U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-354/85-24

Docket No. 50-354

License No. CPPR-120 Priority _____ Category B

Licensee: Public Service Electric & Gas Company

80 Park Plaza - 17C

Newark, New Jersey 07101

Facility Name: Hope Creek Generating Station

Inspection At: Hancocks Bridge, New Jersey

Inspection Conducted: May 20-24, 1985

Inspectors: A. Krasopoulos for 6/26/85
S. V. Pullani, Fire Protection Engineer date

A. Krasopoulos 6/26/85
A. G. Krasopoulos, Reactor Engineer date

Also participating and contributing to the report were:

A. Fresco, Mechanical Systems Specialist, BNL
D. Kubicki, Chemical Engineering Branch, NRR
H. Thomas, Electrical System Specialist, BNL

Approved by: C J Anderson 6/28/85
C. J. Anderson, Chief date
Plant Systems Section

Inspection Summary:
Inspection on May 20-24, 1985 (Inspection Report No. 50-354/85-24).

Areas Inspected: Special, announced team inspection of emergency lighting and the safe shutdown capability of the plant in the event of a fire. The inspection involved 180 inspector hours on-site and 60 inspector hours in-office by the team consisting of 5 inspectors.

Results: No violations or deviations were identified. Fourteen items remained unresolved at the end of the inspection.

## DETAILS

1. Persons Contacted

1.1 Public Service Electric & Gas Company (PSE&G)

*M. Adams, Construction Engineer Electrical
*J. Beller, Staff Engineer
*C. Churchman, Site Engineering Manager
*E. Dalton, Supervising Engineer
G. Daves, Senior Engineer Operations
W. Denardi, Engineer-Systems
*R. Donhes, Lead Quality Assurance Engineer
*R. Drewnoski, Supervising Sited Engineer
*A. Giardino, Manager-Quality Assurance
J. Hagan, Operating Engineer
R. Hilditch, Senior Staff Engineer
S. La Bruna, Assistant General Manager
*E. Logan, Site Manager
*I. Mermelstein, Licensing Engineer
M. Mortarulo, Senior Staff Engineer
*P. Owen, Principal Construction Engineer
*J. Pantazes, Senior Staff Engineer
*W. Pavincich, Principal Engineer
*B. Preston, Licensing Manager
D. Ray, Construction Engineer
*M. Rogers, Senior Staff Engineer
M. Shedlock, Senior Supervisor-Maintenance
*D. Shumaker, Engineer
M. Woloski, Senior Staff Engineer

1.2 Bechtel Power Corporation (BPC)

K. Burrowes, Project Engineer
R. Clarke, Electrical Engineer
*K. Cooke, Electrical Group Supervisor
J. Dahnert, QC Staff Assistant
*M. Drucker, Turnover Coordinator
K. Hom, Architectural Group Deputy Supervisor
*R. Karcher, Mechanical Group Engineer
J. Serafin, Assistant Project Field Engineer
F. Stumpp, Mechanical Group Engineer
P. Vanderveer, Field Engineer

1.3 Nuclear Regulatory Commission (NRC)

*A. Blough, Senior Resident Inspector
*S. Chaudhary, Senior Resident Inspector
J. Lyash, Resident Inspector

*Denotes those present at the exit meeting.

## 2.0 Purpose

This inspection was to ascertain that the licensee is in conformance with his previous commitments with respect to the emergency lighting and with respect to the safe shutdown capability of the plant in the event of a fire.

## 3.0 Background

10 CFR 50.48 and Appendix R of 10 CFR 50 became effective on February 17, 1981 for plants licensed prior to January 1, 1979. For plants licensed or to be licensed after January 1, 1979 (Hope Creek falls under this category), 10 CFR 50.48 and Appendix R are invoked by the licensing process which includes a review of the Fire Protection Program for conformance with the Standard Review Plan (NUREG-0800), Section 9.5.1, dated July 1981 or its previous version, BTP APCSB 9.5-1 including its Appendix A. Hope Creek was reviewed against the former document.

The review of the licensee's Fire Protection Program is documented in the Safety Evaluation Report (SER) dated October 1984. Various licensee commitments are documented in the SER and several licensee submittals. These commitments were used by the team as bases for the inspection. In the Final Safety Analysis Report (FSAR), Appendix 9A, the licensee compared his Fire Protection Program against the requirements of Appendix R. Except as specifically noted therein and other related submittals, the licensee is committed to comply with the requirements of Appendix R.

Section III.G of Appendix R requires that fire protection be provided to ensure that one train of equipment necessary to achieve and maintain safe shutdown remains available in the event of a fire at any location within a licensed operating facility. For hot shutdown conditions, one train of the systems necessary must be free of fire damage (III.G.1.a). For cold shutdown conditions, repair is allowed using in place procedures and materials available onsite with the provision that cold shutdown be achievable within 72 hours of the initiating event (III.G.1.b). Section III.G.2 lists specific options as follows to provide adequate protection for redundant trains of equipment located outside of the primary containment:

- Separation by a fire barrier having a three hour rating (III G.2.a).

- Separation by a horizontal distance of at least 20 feet with no intervening combustibles and with fire detection and automatic fire suppression installed in the fire area (III.G.2.b).

- Enclosure of one train in a fire barrier having a one hour rating in addition to having fire detection and automatic suppression installed in the fire area (III.G.2.c).

If the protection required by Section III.G.2 is not provided or the systems of concern are subject to damage from fire suppression activities, Section III.G.3 of the rule requires that an alternate or dedicated shutdown capability be provided which is independent of the area of concern. Any alternate or dedicated system requires NRC review and approval prior to implementation.

For situations in which fire protection does not meet the requirements of Section III.G, however, such protection is deemed to be adequate by the licensee for the specific situation, the rule allows the licensee to request an exemption on a case-by-case basis. Such exemption requests are submitted to the NRC for review and approval and must be justified by the licensee on a technical basis.

## 4.0 Correspondence

All correspondence on the subject, between the licensee and the NRC, was reviewed by the inspection team in preparation for the site visit. Attachment 1 to this report is a listing of the correspondence reviewed.

## 5.0 Post-Fire Safe Shutdown Capability

The FSAR, Appendix 9A, describes the post-fire safe shutdown capability. The document lists the systems required for safe shutdown and describes four methods (Methods 1, 2, 3, and 4) to achieve and maintain the safe shutdown, using these systems. Subsequently, in specification 10855-G054(F), Generic Project Requirements for Fire Hazard Analysis Safe Shutdown Review Program for the Hope Creek Generating Station, Revision 0, the licensee regrouped these four methods into three methods (Shutdown Methods I and II and Remote Shutdown Method).

### 5.1 Systems Required for Safe Shutdown

These systems are listed in the FSAR, Table 9A-2, which is reproduced as Attachment 2 to this report.

### 5.2 Safe Shutdown Methods

The three methods described below can be used for the safe shutdown in the event of a fire concurrent with a loss of offsite power. The licensee's analysis indicates that at least one method will be available for a fire in any fire area in the plant.

Two of the shutdown methods (designated as methods I and II) are operable using controls that are located primarily in the control room. The third shutdown method involves shutdown from outside the control room, using controls that are located primarily on the remote shutdown panel.

Hope Creek mechanical design consists of two divisions (Division I and II) of mechanical equipment for use during Design Basis Accident or other postulated accidents. These two mechanical divisions are supported by four electrically independent channels (A, B, C, and D). The electrical channels A and C supply Division I; and channels B and D, supply Division II.

Because of the assumption that offsite power may be unavailable for as long as 72 hours after a fire, the components used in the shutdown methods have been selected so that the shutdown methods are operable using onsite power only. The divisions of Class 1E electric power that are needed in order to make shutdown methods I and II operable are as follows:

a. Shutdown Method I - Division I electrical channels A and C (both ac and dc)

b. Shutdown Method II- Division II electrical channels B and D (both ac and dc)

Although most of the components controlled from the remote shutdown panel are powered from Division II, several components are powered from Division I. However, only the Class 1E electric power for Division II and some Division I instrumentation are needed in order to shut the plant down using the remote shutdown panel.

5.2.1 Shutdown Method I

After closure of the Main Steam Isolation Valves (MSIVs), the high pressure coolant injection (HPCI) system is used to supply makeup water to the reactor vessel. The condensate storage tank (CST) is the preferred source of makeup and will be used if available. Transfer from the CST to the torus suction is assumed to be done manually. The operation of the HPCI system also removes energy from the reactor in the form of steam used to drive the HPCI turbine. During the period in which steam is generated at a rate greater than the consumption of the HPCI system, steam is relieved to the suppression pool by the automatic actuation of the main steam safety/relief valves (SRVs), which open when reactor pressure reaches the valve setpoint. Heat is removed from the suppression pool by operating loop A of the residual heat removal (RHR) system in the suppression pool cooling mode. In this mode, water from the suppression pool is circulated through an RHR heat exchanger and then returned to the suppression pool. To initiate operation of the shutdown cooling mode of the RHR system, it is necessary to depressurize the reactor below a nominal pressure of 100 psig. Normally, SRVs would be used to decrease reactor pressure to the point where RHR shutdown cooling can be used. Since all

the SRVs are powered from Division II dc power, then, in the unlikely event that control of all SRVs is lost, the HPCI steam consumption is sufficient to reduce reactor pressure. When the reactor has been depressurized below 100 psig, the RHR system is switched from the suppression pool cooling mode to the shutdown cooling mode. Heat is removed from the RHR heat exchanger by the safety auxiliary cooling system (SACS), which in turn dissipates heat into the station service water system (SSWS). The shutdown cooling mode of RHR will maintain the reactor in a cold shutdown condition.

As an alternative, after the reactor pressure has decreased to a nominal 295 psig, the makeup water can be supplied from the suppression pool by operating loop C of the RHR system in the low pressure coolant injection (LPCI) mode or loop A of the Core Spray System. Depressurization can continue to be through the HPCI turbine or the SRVs if available. Heat is removed from the suppression pool by operating loop A of the RHR suppression pool cooling mode. When the reactor has been depressurized to below a nominal 100 psig, RHR loop A is switched to the shutdown cooling mode. Shutdown cooling suction valve BC-HV-F008 is powered from Division II. In the event that control of that valve is affected by the fire, then the valve motor operator can be disabled and the valve opened manually. Refer to Attachment 3 for a flow chart of shutdown Method I.

5.2.2 Shutdown Method II

After closure of the MSIVs, the reactor core isolation cooling (RCIC) system is used to supply makeup water to the reactor vessel. The CST is the preferred source of makeup and will be used if available. Transfer from the CST to the torus is assumed to be done manually. The operation of the RCIC system also removes energy from the reactor in the form of steam used to drive the RCIC turbine. During the period in which steam is generated at a rate greater than the consumption of the RCIC system, steam is relieved to the suppression pool by the automatic actuation of the SRVs which open when reactor pressure reaches the valve setpoint. Heat is removed from the suppression pool by operating loop B of the RHR system in the suppression pool cooling mode. In this mode, water from the suppression pool is circulated through the B RHR heat exchanger and then returned to the suppression pool. To initiate operation of the shutdown cooling mode of the RHR system, it is necessary to depressurize the reactor below a nominal pressure of 100 psig. This is accomplished by using the SRVs to discharge steam to the suppression pool. When the reactor has been depressurized below 100 psig, operation of the RCIC system is terminated and the RHR system is switched from the suppression pool cooling mode to the shutdown cooling mode. In both of these modes, heat is removed

from the RHR heat exchanger by the SACS which in turn dissipates heat into the SSWS. The shutdown cooling mode of RHR will maintain the reactor in a cold shutdown condition.

Shutdown cooling suction valve BC-F009 is powered from Division I. In the event that control of this valve is affected by the fire, then an alternate shutdown path can be used. The alternate shutdown cooling mode in lieu of RHR B shutdown cooling mode is as follows: Core spray or LPCI D mode of RHR is used to fill up the reactor until the steam lines are flooded. With one or more SRVs open, water flows out the relief valve and back to the suppression pool. RHR B suppression pool cooling mode cools the suppression pool as before. Refer to Attachment 4 for a flow chart of shutdown Method II.

5.2.3 Remote Shutdown Method

If a fire occurs in the main control room, upper or lower cable spreading rooms, the upper or lower control equipment rooms, or the HVAC rooms at elevation 163' 6" and 178' 0" of the diesel building, the shutdown systems that are controlled from within the main control room may become inoperable. In such an event, plant shutdown can be achieved through the use of the remote shutdown panel (RSP) in conjunction with certain systems and components that are controllable from outside the control room. Although many of the cables associated with the RSP are routed through the cable spreading rooms and main control room, these cables can be isolated through the use of transfer switches located on the RSP. Following actuation of the transfer switches to the "emergency" position, fire-caused damage to the cables in the cable spreading rooms, control room and control equipment rooms will not interfere with proper operation of components that are controllable from the RSP.

In addition to equipment whose controls are located on the RSP, the diesel generator, its auxiliaries and various heating, ventilation and air conditioning systems are used for shutdown from outside the main control room. The cables for the diesel generator controls are isolable by use of transfer switches at the diesel control panel.

5.3 Remaining Plant Areas

All other areas of the plant not provided with an alternate safe shutdown capability are required to comply with Sections III.G.1 and 2 of Appendix R, unless an exemption request has been approved by NRR.

## 6.0 Inspection Methodology

The inspection team examined the licensee's capabilities for separating and protecting equipment, cabling and associated circuits necessary to achieve and maintain hot and cold shutdown conditions. This inspection sampled selected fire areas which the licensee had identified as being in conformance with Appendix R.

The following functional requirements were reviewed for achieving and maintaining hot and cold shutdown:

- Reactivity control
- Pressure control
- Reactor coolant makeup
- Decay heat removal
- Support systems
- Process monitoring

The inspection team also examined the licensee's capability to achieve and maintain hot shutdown and the capability to bring the plant to cold shutdown condition in the event of a fire in areas where remote shutdown capability is provided. The examination included a review of the drawings for the remote shutdown capability and review of the procedures for achieving the remote shutdown. Drawings were reviewed to verify electrical independence from the areas of concern. Procedures were reviewed for general content and feasibility.

Also inspected were fire detection and suppression systems and the degree of physical separation between redundant trains of Safe Shutdown Systems (SSSs). The team review included an evaluation of the susceptibility of the SSSs for damage from fire suppression activities or from the rupture or inadvertent operation of fire suppression systems.

The inspection team examined the licensee's fire protection features provided to maintain one train of equipment needed for safe shutdown free of fire damage. Included in the scope of this effort were fire area boundaries, including walls, floors and ceilings, and fire protection of openings such as fire doors, fire dampers, and penetration seals.

The inspection team also examined the emergency lighting for areas of the plant necessary for safe shutdown.

## 7.0 Inspection of Protection Provided to Safe Shutdown Systems

### 7.1 Protection in Various Fire Areas

The plant is broken down into the following general fire areas, which are further defined in the FSAR sections indicated:

a. Turbine building, 9A.6.1

b. Auxiliary Building, Radwaste Area, 9A.6.2

c. Electrical Access Area Division I, 9A.6.4

d. Electrical Access Area Division II, 9A.6.3

*e. Auxiliary Building Control and Diesel Areas, 9A.6.5

f. Reactor Building Drywell, 9A.6.6

g. Reactor Building elevation 132' and above, 9A.6.7

*h. Reactor Building Division I, 9A.6.8

*i. Reactor Building Division II, 9A.6.9

*j. Reactor Building Torus room, 9A.6.10

k. Reactor Building Main Steam Tunnel, 9A.6.11

l. Technical Support Center, 9A.6.12

*m. Remote Shutdown Panel Room, 9A.6.13

*n. Service Water Intake Division I, 9A.6.14

*o. Service Water Intake Division II, 9A.6.15

*p. Traveling Screen Motor Room, 9A.6.16

q. Miscellaneous Areas, 9A.6.17

The licensee, in FSAR Appendix 9A, requested a number of exemptions from the requirements of Appendix R, Section III G. These exemptions are currently under review by NRR.

The team reviewed the protection provided to SSSs in selected fire areas, as indicated by an asterisk (*), for compliance with Appendix R.

The team did not identify any unacceptable conditions except as follows:

Fire Hazards Analysis Not Properly Performed On A Fire Area Concept Basis

The licensee's Fire Hazards Analysis, currently contained in the FSAR as Appendix 9A to Chapter 9, identified all of the fire zones within a properly defined fire area.

This was done to convert the previously performed fire zone type analysis to a fire area type analysis in accordance with Appendix R and Generic Letter 81-12. However, the conclusions in the revised analysis that sufficient equipment will be available to safely shut down the plant in the event of a fire in any single fire area is partly based on the fire zone type analysis contained in FSAR Tables 9A-3 through 9A-252. These tables did not consider the effect of intervening combustibles (primarily cables) between the zones in the same fire area. A complete analysis considering the effects of intervening combustibles not only on adjacent fire zones but also remote zones within the fire area should be provided.

The licensee agreed to revise the Fire Hazards Analysis on a fire area basis by identifying all of the safety-related cables and components within the fire area and showing whether fire wrapping will be provided for those cables and components which are part of the redundant division which is being relied upon for safe shutdown for that particular fire area or else explaining why those particular cables and components can be lost and safe shutdown still can be achieved.

Pending this revised analysis, this remains an unresolved item (50-354/85-24-01).

## 7.2. Safe Shutdown Procedures

### 7.2.1 Procedure Review

The team reviewed the following safe shutdown procedures, which were all in draft form at the time of inspection:

- OP-IO.ZZ-008(Q), HCGS Integrated Operating Procedure-Shutdown From Outside Control Room, Revision A
- OP-AB.ZZ-130(Q), Control Room Evacuation, Revision 0
- OP-AB.ZZ-135(Q), Loss of Offsite Power, Revision 0
- OP-SO. BC-001(Q), Residual Heat Removal System Operation, Revision 0

The scope of the review was to ascertain that the shutdown could be attained in a safe and orderly manner, to determine the level of difficulty involved in operating equipment, and to verify that there was no dependence on repairs for achieving hot shutdown.

The team did not identify any unacceptable conditions except as follows:

a. Incomplete Procedure OP-IO.ZZ-008(Q), Shutdown From Outside Control Room, Revision A

The following steps and/or information need to be added to the procedure:

1. Attachment 1, listing of remote shutdown panel (RSP) transfer switch automatic actions, will be revised to eliminate actions which can only be verified in the main control room.

2. Attachment 2, listing of (RSP) redundant instrumentation, needs to be added.

3. A step will be added to specifically direct the operator to monitor suppression pool level.

4. A step will be added to verify the safety auxiliaries cooling system (SACS) outlet temperature to the heat exchanger.

5. The steps necessary for actuation of the chilled water system will be added.

6. A discrepancy exists between the designation for the suppression chamber temperature quadrant temperature recorders on the RSP and the designation in the procedure.

7. The results of the spurious signal analysis (see unresolved item 50-354/85-24-04 in Section 7.3.2 of this report) need to be incorporated into the procedure for potential spurious valve and instrumentation operations.

By the end of the inspection, the licensee provided Revision B of this procedure, which satisfactorily addressed items 1, 3, 4 and 6. Items 2, 5 and 7 remain to be incorporated into a future revision of the procedure.

Pending completion of the above licensee action and its review by NRC, this remains an unresolved item (50-354/85-24-02).

b. Incomplete Procedure OP-AB.ZZ-135(Q), Loss of Offsite Power, Revision 0

The results of the spurious signal analysis (see unresolved item 50-354/85-24-04 in Section 7.3.2 of this report) need to be incorporated into the procedure including he steps necessary to manually load the diesel generators after isolating the load sequencers.

Pending completion of the above licensee action and its review by NRC, this remains an unresolved item (50-354/85-24-03).

## 7.3 Protection for Associated Circuits

Appendix R, Section III.G, requires that protection be provided for associated circuits that could prevent operation or cause maloperation of redundant trains of systems necessary for safe shutdown. The circuits of concern are generally associated with safe shutdown circuits in one of three ways:

- Common bus concern
- Spurious signals concern
- Common enclosure concern

The associated circuits were evaluated by the team for common bus, spurious signal, and common enclosure concerns. Power, control, and instrumentation circuits were examined for potential problems. A sampling basis was used in making the examination, since many circuits were involved and a determination of cable routing took considerable time.

### 7.3.1 Common Bus Concern

The common bus concern may be found in circuits, either safety related or non-safety related, where there is a common power source with shutdown equipment and the power source is not electrically protected from the circuit of concern.

The team examined, on a sampling basis, 4160V, 480V and 125V DC bus protective relay coordination. The team also examined, on a sampling basis, the protection for specific instrumentation, controls, and power circuits, including the coordination of fuses and circuit breakers. The licensee plans to perform relay setting at approximately 24-month intervals.

No unacceptable conditions were identified.

7.3.2 Spurious Signals Concern

The spurious signal concern is made up of 2 items:

- False motor, control, and instrument indications can occur such as those encountered during 1975 Browns Ferry fire. These could be caused by fire initiated grounds, short or open circuits.

- Spurious operation of safety related or non-safety related components can occur that would adversely affect shutdown capability (e.g., RHR/RCS isolation valves).

The team examined, on a sampling basis, the following areas to ascertain that no spurious signal concern exists:

- Current transformer secondaries
- High/low pressure interface
- General fire instigated spurious signals

No unacceptable conditions were identified except as follows:

Incomplete Spurious Signal Analysis

The licensee has not completed their general fire instigated spurious signal analysis for the safe shutdown components. The licensee has committed to provide a completed analysis by August, 1985.

This is an unresolved item, pending completion of the analysis by the licensee and its review by NRC (50-354/85-24-04).

7.3.3 Common Enclosure Concern

The common enclosure concern may be found when redundant circuits are routed together in a raceway or enclosure and they are not electrically protected or when fire can destroy both circuits due to inadequate fire barrier penetrations.

A number of circuits, selected on a sampling basis, were examined for this concern.

No unacceptable conditions were identified.

## 7.4 General Fire Protection Features

The team examined the general fire protection features in the plant provided to maintain one train of safe shutdown equipment free of fire damage. Included in the scope of this effort were fire area boundaries, including walls, floors and ceilings, and fire protection of openings such as fire doors, fire dampers, penetration seals, fire protection systems, and other fire protection features.

No unacceptable conditions were identified except as follows:

a. Fixed Fire Suppression for the Control Console Pit in the Main Control Room

The team observed that the floor pit under the main control console does not contain a fixed fire suppression system.

The audit team requested the licensee to justify the absence of a fixed fire suppression system in this area. This issue is also related to a request for approval for a deviation from NRC fire protection guidelines. The licensee committed to provide NRR with the requested justification or provide additional information concerning similar arrangements of equipment at other power plants for NRR's review. The information will be provided by August, 1985.

Pending NRR review of this information, this issue remains unresolved (50-354/85-24-05).

b. Fire Resistance of Metal Security Panels in the Main Control Room

The metal security panels that form part of the fire wall around the main control room are required to have a 3 hour fire rating.

The audit team requested that the licensee substantiate the fire resistance of the metal panels.

The licensee committed to provide NRR with a comparison of the construction of these panels to the construction of fire-rated doors. This information will be submitted by August, 1985.

Pending NRR review of the information, this issue will remain unresolved (50-354/85-24-06).

c. Cable Tray Penetration Seals

The audit team wanted to determine if the licensee had considered the effect of cable tray collapse during a fire on the integrity of fire barrier penetration seals.

The licensee supplied the audit team with calculations under "worst case" failure modes to support the conclusion that the seals will remain in place.

Pending review of these calculations by NRR, this issue will remain unresolved (50-354/85-24-07).

d. Ruskin Fire Damper Closure Under Air Flow Conditions

The audit team requested an explanation as to how the applicant will assure closure of fire dampers under air flow conditions. This is an NRC concern since the fire damper manufacturer (the Ruskin Manufacturing Co.) had informed NRC of a deficiency with their equipment, in accordance with the requirements of 10 CFR Part 21.

The licensee committed to provide NRR with a response to this issue by August, 1985, including commitments to implement hardware modifications and/or administrative actions, where necessary.

Pending NRR review of this response, this issue will remain unresolved (50-354/85-24-08).

e. Fire Proofing of Structural Steel

The team requested from the licensee a list of all areas where structural steel will not be fire proofed and the justification for omitting fire proofing in those areas.

The licensee committed to provide NRR with a list of such areas and a summary of the Professional Loss Control methodology and fire hazards analysis which was used as the basis for omitting fire proofing of structural steel.

Pending NRR review of this information, this issue will remain unresolved (50-354/85-24-09).

f. Incomplete Sprinkler Systems

The team observed that some installed sprinkler systems may not meet the NFPA requirements in that adequate coverage was not provided in some cases or the sprinklers were not installed properly. As an example, some service water intake structure sprinklers are sidewall sprinklers where upright sprinkler heads would be more appropriate. In the same area, additional sprinklers are required at the hatches and under the duct work. Also, sprinkler protection is required for the buss duct penetrating the fire wall of the Diesel Generator Wing Area

at El.102'. Additional sprinklers are also required in the lower cable spreading room (El. 77') to provide electrical tray protection.

The licensee explained that an audit of all sprinkler systems is planned. This audit will be performed by an independent fire protection consultant to assess the sprinkler system adequacy and conformance with NFPA standards. This audit will also assure that sprinkler heads are not obstructed.

The licensee committed to make the necessary fixes identified above and also implement any modification requested or identified by the fire protection consultant's audit or provide adequate justification.

This is an unresolved item pending review of actions taken by the licensee (50-354/85-24-10).

g. Fire Detection System Audit

The team observed that the detection provided in some areas may not meet the requirements of NFPA. The licensee explained that an audit of the detection system is planned to be made by an independent qualified fire protection consultant to assess the detection systems conformance with the requirements of NFPA.

The licensee committed to address all findings made by this consultant and make the necessary hardware modifications or provide a justification. In addition, the licensee agreed to provide additional capability in the Remote Shutdown Panel Room.

The team also determined that FSAR section 9.5.1.2.15 does not clearly indicate areas that lack detection. The licensee committed to update this section to clearly state where safety related areas do not have detection capability and provide justification for omitting detection.

This is an unresolved item pending a review of the fire protection consultant's findings, the actions taken by the licensee in this area and a review of the updated FSAR (50-354/85-24-11).

h. HVAC Control Panels for Diesel Generators

The audit team observed that the HVAC control panels for the Diesel Generators are located in such a way, that a single fire may damage both. The licensee stated that this problem has been identified in the FSAR and a deviation request exists therein. The licensee committed to amend the deviation request in the FSAR section 9A.6.5.1.e to include the addition of a partial

height fire barrier wall. The wall will be at least 1 foot higher than the panels, with a wing section to protect at least one division of HVAC Diesel Generator control panel.

This is an unresolved item pending review of the deviation request by NRR (50-354/85-24-12).

i. Room Temperature Monitoring for Loss of HVAC Equipment

The team observed that loss of the HVAC equipment in Rooms 5620 and 5704 could increase the temperature of several rooms containing vital equipment. Monitoring of the ambient temperature is critical since vital equipment and instrumentation have been qualified to certain ambient temperature.

The licensee, at the present time, does not have a temperature monitoring system, and is aware of the need to have one installed. The licensee committed to design and install a temperature monitoring system for the rooms involved.

This is an unresolved item pending review of the system (50-354/85-24-13).

8.0 Emergency Lighting

10 CFR 50, Appendix R, Section III.J, requires that emergency lighting units with at least an 8-hour battery power supply shall be provided in all areas needed for operation of safe shutdown equipment and in access and egress routes thereto. The licensee is committed to provide such lighting (see FSAR Appendix 9A and SER section 9.5.1.4).

The team examined the plant emergency lighting system to ascertain the licensee's compliance with the above commitment. Since a very large portion of the emergency lighting has not yet been installed, the review was performed by walking through the areas required for shutdown from outside the control room and either observing what lighting has already been installed or what is shown on the relevant drawings for future installation.

The team did not find any unacceptable conditions except as follows:

Emergency Lighting Enhancement for Two Locations

In two locations, it was determined that additional emergency lighting should be installed that was not shown on the drawings.

For the corridor to the stairway at elevation 137' on the pathway to the diesel generator, inadequate lighting was shown on Drawing No. E-1433-0, Lighting and Telephone Plan-Control & D/G Area-Plan El.137' & EL.146', Revision 21. Similarly, for the room housing the reactor

protection system breaker panels 10C410 and 10C411, inadequate lighting was shown on Drawing No. E-1425-0, Lighting and Telephone Plan-Aux. Bldg.-Control & D/G Area-Plan El.54', Revision 15.

The licensee agreed to provide additional lighting in these areas. Pending final installation of this lighting, this remains an unresolved item (50-354/85-24-14).

## 9.0 Oil Collection System for Reactor Coolant Pumps

10 CFR 50, Appendix R, Section III.O, requires that the reactor coolant pumps shall be equipped with an oil collection system if the containment is not inerted during normal operation. As the containment in this plant is inerted during normal operation, the above requirement does not apply to this plant. Therefore, no inspection was done in the area.

## 10.0 Quality Assurance

During the course of the inspection, the team reviewed several drawings, fire hazard analysis, fire protection modification packages, procedures, and other fire protection documents. The scope of review included verification of their technical adequacy, appropriate reviews, design and procurement controls, and other Quality Assurance requirements for the licensee's fire protection program. Except as noted in the previous sections of this report, the team did not identify any other unacceptable conditions.

## 11.0 Unresolved Items

Unresolved items are matters for which more information is required in order to ascertain whether they are acceptable, violations, or deviations. Unresolved items are discussed in Sections 7.1,7.2, 7.3.2, 7.4, and 8.

## 12.0 Conclusions

No violations or deviations were identified. Fourteen items remained unresolved at the end of the inspection. These items are summarized in Attachment 5 to this report.

The licensee committed to resolve these items expeditiously, to complete procedural and administrative type of actions by August 15, 1985, and to complete the required hardware modifications by the fuel load. The licensee was informed that the licensing related unresolved items (50-354/85-24-05 through 13) should be resolved directly with the office of NRR.

## 13.0 Exit Interview

The inspection team met with the licensee representatives, denoted in Paragraph 1, at the conclusion of the inspection on May 24, 1985. The team leader summarized the scope and findings of the inspection at that time.

The team leader also discussed with the licensee the contents of the inspection report and ascertained that it did not contain any proprietary information. The licensee agreed that the inspection report may be placed in the Public Document Room without prior licensee review for proprietary information (10 CFR 2.790).

At no time during this inspection was written material provided to the licensee by the team.

ATTACHMENT 1

LIST OF CORRESPONDENCE

| Date | From-To | Subject |
|---|---|---|
| June 1, 1984 | PSE&G-NRC | Additional Information on Fire Protection Evaluation |
| June 15, 1984 | PSE&G-NRC | Additional Information on Fire Protection Evaluation |
| June 19, 1984 | NRC-PSE&G | Hope Creek Fire Protection Meeting Notes |
| October 1984 | NRC-PSE&G | Safety Evaluation Report (SER) |
| May 1985 | PSE&G-NRC | FSAR Amendment 10 |

ATTACHMENT 2

SYSTEMS REQUIRED FOR SHUTDOWN

(Reproduced from FSAR Table 9A-2)

GROUP I - Systems Required for HOT & COLD Shutdown

- Control Rod Drive (Manual Scram Circuits Only)
- Main Steam Isolatation Valves (Manual Closure Function Only)
- Suppression Pool Temperature Monitoring
- Reactor Pressure Vessel Instrumentation

GROUP II - Systems Required for HOT Shutdown

- RCIC or HPCI or ADS plus LPCI
- Main Steam Relief Valves
- Station Service Water (Q Portion Only) (SSWS)
- Service Water Intake Structure and Traveling Screens HVAC
- Diesel Generators and Auxiliaries
- DG Area HVAC
- Safety Auxiliaries Cooling System (SACS)
- Auxiliary Building Control Area HVAC
- Control Area Chilled Water Systems
- Primary Containment Instrument Gas (PCIG) Receiver
- RHR, Suppression Pool Cooling Mode
- ECCS Pump Room Unit Coolers

GROUP III - Systems Required for COLD Shutdown

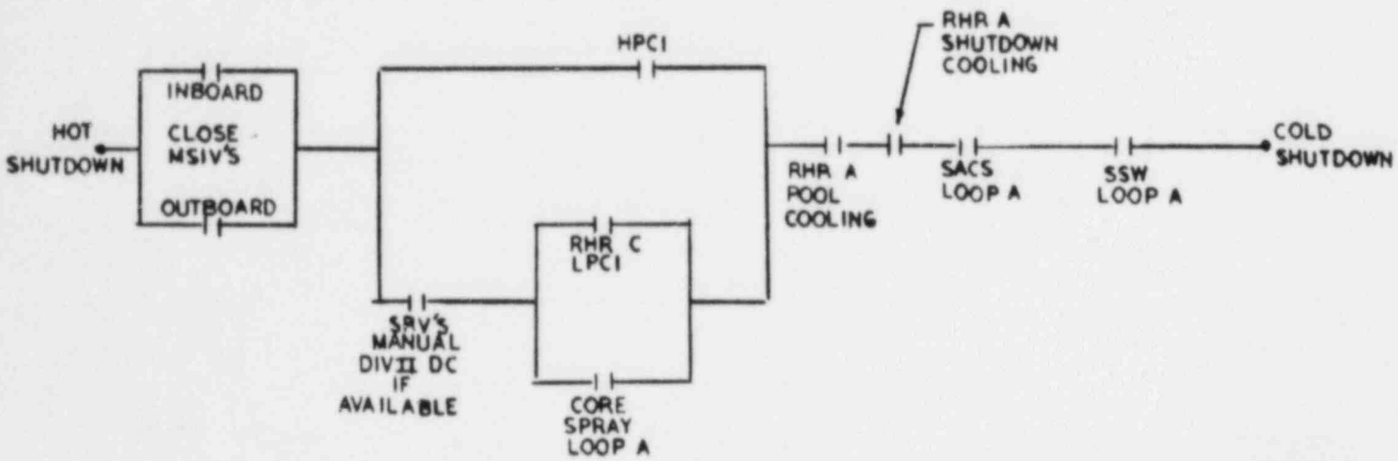
- RHR, Shutdown Cooling Mode
- All GROUP II Systems, except HPCI, RCIC, SRVs & PCIG
- Core spray with SRVs and suppression pool cooling is a backup to shutdown cooling

Minimum Equipment Required for Shutdown

This is a list of the minimum equipment for each system required for shutdown from either the Main Control Room (MCR), or the Remote Shutdown Panel (Refer to FSAR Table 9A-2 for this list).

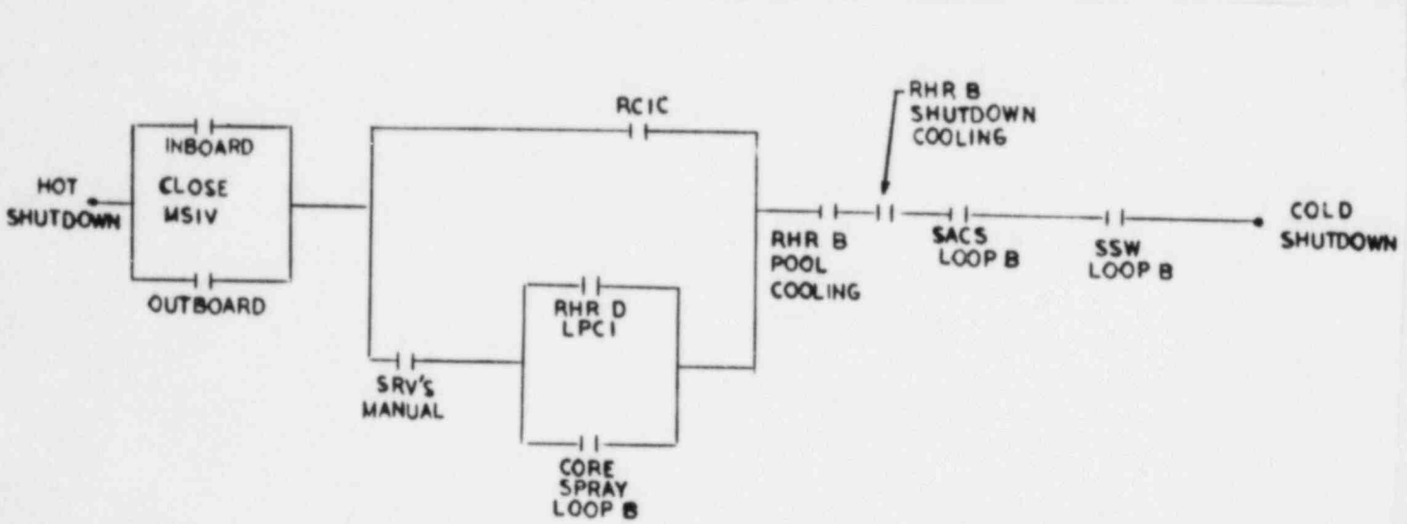
ATTACHMENT 3

SHUTDOWN METHOD I



ATTACHMENT 4

SHUTDOWN METHOD II



ATTACHMENT 5

SUMMARY OF INSPECTION FINDINGS

| Item No. | Item Description | For Details, Refer to Para. |
|---|---|---|
| 85-24-01 | Fire Hazard Analysis not Properly Performed on a Fire Area Concept Basis | 7.1 |
| 85-24-02 | Incomplete Procedure GP-IO.ZZ-008(Q), Shutdown from Outside Control Room Revision A | 7.2.1.a |
| 85-24-03 | Incomplete Procedure OP-AB.ZZ-135 (Q), Loss of Offsite Power, Revision 0 | 7.2.1.b |
| 85-24-04 | Incomplete Spurious Signal Analysis | 7.3.2 |
| 85-24-05 | Fixed Fire Suppression for the Control Console Pit in the Main Control Room | 7.4.a |
| 85-24-06 | Fire Resistance of Metal Security Panels in the Main Control Room | 7.4.b |
| 85-24-07 | Cable Tray Penetration Seals | 7.4.c |
| 85-24-08 | Ruskin Fire Damper Closure under Air Flow Conditions | 7.4.d |
| 85-24-09 | Fire Proofing of Structural Steel | 7.4.e |
| 85-24-10 | Incomplete Sprinkler Systems | 7.4.f |
| 85-24-11 | Fire Detection System Audit | 7.4.g |
| 85-24-12 | HVAC Control Panels for Diesel Generators | 7.4.h |
| 85-24-13 | Room Temperature Monitoring for Loss of HVAC Equipment | 7.4.i |
| 85-24-14 | Emergency Lighting Enhancement for Two Locations | 8.0 |