

Docket File
50-272

NOVEMBER 20 1979

Docket No. 50-272

REGULATORY DOCKET FILE COPY

Mr. F. P. Librizzi, General Manager
Electric Production
Production Department
Public Service Electric and Gas Company
80 Park Place, Room 7221
Newark, New Jersey 07101

Dear Mr. Librizzi:

The Commission has issued the enclosed Amendment No. 21 to Facility Operating License No. DPR-70 for the Salem Nuclear Generating Station, Unit No. 1. This amendment adds license conditions relating to the completion of facility modifications for fire protection in response to your letters dated September 14, 1977, December 19, 1977, July 19, 1978, July 26, 1978, September 8, 1978, September 26, 1978, February 15, 1979, March 2, 1979 and November 5, 1979.

We have discussed the contents and conditions of this license amendment with members of your staff. Although certain procedural details related to the ventilation system remain under review we are proceeding with the issuance of this amendment because only twelve months remain before the October 1980 deadline for implementation of all modifications associated with this program. This date was set in late 1976 and recognizes that such modifications should be completed as soon as practical, with due consideration of the nature of the modifications. Some major modifications may require a year to complete.

By the provisions of 10 CFR Part 2, paragraph 2.204, you may request a hearing with respect to all or any part of this amendment within twenty (20) days from the date of the notice in the Federal Register of the issuance of this amendment. If you do not request a hearing, this amendment will become effective on the expiration of that twenty (20) day period.

By Amendment No. 11 we issued Technical Specifications to incorporate limiting conditions for operation and surveillance requirements for existing fire protection systems. We request that you propose revised Technical Specifications related to facility modifications required by the enclosed amendment by July 1980.

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OFFICE >						
SURNAME >						
DATE >						

Mr. F. P. Librizzi
Public Service Electric and Gas

- 2 -

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

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

Sincerely,

Original Signed By

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

Enclosures:

1. Amendment No. 21 to DPR-70
2. Safety Evaluation
3. Notice of Issuance

cc: w/enclosures
See next page

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

November 20, 1979

Docket No. 50-272

Mr. F. P. Librizzi, General Manager
Electric Production
Production Department
Public Service Electric and Gas Company
80 Park Place, Room 7221
Newark, New Jersey 07101

Dear Mr. Librizzi:

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Mr. F. P. Librizzi
Public Service Electric and Gas

- 2 -

November 20, 1979

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

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

Sincerely,



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

Enclosures:

1. Amendment No. 21 to DPR-70
2. Safety Evaluation
3. Notice of Issuance

cc: w/enclosures
See next page

Mr. F. P. Librizzi
Public Service Electric and Gas Company - 3 -

November 20, 1979

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

PUBLIC SERVICE ELECTRIC AND GAS COMPANY

DOCKET NO. 50-272

SALEM NUCLEAR GENERATING PLANT, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 21
License No. DPR-70

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The facility will operate in conformity with 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 51 of the Commission's regulations and all applicable requirements have been satisfied.
2. Accordingly, operating license DPR-70 is amended by adding paragraph C.5 to read as follows:
 - C.5 Public Service Electric and Gas Company shall maintain in effect and fully implement all provisions of the approved fire protection plan. The approved fire protection plan consists of the document entitled, Salem Nuclear Generation Station Unit No. 1 Fire Protection Program Evaluation Comparison BTP APCS9.5-1 Appendix A" which includes: Initial Issue, submitted with letter dated September 14, 1977 additional information submitted with letters of July 19, July 26, September 8, and September 26, 1978 and February 15, March 2 and November 5, 1979.

The licensee may proceed with and is required to complete the modifications identified in Paragraphs IIC, IIIA, IIIB, IVA, and

IVC of the NRC's Fire Protection Safety Evaluation (SE), dated November 20, 1979 for the facility. These modifications will be completed in accordance with the schedule in Table 1 of the SE. If any modification cannot be completed on schedule, the licensee shall submit a report explaining the circumstances and propose, for staff approval, a revised schedule.

3. This license amendment becomes effective as of twenty days from the date of publication of the notice of issuance unless a hearing has been requested.

FOR THE NUCLEAR REGULATORY COMMISSION



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

Date of Issuance: November 20, 1979

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 21 TO FACILITY OPERATING LICENSE NO. DPR-70

PUBLIC SERVICE ELECTRIC AND GAS COMPANY,
PHILADELPHIA ELECTRIC COMPANY,
DELMARVA POWER AND LIGHT COMPANY, AND
ATLANTIC CITY ELECTRIC COMPANY

SALEM NUCLEAR GENERATING STATION, UNIT NO. 1

DOCKET NO. 50-272

FIRE PROTECTION REVIEW

SALEM NUCLEAR GENERATING STATION
SAFETY EVALUATION REPORT
FIRE PROTECTION REVIEW
UNIT NOS. 1 AND 2

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- VII. CONCLUSIONS .

SALEM NUCLEAR GENERATING STATION
UNIT NOS. 1 AND 2
Fire Protection Safety Evaluation Report

I. INTRODUCTION

We have reviewed the Salem Nuclear Generating Station Unit Numbers 1 and 2 fire protection program and fire hazards analysis submitted by the licensee. The submittal, including their answers to six NRC requests for additional information, was in response to our request to evaluate his fire protection program against the guidelines of Appendix A to BTP APCS 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants." As part of the review, we visited the plant site to examine the relationship of safety related components, systems, and structures in specific plant areas to both combustible materials and to associated fire detection and suppression systems. The overall objective of our review of the Salem Nuclear Generating Plant fire protection program was to ensure that in the event of a fire at either facility, Units 1 and 2 would maintain the ability to safely shutdown, remain in a safe shutdown condition, and minimize the release of radioactivity to the environment.

Our review included an evaluation of the automatic and manually operated water and gas fire suppression systems, the fire detection systems, fire barriers, fire doors and dampers, fire protection administrative controls, fire brigade training, and plant fire protection Technical Specifications.

Since Unit 1 and 2 are of the same design, except where noted, the comments made in this report apply to both units.

Our conclusion, given in Section VII is that the Fire Protection Program at the Salem Nuclear Generating Station Unit Nos. 1 and 2 is adequate at the present time, and meets General Design Criterion 3. However, to further ensure the ability of the plant to withstand the damaging effects of fires that could occur, we are requiring, and the licensee has agreed to provide, additional fire protection system improvements. Until the committed fire protection system improvements are operational, we consider the existing fire detection and suppression systems; the existing barriers between fire areas; improved administrative procedures for control of combustibles and ignition sources; the trained onsite fire brigade; the capability to extinguish fires manually; and the fire protection technical specifications provide adequate protection against a fire that would threaten safe shutdown. These additional fire protection features will be completed for Unit Number 1 prior to the end of its second refueling outage. For Unit Number 2, the program will be implemented prior to the first refueling outage. The schedule for specific protection system improvements is presented in Table I at the end of this report.

This report summarizes the results of our evaluation of the Fire Protection Program at the Salem Nuclear Generating Station.

II. FIRE PROTECTION SYSTEMS DESCRIPTION

A. Water Supply Systems

The water supply system is common to both units and consists of two full capacity 2500 gpm diesel engine driven fire pumps, and a separate motor driven pressure maintenance (jockey) pump whose capacity is 30 gpm at 110 psig. Each pump has its own driver with independent power supplies and controls. Separate pump discharge headers connect to the yard fire main loop at points approximately 5 feet apart and are underground. Post indicator valves are provided to isolate the pump discharge headers in the main yard loop. They are also provided to isolate sections of the fire loop for maintenance and repair.

The two fire pumps, their associated fuel oil day tanks, the jockey pump and the station fresh water pumps are located in the fire pump house. The fresh water pumps are separated from the fire pumps by a three hour barrier. The fire pump room is protected by a wet pipe sprinkler system with heat actuated sprinkler heads. Floor drains are provided which would limit the spread of oil in the event of a leaking oil tank. The fire pumps are mounted on 12-inch high concrete foundations. Separate alarms monitoring pump running, prime mover availability, or failure to start are provided for the pumps in the plant control room. The fire pumps are installed in accordance to the applicable sections of NFPA 20. We have evaluated the above design and criteria and found that it is an acceptable alternative to locating the equipment in separate rooms.

The water supply source is from two 350,000-gallon fresh water tanks of which 300,000 gallons in each is reserved for fire protection. Make-up to the tanks is supplied from on-site production wells. The fire pumps can take suction from either or both tanks. The fire suppression system requiring the greatest water demand is the deluge system for the main transformers. This water demand is 1400 gpm at 70 psig plus 1000 gpm for the hose streams. This is within the design capacity of 2500 gpm for the system.

We have reviewed the design criteria and bases for the water supply systems and conclude that these systems meet the guidelines of Appendix A to Branch Technical Position 9.5-1 and are, therefore, acceptable.

B. Automatic Sprinkler and Manual Water Systems

The automatic sprinkler system and manual hose station hose standpipe system are fed by the main yard loop with multiple connections to interior fire protection systems header, e.g., the auxiliary building, turbine building, service building and reactor building. Each sprinkler system and manual hose station has an independent connection to the fire protection header fed from two directions, therefore, a single failure cannot impair both the primary and backup fire protection system.

Valves in the fire protection system which are not electrically supervised, with indication in the control room, will be locked and supervised in their normal operating position and checked periodically.

The automatic sprinkler systems, i.e., wet sprinkler system, pre-action sprinkler systems, deluge and water spray systems, are designed to the requirements of NFPA Standard No. 13, "Standard for Installation of Sprinkler Systems," and NFPA Standard No. 15, "Standard for Water Spray Fixed System."

Manual hose stations are located throughout the plant to ensure that an effective hose stream can be directed to any safety related area in the plant. These systems are consistent with the requirements of NFPA Standard No. 14, "Standpipe and Hose System for Sizing, Spacing, and Pipe Support Requirements."

Areas that have been equipped or will be equipped* with automatic water suppression systems are:

(A) Water-Operated Deluge Systems

Deluge systems actuated by water-pilot line automatic sprinkler heads are provided for the following equipment areas:

- (1) Nos. 11 and 12 Turbine Oil Storage Tanks
- (2) No. 1 Seal Oil Unit
- (3) No. 1 Turbine Oil Reservoir
- (4) No. 1 Turbine Oil Makeup Tank
- (5) Nos. 11A and 11B Feedwater Pump Turbine Oil Coolers
- (6) No. 1 Turbine Oil Conditioner
- (7) No. 1 Feedwater Pump Lube Oil Tank

*To be installed in accordance with Table 1.

- (8) Nos. 1, 2 and 3 Station Air Compressors
- (9) Nos. 21 and 22 Turbine Oil Storage Tanks
- (10) Nos. 2 Seal Oil Unit
- (11) No. 2 Turbine Oil Reservoir
- (12) Nos. 21A and 21B Feedwater Pump Turbine Oil Coolers
- (13) No. 2 Feedwater Pump Lube Oil Tank
- (14) No. 2 Turbine Oil Conditioner

(B) Electrically-Operated Deluge Systems

Re-cycling deluge systems actuated by continuous strip overheat detectors are provided for the following equipment areas:

- (1) No. 1 Control Room Emergency Air-Conditioning Unit Charcoal Filter
- (2) No. 14 Auxiliary Building Standby Ventilation Unit Charcoal Filter
- (3) No. 1 Containment Pressure Relief Unit Charcoal Filter
- (4) No. 12 Fuel Handling Area Ventilation Unit Charcoal Filter
- (5) Nos. 11 and 12 Iodine Removal Units Charcoal Filters
- (6) No. 2 Control Room Emergency Air Conditioning Unit Charcoal Filter
- (7) No. 24 Auxiliary Building Standby Air-Conditioning Unit Charcoal Filter
- (8) No. 2 Containment Pressure Relief Unit Charcoal Filters
- (9) No. 22 Fuel Handling Area Ventilation Unit Charcoal Filter
- (10) Nos. 21 and 22 Iodine Removal Units Charcoal Filters

(C) Air Operated Deluge Systems

Deluge systems actuated by air-pilot automatic sprinkler heads are provided for the following equipment areas:

- (1) No. 1 Main Transformer, Phases A, B, and C
- (2) Nos. 11, 12, 13 and 14 Reactor Coolant Pumps
- (3) Nos. 11 and 12 Station Power Transformers
- (4) No. 1 High and Low Pressure Turbine Bearing Housings
- (5) No. 1 Auxiliary Transformer
- (6) Heating Boiler Fuel Oil Pump and Heater
- (7) No. 2 Main Transformer, Phases A, B, and C
- (8) Nos. 21, 22, 23 and 24 Reactor Coolant Pumps
- (9) Nos. 21 and 22 Station Power Transformers
- (10) No. 2 High and Low Pressure Turbine Bearing Housings
- (11) No. 2 Auxiliary Transformer

(D) Wet-Pipe Sprinkler Systems

Wet-pipe sprinkler systems, consisting of piping systems which are filled with water, which will spray from heat actuated sprinkler heads, are provided for the following areas:

- (1) Service Building - Elev. 88 ft., 100 ft., 113 ft., and 127 ft., and the cable vaults carrying cables between the Auxiliary Building and the Turbine Building.
- (2) Fire Pump House - Elev. 100 ft.
- (3) Heating Boiler House - Elev. 100 ft.
- (4) No. 1 Turbine Perimeter - Elev. 88 ft., 100 ft., and 120 ft.

- (5) No. 2 Turbine Perimeter - Elev. 88 ft., 100 ft., and 120 ft.
- (6) Auxiliary Building Drumming and Baling Storage Area - Elev. 100 ft.
- (7) Auxiliary Building Resin Storage Areas - Elev. 122 ft.
- (8) Auxiliary Feed Pump/Remote Shutdown Panel - Elev. 84 ft.*
- (9) Charging Pump - Elev. 84 ft.*

We have reviewed the design criteria and bases for the water suppression systems and conclude that these systems with the additional sprinkler systems to be installed meet the guidelines of Appendix A to Branch Technical Position ASB 9.5-1 and are in accordance with the applicable portions of the National Fire Protection Association (NFPA) Codes, and are, therefore, acceptable.

C. Gas Suppression Systems

Total flooding low pressure CO₂ and/or Halon systems are provided for the following areas:

(A) Automatically-Actuated Carbon Dioxide Flooding Systems

Automatically-actuated flooding systems are provided for the following areas:

- (1) Nos. 1A, 1B, and 1C Diesel-Generator Rooms and D.G Control Rooms - Elev. 100 ft. and Day Tank Areas - Elev. 122 ft.

*To be installed in accordance with schedule in Table I.

- (2) Nos. 11 and 12 Diesel Fuel Oil Storage Tanks
 - (3) No. 1 Exciter Enclosure Elev. 140 ft.
 - (4) Diesel Fuel Oil Transfer Pump Rooms (Unit No. 1) - Elev. 84 ft.
 - (5) Nos. 2A, 2B, and 2C Diesel-Generator Rooms and Control Rooms - Elev. 100 ft. and Day Tank Areas - Elev. 122 ft.
 - (6) Nos. 21 and 22 Diesel Fuel Oil Storage Tanks
 - (7) Diesel Fuel Oil Transfer Pump Rooms (Unit No. 2) - Elev. 84 ft.
 - (8) No. 2 Exciter Enclosure - Elev. 140 ft.
- (B) Automatically Actuated Halon Flooding Systems
- (1) No. 1 Relay Room - Elev. 100 ft.*
 - (2) No. 2 Relay Room - Elev. 100 ft.*
- (c) Manually Actuated Carbon Dioxide Flooding Systems
Manually-actuated flooding systems are provided for the following areas:
- (1) No. 1 460V Switchgear Room - Elev. 84 ft.
 - (2) No. 1 4160V Switchgear Room - Elev. 64 ft.
 - (3) No. 1 Electrical Penetration Area - Elev. 78 ft.
 - (4) No. 2 460V Switchgear Room - Elev. 84 ft.
 - (5) No. 2 4160V Switchgear Room - Elev. 64 ft.
 - (6) No. 2 Electrical Penetration Area - Elev. 78 ft.

*To be installed in accordance with schedule given in Table I.

These systems are designed to flood the protected areas with carbon dioxide in concentrations up to 50 per cent. Carbon dioxide fire protection for all areas, except the Exciter Enclosures, is supplied from a 10-ton Cardox refrigerated storage tank (one per unit) located on Elev. 84 ft. of each Auxiliary Building outside the Diesel Fuel Oil Pump Rooms and is discharged to the protected areas either automatically or manually as indicated above. The carbon dioxide fire protection for the Generator Exciter Enclosure for each unit is supplied from a 750-lb. refrigerated storage tank located on Elev. 120 ft. in each Turbine Area. Each tank contains a sufficient supply of carbon dioxide for two full discharges into the largest protected area.

There are three diesel generator sets per unit and each set is flooded by independent CO₂ actuation. The CO₂ system for each Diesel-Generator Room and its associated Control Room and day tank area are actuated together. The CO₂ system for the two Diesel Fuel Oil Pump Rooms for each unit are also actuated together. All other areas are independently actuated.

The CO₂ suppression system is designed in accordance with NFPA Standards Numbers 12 and 12A. We have reviewed the design criteria and basis for these fire suppression systems. We conclude that

these systems satisfy the provisions of Appendix A to Branch Technical Position 9.5-1 and are, therefore, acceptable.

D. Foam Suppression System

A manually actuated foam system with a capacity of 300 gallons is located in a Foam Tank House south of the Turbine Area, for the protection of No. 1 Fuel Oil Storage Tank. The system has been designed and installed in accordance with NFPA Standard No. 11 to cover the liquid surface in 30 minutes. The foam solution is double strength, 3% protein foam concentrate.

We have reviewed the design criteria and bases for the foam suppression system and we conclude that the system satisfies the provisions of Appendix A to Branch Technical Position 9.5-1 and is, therefore, acceptable.

E. Fire Detection Systems

The fire detection system consists of the detectors, associated electrical circuitry, electrical power supplies, and the fire annunciation panel. The types of detectors used at the Salem Nuclear Generating Station are ionization (products of combustion), and thermal (heat sensors). The system is continuously supervised with a NFPA 72D Class B supervised system.

Fire detection systems will give audible and visual alarm and annunciation in the control room. Local audible and/or visual alarms are also provided.

The licensee has agreed to install additional smoke detectors in the following areas:

- (a) Peripheral rooms of the control room complex - Elev. 122 ft.
- (b) Spent and new fuel storage area
- (c) Piping penetration area - Elev. 78 ft.
- (d) Control Area Air Conditioning System Equipment
- (e) Corridor Area - Elev. 100 feet
- (f) Resin Storage
- (g) Auxiliary Building Ventilation Equipment
- (h) Boric Acid Pumps
- (i) Safety Injection Pumps
- (j) Component Cooling Pumps
- (k) Auxiliary Feedwater Pumps
- (l) Charging Pumps
- (m) Containment Spray Pumps
- (o) Storage Tank Recirculation Pumps
- (p) Residual Heat Removal Pumps
- (q) Emergency Air Compressor
- (r) Chilled Water System Chillers

- (s) Mechanical Penetration Area
- (t) Piping Penetration Area (Elev. 78 ft.)
- (u) Inner Piping Penetration Area
- (v) Outer Piping Penetration Area
- (w) General Containment (one detector in each recirculating fan)
- (x) Reactor Coolant Pumps
- (y) Service Water Pumps

We have reviewed the fire detection systems to ensure that fire detectors are located to provide detection and alarm of fires that could occur. We have also reviewed the fire detection systems design criteria and bases to ensure that it conforms to the applicable sections of NFPA No. 72D. We conclude that the design and the installation of the fire detection systems with the additional detectors to be installed, meet the guidelines of Appendix A to Branch Technical Position ASB 9.5-1 and the applicable portions of NFPA No. 72D, and are, therefore, acceptable.

III. OTHER ITEMS RELATING TO THE STATION FIRE PROTECTION PROGRAM

A. Fire Barriers

All floors, walls, and ceilings enclosing separate fire areas are rated at a minimum of 3-hour fire rating with exception of the penetrations discussed in Sections III, B and C. The main control room area contains peripheral rooms which are located within the main control room 3-hour fire barrier. These peripheral rooms are provided with detectors and alarms and minimum one-hour fire rated ceilings and fire doors.

The licensee has provided acceptable documentation to substantiate the fire rating of the 3-hour barriers.

B. Fire Doors and Dampers

We have also reviewed the placement of the fire doors to ensure that fire doors of proper fire rating have been provided. The fire rating of the doors as a minimum will be 1-1/2 hour rating based on the fire loading of the particular fire areas.

Ventilation penetrations through barriers are protected in some areas by standard fire door/dampers. The licensee will provide one of the following for the rest of the unprotected ventilation penetrations:

1. UL listed fire rated door type dampers at each penetration.
2. Coat the ventilation ducts with a flame retardant material to a minimum fire rating of 1-1/2 hours based on the fire loading of the area. In addition the licensee will provide rated fire dampers on all supply and exhaust openings in the ducts.

The licensee has provided the necessary information to demonstrate to our satisfaction that fire door/dampers and their method of installation can provide a fire rating equivalent to the fire barrier or the fire loading of the fire area. The fire door/dampers are and will be installed in accordance with NFPA 90-A.

C. Penetration Fire Stops

Penetrations, including electrical penetration seals, through rated barriers are sealed to provide fire resistance equivalent to the barrier itself. The licensee has provided the necessary information to demonstrate that the penetration seals used in the penetrations for cable trays, conduits, and piping and their method of installation can provide a fire rating equivalent to the fire barrier.

We conclude that the fire barriers, barrier penetrations, fire doors and dampers with the additional doors and dampers to be installed meet the guidelines of Appendix A to Technical Position ASB 9.5-1 and are, therefore, acceptable.

D. Communication Systems

Fixed emergency communication using voice-powered head sets is available at specific locations throughout the station. There is also a public address system on each unit which is powered by an inverter normally fed from the 230 volt alternating current vital bus C and backed up by the 125 volt direct current emergency bus C. To satisfy the guidelines of Appendix A to BTP ASB 9.5-1, the licensee has committed, at our request, to provide an additional communication system consisting of portable radio units. To preclude a single electrical failure from causing the loss of all communication systems, the licensee has documented that the fixed repeater and other accessories associated with the portable radio communication system of each unit will be powered from a different 125 volt direct current emergency bus as that of the public address system for that unit.

The licensee has committed to perform a preoperational test to demonstrate that the frequencies used will not affect the actuation of protective relays. We conclude that the addition of this new communication system satisfies our guidelines set forth in Appendix A to Branch Technical Position APCS 9.5-1 and therefore is acceptable.

E. Reactor Coolant Pressure Boundary Integrity

We expressed a concern to the licensee that spurious valve operation caused by fire may affect the integrity of the reactor coolant pressure boundary. We required that the licensee examine each interface at the reactor coolant pressure boundary and either demonstrate the capability of the design to withstand spurious valve operation caused by fire without the loss of reactor coolant pressure boundary integrity, or modify the design to assure integrity.

The examination performed by the licensee revealed that the pressurizer relief lines having the electrically and pneumatic operated valves and which are connected to the pressurizer relief tank, were the only interfaces which were not isolated from the high pressure reactor coolant system by two normally closed valves. Each of the two pressurizer relief lines in Unit 1 has a normally closed pneumatic operated relief valve in series with a normally open motor-operated valve. Each pressurizer relief line in Unit 2 has one more pneumatic operated valve per line than Unit 1. This additional valve is normally closed and connected in parallel with the other air operated valve.

The spurious opening of a single pneumatic operated relief valve caused by a fire could lead to compromising the reactor coolant boundary integrity if the valve is not closed before the design pressure limits of the pressurizer relief tank are exceeded. Each pressurizer relief line can be isolated by either closing the pneumatic or motor operated valve from the main control room or from the corresponding power distribution and motor control centers. The licensee contends that there is sufficient time available to diagnose the situation and isolate the relief line while the pressurizer is relieving to the pressurizer relief tank.

Our review determined that the existing provisions and future modifications for fire protection in the relay room and other areas of the station where the electrical circuits and cables associated with the pressurizer relief valves are located, are consistent with minimizing the probability of a fire causing the opening of the pressurizer relief lines, and, therefore, we conclude that the design in this regard is acceptable. Furthermore, the consequences resulting from the spurious opening of a relief valve caused by a fire or other reasons compounded with the failure of the valve to close within the specified time, have been analyzed by the NRC staff. It has been determined that the consequences resulting from this event are satisfactorily mitigated by the engineered safety feature systems.

IV. FIRE PROTECTION FOR SPECIFIC AREAS

A. Relay and Switchgear Rooms

Relay and switchgear rooms containing redundant electrical divisions are provided for each unit. These rooms are separated from each other and the balance of the plant by a minimum of 1-1/2 hour rated fire barriers. The relay and switchgear rooms for Unit 1 are separated from their counterparts in Unit 2 by two 1-1/2 hour rated fire barriers and a common corridor. There are a minimum of two access doors to each of the rooms and the doors are located at opposite ends of the rooms.

Currently a manually actuated total flooding CO₂ system is installed in the switchgear rooms and manual hose stations are provided for the relay rooms. The licensee has agreed, at our request, to provide an automatic Halon system for the relay rooms.

When the Halon system is actuated, the ventilation system isolates the rooms and smoke venting can be initiated by manually actuating the exhaust fan. In addition, smoke detectors are installed that alarm in the control room. The back-up fire suppression system is the hose stations located in the immediate vicinity of the access doors and portable extinguishers.

All power, control, and instrumentation cable have passed the IEEE No. 383 Flame Test. All cable trays within these rooms have a minimum separation distance of 18 inches vertical and 12 inches horizontal, as well as a fire resistant barrier of asbestos woven

cloth on the bottom of each tray. The licensee has performed tests to show that the cables used will not propagate a fire from tray to tray with a vertical separation distance of 12 inches. In addition, the higher voltage trays are installed above the lower voltage trays.

The licensee has committed, at our request, to establish an emergency shutdown procedure and necessary modifications to assure the capability to achieve safe shutdown in the event of an exposure fire in these rooms which might disable redundant cable divisions of system necessary for safe shutdown. The applicant will provide an alternative shutdown method for our review. This alternate shutdown method will include where necessary the rerouting of instrumentation cable to the hot shutdown panel. The procedures and modifications for hot and cold shutdown will be implemented by the second refueling for Unit 1 and the first refueling for Unit 2.

We have reviewed the licensee's fire hazards analysis and fire protection provided for the relay and switchgear rooms and consider that appropriate fire protection has been provided and after the modifications and procedures are implemented will conform to the provisions of Appendix A to BTP ASB 9.5-1 and are, therefore, acceptable.

B. Safety Related Pump Areas

In the safety related pump areas, such as the auxiliary feed pump area and the charging pump, the pumps are located in close proximity to each other. Access to the pumps is usually an open corridor. We were concerned that a common exposure fire could jeopardize the safety function of two or more of the pumps. At our request, the licensee has committed to install automatic water sprinkler systems in these areas. In addition, a one hour rated fire barrier or, alternatively, a one-half hour barrier and a sprinkler system will be provided, where necessary, to separate redundant cable trains serving these pumps. Both trains of the auxiliary feedwater system will be protected in this manner.

We have reviewed the licensee's fire hazards analysis for this area and conclude that appropriate fire protection has been provided and after modifications are implemented will meet the guidelines of Appendix A of BTP 9.5-1 and is, therefore, acceptable.

C. Diesel Fuel Oil Storage Rooms

The diesel fuel oil storage area, located on elevation 84, contains two 7-day diesel oil storage tank rooms, two transfer pump rooms, and the plant's CO₂ system 10 ton storage tank. The fire suppression system for this area is an automatic CO₂ total flooding system.

We were concerned that a diesel oil fire in the tank rooms or the diesel oil transfer pump rooms could jeopardize the entire plant's CO₂ suppression system, if manual fire suppression systems had to be used. The licensee, at our request, has committed to install, in addition to the CO₂ system, one of the following systems in the diesel storage tank area:

1. An automatic open head deluge or open head spray nozzle system
2. An automatic closed head sprinkler system
3. An automatic AFFF system, the foam being delivered by a sprinkler or spray system.

We have reviewed the licensee's Fire Hazards Analysis for this area and conclude that appropriate fire protection will be provided and after the modifications are implemented will meet the guidelines of Appendix A of BTP ASB 9.5-1 and is, therefore, acceptable.

D. Other Plant Areas

In order to provide a defense-in-depth design so that a fire will not prevent the performance of necessary safe plant shutdown functions, the licensee has committed to perform a fire interaction analysis on all redundant mechanical and electrical systems and components necessary for safe cold shutdown which are separated only by distance and are within 20 feet of each other. The analysis will postulate a fire in installed or transient combustibles and failure of the primary fire suppression system.

Where additional protection and/or separation is required to assure a safe shutdown condition, the applicant has committed to:

- (1) relocate one or both divisions to achieve a minimum of 20-ft. separation between divisions, or
- (2) provide a one-hour fire rated barrier such as 1" inch ceramic fiber separating one safety related train from the other or from a common exposure fire and area automatic sprinkler systems

will be provided to afford protection against exposure fire at the interactions, or

- (3) provide an alternate shutdown method that is independent of the interaction area.

The licensee's Fire Hazards Analysis addresses other plant areas not specifically discussed in this report. The licensee has committed to install additional detectors, portable extinguishers, hose stations, and some additional emergency lighting as identified in the licensee's installation schedule. We find these areas with the commitment made by the licensee to be in accordance with the guidelines of Appendix A of BTP ASB 9.5-1, and the applicable sections of the National Fire Protection Association Code and are, therefore, acceptable.

V. ADMINISTRATIVE CONTROLS

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

In response to Appendix A to Branch Technical Position ASB 9.5-1, the licensee described his proposed procedures and controls. The licensee has agreed to revise his administrative controls and training procedures to follow supplemental staff guidelines contained in "Nuclear Plant Fire Protection Functional Responsibilities, Administrative Controls and Quality Assurance," dated 6/14/77, and implement them by December 31, 1979. The administrative procedures for the control of combustibles and ignition sources is complete for Unit 1 and will be implemented prior to fuel loading for Unit 2. The present fire brigade consists of a trained three-man brigade. The applicant has committed to have a plant fire brigade of at least five members that will be organized to provide immediate response to fires that may occur at the site. The full brigade will be fully trained and on site by December 31, 1979. The plant fire brigade will also be equipped with stored closed circuit oxygen-type breathing apparatus, portable communications equipment, portable lanterns, and other necessary fire fighting equipment. Spare oxygen cylinders and recharge capability are provided to satisfy the guidelines of Appendix A to Branch Technical Position ASB 9.5-1.

The fire fighting brigade participates in periodic drills. Liaison between the plant fire brigade and the local fire departments has been established. The local fire departments have been on plant tours and have also been involved in training sessions with the plant fire brigade.

We conclude that the fire brigade equipment and training conform to the recommendations of the National Fire Protection Association, Appendix A to Branch Technical Position ASB 9.5-1 and supplemental staff guidelines and are, therefore, acceptable.

VI. TECHNICAL SPECIFICATIONS

We have reviewed the plant Technical Specifications issued for Salem Nuclear Generating Station Unit Nos. 1 and 2 and find that they are consistent with our Standard Technical Specifications for fire protection. Following the implementation of the modifications of fire protection systems and administrative controls resulting from this review, the Technical Specifications will be modified accordingly to incorporate the limiting conditions for operation and surveillance requirements to reflect these modifications.

VII. CONCLUSION

The fire protection system for Salem Nuclear Generating Station Unit Nos. 1 and 2 was evaluated and found to meet General Design Criterion 3 "Fire Protection" at the time the original Safety Evaluation Report was issued in October, 1974.

As a result of investigations conducted by the staff on the fire protection systems, fire protection criteria were developed and further requirements were imposed to improve the capability of the fire protection system to prevent unacceptable damage that may result from a fire. At our request, the licensee conducted a re-evaluation of their fire protection system for Salem Units 1 and 2. The licensee submitted in

September, 1977, a Fire Hazards Analysis for both units and subsequently in response to our positions, six revisions to the Analysis. He also has compared his system, in detail, with the guidelines of Appendix A to Branch Technical Position ASB 9.5-1, "Guidelines for Fire Protection for Nuclear Plants."

During the course of our review we have reviewed the licensee's submittals and his responses to our requests for additional information. In addition, we have made two site visits to evaluate the fire hazards that exist in the Salem Nuclear Generating Station and the design features and protection systems provided to minimize these hazards.

The licensee has completed some modifications or proposed to make additional modifications to improve the fire resistance capability for fire doors, dampers, fire barriers and barrier penetration seals.

The licensee has also proposed to install additional sprinkler systems for areas such as the auxiliary feed pump area, charging pump area, and various other areas, as well as an automatic Halon system in the relay rooms. To ensure that fires can be detected rapidly and the plant operators informed promptly, additional detectors will be installed in various areas of the plant.

In addition, the licensee has committed to establish emergency shutdown procedures to bring the plant to safe cold shutdown condition in the

event of a damaging fire in the relay rooms, the switchgear rooms and other safety-related areas.

The licensee is committed to making all improvements by the second refueling for Unit 1 and the first refueling for Unit 2, thus meeting his license condition. We have reviewed the licensee's schedule and find it acceptable and have included it in Table I.

We find that the Fire Protection Program for the Salem Nuclear Generating Station with the improvements already made by the licensee, is adequate at the present time and, with the scheduled modifications, will meet the guidelines contained in Appendix A to Branch Technical Position ASB 9.5-1 and meets the General Design Criterion 3 and is, therefore, acceptable.

Until the committed fire protection system improvements are operational, we consider the existing fire detection and suppression systems; the existing barriers between fire areas; improved administrative procedures for control of combustibles and ignition sources; the trained onsite fire brigade; the capability to extinguish fires manually; and the fire protection technical specifications provide adequate protection against a fire that would threaten safe shutdown.

Our overall conclusion is that a fire occurring in any area of either Salem Nuclear Generating Station will not prevent that plant from being brought to a controlled safe cold shutdown, and further, that such a fire would not cause the release of significant amounts of radiation.

TABLE I
MODIFICATION IMPLEMENTATION SCHEDULE

Action Item No.	Planned Action Item Description	Status	
		Unit 1	Unit 2
1.	Make organizational revisions to assign the station superintendent responsible for all aspects of firefighting and fire protection.	Completed	Completed
2.	List the Fire Protection Program as "QA Applicable."	Completed	Completed
3.	Perform detailed review of applicable procedures for adequacy in addressing the requirements of Appendix A to Branch Technical Position 9.5-1 and revise as necessary.	Completed	Completed
4.	Replace the wood planks on the new fuel storage pit with wood which has been treated with a flame retardant.	Completed	Completed
5.	Prepare an engineering procedure for performing additional fire hazards analysis to reflect future station modifications.	Completed	Completed
6.	Approximately six (6) fire area boundary doors which are not currently locked or alarmed will be locked, provided with a time delay alarm to indicate in the Control Room when the door has been left open, or routinely inspected by a roving watch. This action will take into account station security plans currently being studied for the Salem Station.	Completed	Completed
7.	Remove the backup hydrogen storage stations from Elev. 122 feet at the west end of the Auxiliary Building, or enclose the present station in a 3-hour fire rated concrete enclosure with forced ventilation to the outdoors.	Completed	Completed
8.	Add a wet pipe sprinkler system for the Dimethylamine storage tanks located in the steam generator blowdown sample rooms, Elev. 100 feet in the Auxiliary Building.	Deleted.	Tanks have been removed.
9. a.	Ionization type fire detectors will be added as indicated in Section II-E of this report to provide general area protection of safety related equipment. These detectors will alarm and annunciate in the Control Room and alarm locally.	Completed	Completed

Action Item No.	Planned Action Item Description	Status	
		Unit 1	Unit 2
9. b.	Installation of additional automatic smoke detectors which alarm and annunciate in the control room, in the following areas:		
	(1) Peripheral rooms within the control room complex in which the operator does not have visual surveillance from the main console.	Completed	Completed
	(2) Piping penetration area elevation 78 feet.	Completed	Completed
	(3) New and spent fuel pool area.	Completed	Fuel Loading
10.	Auxiliary Building floor penetrations for piping, cable, and ventilation ducting that have not been sealed will be sealed with silicone foam to provide a fire stop with a fire rating greater than the area fire area load as reported by the fire hazards analysis.	Completed	Completed
11.	The lower electrical penetration area supply and return air ventilation dampers will be controlled to shut upon a CO ₂ discharge into the lower electrical penetration area.	Completed	Completed
12.	Add fire rated ventilation dampers, which will shut by both fusible-link and CO ₂ discharge, in the exhaust air duct from each diesel fuel oil storage tank room and each fuel oil transfer pump room.	Completed	Completed
13.	Approximately ten (10) additional emergency lights will be installed, as required, to provide for safe evacuation from all areas of the station.	Completed	Completed
14.	Install a hose house at each yard hydrant. Hose house will meet the requirements of NFPA Standard No. 24 except the equipment stored in each house will be that which is necessary and appropriate for the intended application.	Completed	Completed
15.	One (1) fire hydrant, presently specified on the Fire Protection System drawing, Figure D.1-1, that has not been installed, will be installed.	Completed	Completed
16.	Add a second 4-inch diameter water supply header with appropriate isolation valves from the common Auxiliary Building Header to each Reactor Containment upstream of	Completed	Completed

<u>Action Item No.</u>	<u>Planned Action Item Description</u>	<u>Status</u>	
		<u>Unit 1</u>	<u>Unit 2</u>
16. (cont'd)	the Containment penetration isolation valve as shown schematically in Figure 3.5-2. Add appropriate 6-inch valves in the Auxiliary Building common fire water supply header.		
17.	The hose standpipe root isolation valves and the yard main post indicator valves will be provided with locking devices.	Completed	Completed
18.	Add one hose station in the mechanical penetration area of each unit near the entrance to the Fuel Handling Building. Provide with 150 ft. lengths of 1-1/2 inch fire hose and adjustable fog pattern electrical safe type nozzles.	Completed	Completed
19.	Extend the existing fire water standpipe in the Auxiliary Building corridor to reach Elevation 122 feet. Add a hose station at Elevation 122 feet with 150 feet of 1-1/2 inch fire hose and an adjustable fog pattern electrical safe type nozzle.	Completed	Completed
20.	Add a fire hydrant in the yard near the Service Water Pump House.	Completed	Completed
21.	Two (2) dedicated air breathing units (Bio-pacs) with two (2) spare cylinders will be stored at the Reactor Containment entrance for each unit on Elevation 100 feet in the Mechanical Penetration Area. This will be accomplished by relocating four (4) of the twenty (20) units presently available at the station.	Completed	Completed
22.	In addition to existing CO ₂ type extinguishers, two portable water extinguishers will be placed in the vicinity of the Control Room, Computer Rooms and the Watch Engineer's Office.	1/80	1/80

Action Item No.	Planned Action Item Description	Status	
		Unit 1	Unit 2
23.	Instrumentation will be provided in the exhaust air ducts from the Battery Rooms to indicate loss of ventilation flow with annunciation in the Control Room.	Completed	Completed
24.	Add dikes around each emergency air compressor and each chilled water system chiller to contain the spread of lube oil leakage.	Completed	Completed
25.	Provide manually operated isolation dampers in the supply air and return air ventilation ducts serving the Drumming and Baling Area to permit area isolation from the remainder of the Auxiliary Building ventilation systems.	Completed	Completed
26.	Implementation of staff supplemental guidance contained in "Nuclear Plant Fire Protection Functional Responsibilities, Administrative Controls, and Quality Assurance," dated June 14, 1977 for:		
	a. Administrative Procedures, Fire Brigade Size, and Testing Program	Completed	Completed
	b. Storage of Combustible Material near Safety Related Conduit/Cable or Equipment.	Completed	Completed
27.	Installation of a portable radio system incorporating repeaters as necessary for the fire brigade and operations personnel. Preoperational testing will be performed to demonstrate that the frequencies used will not affect the actuation of protective relays. Fixed repeaters installed to permit use of the portable radios will be protected from exposure fire damage.	Second refueling	First refueling

Action Item No.	Planned Action Item Description	Unit 1	Unit 2
28. a.	Verification that all fire doors used to protect openings in walls containing safety-related equipment and/or conduit/cable have a fire rating of at least 1-1/2 hours and that the rating is commensurate with the fire hazards analysis for the area assuming an exposure fire.	Completed	Completed
b.	Installation of fire doors as a result of 28a above.	1/80	12/79
29. a.	Install in all 3 hour fire barrier ventilation penetrations one of the following designs:	Engineering Solution completed October 1979	
	(1) Rated fire door/dampers in all ventilation penetrations	Implementation by Second refueling	
	(2) 1-1/2 hour fire retardant coatings on the duct work plus fire dampers at all louvers. The NRC will review the design prior to installation. In addition the following areas will be modified to conform to this position:	First refueling	
	1. Control Room	Same as above	
	2. Relay Room	Same as above	
	3. Switchgear Rooms	10/80	10/80
	4. Diesel Fuel Oil Storage Area-Inlet and Exhausts	End of first refueling	Fuel loading
	5. Fuel Oil Transfer Pump Room Inlet and Exhausts	End of first refueling	Fuel loading
	6. Radwaste Area (Drumming and Bailing Area)	10/80 (covered under Item 25)	
30.	Installation of fixed 8-hour capacity self-contained emergency lighting of the flourescent or sealed beam type.	Completed	Completed

Action Item No.	Planned Action Item Description	Unit 1	Unit 2
31.	Installation of an outside hydrant for back-up fire suppression for the service water pump house with a hose house over the hydrant and 1-1/2 inch hose preconnected to the hydrant outlet. Also, provisions for a second hose of sufficient length to enable the second hose stream from the hydrant in the event that the second hose must be routed differently and when more than one hose stream is needed to fight the fire.	Completed	Completed
32.	Installation of automatic, zoned, pre-action, dry pipe sprinklers in the following areas:		
	a. Charging Pump Area	Second refueling	First refueling
	b. Auxiliary Feed Pump Area	Second refueling	First refueling
33.	Installation of an automatic Halon total flooding system in the relay rooms.	Second refueling	First refueling
34.	Installation of additional hose stations near the battery rooms so that the rooms can be reached with a maximum of 100 feet of hose. In addition the hoses will be equipped with the appropriate nozzles to combat electrical fires.	Completed	Completed
35.	The total rerouting of the hydrogen lines to the volume control tank away from safety related equipment, cables, and conduit.	Completed	Completed

<u>Action Item No.</u>	<u>Planned Action Item Description</u>	<u>Unit 1</u>	<u>Unit 2</u>
36.	Installation of one of the following fire suppression systems as back-up to the automatic total flooding CO ₂ system for the diesel oil storage tank rooms: a. An automatic open head deluge or open head spray nozzle system. b. An automatic closed head sprinkler. c. An automatic AFFF system, the foam being delivered by a sprinkler or spray system.	10/80	First refueling
37.	Implementation, modification and installation of an alternative shutdown capability so that hot shutdown capability can be maintained and cold shutdown can be accomplished within 72 hours, independent of the relay, switchgear and control rooms. This will include the rerouting of cables where practicable, installation of automatic sprinklers and half-hour fire barriers between redundant trains and equipment located within 20 feet of each other and written procedures.	Second refueling	Implementation by: First refueling

Environmental Consideration

We have determined that the 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 §1.5(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.

Conclusions

We have found that the Fire Protection Program for the Salem Nuclear Generating Station with the improvements already made by the licensee, is adequate at the present time and, with scheduled modifications, will meet the guidelines contained in Appendix A to Branch Technical Position ASB 9.5-1 and meets the General Design Criterion 3 and is, therefore acceptable.

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

Date: November 20, 1979

UNITED STATES NUCLEAR REGULATORY COMMISSION

DOCKET NO. 50-272
PUBLIC SERVICE ELECTRIC AND GAS COMPANY,
PHILADELPHIA ELECTRIC COMPANY,
DELMARVA POWER AND LIGHT COMPANY, AND
ATLANTIC CITY ELECTRIC COMPANY

NOTICE OF ISSUANCE OF AMENDMENT TO FACILITY
OPERATING LICENSE

The U. S. Nuclear Regulatory Commission (the Commission) has issued Amendment No. 21 to Facility Operating License No. DPR-70, issued to Public Service Electric and Gas Company, Philadelphia Electric Company, Delmarva Power and Light Company and Atlantic City Electric Company (the licensees), which revised Technical Specifications for operation of the Salem Nuclear Generating Station, Unit No. 1 (the facility) located in Salem County, New Jersey. The amendment will become effective twenty days from the date of publication of this notice of issuance unless a hearing has been requested.

The amendment adds a license condition pertaining to the completion of facility modifications to improve the fire protection program.

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

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

For further details with respect to this action, see (1) the licensee's submittals dated September 14, 1977, December 19, 1977, July 19, 1978, July 26, 1978, September 8, 1978, September 21, 1978, February 15, 1979, March 2, 1979 and November 5, 1979, (2) Amendment No. 21 to License No. DPR-70, and (3) the Commission's related Safety Evaluation. All of these items are available for public inspection at the Commission's Public Document Room, 1717 H Street, N.W., Washington, D. C. and at the Salem Free Public Library, 112 West Broadway, Salem, New Jersey. A copy of items (2) and (3) may be obtained upon request addressed to the U. S. Nuclear Regulatory Commission, Washington, D. C. 20555, Attention: Director, Division of Operating Reactors.

Dated at Bethesda, Maryland, this 20th day of November, 1979.

FOR THE NUCLEAR REGULATORY COMMISSION



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