



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 173 TO FACILITY OPERATING LICENSE NO. DPR-53
AND AMENDMENT NO. 150 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 March 25, 1992, as supplemented May 28, 1992, 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 (TS). The proposed amendments would revise the Calvert Cliffs TS for both units to provide conditions under which the steam generator inspection intervals may be extended to 30 months in accordance with the guidance provided in Generic Letter (GL) 91-04. In addition, a one-time variance (Unit 2 only) is requested from the proposed TS condition which requires that the last inspection include 20 percent of the steam generator tubes being inspected with results in the C-1 Category when extending the inspection frequency beyond 24 months. The C-1 Category is when less than 5 percent of the total tubes inspected are degraded tubes and none of the tubes are defective. The GL had not been issued prior to the last inspection of the Unit 2 steam generators during which 15 percent of the tubes were tested with results in the C-1 Category.

Specifically, the requested changes are for TS 4.4.5.3, 3.4.6.2., 4.4.6.2, and supporting TS Bases. The licensee's submittal identifies and provides justification where deviations from the guidance provided in GL 91-04 are proposed. The requested variance for Unit 2 inspection of 20 percent of the tubes tested with results in C-1 Category, as specified in the GL, is a footnote for Unit 2, TS 4.4.5.3, which states that a 15 percent sample with results in the C-1 Category is acceptable for the unit's current cycle 9 operation.

The May 28, 1992, letter provided supporting information for the requested Unit 2 one-time variance that did not expand the scope of the original Notice or change the initial proposed no significant hazards consideration determination.

2.0 BACKGROUND

GL 91-04 was issued on April 2, 1991, to provide guidance to licensees for preparing license amendment requests to modify existing surveillance intervals to be compatible with 24-month fuel cycles. Improved reactor fuels allow licensees to increase the duration of fuel cycles from the previous 18-month cycles to 24-month cycles. The Calvert Cliffs units are currently operating on 24-month cycles.

The Calvert Cliffs TS require that the results of the inservice inspections (ISI) of the steam generator tubes shall be classified into one of the following these categories:

<u>Category</u>	<u>Inspection Results</u>
C-1	Less than 5% of the total tubes inspected are degraded tubes and none of the inspected tubes are defective.
C-2	One or more tubes, but not more than 1% of the total tubes inspected are defective, or between 5% and 10% of the total tubes inspected are degraded tubes.
C-3	More than 10% of the total tubes inspected are degraded tubes or more than 1% of the inspected tubes are defective.

The current Calvert Cliffs TS allow the surveillance interval for performing the ISI of the steam generators to be extended to a maximum of 40 months if the results from two consecutive inspections are each in the C-1 category or if two consecutive inspections demonstrate that previously observed degradation has not continued and no additional degradation has occurred. However, if either of the two previous inspections yielded inspection results in the C-2 category, the next inspection must be performed within 24 months. Unlike other surveillances, the 24-month inspection period is not subject to a 25 percent extension under TS 4.0.2. Calvert Cliffs Units 1 and 2 operate on a nominal 24-month fuel cycle and the 24-month inspection interval frequently does not coincide with the next refueling outage, particularly if there were unplanned outages during the fuel cycle or if there is a delay between the completion of the steam generator inspections and plant startup.

GL 91-04 provides guidance for TS which allows extension of the inspection interval for steam generators in the C-2 category from 24 to 36 months. This guidance includes increasing the number of tubes inspected based on the results of the previous inspection, performing an engineering analysis of steam generator tube integrity for operation longer than 24 months between

inspections and reducing the TS limit on leakage between the primary and secondary coolant systems.

3.0 EVALUATION

The event which must be considered when revising the steam generator inspection intervals is the steam generator tube rupture event as discussed in Section 14.15 of the Updated Final Safety Analysis Report (UFSAR) for the Calvert Cliffs facility. The steam generator tubes provide a heat transfer boundary between the primary reactor coolant and the secondary feedwater and steam, and the proposed inspection intervals should provide reasonable assurance that the steam generator tubes will have structural integrity until the next inspection. The integrity of the barrier is significant to radiological safety in that a leaking or ruptured tube would allow the transfer of reactor coolant into the main steam system with possible release to the environment.

The licensee has proposed the TS changes in accordance with the guidance provided in GL 91-04 to maintain an acceptable confidence level in the structural integrity of the steam generator tubes. Where the licensee deviates from the guidance of GL 91-04, justification is provided. The proposed changes address an increase in sample size, details on the engineering analysis to be used, and the requirements for lower limits on the primary-to-secondary leakage.

3.1 Sample Size

In relation to the sample size, the licensee notes that the TS for Calvert Cliffs require a minimum of 3 percent of the total number of tubes in each steam generator be inspected during each ISI interval.

The proposed TS allow this inspection interval to be extended beyond 24 months if the last inspection examined at least 20 percent of the tubes and the results were in the C-1 category or at least 40 percent of the tubes were examined and the results were in the C-2 category. This increasing sample size is a compensating measure to offset the extension in surveillance intervals in accordance with the guidance in GL 92-01. The proposed changes also require an engineering assessment if the ISI results of either of the previous two inspections were in the C-2 category in accordance with GL 91-04.

The proposed wording for TS 4.4.5.3.2 are consistent with the guidance provided in GL 91-04 with the following exception. The licensee has added "at least" in front of the 20 percent and 40 percent tube inspection statements. This addition is to clearly state that the percentages are the minimum required in that the licensee frequently inspects 100 percent of the steam generator tubes.

In addition, a footnote is proposed for the Unit 2, TS 4.4.5.3.2.a, which states that "for Cycle 9, an inspection of 15% of the steam generator tubes with inspection results in the C-1 Category shall be acceptable to extend the

next inspection up to 30 months to coincide with the next refueling outage." The last ISI of the Unit 2 steam generators was performed in October of 1990 and 15 percent of the steam generator tubes were inspected. This inspection was performed prior to the issuance of GL 91-04 which was issued on April 2, 1991, which specified a sample size of 20 percent.

The licensee indicates that 100 percent of the tubes (16,947 tubes) were inspected in both of the Unit 2 steam generators in April of 1989. As the result of the inspection, only 11 of 22 tubes were found to have indications of imperfections which exceeded the plugging limit of 40 percent loss of nominal wall thickness. An additional 11 tubes were plugged as a preventive measure. The results of the ISI were in the C-2 category. In addition, a Motorized Rotating Pancake Coil (MRPC) examination of the Unit 2 steam generator tubes was performed in July 1990. The tube-to-tubesheet expansion region was examined on 35% of the hot leg tubes and no flaws were detected.

In October 1990, 15 percent of the tubes in both Unit 2 steam generators were inspected in preparation for the resumption of power operation following an extended shutdown. No power operation occurred on Unit 2 between the April 1989 and this inspection. During this period steam generator chemistry conditions were maintained consistent with the recommendations in Electric Power Research Institute (EPRI) Report NP-6239-S405-2, "PWR Secondary Water Chemistry Guidelines," Revision 2. The ISI resulted in no tubes being plugged and the results were in the C-1 category.

Additional justification for the requested one-time variance was provided in the May 28, 1992, submittal. The Unit 1 steam generators were controlled to the same chemistry requirements during the 1989-1990 shutdown as were in the Unit 2 steam generators. An ISI of the Unit 1 steam generators just completed during the current Unit 1 refueling outage revealed little degradation. Only 18 of the 16,861 tubes inspected full length with the bobbin coil were plugged as result of eddy current indications. In addition, a 3-coil MPPC examination was conducted on 25% of the hot leg tube-to-tube sheet expansion zone region in each steam generator and no cracks were detected.

The proposed changes to the TS wording in TS 4.4.5.3.a, 4.4.5.3.b and a new 4.4.5.3.d reflect the guidance in GL 91-04. Specifically, if the criteria in TS 4.4.5.3.a is met the ISI interval can be extended to a maximum of once per 30 or 40 months, as applicable, and the provisions of TS 4.0.2 do not apply for extending the frequency of ISI as specified in TS 4.4.5.3.a and .b.

The staff has determined that the proposed changes to TS 4.4.5.3.a, 4.4.5.3.b, the addition of 4.4.5.3.d, and the one-time variance from the 20 percent sample size are acceptable. The use of "at least" in the wording of the TS provides clarification that the percent specified are minimum percentages, the rest of the proposed TS are consistent with GL 91-04; adequate justification, as discussed above, has been provided for the requested one-time variance from the 20 percent sample size for Unit 2 during the remainder of cycle 9 operation.

3.2 Engineering Assessment

GL 91-04 provided guidance for modifying the TS Bases Section to clarify the intent of the engineering assessment of steam generator tube integrity included in the proposed changes to TS 4.4.5.3.a. The guidance provided in GL 91-04 provides three elements to be considered in an engineering assessment. The licensee proposes inclusion of the three elements with one exception. The proposed element two does not include an assessment of the maximum flaw size.

The ISI of the steam generator tubes is to provide reasonable assurance that the structural integrity of this portion of the reactor coolant system boundary is maintained. The purpose of the engineering assessment is to demonstrate that the steam generator tubes maintain adequate structural capability against burst between inspections.

The licensee's justification for not including the requirement to assess the maximum flaw size is that pressurized water reactor (PWR) steam generator tube inspections are typically conducted using an eddy current bobbin coil device. While this device is capable of determining the depth of a tube defect, it is not capable of determining the length or width of the defect. Therefore, there is insufficient information to determine the size of a detected flaw or the maximum flaw size that can be expected before the next inspection. This information is not necessary in order to determine the structural margins relative to Regulatory Guide (RG) 1.121, "Bases for Plugging Degraded PWR Generator Tubes." This determination is currently made using only depth information from eddy current testing.

The licensee further stated that if the results of either of the previous two ISI were in the C-2 category classification, an engineering assessment would be required prior to operation beyond 24 months. This assessment would determine whether all tubes will retain adequate structural margins against burst throughout normal operating, transient, and accident conditions until the end of the fuel cycle or 30-months, whichever occurs first. The assessment would include a review of the flaws found during the previous inspection and a comparison of the structural margins to the criteria in RG 1.121. Also, the assessment model would be updated, as appropriate, based on comparison of the predicted results of the steam generator tube integrity assessment with actual results from inspections.

The staff has determined that the proposed changes to TS Bases 3/4 4.5 are acceptable. As noted above, the licensee states and the staff agrees, that an assessment of the maximum flaw size is not necessary to determine the structural margin relative to the criteria of RG 1.121. In addition, recent ISI of the steam generator tubes at the Calvert Cliffs units have resulted in a small number of tubes with flaw indications (22 of 16,947 and 18 of 16,861) which required plugging. Thus, there is reasonable assurance that the structural integrity will be maintained for the proposed increase in the interval between ISI.

3.3 Leakage Limits

GL 91-04 specifies a reduced primary-to-secondary leakage limit for any steam generator not isolated from the Reactor Coolant System to allow plant operation beyond 24 months. The guidance provided in GL 91-04 reduces the current standard TS leakage limit of 500 gallons-per-day for each steam generator to 100 gallons-per-day for each steam generator.

The current Calvert Cliffs TS do not include the 500 gallons-per-day leakage limit, however, the licensee imposes an administrative limit of an 100 gallons-per-day leakage for each steam generator. The proposed change to TS 3.4.6.2.c will include the 100 gallons-per-day leakage limit through any one steam generator as specified in GL 91-04.

The staff has determined that the proposed change to TS 3.4.6.2.c is consistent with the primary-to-secondary limit specified in GL 91-04, is a conservative limit for allowing plant operation beyond 24 months, and is acceptable.

In addition, the current surveillance TS 4.4.6.2.c states that the leakage is determined by performing a "water inventory balance." While the leakage measurement for comparison to the 1 gallon-per-minute limit is determined using a water inventory balance, the leakage measurement for comparison to the 100 gallon -per-day per steam generator limit will be determined using an analysis of secondary coolant radiochemistry. This analysis cannot be considered a "water inventory balance." Therefore, the licensee proposes to revise the surveillance requirement to state, "Determining Reactor Coolant System leakage." The proposed change does not alter the surveillance requirement, but allows the different measurement technique to be used.

The staff has determined that the proposed change to TS 4.4.6.2.c is acceptable in that the surveillance requirement is not changed and other measurement techniques are available for meeting the required surveillance. The changes to TS Bases 3/4.4.6.2 to reflect the new primary-to-secondary leakage are also acceptable.

4.0 SUMMARY

Based on the above evaluation, the staff has determined that the ISI intervals for the Calvert Cliffs, Units 1 and 2, steam generators may be extended to 30 months and that a one-time variance, for Unit 2 only, from the proposed TS requirement that the last inspection include 20 percent of the steam generator tubes having been inspected when extending the ISI interval beyond 24 months. This one-time variance is only applicable for the remainder of cycle 9 operation for Unit 2 which is scheduled to be completed in the spring of 1993.

Therefore, the proposed changes to TS 4.4.5.3.a, 4.4.5.3.b, 3.4.6.2.c, 4.4.6.2.c, B3/4.4.5, B3/4.4.6.2, and the addition of 4.4.5.3.d are acceptable and provide reasonable assurance that the steam generator tubes will maintain structural integrity between the allowed ISI intervals.

5.0 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.

6.0 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 to the 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 18170). 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.

7.0 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.

Principal Contributors:
D. McDonald
H. Conrad

Date: July 13, 1992

DATED: July 13, 1992

AMENDMENT NO. 173 TO FACILITY OPERATING LICENSE NO. DPR-53-CALVERT CLIFFS
UNIT 1

AMENDMENT NO. 150 TO FACILITY OPERATING LICENSE NO. DPR-69-CALVERT CLIFFS
UNIT 2

Docket File

NRC & Local PDRs

PDI-1 Reading

S. Varga, 14/E/4

J. Calvo, 14/A/4

R. Capra

C. Vogan

D. McDonald

OGC

D. Hagan, 3302 MNBB

C. Liang, 8/E/23

G. Hill (8), P-137

Wanda Jones, P-130A

C. Grimes, 11/F/23

ACRS (10)

OPA

OC/LFMB

PD plant-specific file

C. Cowgill, Region I

T. Dunning, 11/E/22

M. Fields, 13/H/15

K. Wichman, 7/D/4

H. Conrad, 7/D/4

cc: Plant Service list

176001