



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 188 TO FACILITY OPERATING LICENSE NO. DPR-53
AND AMENDMENT NO. 165 TO FACILITY OPERATING LICENSE NO. DPR-69
BALTIMORE GAS AND ELECTRIC COMPANY
CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NOS. 1 AND 2
DOCKET NOS. 50-317 AND 50-318

1.0 INTRODUCTION

By letter dated September 1, 1992, as supplemented March 17, 1994, the Baltimore Gas and Electric Company (the licensee) submitted a request for changes to the Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2, Technical Specifications (TSs). The requested changes would revise TS 3/4.4.3, "Relief Valves," to improve the reliability of the reactor coolant system's (RCS's) power-operated relief valves (PORVs) and their associated block valves for overpressure protection during normal operation and anticipated transients. The requested changes would also revise TS 3/4.4.9, "Pressure/Temperature Limits," to improve the availability of the PORVs for low temperature overpressure protection. Accompanying changes would also be made to the associated TS Bases. The licensee proposed these changes in response to Generic Letter (GL) 90-06, "Resolution of Generic Issue 70, 'Power-Operated Relief Valve and Block Valve Reliability,' and Generic Issue 94, 'Additional Low-Temperature Overpressure Protection for Light-Water Reactors,' pursuant to 10 CFR 50.54 (f)." The March 17, 1994, letter provided updated TS pages and did not change the initial proposed no significant hazards consideration determination.

The NRC issued GL 90-06 on June 25, 1990, to advise pressurized water reactor licensees and construction permit holders of certain staff positions delineated in Enclosures A and B to the GL. Enclosure A presented the staff position resulting from the resolution of Generic Issue (GI) 70 and was applicable to all Combustion Engineering (CE)-designed plants with PORVs. Enclosure B presented the staff position resulting from the resolution of GI 94 and was applicable to all CE-designed plants. With respect to the resolution of GI 70, the affected licensees were requested to take the following actions:

1. Include PORVs and block valves within the scope of an operational quality assurance (QA) program that is in compliance with 10 CFR Part 50, Appendix B.

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2. Include PORVs and block valves within the scope of a program covered by subsection IWW, "Inservice Testing of Valves in Nuclear Power Plants," of Section XI of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code).
3. Include TSs for PORVs and block valves for operational Modes 1, 2, and 3 to incorporate the new staff positions. Included in the staff positions was a requirement that plants that operate with the block valves closed due to leaking PORVs maintain electrical power to the block valves so that they can be readily opened from the control room upon demand. The GL included sample TSs.

With respect to the resolution of GI 94, the GL cited continuing low-temperature overpressure protection (LTOP) events and the need to restrict plant operations with an LTOP channel out-of-service. Accordingly, the GL provided sample TSs that included a new requirement to decrease the allowable outage time for a single LTOP channel from 7 days to 24 hours while in Modes 5 or 6.

The licensee initially responded to GL 90-06 by letter dated December 20, 1990. The response did not include a commitment to incorporate the TS changes delineated in the GL since these changes were still being evaluated by the licensee at that time. By letter dated July 30, 1992, the staff advised the licensee that the initial response did not address selected portions of the GL. The staff's letter identified those portions of GL 90-06 that were not addressed and requested the licensee to resubmit a response. The licensee responded to this staff request by letter dated September 1, 1992. This response provided several clarifications and forwarded proposed TS changes.

2.0 EVALUATION

The staff's evaluation of the proposed TS changes and other licensee responses to GL 90-06 is documented below.

2.1 Changes to Limiting Condition for Operation (LCO) 3.4.3

The licensee has proposed that the applicability of LCO 3.4.3 be revised to exclude Mode 3 at and below the temperature at which LTOP is required. This would be accomplished by adding a footnote to the Applicability Statement that would indicate that TS 3/4.4.9.3 applies in Mode 3 when at or below 365 °F (Unit 1) or 305 °F (Unit 2). Overpressure protection requirements are delineated in TS 3/4.4.9.3. The staff finds this proposed change to be acceptable since it will prevent overlap and conflict between the requirements of LCO 3.4.3 and TS 3/4.4.9.3.

The proposed changes would modify and divide the existing Action (a) for LCO 3.4.3 into Actions (a), (b), and (c) to provide for different actions when the PORV(s) is isolated due to excessive seat leakage or inoperable for other causes. The existing Action (b), which provides requirements if one or more block valves are inoperable, would be modified and become proposed Action (d).

Existing Action (c), which indicates that the provisions of Specification 3.0.4 are not applicable, would become Action (e).

The proposed Actions (a), (b), (c), (d), and (e) would read as follows:

- (a) If one or both PORVs has excessive seat leakage, within 1 hour close the associated block valve(s) and maintain power to the block valve(s).
- (b) With one PORV inoperable due to causes other than excessive PORV seat leakage, within 1 hour either restore the PORV to OPERABLE status or close the associated block valve and remove power from the block valve; restore the PORV to OPERABLE status within the following 5 days or be in HOT STANDBY within the next 12 hours and at or below 365 °F (Unit 1) or 305 °F (Unit 2) within the following 24 hours.
- (c) With both PORVs inoperable due to causes other than excessive PORV seat leakage, within 1 hour either restore one PORV to OPERABLE status or close the associated block valve and remove power from the block valve; restore one PORV to OPERABLE status within the following 72 hours or be in HOT STANDBY within the next 12 hours and at or below 365 °F (Unit 1) or 305 °F (Unit 2) within the following 24 hours.
- (d) With one or both block valves inoperable, within 1 hour restore the block valve(s) to OPERABLE status or place its associated PORV(s) in override closed. Restore at least one block valve to OPERABLE status within the next 72 hours if both block valves are inoperable; restore any remaining inoperable block valve to OPERABLE status within the following 5 days; otherwise, be in at least HOT STANDBY within the next 12 hours and at or below 365 °F (Unit 1) or 305 °F (Unit 2) within the following 24 hours.
- (e) The provisions of Specification 3.0.4 are not applicable.

The proposed Action (a) incorporates the requirement of GI 90-06 to maintain power to a closed block valve(s) so that the block valve is operable and may be subsequently opened to allow the PORV to be used to control RCS pressure. The words inoperable and operable have been removed from Action (a) to provide the flexibility. In addition, the licensee has proposed that the requirement to initiate shutdown be removed from Action (a) as well. If the seat leakage from the PORV exceeds the RCS leakage limit of TS 3/4.4.6, the applicable Action Statement of TS 3/4.4.6 would be followed. If the block valve fails to function as required, the requirements of proposed Action (d) for LCO 3.4.3 would be applicable. The proposed Action (a) also replaces the word "more" with "both" to better reflect the design of Calvert Cliffs, which only includes two PORVs per unit.

Proposed Action (b) provides actions that are to be taken when one PORV is inoperable due to causes other than excessive seat leakage. These actions

include removing power from the block valve and require shutdown if the PORV is not restored to operable status. The GL proposed an allowed out-of-service time (AOT) of 72 hours before unit shutdown is required in the case of one PORV inoperable due to causes other than excessive seat leakage. The licensee has proposed an AOT of 5 days to be consistent with the current AOT when the unit is in the LTOP region. The licensee has stated that the PORVs have no safety function in Modes 1, 2, and 3 above the LTOP region. The licensee has also proposed that Action (b) terminate required shutdown actions once the RCS temperature is below the temperature for which LTOP is required. Requirements to proceed to cold shutdown are not appropriate since the applicability of the LCO does not extend past the hot standby mode.

The proposed Action (c) provides actions that are to be taken when both PORVs are inoperable due to causes other than excessive seat leakage. The proposed actions are the same as those proposed for one PORV inoperable due to causes other than excessive seat leakage, with the exception that shutdown would be required within 72 hours if at least one PORV is not restored to operable status. The GL proposed an AOT of one hour. The licensee proposed the 72-hour AOT to more realistically allow for possible PORV repairs, thereby avoiding unnecessary shutdowns and entering the region when PORVs are depended upon for LTOP. The licensee has concluded that it would be safer to attempt repairs in Modes where the PORVs are not needed. As in the case of Action (b), the licensee has proposed that Action (c) terminate required shutdown actions once the RCS temperature is below the temperature for which LTOP is required. Requirements to proceed to cold shutdown are not appropriate since the applicability of the LCO does not extend past the hot standby mode.

Proposed Action (d) would establish remedial measures to be taken if one or more block valves are inoperable. The primary function of a block valve is to isolate a stuck-open PORV. Therefore, if the block valve cannot be restored to operable status within 1 hour, the proposed remedial action is to place the PORV in override closed to preclude its automatic opening for an overpressure event and to avoid the potential for a stuck-open PORV at a time that the block valve is inoperable. The GL recommended that 1 hour be allowed to restore at least one block valve to operable status and that 72 hours be allowed to restore any remaining inoperable block valve to operable status. The licensee has proposed that 72 hours be allowed to restore at least one block valve to operable status and that 5 days be allowed to restore any remaining inoperable block valve to operable status. The proposed allowable times to restore block valve(s) to operable status are based upon the remedial action time limits for inoperable PORVs contained in proposed Actions (b) and (c) since the PORVs are not capable of automatic mitigation of an overpressure event when placed in override closed. When a block valve is inoperable, placing the PORV in override closed is sufficient to preclude the potential for a stuck-open PORV that could not be isolated because of an inoperable block valve. As in the cases of proposed Actions (b) and (c), the licensee has proposed that Action (d) terminate required shutdown actions once the RCS temperature is below the temperature for which LTOP is required. Requirements to proceed to cold shutdown are not appropriate since the applicability of the LCO does not extend past the standby mode.

Proposed Action (e) would indicate that the provisions of Specification 3.0.4 are not applicable, as currently specified by existing Action (c).

The staff has concluded that the proposed changes to LCO 3.4.3 are acceptable based on a determination that the licensee has provided adequate justification for the exceptions to the recommendations of GL 90-06.

2.2 Changes to TS 4.4.3

GL 90-06 recommended a surveillance requirement to operate each PORV through one complete cycle of travel during Modes 3 or 4. This requirement was intended to provide additional assurance that the PORVs will function when required under LTOP conditions. The licensee did not propose to incorporate this surveillance requirement into the TSs. This is acceptable to the staff for the reasons indicated below.

1. The current practice of testing the LTOP circuitry in Mode 3 prior to reaching LTOP conditions on a shutdown and stroke testing the PORVs in Mode 5 provides assurance that the PORVs will operate in LTOP conditions.
2. The current plant configuration does not provide a means for the operator to open a PORV by operating a switch in the Control Room. The testing recommended by the GL would have to be performed from the back of the control board using jumpers. In addition, there is no means for the operator to close a PORV from the Control Room if the valve were to stick open following such a test. Substantial modifications to the PORV control circuit and Control Room panels would be required to provide the means to perform this testing safely.

The licensee has proposed that TS 4.4.3.2 be revised to read as follows:

Each block valve shall be demonstrated OPERABLE at least once per 92 days by operating the valve through one complete cycle of full travel unless the block valve is closed to meet the requirements of Action a., b., or c. in Specification 3.4.3.

The GL recommended that block valves be exempted from the 92-day cycling requirement when the associated PORVs are inoperable for causes other than excessive seat leakage. The licensee has proposed to exempt the block valves from this surveillance when they are closed to isolate either a PORV that has excessive seat leakage or a PORV that is inoperable for other reasons. GL 90-06 recommended cycle testing the PORV block valves every 92 days if the PORV is inoperable due to seat leakage. This recommendation is based on the need to provide reasonable assurance of block valve operability in the event the PORV is required to be operated after being isolated by the block valve to stop leakage. As stated above, the PORV control system at Calvert Cliffs 1 and 2 is unlike that at other PWR plants in the United States and does not provide the capability to manually open and close the PORV with a switch in the control room. While unlike the PORVs in that they are able to be stroke

tested from the control room, the importance of reopening the block valve is not as great as that assumed in the analysis supporting the GL 90-06 recommendation due to the diminished capability of opening the PORV even if the block valve is reopened. Therefore, the alternative testing of the block valves proposed by the licensee and the proposed revision to TS 4.4.3.2 is acceptable.

GL 90-06 proposed a surveillance requirement to test the PORV air control system by operating the solenoid air control valve and check valves on associated air accumulators. The licensee did not propose this surveillance requirement since the Calvert Cliff's PORVs are electrically powered, as discussed in Section 4.2 of the Updated Final Safety Analysis Report.

The GL proposed a surveillance requirement for the testing of the emergency power supply for the motive and control power for the PORVs and block valves. In essence, the valves would be cycled following manual transfer of motive and control power from the normal to the emergency bus. This additional testing was intended to provide assurance that the PORVs and block valves will function when required. However, the licensee has stated that at Calvert Cliffs electrical power for the PORVs and their block valves is supplied by a bus which is backed by an emergency diesel generator (EDG). The transfer from the normal power supply to the EDG power supply for this bus occurs on an under-voltage condition. This transfer from the normal supply to the EDG power supply is currently tested at least once per 18 months pursuant to TS 4.8.1.1.2.d.3. The licensee, therefore, did not propose incorporation of the GL 90-06 surveillance requirement on the basis that no additional surveillance is needed to assure appropriate power supply transfer.

The licensee also proposed associated changes to the Bases for TS 3/4.4.3.

The staff has concluded that the proposed changes to TS 4.4.3 are acceptable based on a determination that adequate justifications have been provided for the exceptions to the recommendations of GL 90-06. In addition, the staff has no objections to the proposed Bases changes.

2.3 Changes to TS 3/4.4.9.3

The licensee has proposed that LCOs 3.4.9.3.a.1. and 3.4.9.3.a.2. be revised to require that block valves be open when in Minimum Pressurization Temperature (MPT) Enable. The block valves must be open when the plant is in MPT Enable in order to meet the assumptions of PORV operability in the LTOP calculations.

The proposed change to Action (a) for LCO 3.4.9.3 would specify that portion of Mode 3 during which LTOP is required. This is necessary to provide an appropriate Action Statement for operation in Mode 3 at temperatures less than the LTOP entry conditions.

The licensee has proposed a new Action (b) for LCO 3.4.9.3 to provide required actions with one PORV inoperable in Modes 5 or 6, as recommended in GL 90-06. The new Action (b) would read as follows:

With one PORV inoperable in Modes 5 or 6, either restore the inoperable PORV to OPERABLE status within 24 hours, or depressurize and vent the RCS through a > 1.3 square inch vent(s) within the next 48 hours; and maintain the RCS in this vented condition until both PORVs have been restored to OPERABLE status.

The proposed new Action (b) is consistent with the recommendations of GL 90-06 for actions with one PORV inoperable in Modes 5 or 6 with one exception. The GL recommended that depressurization and venting of the RCS be required to be accomplished within a total of 32 hours. The licensee has proposed that this time be 48 hours in that it represents a more appropriate practical time to complete a controlled, deliberate cooldown, and orderly depressurization and venting of the RCS from the LTOP entry conditions. The licensee noted that the staff had previously approved the 48-hour depressurization time in License Amendment Nos. 145 (Unit 1) and 131 (Unit 2).

The addition of the new Action (b) would require that current Actions (b) through (g) be redesignated (c) through (h).

GL 90-06 recommended that depressurization and venting of the RCS be accomplished within 8 hours when both PORVs are inoperable. The TSs currently require that depressurization and venting be accomplished within 48 hours when both PORVs are inoperable. The licensee did not propose that this requirement be changed since 48 hours is considered to be the appropriate practical time to complete a controlled, deliberate cooldown, and orderly depressurization and venting of the RCS from the LTOP entry conditions. The licensee noted that the staff had previously approved the 48-hour depressurization time in License Amendment Nos. 145 (Unit 1) and 131 (Unit 2).

The licensee proposed an essentially administrative change to the surveillance requirement in TS 4.4.9.3.1.c. Specifically, it was proposed that the word "isolation" be replaced with the word "block" to make the discussion of block valves consistent throughout the TSs.

Changes were also proposed to the Bases for TS 3/4.4.9 in order to reference the origin of the new Action (b) and to explain the extended time for depressurization and venting.

The staff has determined that the proposed changes to TS 3/4.4.9.3 either appropriately clarify requirements or satisfy the intent of GL 90-06. Where exceptions to the GL have been proposed, the exceptions are consistent with previously approved license amendments. The staff, therefore, concludes that the proposed changes to TS 3/4.4.9.3 are acceptable. In addition, the staff has no objections to the proposed Bases changes.

2.4 Other Responses to GL 90-06

With respect to QA, GL 90-06 recommended that PORVs and block valves be included within the scope of an operational QA program that is in compliance with 10 CFR Part 50, Appendix B. It was recommended that this program include the following elements:

- a. The addition of PORVs and block valves to the plant operational QA List.
- b. Implementation of a maintenance/refurbishment program for PORVs and block valves that is based on the manufacturer's recommendations or guidelines and is implemented by trained plant maintenance personnel.
- c. When replacement parts and spares, as well as complete components, are required for existing nonsafety-grade PORVs and block valves (and associated control systems), these items should be procured in accordance with the original construction codes and standards.

The licensee's initial response to GL 90-06 committed to maintain PORVs and block valves in the Q List as safety-related pressure boundary items. With respect to Item b. above, the licensee's initial response to the GL committed to maintain improvement. The licensee's letter dated September 1, 1992, clarified that the maintenance program for PORVs and block valves meets or exceeds vendor recommendations. With respect to Item c. above, the licensee's initial response to GL 90-06 stated that procurement programs were under evaluation and that the licensee would keep the NRC informed of the progress of this evaluation. The licensee's letter dated September 1, 1992, indicated that PORVs, block valves, and associated control systems have been classified as Augmented Quality (AQ) items and as such, will come under the controls of the licensee's AQ programs.

The NRC staff has concluded that the licensee's responses to the GL 90-06 QA recommendations are consistent with the intent of the GL and are, therefore, acceptable.

With respect to testing, GL 90-06 recommended the following:

Include PORVs, valves in PORV control air systems, and block valves within the scope of a program covered by Subsection IWV, "Inservice Testing of Valves in Nuclear Power Plants," of Section XI of the ASME Boiler and Pressure Vessel Code. Stroke testing of PORVs should only be performed during Mode 3 (HOT STANDBY) or MODE 4 (HOT SHUTDOWN) and in all cases prior to establishing conditions where the PORVs are used for low-temperature overpressure protection. Stroke testing of the PORVs should not be performed during power operation. Additionally, the PORV block valves should be included in the licensee's expanded MOV test program discussed in NRC Generic Letter 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance," dated June 28, 1989.

In the initial response to GL 90-06 the licensee committed to include PORVs and block valves in the inservice testing program. The plant does not have a PORV control air system as previously noted. The licensee also committed to include the PORV block valves within the scope of the MOV test program. The licensee indicated that the issue of stroke testing PORVs prior to LTOP conditions was still to be resolved. However, as previously discussed in Section 2.2 above, the licensee's submittal dated September 1, 1992, specifically did not propose to stroke test the PORVs in Modes 3 or 4. The decision not to propose this testing was based, in part, on the conclusion that the current practice of testing the LTOP circuitry in Mode 3 prior to reaching LTOP conditions on a shutdown, and stroke testing the PORVs in Mode 5 provides reasonable assurance that the PORVs will operate in LTOP conditions. The licensee also stated that substantial modifications would be required to provide the means to do the recommended testing safely.

The licensee commitments to include the valves in the inservice and MOV testing programs are clearly consistent with the GL recommendations. However, the staff does not believe that stroke testing the PORVs in Mode 5 will provide the same assurance of operability as the recommended testing in Modes 3 or 4. However, the staff has determined that the safety benefit associated with the recommended testing does not justify the substantial modifications that would be required. Therefore, the proposed alternative testing in Mode 5 is acceptable for meeting the intent of the GL. In summary, the staff has determined that the licensee's responses to the GL 90-06 testing recommendations are acceptable.

3.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Maryland State official was notified of the proposed issuance of the amendments. The State official had no comments.

4.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes surveillance requirements. The NRC staff has determined that the amendments involve 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 the amendments involve no significant hazards consideration, and there has been no public comment on such finding (57 FR 45076). Accordingly, the amendments meet 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 the amendments.

5.0 CONCLUSION

The Commission 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, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

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