September 3, 1998

Mr. Charles H. Cruse, Vice President
Nuclear Energy Division
Baltimore Gas & Electric Company
1650 Calvert Cliffs Parkway
Lusby, MD 20657-4702

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NOS. 1 & 2, INTEGRATED PLANT ASSESSMENT REPORT FOR THE REACTOR COOLANT SYSTEM (TAC NOS. MA1016, MA1017, AND M99223)

Dear Mr. Cruse:

By letter dated December 17, 1997, Baltimore Gas and Electric Company (BGE) submitted for review the Reactor Coolant System (4.1) integrated plant assessment technical report as attached to the "Request for Review and Approval of System and Commodity Reports for License Renewal." BGE requested that the Nuclear Regulatory Commission (NRC) staff review report 4.1 to determine if the report meets the requirements of 10 CFR 54.21(a), "Contents of application-technical information," and the demonstration required by 10 CFR 54.29(a)(1), "Standards for issuance of a renewed license," to support an application for license renewal if BGE applied in the future. By letter dated April 8, 1998, BGE formally submitted its license renewal application.

The NRC staff has reviewed report 4.1 against the requirements of 10 CFR 54.21(a)(1), 10 CFR 54.21(a)(3). By letter dated April 4, 1996, the staff approved BGE's methodology for meeting the requirements of 10 CFR 54.21(a)(2). Based on a review of the information submitted, the staff has identified in the enclosure, areas where additional information is needed to complete its review.

Please provide a schedule by letter or telephonically for the submittal of your responses within 30 days of the receipt of this letter. Additionally, the staff would be willing to meet with BGE prior to the submittal of the responses to provide clarifications of the staff's requests for additional information.

Sincerely,

Original Signed By

David L. Solorio, Project Manager
License Renewal Project Directorate
Division of Reactor Program Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-317 and 50-318
Enclosure: Request for Additional Information
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Mr. Charles H. Cruse
Baltimore Gas & Electric Company

Calvert Cliffs Nuclear Power Plant
Unit Nos. 1 and 2

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REQUEST FOR ADDITIONAL INFORMATION
CALVERT CLIFFS NUCLEAR POWER PLANT UNIT NOS. 1 & 2
REACTOR COOLANT SYSTEM
INTEGRATED PLANT ASSESSMENT, SECTION 4.1
DOCKET NOS. 50-317 AND 50-318

1. Table 4.1-2 of the application indicates that Reactor Coolant System (RCS) piping with "device codes" of "-CC," "-GC," "-HB," and "-HC" are subject to aging management review (AMR). Please explain these "device codes" and describe components represented by them. Also, the description should identify whether these components include cold-leg, hot-leg, pressurizer surge line, spray line, connected American Society of Mechanical Engineers (ASME) Class 1 branch lines, and nozzles and safe ends at the reactor vessel, steam generators, pressurizer, pumps, and valves.

2. Provide a summary of the RCS piping sizes, piping material, and the corrosion allowances used in the design. Describe the basis upon which Baltimore Gas and Electric Company (BGE) concluded that the corrosion allowances are adequate for the period of extended operation.

3. The application does not apparently discuss several aging effects associated with certain RCS components. Summarize how the following aging effects have been addressed by BGE's aging management review.

   a. crack initiation and growth (stress corrosion cracking (SCC)) for the pressurizer shell/heads (including clad cracking), spray line nozzle, surge line nozzle, valve nozzle, manway, support skirt, integral attachments, and Unit 2 heater sleeve;

   b. corrosion and boric acid wastage for the pressurizer instrument nozzle and integral attachments;

   c. loss of preload for the pressurizer manway bolting.

   d. crack initiation and growth (SCC) for the RCS carbon steel (c/s) -- hot and cold leg piping, nozzles, safe ends, and integral support;

   e. SCC for stainless steel (s/s) -- reactor coolant pump (RCP) nozzles, safety and relief valve bodies and body flanges, bonnet and bonnet flanges, and nozzles; hot and cold leg, surge line, spray line, nozzles and safe ends; for s/s auxiliary piping of the decay heat removal system, core flood system and any other included Class 1 piping; fittings, nozzles, and safe ends of auxiliary piping; and component integral supports; cast austenitic stainless steel (CASS) -- RCP casing, cover, casing flange, cover flange; safety and relief valve bodies, bonnets, body and bonnet flanges; cold and hot legs; surge line, nozzles; fittings, nozzles, and safe ends of auxiliary piping;

   f. SCC for nickel alloy -- auxiliary piping safe ends;

Enclosure

g. SCC for High strength low alloy (HSLA) steel -- RCP closure bolting and safety valves closure bolting;

h. general corrosion (boric acid corrosion from leakage of primary coolant) for integral supports (c/s), safety and relief valve bodies, bonnets, body flange, bonnet flange (s/s and CASS); RCP casing, cover, casing flange, cover flange (CASS); and safety valve closure bolting;

i. thermal embrittlement for CASS components -- RCP casing and cover flanges; safety and relief valve body, bonnet, body and bonnet flange, hot and cold legs; surge lines; nozzles and safe ends; auxiliary piping fittings, nozzles, and safe ends;

j. loss of preload/stress relaxation for RCP closure bolting and safety and relief valve closure bolting.

4. The application does not apparently contain an AMR of the following pressurizer components: heater belt forgings; heater sheaths and end caps; heater bundles; and bundle cover plates. If these components are applicable to the Calvert Cliffs units, describe where these components are addressed in the LRA, or justify why these components have been excluded.

5. For the following aging effects and components, summarize the extent to which BGE relies upon the associated programs for aging management, and provide examples of any operating experience that demonstrates the effectiveness of the programs that are relied upon to manage these aging effects:

a. boric acid corrosion -- Technical Specifications (TS) leakage limits, and ASME Section XI, Subsection IWB, examination categories B-P;

b. cracking of large bore piping -- ASME Section XI, Subsection IWB, examination categories B-J and B-F, and flaw evaluation criteria IWB-3000;

c. cracking of small bore piping (less than 4 in but greater than 1 in diameter) -- augmented volumetric inservice inspection; and, because some safe ends and welds on small bore piping are of Inconel, information resulting from the assessment of NRC Information Notice (IN) 90-10;

d. cracking of bolting -- programs consistent with ASME Section XI, Subsection IWB, examination categories B-G-1 and B-G and NRC Bulletin 82-02;

e. pressurizer shell, heads, heater belt forgings -- ASME Section XI, Subsection IWB, examination categories B-B and B-P, and primary water chemistry;

f. pressurizer nozzles -- ASME Section XI, Subsection IWB, examination categories B-D, B-E, B-F, and B-P, TS leakage limits, primary water chemistry, augmented inspection of small bore piping; and if Inconel is used, information resulting from IN 90-10;

g. integral attachments -- ASME Section XI, Subsection IWB, examination category B-H, and primary water chemistry;

h. heater sheaths and end caps -- ASME Section XI, Subsection IWB, examination category B-P, and TS leakage limits;

i. loss of preload in bolting -- ASME Section XI, Subsection IWB, examination categories B-G-1, B-G-2, and B-P, response to NRC Bulletin 82-02 and Generic Letter 88-05, and TS leakage limits.

6. Describe the manner by which Procedure STP-M-574-1/2, "EC Examination of CCNPP ½ Steam Generators," manages aging effects.

7. How is erosion/corrosion managed for the secondary manway and cover plate, hand hole and cover plate?

8. It appears that BGE used ferrite criteria to screen components subject to thermal embrittlement. However, the NRC regards ferrite content as inadequate criterion for screening as stated in NUREG-1557. Therefore, justify using ferrite content as screening criteria.

9. Steam generator tubes have experienced intergranular attack (IGA). The application does not identify IGA as an aging issue. Provide basis for this determination.

10. Discuss how BGE will manage SCC of the CASS surge nozzle safe end.

11. What are the acceptance criteria in Procedure RV-78, "RV Flange Protection Ring Removal and Closure Head Installation?"

12. Describe how denting and pitting of the SG tubes will be managed.

13. Please provide a summary description for the following procedures regarding how their implementation will address the following elements for their related aging management program(s): (a) The scope of structures and components managed by the program; (b) Preventive actions designed to mitigate or prevent aging degradation; (c) Parameters monitored or inspected relative to degradation of specific structure and component intended functions; (d) Detection of aging effects before loss of structure and component intended functions; (e) Monitoring, trending, inspection, testing frequency, and sample size to ensure timely detection of aging effects and corrective actions; (f) Acceptance criteria to ensure structure and component intended functions; and (g) Operating experience that provides objective evidence to demonstrate that the effects of aging will be adequately managed.

a. Procedure SG-20, "Primary manway cover removal and installation"

b. Administrative Procedure MN-3-110, "Inservice Inspection of ASME XI Components"
c. Technical Procedure FASTENER-01, "Torquing and Fastener Applications"
d. Procedure STP-M-574-1/2, "EC Examination of CCNPP ½ Steam Generators"
e. CASS Evaluation program
f. Alloy 600 program
g. STP-0-27-1/2, "RCS Leakage Evaluation"
h. MN-3-301, "BACI Program"
i. EN-1-300, "Implementation of Fatigue Monitoring"

14. Clarify whether crevice corrosion for the RCS is a plausible aging effect and, if so, provide a reference to where aging management is addressed in the LRA. If crevice corrosion is not a plausible aging effect for the RCS, describe the basis for that conclusion.

15. The application discusses prior degradation of the RCP suction deflector at Calvert Cliffs. What was the cause of the suction deflector bolting failures? What was the material of the bolts that failed, and how are the bolts being managed for aging?

16. Are there any parts of the systems, structures and components within the RCS that are inaccessible for inspection? If so, describe what aging management program will be relied upon to maintain the integrity of the inaccessible areas. If the aging management program for the inaccessible areas is an evaluation of the acceptability of inaccessible areas based on conditions found in surrounding accessible areas, please provide information to show that conditions would exist in accessible areas that would indicate the presence of, or result in degradation to, such inaccessible areas. If different aging effects or aging management techniques are needed for the inaccessible areas, please provide a summary to address the following elements for the inaccessible areas: (a) Preventive actions that will mitigate or prevent aging degradation; (b) Parameters monitored or inspected relative to degradation of specific structure and component intended functions; (c) Detection of aging effects before loss of structure and component intended functions; (d) Monitoring, trending, inspection, testing frequency, and sample size to ensure timely detection of aging effects and corrective actions; (e) Acceptance criteria to ensure structure and component intended functions; and (f) Operating experience that provides objective evidence to demonstrate that the effects of aging will be adequately managed.