



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 16 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 June 4, 1986, Public Service Electric & Gas Company (the licensee) requested an amendment to Facility Operating License No. NPF-57 for the Hope Creek Generating Station. The proposed amendment would change plant Technical Specification (TS) 3/4.6.1.8 and its associated bases. These changes deal with the Limiting Condition for Operation (LCO) and Surveillance Requirements (SR) for the drywell and Suppression Chamber (SC) purge systems. Specifically, the proposed LCO would allow the primary containment (drywell and SC) butterfly isolation valves on either the 26-inch drywell purge supply and exhaust lines, or on the 24-inch SC purge supply and exhaust lines, to be opened for pre-purge cleanup or deinerting of the primary containment during reactor Operational Conditions 1, 2, and 3. Also, it would allow the butterfly isolation valve on the six-inch nitrogen supply line to the primary containment, the inboard butterfly isolation valves on the 26 and 24-inch purge supply lines, and the butterfly isolation valves on the 26 and 24-inch purge exhaust lines, to be opened if needed, for inerting the primary containment during the above operational conditions. The licensee proposed the above LCO in lieu of the existing LCO 3.6.1.8 which requires the above valves to be operable and sealed closed during plant Operational Conditions 1, 2, and 3. The proposed change would require the above valves to be kept administratively controlled closed at all other times during Plant Operational conditions 1, 2, and 3. The licensee additionally proposed changes to HCGS TS Table 3.6.3-1, "Primary Containment Isolation Valves". Specifically, the licensee proposed changing the existing 15 second maximum isolation time for these valves given in the table to five seconds maximum isolation time.

Based on discussions of the above proposed changes in a meeting with the licensee on October 23, 1986, the staff noted that the LCO should not only specify the permitted functions, but also should specify a cumulative annual time limit (number of hours in a 365-day period) for the use of the purge lines during plant Operational Conditions 1, 2, and 3. The staff requested that justification for the time chosen be also provided. The staff further suggested that the LCO should restrict the use of the

purge lines to one supply line and one exhaust line at any one time, for performing any one of the above functions to comply with the requirements of Branch Technical Position (BTP) CSB 6-4, "Containment Purging During Normal Operations," NUREG-0800, Revision 2, July 1981.

In response to the above suggestions, by letter dated November 21, 1986, the licensee revised and superseded their earlier proposed changes to HCGS TS 3/4.6.1.8. Subsequently, by letters dated December 18, 1986 and February 20, March 19, May 15 and July 13, 1987, the licensee made minor revisions to HCGS TS 3/4.6.1.8 and the associated bases as identified in the November 21, 1986 submittal or provided additional information in support of the proposed changes. Staff's evaluation of the proposed changes to HCGS TS 3/4.6.1.8, TS Table 3.6.3-1 and bases for TS 3/4.6.1.8 is given below.

2.0 EVALUATION

Demonstration of operability of the containment purge and vent valves, particularly the ability of these valves to close during a design basis accident, is necessary to assure containment isolation. This demonstration of operability is required by Branch Technical Position (BTP) CSB 6-4 "Containment Purging During Normal Operations," NUREG-0800, Revision 2, July 1981, and Standard Review Plan (SRP) 3.10 for containment purge and vent valves which are not sealed closed during Operational Conditions 1, 2, 3, and 4.

The valves identified as the containment isolation valves in the Hope Creek purge and vent system are as follows:

<u>Valve Tag No.</u>	<u>Valve</u>		<u>Valve Location</u>
	<u>Size</u>	<u>Use</u>	
1-GS-HV-4950	26"	Drywell Purge Exhaust	Outside Contmt.
1-GS-HV-4952	26"	Drywell Purge Exhaust	Outside Contmt.
1-GS-HV-4956	26"	Drywell Purge Exhaust	Outside Contmt.
1-GS-HV-4979	26"	Drywell Purge Exhaust	Outside Contmt.
1-GS-HV-4978	6"	Nitrogen Purge	Outside Contmt.
1-GS-HV-4958	24"	Suppression Chamber Supply	Outside Contmt.
1-GS-HV-4962	24"	Suppression Chamber Supply	Outside Contmt.
1-GS-HV-4964	24"	Suppression Chamber Supply	Outside Contmt.
1-GS-HV-4980	24"	Suppression Chamber Supply	Outside Contmt.

All the purge and vent valves are butterfly valves manufactured by the BIF Corporation and are equipped with Matryx rotary hydraulic actuators. The actuators are controlled by ASCO solenoid valves.

The licensee has provided purge and vent valve operability demonstration in its June 4 and November 21, 1986 submittals related to this amendment request and in its April 7, 1986 submittal in support of its application for an operating license.

The licensee's approach to operability demonstration of the purge and vent valve is based on testing a 26-inch BIF valve under simulated DBA/LOCA conditions at Wyle Laboratories. Test Report No. 47962-1, provided as Attachment 3 to its June 4, 1986 submittal, documents the test setup, instrumentation used, the acceptance criteria, the test procedure and a summary of the test results. The valve (26-inch) assembly used in the test was subjected to saturated steam flow against the curved side of the valve disc and closed against a differential pressure ranging from 57.5 psia to 131.7 in 3.92 seconds. Subsequent physical examination after testing checked:

- a) The resilient rubber seat for cuts or tears.
- b) The exposed shaft for cracks and deformation.
- c) Both sides of the disc for cracks or failure indicators.
- d) The internal surface of the body of the valve for cracks.
- e) The external actuator surface for cracks and deformation.

No physical damage or failure was noted.

Even though the Hope Creek valves differ in size, they are manufactured using similar materials, valve body styles, and actuators as shown in drawings provided in the licensee's June 4, 1986 submittal.

To assure that the 26-inch and 24-inch valves close in less than five seconds, the tubing size was increased from $\frac{1}{2}$ -inch to $\frac{3}{4}$ -inch between the solenoid and the actuator's hydraulic cylinder, and tubing was rerouted to decrease the number of fittings. Based on the closure time documented in Wyle Laboratories Test Report No. 47962-1 and Hope Creek's surveillance testing, all the containment vent/purge valves close in less than five seconds.

Seismic qualification for the 26-inch, 24-inch, and 6-inch purge and vent valve assemblies at Hope Creek is confirmed in the licensee's April 7, 1986 submittal.

The licensee's approach to operability demonstration is to test the largest size purge and vent valve (26-inch), used for containment isolation at Hope Creek under postulated DBA/LOCA conditions of flow, pressure and temperature. Since all of the purge and vent valves used at Hope Creek are similar in design and materials, the results of testing the largest valve under LOCA conditions can be applied to the smaller valves (24-inch and 6-inch).

The test demonstrated the ability of the valve to close against a peak differential pressure of 131.7 psia in 3.92 seconds. Since the peak containment pressure is 48.1 psig during LOCA conditions, the test at 131.7 psia provides a large safety margin for the valve's critical parts and the ability to close against the increase in containment pressure during a LOCA.

BTP CSB 6-4 also requires a post-test valve examination to establish structural integrity of the key valve/actuator components. Upon completion of testing, the licensee, physically examined the rubber seat, valve shaft, valve body, valve disc and actuator for cracks and deformation. No physical damage or failure was noted.

Seismic qualification for the purge and vent valves at Hope Creek is confirmed in the licensee's April 7, 1986 submittal.

The licensee's June 4, 1986 submittal demonstrates the ability of these valves to close from the (90°) full open position against the rise in containment pressure in the event of a DBA/LOCA, thereby meeting the requirements of T.M.I. II.E.4.2.

On the basis of the above information, the staff finds that the licensee has demonstrated the operability of the 26-inch, 24-inch and six-inch purge and vent valves at Hope Creek.

The proposed LCO would allow primary containment isolation valve(s) on one purge supply line (26 or 24-inch), the isolation valve on the six-inch nitrogen supply line, and the isolation valves on one purge exhaust line (26 or 24-inch) to be open, as appropriate, for up to 120 hours in a 365 day period, for pre-purge cleanup, inerting, deinerting or pressure control of the primary containment during plant Operational Conditions 1, 2, and 3. There is no separate primary containment penetration for the six-inch nitrogen supply line, which is used only during inerting. The line has a common primary containment butterfly isolation valve shared by two nitrogen supply branches, which are connected to the drywell and SC purge supply lines between the inboard and outboard purge supply isolation valves on the lines. The LCO restrictions on time and number of purge system exhaust lines that can be used at any one time are not applicable when the in-board purge exhaust isolation valves alone (outboard purge exhaust isolation valves remain closed) are used in conjunction with the two-inch bypass vent valves to vent the primary containment atmosphere for pressure control. Also, the proposed revision to TS Table 3.6.3-1 reduces the existing maximum isolation time (includes instrument delay time) of 15 seconds to five seconds for all the butterfly isolation valves.

The licensee justified their proposed excess time of 30 hours per year over the 90 hours per year normally suggested by the staff (Acceptance Criteria of SRP 6.2.4). The basis for the extra time is due to the additional time needed for pre-purge cleanup of the primary containment for HCGS. The licensee stated that HCGS utilizes a unique atmosphere recirculation Containment Pre-purge Cleanup System (CPCS) to maintain lower offsite doses from releases anticipated during normal operations than purging such release through charcoal filters. In addition, the CPCS would be used only either prior to purging, or during plant Operational Conditions 1, 2, and 3, prior to deinerting. The licensee estimated that the 90-hour-per-year limit would permit about six inert/deinert cycles per year. Based on the CPCS design parameters and drywell volume, the licensee determined that roughly four hours of pre-purge cleanup would be required prior to each deinert cycle giving roughly a total of 24 hours for six deinert cycles per year for the pre-purge cleanup operation.

The licensee has also analyzed the effect of a postulated LOCA, during the time when the purge isolation valves are open, on structures and safety-related equipment beyond the purge system isolation valves. Assuming a closure time of five seconds for the valves, the analysis showed that rupture of the CPCS ductwork would occur at a pressure of 3-4 psid due to LOCA. The resulting peak pressure of ≤ 1 psid in the safety-related Filtration-Recirculation-Ventilation System (FRVS) will have a minimal effect upon the recirculation function of the FRVS and will not affect the filtration, exhaust and drawdown functions of the FRVS. Since the HCGS design does not require the FRVS operation during pre-purge cleanup, deinerting or inerting, the inlet and outlet dampers for all the FRVS fan/filter units are in a closed condition during the above operations. This would protect the FRVS fan filter units from the pressure surge due to the LOCA.

However, to provide added safety margin to the FRVS ductwork, the licensee committed to install blow-out panels rated at 1.00 ± 0.25 psid in the CPCS ductwork upstream of the purge supply isolation valves and downstream of the purge exhaust isolation valves prior to implementation of the proposed TS changes. These panels will lower the pressure rise across the FRVS dampers and/or ductwork. Estimated peak pressure in the FRVS ductwork is 0.2 psid. These panels, therefore, provide added safety margin to further assure the integrity of the FRVS ductwork. Also, these panels are expected to lower the pressure surge on the FRVS fan/filter units which are also protected by the closed inlet and outlet dampers on each unit. The licensee has also evaluated the effect of increased relative humidity resulting from the LOCA blowdown on the FRVS filter units. Assuming that 100 percent relative humidity will be reached due to steam release in the rooms where the blowdown from the CPCS ducts takes place, the licensee determined that due to mixing in the FRVS inlet ductwork, the relative humidity at the filter units will remain below their design limits and, therefore, their efficiency will not be compromised. The licensee has also committed to refit the FRVS isolation dampers with new pressure differential switches in lieu of the existing ones to prevent the isolation of the FRVS ducts to the torus and connecting compartments following a LOCA. The LOCA analysis considered the possible effects of pressurization of the rooms in which the blowdown of the drywell/SC fluid through the blow-out panels will occur, and the connecting rooms. The licensee determined that the pressure buildup in the subject rooms will not be sufficient to affect either the integrity of the ducts or the operability of the safety equipment in the rooms, provided that the flow paths from the drywell and the SC areas are limited to a total of one purge supply line and one purge exhaust line from both the areas.

The proposed SR revision requires the licensee to verify that the applicable butterfly isolation valves have not been opened for more than 120 hours in the previous 365 days prior to opening them during plant Operational Conditions 1, 2, and 3. The licensee's proposed Action Statement deletes reference to sealed closed state for the isolation valves during plant Operational Conditions 1, 2, and 3. These valves can be open as permitted by the proposed LCO.

In its proposed Amendment to the HCGS Final Safety Analysis Report (FSAR), the licensee also discussed how the proposed TS revision complies with the requirements of BTP CSB 6-4. By submittal dated December 19, 1986, the licensee provided LOCA dose analysis. The licensee determined that the peak doses (thyroid doses) at the site boundary and at the control room resulting from a postulated LOCA due to unfiltered release to the environment during the five-second purge valve closure time, are well below the applicable 10 CFR dose limits.

The staff has independently analyzed the radioactivity release to the environment during a LOCA for the duration of the first five seconds before the vent/purge valves are isolated, and before the onset of fuel failure. Therefore, the radioactivity source associated with this release is based on the maximum primary coolant activity, including the iodine spiking factor. On the basis of this analysis, incremental 30-day control room doses were estimated. The calculated incremental control room thyroid dose is 6.6×10^{-3} rem. The incremental whole body dose is negligible. The calculated incremental two-hour exclusion area boundary and 30-day low population zone boundary doses are 0.270 rem and 0.013 rem respectively. The staff previously estimated control room, exclusion area boundary and low population zone boundary total LOCA doses are respectively 1.6 rem, 124 rem and six rem to the thyroid. Therefore, the revised control room, exclusion area boundary and low population zone boundary LOCA doses are practically unchanged as a result of the proposed Technical Specification revision.

The licensee also proposed changes to the SR dealing with the time interval between leak rate integrity tests for the butterfly isolation valves with resilient material seals. The request is consistent with current SRs for such valves and is, therefore, acceptable.

Based on the review as discussed above, the staff finds that:

1. The licensee has demonstrated the operability of the 26-inch, 24-inch and six-inch purge and vent valves used at Hope Creek.
2. The proposed cumulative annual time limit when the applicable combination of the butterfly isolation valves can be open is a reasonable value based upon the time required for inerting, deinerting, pressure control or pre-purge cleanup of the primary containment during plant Operational Conditions 1, 2, and 3. This restriction in conjunction with restriction on the number of purge supply and exhaust lines that can be utilized at any one time, and the proposed five-second closure time (including the instrument delay time) for all the above valves, provides reasonable assurance that containment integrity will be maintained and radiological releases will be either prevented or limited to within acceptable limits should a LOCA occur while the valves are open for these purposes.

3. The proposed time of 120 hours per year exceeds the 90 hours per year suggested in SRP 6.2.4 Acceptance Criterion II.6.n. However, the design of the HCGS pre-purge cleanup system and the proposed utilization of the system only prior to deinerting during Operational Conditions 1, 2, and 3, justify the proposal.
4. The licensee's LOCA analysis demonstrates that the FRVS will essentially maintain its functional capability even without blow-out panels in the CPCS ductwork.
5. The proposed installation of the blow-out panels will increase the safety margin for the FRVS ductwork.
6. With the restriction on the number of purge supply and exhaust lines that can be utilized at any one time, possible pressurization of the applicable rooms resulting from LOCA blowdown through the blow-out panels will have no unacceptable effects on the integrity of the ducts or operability of safety-related equipment in the subject rooms.
7. The proposed SR changes adequately protect against inadvertent opening of the subject valves in excess of the allowed annual time limit.
8. The proposed time interval between leak rate integrity tests for the applicable isolation valves with resilient material seals is consistent with the staff's position on such tests.
9. Keeping open only the inboard purge exhaust valve(s) for achieving pressure control need not be subjected to the restrictions identified in the proposed LCO since, during such operations, the outboard purge exhaust isolation valves will remain closed and only the smaller vent line(s) (two-inch) will be used. Also, the inboard purge exhaust isolation valve(s) can be closed within five-seconds and the vent valve(s) can be closed within 15 seconds following LOCA.
10. The proposed changes will not result in any significant changes to the previously estimated LOCA doses for the control room, exclusion area boundary and low population zone boundary. Therefore, the control room habitability system will still meet the GDC 19 requirements and the site boundary and offsite doses continue to meet the guidelines of 10 CFR Part 100.
11. The proposed TS changes satisfy the intent and purpose of BTP CSB 6-4.

Based on the above, the staff concludes that the proposed changes to HCGS TS 3/4.6.1.8 and the associated bases and to the TS Table 3.6.3-2 are acceptable.

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 9582) on March 25, 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.

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