November 9, 1987

Docket No. 50-354

Mr. Corbin A. McNeill, Jr.
Senior Vice President - Nuclear
Public Service Electric & Gas Company
P.O. Box 236
Hancocks Bridge, New Jersey 08038

Dear Mr. McNeill:

SUBJECT: STANDBY LIQUID CONTROL SYSTEM SODIUM PENTABORATE CONCENTRATION (TAC NO. 61255)

Re: HOPE CREEK GENERATING STATION

The Commission has issued the enclosed Amendment No. 11 to Facility Operating License No. NPF-57 for the Hope Creek Generating Station. This amendment consists of changes to the Technical Specifications (TSs) in response to your application dated July 14, 1987.

This amendment increases the minimum required concentration and the minimum required weight of sodium pentaborate in the standby liquid control system storage tank.

A copy of our safety evaluation is also enclosed. Notice of Issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,

/s/

George Rivenbark, Project Manager
Project Directorate I-2
Division of Reactor Projects I/II
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 11 to License No. NPF-57
2. Safety Evaluation

cc w/enclosures:
See next page

OGC concurred on license amendment package on 10.30.87 See Amendment concurrence pg. pab

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

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cc w/enclosures:
See next page

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3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/s/

Walter R. Butler, Director
Project Directorate I-2
Division of Reactor Projects I/II
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: November 9, 1987

LA:PDI-2:DRPI/II	PM:PDI-2:DRPI/II	OGC	D:PDI-2:DRPI/II
MO'Brien	GRivenbark:ca		WButler
10/27/87	10/13/87	10/30/87	11/3/87

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

PUBLIC SERVICE ELECTRIC & GAS COMPANY

ATLANTIC CITY ELECTRIC COMPANY

DOCKET NO. 50-354

HOPE CREEK GENERATING STATION

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 11
License No. NPF-57

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

   A. The application for amendment filed by the Public Service Electric & Gas Company (PSE&G) dated July 14, 1987, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

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

   C. There is reasonable assurance: (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations set forth in 10 CFR Chapter I;

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

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

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-57 is hereby amended to read as follows:

   (2) Technical Specifications and Environmental Protection Plan

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 11, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the license. PSE&G shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Walter R. Butler, Director
Project Directorate I-2
Division of Reactor Projects I/II
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: November 9, 1987

ATTACHMENT TO LICENSE AMENDMENT NO. 11

FACILITY OPERATING LICENSE NO. NPF-57

DOCKET NO. 50-354

Replace the following pages of the Appendix "A" Technical Specifications with the attached pages. The revised pages are identified by Amendment number and contain vertical lines indicating the area of change. Overleaf pages provided to maintain document completeness.*

Remove	Insert
3/4 1-19*	3/4 1-19*
3/4 1-20	3/4 1-20
3/4 1-21	3/4 1-21
B 3/4 1-3*	B 3/4 1-3*
B 3/4 1-4	B 3/4 1-4
-	B 3/4 1-5

REACTIVITY CONTROL SYSTEMS

3/4.1.5 STANDBY LIQUID CONTROL SYSTEM

LIMITING CONDITION FOR OPERATION

3.1.5 The standby liquid control system consists of two redundant subsystems and shall be OPERABLE.

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2, and 5*

ACTION:

a. In OPERATIONAL CONDITION 1 or 2:

1. With one system subsystem inoperable, restore the subsystem to OPERABLE status within 7 days or be in at least HOT SHUTDOWN within the next 12 hours.

2. With both system subsystems inoperable, restore at least one subsystem to OPERABLE status within 8 hours or be in at least HOT SHUTDOWN within the next 12 hours.

b. In OPERATIONAL CONDITION 5*:

1. With one system subsystem inoperable, restore subsystem to OPERABLE status within 30 days or insert all insertable control rods within the next hour.

2. With both standby liquid control system subsystems inoperable, insert all insertable control rods within one hour.

SURVEILLANCE REQUIREMENTS

4.1.5 The standby liquid control system shall be demonstrated OPERABLE:

a. At least once per 24 hours by verifying that;

1. The temperature of the sodium pentaborate solution in the storage tank is greater than or equal to 70°F.

2. The available volume of sodium pentaborate solution is within the limits of Figure 3.1.5-1.

3. The heat tracing circuit is OPERABLE by determining the temperature of the pump suction piping to be greater than or equal to 70°F.

*With any control rod withdrawn. Not applicable to control rods removed per Specification 3.9.10.1 or 3.9.10.2.

SURVEILLANCE REQUIREMENTS (Continued)

b. At least once per 31 days by:

1. Verifying the continuity of the explosive charge.

2. Determining that the available weight of sodium pentaborate is greater than or equal to 5,776 lbs and the concentration of boron in solution is within the limits of Figure 3.1.5-1 by chemical analysis.*

3. Verifying that each valve (manual, power operated or automatic) in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct position.

c. Demonstrating that, when tested pursuant to Specification 4.0.5, the minimum flow requirement of 41.2 gpm, per pump, at a pressure of greater than or equal to 1255 psig is met.

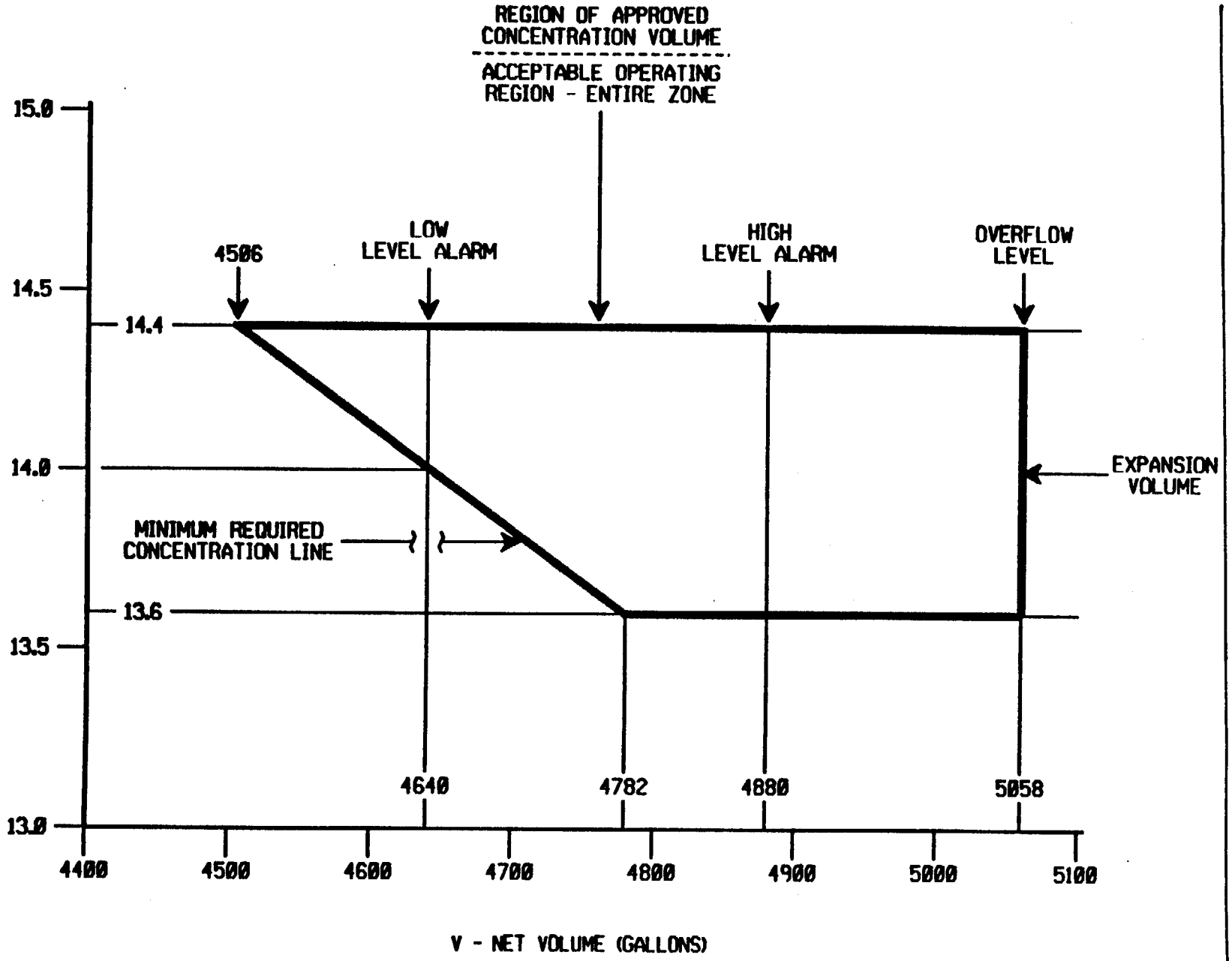
d. At least once per 18 months during shutdown by:

1. Initiating one of the standby liquid control system subsystem, including an explosive valve, and verifying that a flow path from the pumps to the reactor pressure vessel is available by pumping demineralized water into the reactor vessel and verifying that the relief valve does not actuate. The replacement charge for the explosive valve shall be from the same manufactured batch as the one fired or from another batch which has been certified by having one of that batch successfully fired. Both injection subsystems shall be tested in 36 months.

2. **Demonstrating that all heat traced piping between the storage tank and the injection pumps is unblocked and then draining and flushing the piping with demineralized water.

3. Demonstrating that the storage tank heaters are OPERABLE by verifying the expected temperature rise of the sodium pentaborate solution in the storage tank after the heaters are energized.

*This test shall also be performed anytime water or boron is added to the solution or when the solution temperature drops below 70°F.
**This test shall also be performed whenever both heat tracing circuits have been found to be inoperable and may be performed by any series of sequential, overlapping or total flow path steps such that the entire flow path is included.



SODIUM PENTABORATE SOLUTION
VOLUME/CONCENTRATION REQUIREMENTS

FIGURE 3.1.5-1

CONTROL RODS (Continued)

Control rod coupling integrity is required to ensure compliance with the analysis of the rod drop accident in the FSAR. The overtravel position feature provides the only positive means of determining that a rod is properly coupled and therefore this check must be performed prior to achieving criticality after completing CORE ALTERATIONS that could have affected the control rod coupling integrity. The subsequent check is performed as a backup to the initial demonstration.

In order to ensure that the control rod patterns can be followed and therefore that other parameters are within their limits, the control rod position indication system must be OPERABLE.

The control rod housing support restricts the outward movement of a control rod to less than 6 inches in the event of a housing failure. The amount of rod reactivity which could be added by this small amount of rod withdrawal is less than a normal withdrawal increment and will not contribute to any damage to the primary coolant system. The support is not required when there is no pressure to act as a driving force to rapidly eject a drive housing.

The required surveillance intervals are adequate to determine that the rods are OPERABLE and not so frequent as to cause excessive wear on the system components.

3/4.1.4 CONTROL ROD PROGRAM CONTROLS

Control rod withdrawal and insertion sequences are established to assure that the maximum insequence individual control rod or control rod segments which are withdrawn at any time during the fuel cycle could not be worth enough to result in a peak fuel enthalpy greater than 280 cal/gm in the event of a control rod drop accident. The specified sequences are characterized by homogeneous, scattered patterns of control rod withdrawal. When THERMAL POWER is greater than 20% of RATED THERMAL POWER, there is no possible rod worth which, if dropped at the design rate of the velocity limiter, could result in a peak enthalpy of 280 cal/gm. Thus requiring the RSCS and/or RWM to be OPERABLE when THERMAL POWER is less than or equal to 20% of RATED THERMAL POWER provides adequate control.

The RSCS and RWM provide automatic supervision to assure that out-of-sequence rods will not be withdrawn or inserted.

The analysis of the rod drop accident is presented in Section 15.4.9 of the FSAR and the techniques of the analysis are presented in a topical report, Reference 1, and two supplements, References 2 and 3.

The RBM is designed to automatically prevent fuel damage in the event of erroneous rod withdrawal from locations of high power density during high power operation. Two channels are provided. Tripping one of the channels will block erroneous rod withdrawal soon enough to prevent fuel damage. This system backs up the written sequence used by the operator for withdrawal of control rods.

3/4.1.5 STANDBY LIQUID CONTROL SYSTEM

The standby liquid control system provides a backup capability for bringing the reactor from full power to a cold, Xenon-free shutdown, assuming that the withdrawn control rods remain fixed in the rated power pattern. To meet this objective it is necessary to inject a quantity of boron which produces a concentration of 660 ppm in the reactor core and other piping systems connected to the reactor vessel. To allow for potential leakage and imperfect mixing, this concentration is increased by 25%. The generic design basis of the standby liquid control system provides a specified cold shutdown boron concentration in the reactor core. The standby liquid control system was typically designed to inject the cold shutdown boron concentration in 90 to 120 minutes. The time requirement was selected to override the reactivity insertion rate due to cool down following the xenon poison peak. The pumping rate of 41.2 gpm meets the requirement.

The minimum storage volume of the solution is established to include the generic shutdown requirement and to allow for the portion below the pump suction nozzle that cannot be inserted. An additional allowance in the standby liquid control storage volume is provided to account for storage tank instrument inaccuracy and drift. Even with the maximum specified instrument inaccuracy and drift, the required quantity of sodium pentaborate solution is always available for injection.

A normal quantity of 4640 gallons of sodium pentaborate solution having a 14.0 percent concentration is required to meet the shutdown requirements. The temperature requirement for sodium pentaborate solution and the pump suction piping is necessary to ensure the sodium pentaborate remains in solution.

With redundant pumps and explosive injection valves and with a highly reliable control rod scram system, operation of the reactor is permitted to continue for short periods of time with the system inoperable or for longer periods of time with one of the redundant components inoperable.

Surveillance requirements are established on a frequency that assures a high reliability of the system. Once the solution is established, boron concentration will not vary unless more boron or water is added, thus a check on the temperature and volume once each 24 hours assures that the solution is available for use.

Replacement of the explosive charges in the valves at regular intervals will assure that these valves will not fail because of deterioration of the charges.

The ATWS Rule (10 CFR 50.62) requires the addition of a new design requirement to the generic standby liquid control system design basis. Changes to flow

rate, solution concentration or boron equivalent to meet the ATWS Rule must not invalidate the original system design basis. Paragraph (c)(4) of 10 CFR 50.62 states that:

> "Each boiling water reactor must have a Standby Liquid Control System (SLCS) with a minimum flow capacity and boron control equivalent in control capacity to 86 gallons per minute of 13 weight percent sodium pentaborate solution (natural boron enrichment)."

The described minimum system parameters (82.4 gpm, 13.6 percent concentration and natural boron equivalent) will ensure an equivalent injection capability that exceeds the ATWS Rule requirement. The stated minimum allowable pumping rate of 82.4 gallons per minute is met through the simultaneous operation of both pumps.

1. C. J. Paone, R. C. Stirn and J. A. Woolley, "Rod Drop Accident Analysis for Large BWR's", G. E. Topical Report NEDO-10527, March 1972

2. C. J. Paone, R. C. Stirn and R. M. Young, Supplement 1 to NEDO-10527, July 1972

3. J. M. Haun, C. J. Paone and R. C. Stirn, Addendum 2, "Exposed Cores", Supplement 2 to NEDO-10527, January 1973

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 11 TO FACILITY OPERATING LICENSE NO. NPF-57

PUBLIC SERVICE ELECTRIC & GAS COMPANY

ATLANTIC CITY ELECTRIC COMPANY

HOPE CREEK GENERATING STATION

DOCKET NO. 50-354

1.0 INTRODUCTION

By letter dated May 21, 1985, Public Service Electric & Gas Company (PSE&G), the licensee, described to the staff how the Standby Liquid Control System (SLCS) design at Hope Creek meets the requirements of ATWS Rule 10 CFR 50.62(c)(4). The staff has informed PSE&G that the current Hope Creek Technical Specifications (TSs) (Surveillance Requirement 4.1.5.c) only require the two SLCS pumps to provide a minimum flow of 82.4 gpm, whereas 10 CFR 50.62(c)(4) requires that the SLCS operate at 86 gpm if the concentration of sodium pentaborate in the SLCS is 13 weight percent as currently specified by the Hope Creek TSs (Hope Creek has a 251 inch diameter reactor pressure vessel). As a result of discussions with the staff concerning the inadequacy of the current Hope Creek TS requirements for the SLCS to assure that the SLCS meets the ATWS Rule requirements, PSE&G, by letter dated July 14, 1987, requested changes to the TSs with regard to the SLCS. The proposed changes are to TS Section 4.1.5.b.2, Figure 3.1.5-1 and Bases 3/4.1.5. The proposed changes reflect the licensee's plan to increase the minimum required concentration of sodium pentaborate in the SLCS tank (Figure 3.1.5-1) to 13.6 weight percent by increasing the required minimum weight of sodium pentaborate in the SLCS storage tank (TS 4.1.5.b.2) by 16 pounds (i.e., from 5760 to 5776 pounds). It also lowered the SLCS storage tank low and high level alarms shown on Figure 3.1.5-1 from 4850 and 4997 gallons to 4782 and 4880 gallons respectively. This increase in concentration in conjunction with the capability to operate both SLCS pumps simultaneously at a total combined flow rate of 82.4 gpm is proposed to satisfy the requirements of 10 CFR 50.62(c)(4).

2.0 EVALUATION

The changes proposed by the licensee have been reviewed by the staff against the requirements of the ATWS Rule (10 CFR 50.62), and Generic Letter 85-03 "Clarification of Equivalent Control Capacity for Standby Liquid Control Systems," dated January 28, 1985. The licensee's proposed increase in sodium pentaborate concentration to 13.6 weight percent in conjunction with a flow rate of 82.4 gpm will provide a boron

content equivalent in control capacity to 86 gpm of 13 weight percent sodium pentaborate. This is in compliance with 10 CFR 50.62(c)(4) and is therefore acceptable.

As a result of these changes, the sodium pentaborate solution saturation temperature increases to 62°F from 59°F (approximately 5%). The increased saturation temperature is still less than the temperature maintained by the electrical heater system which maintains the SLCS tank solution between 75°F and 85°F. The performance of TS Surveillance Requirements 4.1.5.a.1 and a.3, on a daily basis, assures that the SLCS system heat tracing and SLCS tank electrical heater system maintains system temperature at greater than or equal to 70°F. Additionally, the areas in which the SLCS system is located are maintained at temperatures of at least 70°F.

On the basis of our review as discussed above, we have concluded that the proposed TS changes are acceptable and will assure that the SLCS is in compliance with 10 CFR 50.62(c)(4).

PSE&G's plan to periodically test only one SLCS system pump at a time instead of both pumps simultaneously is also acceptable. This finding is based upon the licensee's statement that tests were performed at Hope Creek during startup which verified that the SLCS is capable of operating under the increased pressures associated with two pump operation.

The Bases section was revised to reflect the proposed changes. The revised Bases are acceptable since it adequately explains the bases for the current requirements in the TSs.

3.0 ENVIRONMENTAL CONSIDERATION

This amendment involves a change to a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes to the surveillance requirements. The staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that this amendment involves no significant hazards consideration and there has been no public comment on such finding. Accordingly, this amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of this amendment.

4.0 CONCLUSION

The Commission made a proposed determination that the amendment involves no significant hazards consideration which was published in the Federal Register (52 FR 32208) on August 26, 1987 and consulted with the State of New Jersey. No public comments were received and the State of New Jersey did not have any comments.

The staff has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (2) 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 nor to the health and safety of the public.

Principal Contributors: G. Thomas and G. Rivenbark

Dated: November 9, 1987