valve in the flow path is in its correct position,
 - b. Verifying that each pump develops at least 90% of the flow and head at some point on the manufacturer's pump performance curves.

Amendment No. 37, 38, 44

- 60-M
- c. Cycling each valve in the flow path that is not testable during plant operation through at least one complete cycle of full travel, and
- d. Verifying that each pump starts to supply the fire suppression water system at >50 psig.
- (6) At least once per 36 months by performing flow tests of the system in accordance with Chapter 5, Section 11 of Fire Protection Handbook, 14th Edition, published by National Fire Protection Association.
- B. The Spray and/or Sprinkler Systems indicated in Technical Specification 3.14.A(2) shall be demonstrated to be operable:
 - At least once per 12 months by cycling each testable valve in the flow path through at least one complete cycle of full travel. For the valves located in the containment sphere, testing shall be performing consistent with the 12-month requirement when possible during available plant outages.
 - (2) At least once per 18 months:
 - a. By performing a system functional test which includes simulated automatic actuation of the system, and:
 - 1. Verifying that the automatic valves in the flow path actuate to their correct positions on a smoke and infrared test signal, and
 - 2. Cycling each valve in the flow path that is not testable during plant operation through at least one complete cycle of full travel.
 - b. By inspection of the spray headers to verify their integrity, and
 - (3) By inspection of each nozzle at least once every refueling outage to verify no blockage.
 - (4) At least once every second refueling outage by performing an air flow test through each accessible spray/sprinkler header and verifying that the spray/sprinkler nozzles are unobstructed.
- C. Each Fire Hose Station indicated in Table 3.14.1 shall be verified to be operable:

Amendment No. 37, 44

- b. At least one licensed Operator shall be at the controls when fuel is in the reactor.* During refueling operations this operator is permitted to step outside the red line to update the refueling status board.
- c. At least two licensed Operators shall be present in the control room during reactor startup, scheduled reactor shutdown and during recovery from reactor trips.** One of the two licensed Operators is permitted to be present in the Chemical Laboratory or the area around and behind the vertical instrumentation boards for short periods of time for the purpose of checking necessary instrumentation.
- d. An individual qualified in radiation protection supervision shall be on site when fuel is in the reactor.
- e. All core alterations after the initial fuel loading shall be directly supervised by a licensed Senior Reactor Operator.
- f. A Fire Brigade of at least five members shall be maintained on site at all times. This excludes members of the minimum shift crew necessary for safe shutdown of Unit 1 and any personnel required for other essential functions during a fire emergency.

6.2.3 Fire Protection Organizations

The responsibility for the operational Fire Protection Program at the San Onofre Nuclear Generating Station Unit 1 is vested in the Vice President of the Power Supply Department. The implementation of this program is delegated to staff and line organizations within the Power Supply Department as shown in Figure 6.2.3.1.

"At the controls" means within the area bounded by the three vertical instrumentation boards and the red line on the floor of the control room.

** Reactor startup, reactor shutdown and recovery from reactor trips means operations between keff = 0.99 and the attainment of 5% indicated thermal power.

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FIRE PROTECTION

SAFETY EVALUATION REPORT

BY THE

OFFICE OF NUCLEAR REACTOR REGULATION

U.S. NUCLEAR REGULATORY COMMISSION

IN THE MATTER OF

SOUTHERN CALIFORNIA EDISON COMPANY

SAN ONOFRE NUCLEAR GENERATING STATION UNIT 1

DOCKET NO. 50-206

●ate: July 19, 1979

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1.0 INTRODUCTION

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

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

- "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," NUREG-75/087, Section 9.5.1, "Fire Protection," May 1976, which includes "Guidelines for Fire Protection for Nuclear Power Plants" (BTP 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.
- "Manpower Requirements for Operating Reactors," June 8, 1978.

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

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

(1) "Fire Protection Program Review," dated March 1977;

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(2) The fire protection review team's site visit of July 10-13, 1978;

(3) The licensee's response to staff positions.

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

This report summarizes the result of our evaluation of the fire protection program at Southern California Edison Company's San Onofre Nuclear Generating Station Unit 1. The chronology of our evaluation is summarized in Appendix A of this report.

2.0 FIRE PROTECTION GUIDELINES

General Design Criterion 3 - "Fire Protection"

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

"Structures, systems and components important to safety shall be designed and located to minimize, consistent with safety requirements, the probability and effect of fires and explosions."

"Noncombustible and heat resistant materials shall be used wherever practical throughout the unit, particularly in locations such as the containment and the control room."

"Fire detection and protection systems of appropriate capacity and capability shall be provided and designed to minimize the adverse effects of fires on structures, systems and components important to Safety."

"Fire fighting systems shall be designed to assure that their rupture or inadvertent operation does not significantly impair the safety capability of these structures, systems and components."

Supplementary Guidance

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

Appendix A provides guidance on the preferred and, where applicable, acceptable alternatives to fire protection design for those nuclear power plants for which applications for construction permits were docketed prior to July 1, 1976.

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

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

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

"Sample Technical Specifications," May 12, 1977.

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

2-1

"Manpower Requirements for Operating Reactors," June 8, 1978.

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

- (1) reduce the likelihood of occurrence of fires;
- (2) promptly detect and extinguish fires if they occur;
- (3) maintain the capability to safely shut down the plant if fires occur; and
- (4) prevent the release of a significant amount of radioactive materials if fires occur.

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

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

3.0 SUMMARY OF MODIFICATIONS AND INCOMPLETE ITEMS

Modifications

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

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

3.1.1 Fire Detection Systems

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

- (1) In the vital bus cabinet in the control room (5.1). \checkmark
- (2) Above the motor control center in the lower area of the auxiliary building (5.5).
- (3) In the solid waste baling room in the auxiliary building (5.5).
- (4) In the pipe tunnel to the auxiliary building (5.5).
- (5) Additional smoke detectors will be provided in the turbine lube oil reservoir area of the turbine building (5.6).
- (6) In the oil storage shed in the east feedpump area of the turbine building (5.6).
- (7) In the west feedpump area of the turbine building above the instrument air compressors (5.6).
- (8) In the battery room located in the diesel generator building (5.7).
- (9) In the area of the residual heat removal pumps and third reactor coolant pump in the containment (5.8).
- (10) In the area of the electrical penetrations in the containment (5.8).
- (11) Additional fire detection systems will be provided for areas as indicated in the licensee's fire hazards analysis.



Item	Implementation Schedule		
• · · ·	By End of Core 8 Refueling*	Integrated with SEP	
Eire Detection	3.1.1(1) and (5)	Others	
• Water Supply	3.1.2	None	
Yard Hydrants	3.1.3	None	
Hose Stations (a)	3.1.4	None	
 Water Suppression Systems 	for Area 9A	Others	
Foam Suppression Systems	3.1.6	None	
Gas Suppression Systems	for 4Kv Room	For 480v Room	
 Portable Extinguishers(b) 	3.1.8	None	
Fire Doors	3.1.9	None	
Supervision of Fire Doors(c)	3.1.10	None .	
• Fire Barriers(c)	Between Test Pump and Charging Pump. At North Wall of Area 9A.	In other Areas	
• Fire Dampers	In Control Room Ventilation Opening.	In other Rooms	
Fire Barrier Penetrations	3.1.13(1), (2) and (5)	Others	
Water Damage Protection	None	3.1.14	
Control of Combustibles	3.1.15	None	
Isolation Devices	3.1.16	None	
Emergency Lighting(d)	3.1.17	None	

Presently scheduled for Spring 1980.

The items in column "Integrated with SEP" are not needed to protect equipment associated with the existing safe shutdown capability. The licensee has stated that these modifications may be impacted by possible modifications resulting from the ongoing Systematic Evaluation Program (SEP). The staff concurs. Therefore, deferral of implementation to the SEP will insure an integrated long-term resolution of these fire protection modifications with the results from our SEP review.

) Completed) Completed) Completed) Handlights - Completed

Fire Water Supply

Test features will be provided for the fire pumps which meets the require- ν ments of NFPA 20 (4.3.1.2).

An isolation valve(s) will be provided in the above ground cross connection V of the yard loop which is routed through the turbine building to prevent the loss of both manual and automatic water suppression due to a single impairment (4.3.1.3).

A self-actuated pressure value or a check value with a parallel bypass V value will be provided in the Units 2 and 3 connection to the Unit 1 fire water loop (4.3.1.3).

B.1.3 Yard Hydrants

3.1.2

3.1.4

*

Yard hydrants and post indicator valves near roadways will be protected by adequate barricades to prevent physical damage. Hydrants will be checked to insure that grade elevation is above the lower flange of the break off riser (4.3.1.3).

A number of hydrants will be relocated to insure accessibility and operability (4.3.1.3).

A second fire water feed will be provided to the administration/control building header from the northeast portion of the yard water main. Isolation valves will be provided for maintenance (4.3.1.3).

Hose Stations

An isolation valve will be provided on the standpipe riser for the administration and control building (4.3.1.4).

The most hydraulically remote hose station(s) have been checked to verify that a residual pressure of 65 psig can be provided at the nozzle (4.3.1.4).

A hose reel will be provided at the southeast entrance to the 4160 volt switchgear room (5.2).

A hose reel will be provided at the southwest entrance to the 480 volt switchgear room (5.3).

A hose reel will be provided with access to the pipe tunnel (5.5).

3.1.5 Water Suppression Systems

The east wall of the 480 volt switchgear room will be protected by a \checkmark directed water spray system (5.3).

A sectionalized directed water spray system will be provided to protect \checkmark the large concentration of cable trays in the north turbine building area. Actuation of the system will be provided by the use of line type temperature detectors placed in the cable trays (5.6) (Area 9A).

The north wall and structural steel members in the turbine lube oil area will be protected by a directed water spray system (5.6) (Area 9A).

A fuse link wet-pipe area sprinkler system will be provided for the large V concentration of combustibles in the north turbine area (5.6) (Area 9A).

The deluge system protecting the hydrogen seal oil unit will be replaced with an automatic foam or water suppression system (5.6).

3.1.6 Foam Suppression Systems

The deluge system for the lube oil reservoir and conditioner will be $\sqrt{}$ modified to provide an automatic foam suppression system (5.6).

6.1.7 Gas Suppression Systems

An automatic total flooding Halon 1301 gas suppression system will be $\sqrt{}$ provided for the 4160 volt switchgear room. The system will be designed to permit a second application of the suppression agent (5.2).

An automatic total flooding Halon 1301 gas suppression system will be provided for the 480 volt switchgear room (5.3).

3.1.8 Portable Extinguishers

Mounting brackets will be provided for the Halon 1211 extinguishers in the control room (5.1).

3.1.9 Fire Doors

*

The double doors in the east wall of the 480 volt switchgear room will be replaced with 3-hour fire rated doors (5.3).

A one-hour fire rated door will be provided between the solid waste baling area and the boric acid injection pump room in the auxiliary building (5.5).

Supervision of Fire Doors

Fire doors in safety-related areas will be inspected semiannually to verify that self-closing mechanisms and latches are in good working order. Unsupervised and unlocked self-closing fire doors for safety-related areas will be inspected monthly to verify that they are being maintained in the closed position (4.9).

3.1.11 Fire Barriers

A fire shield will be provided between the test pump and north charging pump in the auxiliary building (5.5).

Fire stops will be provided for cable trays at the entrances to the pipe tunnel (5.5).

3-4

The north wall of the turbine lube oil area will be upgraded to provide a one-hour fire rating (5.6).

The roof and door of the oil storage shed in the east feedpump area of the turbine building will be replaced to provide a 3-hour fire rating (5.6).

Fire stops will be provided in cable trays which are routed between redundant divisions of cable trays in the containment (5.8).

3.1.12 Fire Dampers

Three-hour rated fire dampers will be provided in the ventilation penetrations from the 4160 volt switchgear room (5.2).

Fire dampers will be provided in the ventilation openings from the 480 volt switchgear room (5.3).

Fire dampers will be provided in the ventilation penetrations to the battery room (5.4).

● 3.1.13 Fire Barrier Penetrations

Fire barrier penetrations will be sealed to provide a 3-hour fire rating or a rating commensurate with the fire hazards for the following areas:

- (1) Cable penetrations for the control room (5.1).
- (2) Cable penetrations for the 4160 volt switchgear room (5.2).
- (3) Cable penetrations for the 480 volt switchgear room (5.3).
- (4) Cable penetrations from the dc switchgear room to the administration and control building (5.4).
- (5) Cable penetrations in the north wall of the turbine lube oil area in the turbine building (5.6).

3.1.14 Water Damage Protection

Water spray shields will be provided for electrical equipment in the 4160 and 480 volt switchgear rooms to prevent water damage due to the use of hose streams to combat fires in cable trays above the equipment (5.2), (5.3).

3.1.15 Control of Combustibles

A hydrogen monitor will be provided for the battery room with a remote reading in the control room (5.4).

Curbs or drain pans will be provided at the base of the charging pumps and test pumps to contain oil spills (5.5).

A curb will be provided around the hydrogen seal oil unit to contain lubricating oil spills (5.6).

Curbing will be provided to contain an oil spill within the air intake filter rooms or fire detection will be provided in the area (5.7).

An oil collection system will be provided for the reactor coolant pumps (5.8).

A curb will be provided around the clean and dirty lube oil storage tanks in the yard area. The volume will be sufficient to contain the contents of the tank plus an allowance for fire extinguishing media (5.9).

The station service transformers will be curbed to contain an oil spill (5.9).

The oil in the station service transformer will be replaced with a silicone V base oil or an automatic deluge system will be provided to protect transformers 2 and 3 (5.9).

The doorway of the 480 volt switchgear room facing the station service transformers will be filled in to provide a fire barrier rating equivalent to the west wall of the room (5.3).

A curb will be provided to contain a gasoline spill at the engine driven screen wash pump (5.9).

3.1.16 Isolation Devices

An isolation device will be provided between the control room panel steam dump controls and the auxiliary panel to prevent fire damage at the auxiliary panel from having an impact on the normal steam dump control (5.6).

3.1.17 Emergency Lighting

Fixed battery pack lighting units will be provided for the stairwell to the lower level in the auxiliary building and in the stairwell access routes to the control room in the administration building (4.6).

An additional quantity of administratively controlled hand lights will be provided for the contingency of loss of station lighting (4.6).

2.2 Incomplete Items

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

3-6

3.2.1 Alternate Shutdown Capability

The licensee is evaluating alternate methods for safe shutdown which are not dependent upon the chemical and volume control system test pump. The consideration for the availability of offsite power will also be addressed in the evaluation of shutdown alternatives (4.1).

3.2.2 <u>Smoke Detection System Tests</u>

The licensee is evaluating a method to conduct in situ tests with a suitable smoke generation device to verify that a fire would be promptly detected by installed smoke detectors and that ventilation air flow patterns in the area do not significantly reduce or prevent detection response. Bench tests will be conducted to verify that smoke detectors will provide prompt response and have adequate sensitivity to the products of combustion for the combustibles in the area where smoke detectors are installed. If any fire detection systems are found to be inadequate, appropriate modifications will be made to provide adequate performance (4.2).

3.2.3 <u>Turbine Building Structure</u>

The licensee is evaluating the effect of a fire involving the hydrogen seal oil system on the structural steel of the turbine building without the benefit of a fire suppression system (5.6).



Cable Spreading Area

We have recommended the use of flame retardant coatings for cables or the installation of fire barriers between cable trays and fire stops in cable trays in the cable spreading area of the 4160 volt switchgear room. We will address the resolution of this recommendation with the resolution of alternate shutdown capability noted in Section 3.2.1 above (5.2).

3.2.5 <u>Containment</u>

We have recommended that fire stops be located in cable trays which provide a continuity of combustibles between redundant cable trays. We will address the resolution of this recommendation with the resolution of any problems which develop as a result of the Systematic Evaluation Program review (5.8). ė

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	Item	Schedule
1.	Alternate Shutdown Capability	submitted January 15, 1979
2.	Smoke Detection System Tests	March 1980
3.	Turbine Building Structure	submitted May 15, 1979
4.	Cable Spreading Area	dependent on resolution of item l
5.	Containment	deferred to SEP review



4.0 EVALUATION OF PLANT ARRANGEMENT

Safe Shutdown Systems

There are several combinations of safe shutdown systems which are capable of shutting down the reactor and cooling the core during and subsequent to a fire. The licensee identified safe shutdown systems in his fire hazards analysis. The combinations available in a fire situation will depend upon the effects of the fire on such systems, their power supplies, and their control stations.

Many of the systems required for safe shutdown are located in separate fire areas to preclude fire damage to redundant systems. In some areas of the plant, the physical separation of redundant safe shutdown systems is inadequate to prevent fire damage to redundant systems. The licensee has taken action to mitigate these consequences of fires and to improve the capability of controlling and extinguishing fires in these areas as noted in Section 5.0 of this report.

Due to the unacceptable consequences of a major fire in the 4160 volt switchgear room, measures have been taken, on an interim basis, to provide an additional offsite power source to insure safe shutdown capability. Additional modifications have been made as noted in Section 5.0 of this report to permit safe shutdown independent of fire damage in the 4160 volt switchgear room.

We find that, from a review of the recent modifications for insuring the capability for safe shutdown and with the improvements implemented for the fire protection program, an adequate basis has been provided to assure that the plant can be maintained in a safe condition during the interim period until final fire protection modifications have been completed. With respect to safe shutdown capability following this interim period, the licensee will propose further alternate methods for safe shutdown following ongoing investigations. We will address the resolution of this subject in a supplement to this report.

Fire Detection and Signaling Systems

4.2

Fire detection and signaling systems are provided which transmit alarm and supervisory signals to the control room. The fire detectors are powered from the 120v ac utility bus. This bus is connected to the diesel generators and is supplied power upon the loss of offsite power.

Visual and audible annunciation is provided in the control room for detection actuation, pump supervisory signals and deluge actuation.

The plant presently does not have complete fire detection coverage and some areas containing or exposing safety-related systems do not have fire detection systems. To protect these areas, smoke detectors will be provided in a number of safety-related areas as noted in Section 5.0 of this report.

4-1

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

We find that subject to implementation of the above modifications and tests, the fire detection system will provide prompt response to fires. This satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

4.3 Fire Control System 4.3.1 Water Systems 4.3.1.1 Water Supply

The fire-water supply consists of a 3,000,000 gallon capacity service water reservoir at Unit 1 of which 300,000 gallons is dedicated to fire water use and two 300,000 gallon fire water tanks at Units 2 & 3. The Unit 1 fire pumps take suction from the service water reservoir through a single 8-inch feed. The Units 2 and 3 fire pumps take suction from two ground level fire water storage tanks. The piping is so arranged that each pump can take suction from either of the fire water tanks.

The Units 2 and 3 supply tanks are valved to insure that a leak in one tank would not cause the loss of the remaining tank. A break in the 8-inch supply to the Unit 1 fire pumps would place both pumps out of service; however, with isolation of the break the separate feed from the Units 2 and 3 fire system provides an alternate fire water source for Unit 1.

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

4.3.1.2 Fire Pumps

Two horizontal shaft, electric centrifugal fire pumps are provided for Unit 1 fire system. These pumps are located outdoors, west of the 480 volt switchgear room. Each pump has a design capacity of 1,000 gpm at 120 psig. Power for the Unit 1 pumps are supplied from two different buses of the 480-volt plant auxiliary power system which can be supplied by the diesel generators. Fire pump power, pump running and failure to start are supervised and annunciated in the control room. The pumps are started manually in the control room. Test features will be provided for the fire pumps which meet the requirements of NFPA 20.

The Units 2 and 3 fire pumps consist of two electric motor driven 1500 gpm and one 2500 gpm diesel driven fire pump. The pumps start automatically on low system pressure. With the Units 2 and 3 fire pumps, adequate volume and pressure will be supplied to the Unit 1 system.

4-2

We find that the fire pumps have adequate capacity to supply the site fire water demand. This satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

Fire Water Piping System

The Unit 1 fire pumps discharge directly into the above ground cross connection which runs through the turbine building. This cross connection supplies the manual and automatic fire protection for the turbine and administration/control buildings. An isolation valve(s) will be installed in this cross connection, to prevent the loss of both manual and automatic fire suppression in a fire area due to a single impairment.

The Units 2 and 3 fire system is interconnected through a 12-inch connection to the Unit 1 loop. Presently the two valves between the systems are normally closed. A self-actuated pressure valve or a check valve with a parallel bypass valve will be provided in the Units 2 and 3 connection to the Unit 1 fire water loop and the isolation valves maintained open.

All yard hydrants are supplied from the Unit 1 fire loop. The hydrants do not have curb box valves for isolation of the hydrant for maintenance and repair. However, the hydrants are protected by an automatic check valve which would close if the hydrants were struck by a heavy object. A break off riser is provided between the hydrant and check valve. The hydrants will be checked to insure that grade elevation is above the lower flange of the break off riser. Sectional valves are strategically located to isolate various sections of the mains to keep impairment of systems to a minimum. Hydrants and post indicator valves near roadways will be protected by adequate barricades to prevent physical damage. A number of hydrants will be relocated to insure accessibility and operability in an emergency situation.

All post indicator valves and isolation valves in the fire water piping system are electrically supervised or administratively controlled by the use of locks or seals and periodic inspections are made to verify that the valves are in the proper position. The valves have been tagged to indicate the valve service. The fire water system is dedicated to fire water service but emergency use may be allowed for short durations.

Yard hydrants are strategically located around the exterior of the plant with two hose houses located at opposite ends of the plant. Additional manual fire fighting tools will be provided in each hose house. The hydrants hose threads are compatible with the local fire department.

A second fire water feed will be provided to the administration and control building header from the northeast portion of the yard water main and isolation valves will be provided for maintenance.

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

4-3

4.3.1.4 Interior Hose Stations

Interior hose stations are strategically located throughout most areas of the plant. Hose stations are of the rack type and are equipped with 75 feet of single jacket rubber lined hose except for a few hose stations with unlined linen hose. The linen hose at the hose stations near the control room has been replaced with single jacketed rubber lined hose with adjustable flow fog nozzles. An isolation valve will be provided on the standpipe riser for the administration and control building. The most hydraulically remote hose station(s) have been checked to verify that a residual pressure of 65 psig can be provided at the nozzle.

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

4.3.1.5 Fixed Water Suppression Systems

Fixed water suppression systems are provided for the containment, diesel generator building, and the turbine building. The containment system is an open head deluge system which is manually actuated. It is supplied water from the refueling water pumps, independent of the fire water system.

The manual deluge system protecting the lube oil reservoir and conditioner in the turbine building will be modified to provide an automatic foam suppression system. Within this same area, a directed water spray system actuated by line type temperature detectors in the cable trays will be provided to protect the cable trays. For both of these fire hazards, a back up area fuse link sprinkler system will be provided. The manual deluge system protecting the hydrogen seal oil unit in the turbine building will be replaced with an automatic water or foam suppression system.

A preaction closed head sprinkler system protects the diesel generator rooms. A combination of flame detection and ionization detection is provided to actuate the deluge valve.

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

4.3.1.6 Foam Suppression Systems

Automatic foam suppression systems will be provided as noted in Section 4.3.1.5 above. Foam application nozzles and foam concentrate is provided in the hose houses to provide an additional suppression capability for oil fires.

We find that, subject to implementation of the above described modifications, the foam suppression systems provide an additional effective capability to suppress combustible liquid fires. This satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

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4.3.1.7 Effects of Suppression Systems on Safety Systems

The design of the fixed water suppression system protecting the diesel generator building includes fuse link sprinkler heads and a deluge valve actuated by flame and smoke detectors. These features reduce the potential for inadvertent operation which could potentially impact on the operation of a diesel generator unit. As noted in Section 5.0 of this report, modifications will be provided to prevent water damage to electrical equipment due to operation of fixed water suppression systems and additional protection will be provided to reduce the potential of water damage from manual hose streams.

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

4.3.2 Gas Fire Suppression Systems

Automatic total flooding Halon 1301 suppression systems will be provided for the 480 volt and 4160 volt switchgear rooms. These systems will be capable of manual operation. The system protecting the 4160 volt switchgear room will be designed to permit a second application of the suppression agent (double shot system).

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

4.3.3 Portable Fire Extinguishers

Portable dry chemical and carbon dioxide have been distributed throughout the plant. The fire extinguishers meet the general intent of the National Fire Protection Association. The extinguisher selection was made in accordance with the type of hazard to be protected. All fire extinguishers are maintained fully charged, tagged, and dated including contractors' units.

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

4.4 <u>Ventilation Systems and Breathing Equipment</u> 4.4.1 <u>Ventilation Systems</u>

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



significant fire. The capacity and configuration of the normal air handling systems may be inadequate for effective smoke removal. Portable smoke venting equipment has been provided for fire brigade use as a backup to installed systems.

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

4.4.2 Breathing Equipment

Self-contained air breathing equipment is provided consisting of six Survivair packs and about 30 spare air cylinders. Air distribution manifolds are provided in the control room and hose houses. About eight air masks are provided in each hose house with air tubing. The control room air breathing equipment has been consolidated in a single, orderly, and sanitary location.

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

Floor Drains

4 5

Floor drains have been provided in all areas protected by fixed water suppression systems. Drainage is also provided in areas where manual hose lines would be used. Water use in areas that do not have drainage systems would be used selectively to prevent water accumulation.

We find that the drainage system is adequate to handle fire suppression water to prevent drainage to electrical equipment. This satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

4.6 Lighting Systems

The normal lighting system receives its power from the station auxiliary transformers. Upon the loss of these sources, standby sources are made available by transfer to the station batteries and the diesel generators to provide a supply of power. These features insure that lighting is available for emergency conditions. The licensee has further insured the availability of adequate lighting by providing fixed seal beam self-contained battery operated units at strategic locations.

Fixed battery pack lighting units will be provided for the stairwell to the lower level of the auxiliary building and in the stairwell access routes to the control room in the administration building. An additional quantity of administratively controlled portable hand lights will be provided for the contingency of loss of station lighting.

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

4.7 Communication Systems

Normal communication within the plant is provided by a page and answer system with stations located throughout the plant. Backup power is provided for this system. A second system consists of portable communications radios which are provided for emergency use. Radio communications and public telephone lines are provided for access to offsite agencies.

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

4.8 <u>Electrical Cables</u>

The electrical cable insulation used in the plant consists mainly of polyvinyl chloride, butyl compound, neoprene, and other insulating and jacket materials that do not meet current flame test requirements. The new cable installations such as used for the emergency diesel generators and future changes will be made with cable that meets the requirement of the IEEE-383 flame test. Fire protection measures have been or will be provided with due consideration for the combustible nature of cable insulation materials.

We find that, subject to the resolution of open items identified in Section 3.2 of this report, the electrical cables and fire protection measures as identified herein are adequate to satisfy the objectives identified in Section 2.2 of this report and are, therefore, acceptable.

Fire Barrier Penetrations

4.9

Fire barriers are penetrated by doorways, ventilation ducts, electrical cables, piping and conduit. Fire doors for safety-related areas will be inspected semiannually to verify that self-closing mechanisms and latches are in good working order. Unsupervised and unlocked self-closing fire doors for safety-related areas will be inspected monthly to verify that they are being maintained in the closed position. To provide assurance that fire doors remain closed, signs are used on doors to indicate that doors form a fire barrier and are to be maintained closed.

Cable and cable tray penetrations in fire barriers will be upgraded to provide a fire barrier rating of 3 hours or commensurate with the fire hazards in the area. Modifications for fire barrier penetrations in specific plant areas are noted in Section 5.0 of this report.

We find that, subject to the implementation of the modifications described herein, the fire barrier penetrations are adequate to prevent the spread

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of fires between isolated fire areas. This satisfies the objectives identified in Section 2.2 of this report and is, therefore acceptable.

Separation Criteria

The physical separation of redundant electrical cables and components is not adequate in itself to prevent fire damage to redundant systems. Modifications have been proposed as described herein to insure that redundant systems required for safe shutdown would not be lost due to the consequences of fire in any area of the plant. We will evaluate the licensee's proposal in conjunction with the open items in Section 3.2 and address the resolution in a supplement to this report.

4.11 Fire Barriers

The licensee's fire hazards analysis addressed fire barrier requirements by consideration of the combustibles in each fire area. The potential energy release for all combustibles in an area was calculated. This value was divided by the floor area to obtain a relative combustible loading for the area. Based upon this analysis modifications have been proposed to upgrade the rating of fire barriers or to provide fixed suppression systems to protect fire barriers in specific plant areas as noted in Section 5.0 of this report.

We find that, subject to the implementation of the modifications identified herein, adequate measures have been provided to prevent fire spread between protected areas of the plant. This satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

4.12 Access and Egress

Access to most areas of the plant is unencumbered due to the openness of design. Most safety-related areas have open access.

Access to the upper cable trays in the 4160 volt switchgear rooms presents the most difficult fire fighting access problem. Fire ladders are maintained in this area.

The diesel generator rooms have two direct access means from the outside. The two rooms are not interconnected by access doors.

We find that the provisions for access and egress are adequate for manual fire fighting and evacuation in safety-related areas. This satisfies the objectives identified in Section 2.2 of this report and is, therefore acceptable.

Toxic and Corrosive Combustion Products

4.13

The products of combustion for many plastic materials, most common being cable insulation and jacket materials, are toxic to humans and corrosive to metals. Prompt fire detection and extinguishment are relied upon to minimize the quantities of smoke generated. Portable means of smoke removal are provided as an aid in fire fighting access. The fire brigade is provided with and trained in the use of emergency breathing apparatus for fighting fires involving such materials. The openness of this plant eliminates many of the ventilation and corrosive problems involving a number of safety-related areas.

We find that adequate precautions have been taken to minimize the effects of toxic and corrosive products. This satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

5.0 EVALUATION OF SPECIFIC PLANT AREAS

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

5.1 <u>Control Room</u> 5.1.1 <u>Safety-Related Equipment</u>

The control room contains the controls for normal station operation and for shutdown of the plant under abnormal conditions. Operating indicators, controls, and alarms are mounted on U-shaped free standing control boards. Auxiliary electrical equipment cabinets are located in the area behind the control boards.

5.1.2 <u>Combustibles</u>

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

Consequences if No Fire Suppression

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

5.1.4 Fire Protection System

Portable CO_2 and Halon 1211 extinguishers are provided for manual fire suppression capability. Hose cabinets are located in the corridors outside the control room. Smoke detectors are provided at the ceiling of the control room and in the control console.

5.1.5 Adequacy of Fire Protection

The fire barrier penetrations for the control room area are not adequate to prevent an exposure fire hazard from adjacent areas. The lack of fire detection in the vital bus cabinet prevents prompt response to a fire in this area.

5.1.6 Modifications

The licensee has proposed the following modifications. A fire detector will be installed in the vital bus cabinet. Cable penetrations to other areas will be provided with seals having a 3-hour fire rating. Mounting brackets will be provided for the Halon 1211 portable extinguisher units.

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

4160 Volt Switchgear Room 5.2.1 Safety-Related Equipment

The 4160 volt switchgear room is located directly below the control room. The upper half of this room is the cable spreading area. Instrument, control, and power cables are routed through the cable spreading area. Redundant division of 4160 volt switchgear and one division of 480 volt switchgear are located in this area.

5.2.2 Combustibles

5.2

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

5.2.3 Consequences if No Fire Suppression

An unmitigated fire in the area could result in the loss of the normal means of supplying both onsite and offsite power to redundant systems required for safe shutdown.

5.2.4 Fire Protection Systems

Fire detection is provided by ceiling mounted smoke detectors. Portable extinguishers are located in the area. Hose stations in adjacent areas provide water suppression capability.

5.2.2 Adequacy of Fire Protection

The fire protection for this area is inadequate to prevent damage to redundant systems which may be required for safe shutdown. The electrical equipment is not protected to prevent water damage from fire hoses.

5.2.6 Modifications

The licensee has proposed the following modifications. An automatic total flooding Halon 1301 gas suppression system will be provided for the area. A hose reel will be provided at the southeast entrance to the switchgear room. Water spray shields will be provided to prevent water damage to electrical equipment. Cable penetrations will be sealed to provide a 3-hour fire rating. A 3-hour rated fire damper will be provided in the ventilation penetration to the control room.

Recent modifications have been completed for the following. Power and control cables for the dc thermal barrier emergency cooling pump have been rerouted external to the 4160 volt switchgear room. The southwest door to the switchgear room has been replaced with a self-closing 3-hour fire rated door. The southeast door to the switchgear room was sealed to prevent a combustible liquid spill on the ramped accessway from entering the area.

5-2

Due to the high fire loading and the difficulty which could be encountered in manually combating an electrical cable fire in the area, we have recommended the use of flame retardant coatings for cables or the installation of fire barriers between cable trays and fire stops in cable trays. As noted in Section 4.1 of this report, the licensee is investigating other alternatives for safe shutdown independent of this area. We will address the resolution of this recommendation and the alternatives for safe shutdown in a supplement to this report.

5.3 <u>480 Volt Switchgear Room</u> 5.3.1 Safety-Related Equipment

Two separate buses of the 480 volt switchgear are located in the area. Redundant equipment for safe shutdown is located in the 4160 volt switchgear room.

5.3.2 Combustibles

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

● 5.3.3 Consequences if No Fire Suppression

An unmitigated fire in the area could result in a loss of one division of safe shutdown equipment



Fire Protection Systems

Fire detection is provided by ceiling mounted smoke detectors. Portable extinguishers are provided in the area. Hose stations in adjacent areas provide water suppression capability.

5.3.5 Adequacy of Fire Protection

The fire suppression capability for this area is inadequate to control and suppress a major fire. The electrical equipment is not protected to prevent water damage from fire hoses. The door and wall to the adjacent turbine lube oil area is inadequate to prevent an exposure fire hazard from this area.

5.3.6 Modifications

The licensee has proposed the following modifications. An automatic total flooding Halon 1301 gas suppression system will be provided for the area. A hose reel will be installed at the southwest entrance to the room. Water spray shields will be provided to prevent water damage to electrical equipment. Cable penetrations will be sealed to provide an appropriate fire rating. Fire dampers will be provided in the ventilation openings to adjacent areas. The double doors in the east wall will be replaced with 3-hour rated fire doors. The east wall will be protected by a directed water spray system. The doorway facing the station service transformers will be filled in to provide a fire barrier rating equivalent to the west wall of the room.

Recent modifications have been completed for the following. A 12kV line was installed with a connection from the offsite power system to a 12kV/480 volt transformer. The low side of the transformer has been connected to a spare breaker location to provide an alternate power source for safe shutdown using equipment supplied power from the 480 volt switchgear room. Level indications for the volume control tank have been provided at the test pump switchgear location to permit control of primary coolant make up flow during an emergency condition. The south door to the switchgear room has been replaced with a self-closing 3-hour fire rated door.

We find that, subject to the implementation of the above described modification, the fire protection for the 480 volt switchgear room satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

5.4 <u>DC Switchgear Room and Battery Room</u> 5.4.1 Safety-Related Equipment

The battery chargers and dc distribution switchboard for one of two redundant dc power systems are located in the dc switchgear room at the south end of the administration and control building. The batteries for the associated dc bus are located in an adjacent room.

5.4.2 Combustibles

The combustibles in the dc switchgear room consist of electrical cable and wire insulation. The combustibles in the battery room consist of wood battery racks and plastic battery cells.

5.4.3 Consequences if No Fire Suppression

An unmitigated fire in either area could result in a loss of one of the two redundant dc power sources.

5.4.4 Fire Protection Systems

Smoke detectors are provided at the ceiling in each area. Portable extinguishers are located at the entrance to the dc switchgear room. A hose station in an adjacent area provides water suppression capability.

5.4.5 Adequacy of Fire Protection

The cable penetrations for the switchgear room are not adequately sealed to prevent the spread of a fire. The ventilation penetrations for the battery room are not protected to prevent an exposure from adjacent areas.

5.4.6 Modifications

The licensee has proposed the following modifications. The cable penetrations from the dc switchgear room to the administration and control building will be sealed to provide an appropriate rating. Fire dampers will be provided in the ventilation penetrations to the battery room. A hydrogen

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monitor will be provided for the battery room with a remote reading in the control room.

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

5.5 <u>Auxiliary Building</u> 5.5.1 Safety-Related Equipment

The volume control tank and boric acid injection tanks and pumps are located in separate rooms at grade elevation in the auxiliary building. The lower level of the auxiliary building has a separate room housing the charging pumps and the test pump. A motor control center and gas radwaste systems are located on lower level. A pipe tunnel terminates at the auxiliary building which is used for cable routing to this area.

5.5.2 Combustibles

The combustibles in the area consist of electrical cable insulation, lubricating oil in pumps and oil storage, and miscellaneous transient combustibles. Solid wastes are handled in a baling room adjacent to the boric acid injection pump room. Unprotected transient combustibles which were stored under the stairwell and in other areas have been removed.

Consequences if No Fire Suppression

An unmitigated fire could threaten the availability of redundant safetyrelated systems used for safe shutdown.

5.5.4 Fire Protection Systems

Smoke detectors are provided over the boric acid batch tank and transfer pumps. In the lower areas, smoke detectors are provided in the charging pump area, in the radwaste control board, the motor control center cabinet and in the main room at this elevation. Hose stations are provided on each elevation of the auxiliary building. Portable fire extinguishers are available for all areas.

5.5.5 Adequacy of Fire Protection

Measures have not been provided to contain lubricating oil spills in the charging pump area. The lack of fire detection prevents prompt response to cable fires in the pipe tunnel. The lack of readily available hose stations prevents prompt effective extinguishment of fires in the pipe tunnel.

5.5.6 Modifications

The licensee has proposed the following modifications. A fire detector will be installed over the motor control center in the lower area. Curbs or drain pans will be provided at the base of the charging pumps and test

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pump to contain lubricating oil spills. A fire shield will be provided between the test pump and north charging pump. Fire detection will be provided in the radwaste baling room and a one-hour fire rated door will. be provided between this area and the boric acid injection pump room. A hose reel will be provided with access to the pipe tunnel manholes. Fire stops will be provided for the cable trays which enter the pipe tunnel. Fire detection will be provided in the pipe tunnel.

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

Turbine Building 5.6.1 Safety-Related Equipment

The turbine building is divided into five major areas. At the upper elevation the turbine generator deck is open to the environment and forms a ceiling to the remaining areas below. The north area of the lower elevation contains the turbine lube oil systems and is adjacent to the 4160 volt and 480 volt switchgear rooms. The safety-related equipment in this area consists of a large concentration of electrical cables. The feedwater pumps are located in the east and west areas. The west area also includes the auxiliary feedwater pump and instrument air compressors. The hydrogen seal oil unit is located in the south area. The safety-related equipment in this area consists of the auxiliary control panel, a motor control center, and electrical cables.

5.6.2 Combustibles

5.6

The largest concentration of combustibles exist in the turbine lube oil area which contains 15,000 gallons of lube oil and a large quantity of electrical cable insulation. An oil storage shed is located in the east feedpump area. The major combustibles in this area consist of 530 gallons of lube oil and cable insulations. The west feed pump area contains a like quantity of cable insulation and about 40 gallons of lube oil, the majority of which is associated with the feedpump. The major combustibles in the south area are cable insulation and 300 gallons of oil associated with the hydrogen seal oil unit.

5.6.3 Consequences if No Fire Suppression

An unmitigated fire in the turbine lube oil area could result in the loss of redundant safe shutdown systems and could spread to the adjacent switchgear rooms and north to the containment penetration areas. An unmitigated fire in the hydrogen seal oil unit area would damage control functions performed from the auxiliary control panel.

Fire Protection Systems

The turbine lube oil reservoir and conditioner are protected by a manual water deluge system. A manual water deluge system is also provided for

the hydrogen seal oil unit. Smoke detectors are provided over the lube oil reservoir and conditioner, and over the major cable concentrations in this area. Smoke detectors are also provided in the south end of the building in the exciter area. All areas of the turbine building are protected by hose stations and portable extinguishers.

5.6.5 Adequacy of Fire Protection

The fire protection systems and features are inadequate to prevent major damage to the turbine building structure or to prevent unacceptable damage to electrical cables.

5.6.6 Modifications

The licensee has proposed the following modifications. The deluge system for the lube oil reservoir and conditioner will be modified to provide an automatic foam suppression system. Smoke detectors in this area will be relocated and additional detectors will be installed to provide improved detection for the fire hazards. A sectionalized directed water spray system will be provided to protect the large concentrations of cable trays in the north turbine building area. Actuation of this system will be provided by the use of line type temperature detectors placed in the cable A fuse link wet pipe sprinkler system will be installed to provide travs. area backup suppression for the large concentration of combustibles in the north turbine area. The north wall of the turbine lube oil area will be upgraded to provide a one-hour fire rating. The north wall and structural steel in the area will be protected by a directed water spray system. Electrical cable penetrations in the north wall will be sealed to provide one-hour fire rating.

Fire detection will be provided in the oil storage shed in the east feedpump area. The roof and doors of the oil storage shed will be replaced to provide 3-hour rated protection. Fire detection will be provided in the area of the instrument air compressors in the west feedpump area.

The deluge system protecting the hydrogen seal oil unit will be replaced with an automatic foam or water suppression system. A curb will be provided around the hydrogen seal oil unit to contain lubricating oil spills. Isolation devices will be provided between the steam dump controls of control room panel and the auxiliary control panel to prevent fire damage at the auxiliary control panel from having an impact on the normal steam dump controls. An analysis will be made to evaluate the effect of a fire involving the hydrogen seal oil system on the structural steel of the turbine building without the benefit of a fire suppression system.

Recent modifications have been initiated or completed in the following areas. A dyke has been installed to enclose the lube oil reservoir and conditioner to prevent an oil spill from covering the entire area. Due to the potential for fire damage to instrument air lines in the vicinity of the lube oil reservoir, modifications have been made to permit the restoration of air to critical components required for safe shutdown. An air

accumulator has been provided to insure the operability of salt water cooling pump discharge valve.

An alternate source of instrument air has been piped at the locations to permit a readily available backup source of instrument air to the auxiliary feedpump steam control valve, auxiliary control panel, and as a source of motive air to two of the steam dump valves. The control air signal tubing for the operation of the steam dump valves from the auxiliary control panel has been rerouted outside the areas of the lube oil reservoir.

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

5.7 <u>Diesel Generator Building</u> 5.7.1 Safety-Related Equipment

The diesel generators, starting air systems and control equipment are located in separate rooms in the diesel generator building. The redundant 125 volt dc bus, distribution equipment, and battery charger is located in the north diesel generator room. A separate room, therein, encloses the dc batteries. Two small rooms are provided for the diesel air intake filters in each diesel generator room.

5.7.2 Combustibles

The major combustibles consist of 550 gallons of fuel oil in the diesel day tanks and 2500 gallons of lube oil for each diesel generator. The diesel air intake filters contain about 80 gallons of oil each.

5.7.3 Consequences if No Fire Suppression

An unmitigated fire in the area could result in the loss of a diesel generator unit. The wall separating the two units would prevent fire damage to the adjacent unit. In the north room, fire damage could result in the loss of one of the plant dc power systems.

5.7.4 Fire Protection Systems

Each room is protected by a dry pipe preaction sprinkler system with fuse link heads. A combination of smoke and flame detection signals is used to operate the water supply valves. The detection systems actuate an alarm in the control room. The water supply includes local and remote flow alarms. Recent modifications have been made to maintain the OS&Y valves, supplying these systems, in a locked open position.

5.7.5 Adequacy of Fire Protection

The lack of fire detection prevents prompt response to fires in the battery room. Measures have not been provided to detect or contain fires in the air intake filter rooms.

5.7.6 Modifications

The licensee has proposed the following modifications. A fire detector will be provided in the battery room. Curbing will be provided to contain an oil spill within the air intake filter rooms or fire detection will be provided in these rooms.

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

5.8 <u>Containment</u>

5.8.1 Safety-Related Equipment

The equipment located in containment includes two residual heat removal pumps and heat exchangers, letdown heat exchangers, piping, valves and electrical cables.

5.8.2 Combustibles

The major combustibles inside the containment consist of 225 gallons of lubricating oil for each of the three reactor coolant pumps, 1200 lb of charcoal in the atmospheric cleanup system, and electrical cable insulation.



Consequences if No Fire Suppression

An unmitigated fire could result in the loss of redundant electrical cables due to the continuity of combustibles which exist by the routing of cables between redundant cable trays. A major oil spill fire could result in damage to shutdown systems.

5.8.4 Fire Protection Systems

Smoke detectors are provided over each steam generator, two of the three reactor coolant pumps, and under the pressurizer. Two flame detectors are located on the crane rails above the operating floor. Two manually operated deluge sprinkler systems using borated water from the refueling water pumps are located in the containment. Open head spray nozzles are located above each of the reactor coolant pumps and residual heat removal pumps. A hose reel station with 150 feet of hose is located on the refueling floor and is supplied water from the refueling water pumps. Portable extinguishers are located in many areas.

5.8.5 Adequacy of Fire Protection

The lack of fire detection in the residual heat removal pump area and at the containment electrical penetration area prevents prompt response to fires in these areas. Adequate means have not been provided to contain oil leakage which could result in a major fire in the primary coolant pump area. Measures have not been provided to prevent cable fires from propagating to redundant divisions of cable trays.

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5.8.6 Modifications

The licensee has proposed the following modifications. Fire detectors will be provided over the residual heat removal pumps, the third reactor coolant pump, and at the containment electrical penetration areas. An oil collection system will be provided for the reactor coolant pumps.

The staff has recommended that fire stops be provided in cable trays which are routed between redundant cable trays. The licensee has proposed to defer action on this recommendation pending the completion of the Systematic Evaluation Program review. We will address the adequacy of the fire protection for the containment upon completion of this review.

5.9 Yard Area

5.9.1 Safety-Related Equipment

The safety-related equipment in the yard includes the condensate storage tank, component cooling water pumps and heat exchangers, refueling water storage tank and refueling water pumps, spent fuel pumps, safety injection pumps, station service transformers, and salt water cooling pumps.

5.9.2 Combustibles

Combustibles in the yard area include the hydrogen storage system, clean and dirty lube oil storage tanks, oil in transformers, buried fuel oil tanks, a 26-gallon gasoline tank, storage warehouse, trailers, construction equipment, wood sheds and miscellaneous storage.

5.9.3 Consequences if No Fire Suppression

An unmitigated oil spill fire in the area of the lube oil storage tanks could result in damage to safety injection pumps and other components in the area. An unmitigated fire at the station service transformers could result in damage to electrical cables and the fire water pumps in this area. The location of the gasoline engine driven screen wash pump presents an exposure hazard to the salt water cooling pumps.

5.9.4 Fire Protection Systems

Protection for the yard area is provided by yard hydrants and hose stations for those areas adjacent to the turbine building. A wheeled unit fire extinguisher in the yard area and portable extinguishers are available.

• 5.9.5 Adequacy of Fire Protection

Measures have not been provided to limit the spread of an oil spill fire in the lube oil tank storage area. The station service transformers present an unacceptable exposure fire hazard to safety-related cables and systems.





Modifications

The licensee has proposed to provide the following modifications. A curb will be provided around the clean and dirty lube oil tanks. The volume will be sufficient to hold the contents of the tanks plus an allowance for fire extinguishing media. The station service transformers will be curbed to contain an oil spill. The combustible oil in the station service transformers will be replaced with a silicone base oil or an automatic deluge system will be provided to protect transformers 2 and 3. A curb will be provided to contain a gasoline spill at the engine driven screen wash pump.

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

6.0 ADMINISTRATIVE CONTROLS

The licensee's description of the administrative controls for fire protection as contained in his fire hazards analysis report is not sufficient to permit a conclusion by the staff. We have subsequently recommended that the licensee's administrative controls follow the NRC guidelines set forth in "Nuclear Plant Fire Protection Functional Responsibilities, Administrative Controls, and Quality Assurance." The licensee, by letter dated May 19, 1978, has stated that his program for administrative controls is in conformance with the NRC guidelines, except for a few specific areas where deviations were noted and a justification therefor was provided. By letter dated June 21, 1978 we identified staff concerns and positions on exceptions to the staff guidelines taken by the licensee. During the site visit exit meeting on July 13, 1978, the licensee accepted the staff positions on administrative controls.

We find that the administrative controls for the fire protection program satisfy the objectives identified in the staff guidelines. This satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

7.0 TECHNICAL SPECIFICATIONS

The Technical Specifications for fire protection were previously modified by Amendment No. 31 issued on March 8, 1978, to include limiting conditions for operation and surveillance requirements for existing fire protection systems and administrative controls. The Technical Specifications have been revised to provide a five man fire brigade and to permit only the use of the Unit 2 and 3 fire water system in the event that the normal water supply or either of the Unit 1 fire pumps is unavailable. Use of the Unit 1 screen wash pumps as parts of an alternate fire suppression water system has been deleted.

Following the implementation of the modifications of fire protection systems resulting from this review, the Technical Specifications will be similarly modified to incorporate the limiting conditions for operation and surveillance requirements for these modifications.

8.0 CONCLUSION

The licensee has performed a fire hazards analysis and has proposed certain modifications to improve the fire protection program. Additional modifications have been proposed by the licensee during the course of our review, which are based upon the fire hazards analysis and our onsite evaluation of the fire protection program. These proposed modifications are summarized in Section 3.1. In 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 the San Onofre 1 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 the Special Review Group's conclusion that the operation of the facility need not be restricted for public safety:

"Fires occur rather frequently; however, fires involving equipment unavailability comparable to the Browns Ferry fire are quite infrequent (see Section 3.3 of [NUREG-0050]). The Review Group believes that steps already taken since March 1975 (see Section 3.3.2) have reduced this frequency significantly."

"Based on its review of the events transpiring before, during and after the Browns Ferry fire, the Review Group concludes that the probability of disruptive fires of the magnitude of the Browns Ferry event is small, and that there is no need to restrict operation of nuclear power plants for public safety. However, it is clear that much can and should be done to reduce even further the likelihood of disabling fires and to improve assurance of rapid extinguishment of fires that occur. Consideration should be given also to features

that would increase further the ability of nuclear facilities to withstand large fires without loss of important functions should such fires occur."

We recognize that the "Risk Assessment Review Group Report to the U.S. Nuclear Regulatory Commission," NUREG/CR-0400 (The Lewis Committee Report), states that this Review Group is unconvinced of the correctness of the WASH-1400 conclusion that fires contribute negligibly to the overall risk of nuclear plant operation. In the Commission's Policy Statement dated January 18, 1979, "NRC Statement on Risk-Assessment and the Reactor Safety Study Report (WASH-1400) in Light of the Risk-Assessment Review Group Report", the Commission indicated on page 3 that it "accepts the Review Group Report's conclusion that absolute values of the risks presented by WASH-1400 should not be used uncritically either in the regulatory process or for public policy purposes and has taken and will continue to take steps to assure that any such use in the past will be corrected as appropriate. In particular, in light of the Review Group conclusions on accident probabilities, the Commission does not regard as reliable the Reactor Safety Study's numerical estimate of the overall risk of reactor accident."

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

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

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

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

Staff Response:

The licensee obtained a blower for smoke venting in conformance to the staff guidelines noted in Section 2.2 of this report. Smoke venting capability also would be provided by offsite fire assistance units and the general open construction of the plant reduces the need for such equipment. Therefore, the staff concludes that a significant difference in smoke venting capability would not be provided by conformance to the consultants' recommendation.

9.0 STAFF RESPONSE TO CONSULTANTS' REPORT

Under contract to Nuclear Regulatory Commission, Brookhaven National Laboratory has provided the services of fire protection consultants who participated in the evaluation of the licensee's fire protection program and in the preparation of the Safety Evaluation Report (SER). Their letter, "Fire Protection in Operating Nuclear Power Stations - San Onofre Unit 1 - Safety Evaluation Report Review," dated January 31, 1979, concurs with the staff conclusions noted in the Safety Evaluation Report.

The consultants' recommendations, which we have not adopted, along with our basis therefore are as follows:

Consultants' Recommendation:

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

Staff Response:

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

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

Consultants' Recommendation:

"The portable smoke venting equipment is a single large industrial blower and not portable smoke ejectors approved for fire fighting activity. We have recommended two 5000 CFM fire fighting smoke ejectors of the explosion proof type."

