September 7, 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, UNITS 1 & 2, COMMODITY REPORTS FOR COMPONENT SUPPORTS AND PIPING SEGMENTS THAT PROVIDE STRUCTURAL SUPPORT (TAC NOS. MA0291, MA0292, AND M99204)

Dear Mr. Cruse:

By letters dated October 22, 1997, and March 27, 1998, Baltimore Gas and Electric Company (BGE) submitted for review the Component Supports (3.1) and Piping Segements that Provide Strucutral Support (3.1A) commodity reports, respectively, 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 reports 3.1 and 3.1A to determine if the reports meet 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 reports 3.1 and 3.1A against the requirements of 10 CFR 54.21(a)(1), and 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
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Mr. Charles H. Cruse
Baltimore Gas & Electric Company

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Unit Nos. 1 and 2

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REQUEST FOR ADDITIONAL INFORMATION
CALVERT CLIFFS NUCLEAR POWER PLANT UNIT NOS. 1 & 2
COMPONENT SUPPORTS AND
PIPING SEGMENTS THAT PROVIDE STRUCTURAL SUPPORT
COMMODITY REPORTS, SECTIONS 3.1 AND 3.1A
DOCKET NOS. 50-317 AND 50-318

Section 3.1.1 - Scoping

1. Table 3.1-1 contains a list of systems within the scope of license renewal that contain component supports within the commodity evaluation cover under Section 3.1 of the license renewal application (LRA). This list was compared to the list of all the systems within the scope of license renewal. This review revealed five system (System 68, Spent Fuel Storage; System 70, Refuel Pool; System 76, Secondary Sampling System; System 103, Emergency Diesel Generator HVAC; and System 120, Barriers and Barrier Penetrations) that were identified as being within the scope of license renewal but not having component supports within the scope of the commodity evaluation provided in Section 3.1 of the LRA. Please identify the scope of component supports from these five systems that are included within the scope of the aging management review under the component supports commodity groups. Indicate whether any of these five systems have no component supports that require an aging management review.

Section 3.1A - Scoping

2. Subsection 3.1A.1.1 includes a statement that the system's seismic structural boundary extends beyond the valve to the first seismic anchor or "equivalent." Provide a discussion to explain what kind of piping support arrangement is "equivalent" to the "seismic anchor."

Section 3.1.2 - Aging Management Review

3. Page 3.1-1 of Section 3.1 described that the Seismic Qualification Utility Group (SQUG) guidance was used as one of the sources for grouping the component supports and was used for the baseline inspections. As stated on Page 5 of supplemental safety evaluation report No. 2 (SSER-2) on SQUG's Generic Implementation Procedure, Revision 2 (GIP-2) dated May 22, 1992, the qualification of seismic adequacy of equipment (including supports) in older operating nuclear plants does not address the aging effects of equipment. The SSER-2 also stated that the staff will not accept any claim that the experience data collected by the SQUG for the Unresolved Safety Issue (USI) A-46 program adequately addressed the aging effects of equipment. Provide a justification for using the GIP-2 for scoping component supports.

4. Page 3.1-1 of subsection 3.1.1.1 provides the definition of component supports, "a component support is defined as the connection between a system, or component within a system, and a plant structural member (e.g., the concrete floor or wall, structural beam or

Enclosure

column, or ground outside the plant buildings)." From the review of Section 3.1, it is not clear that the steel structural frames used for the support of piping systems were treated as component support or as structural components. If the steel structural frames are considered as components, which of the aging management programs (existing or new) will be used for managing the aging effects of the steel structural frames.

5. Page 3.1-1 in Section 3.1 includes a statement that the structures aging management review (AMR) considered the effects of aging caused by the surrounding environment, while the component supports AMR considered the effects of aging caused by the supported equipment (thermal expansion, rotating equipment, etc.) as well as the surrounding environment. Clarify how the aging effects of the supported equipment was considered in the AMR for the component supports.

6. Please address the following questions related to the commodity description and the boundary for component supports:

   a. Are all types of fasteners (such as bolts, nuts, clips, clamps, brackets, etc.) used to attach component supports to components and component supports to structures included within the scope of component supports requiring an AMR? If so, in what section of the LRA is the AMR of fasteners addressed? If not, provide a justification for not including fasteners within the scope of an AMR.

   b. For fasteners that rely on welded connections to the components (e.g., pipe stanchions with welded attachment to a pipe or a piece of equipment), identify if the welds are considered part of the fastener, component being supported or the component support. Identify where in the LRA is the AMR for these fasteners and welds are located, or provide a justification for not including these fasteners and welds within the scope of an AMR.

   c. Structural steel members such as supplementary steel members (e.g., heating, ventilation, and air conditioning (HVAC) duct supports labeled as "rod hanger trapeze supports) are not identified as within the scope of component supports. Identify where in the LRA the AMR for these components is addressed or provide a justification for not performing an AMR of these components.

7. Page 3.1-2 in subsection 3.1.1.1 includes the statement that supports for tubing are included in Section 6.4 of the LRA entitled "Instrument Lines." How is the distinction made (or boundary) between piping and tubing for defining the scope to be covered under Section 3.1 versus Section 6.4?

8. Table 3.1-1 on page 3.1-3 defines the systems within the scope of license renewal containing supports within the commodity evaluation. This table does not include the steam generator blowdown system; containment isolation group; control room and diesel generator building HVAC systems. Identify the section within the LRA that addresses the AMR for the associated supports for these systems and structures or provide a justification for not including them within the scope of components requiring an AMR.

9. In Table 3.1-2, only the rod hanger trapeze supports are listed for the HVAC ducting supports. Based on the staff's experience, unistrut type of supports are widely used for the HVAC ductworks in operating nuclear power plants. Clarify if the rod hanger trapeze type of support is the only type of support used for the HVAC ducting systems. If any other type of support is used for the HVAC ducting systems, identify where in the LRA these supports are addressed or provided a justification for not subjecting these components to an AMR.

10. Table 3.1-2 only identifies ring foundations for supports of the flat-bottom field-erected vertical tanks. Provide the basis for not considering the degradation due to aging (loose anchors, general corrosion of anchor chairs and long anchor bolts, etc.) of the anchorage systems in the component support AMR.

11. Provide a discussion of how dynamic loading (e.g., vibrations) aging effects for the anchorage systems of elements inside electrical cabinets (such as relays) are managed.

12. Table 3.1-3 indicates that general corrosion is not plausible for frames and saddles. Please provide the basis for this conclusion.

13. Based on the staff's experience, "loose bolts" (high strength bolts, anchor bolts, etc.) due to vibration is a common type of aging effect of component supports with bolt-connections. Provide the basis for excluding this as an applicable aging effect. If applicable, please include a discussion of how the plant operating and maintenance history support this conclusion.

14. Provide the basis for excluding concrete cracking as an applicable aging effect requiring an aging management program for the flat-bottom vertical tank ring foundation.

15. Regarding expansion anchors and embedded anchors, which are commonly used for the connections between the component supports and structural components (walls, floors and beams), please clarify the following:

    a. Any loss of clamping force over time (age-related degradation) associated with expansion anchors should be properly managed, because it will affect the stiffness properties of supports and will change the behavior of components under dynamic loading such as an earthquake. Please clarify how the loss of clamping force was addressed in the AMR for these components. If not addressed, provide the basis for not addressing the loss of clamping force for these components.

    b. The cracking of surrounding concrete (age-related degradation) that typically occurs around concrete expansion and embedded anchors was not identified as a potential aging effect. Provide the basis for not considering this as a potential aging effect.

c. Provide the basis for not including corrosion of steel chairs, loose long anchor bolts, and deterioration of the nozzle between tanks and connected pipes within the scope of an AMR. Based on the staff's experience, these components would have been expected to be addressed within the "support/ARDM combination" Group 6.

16. Please clarify the following questions related to the baseline walkdowns or inspections described on pages 3.1-6 and 3.1-7.

a. Will the baseline walkdowns (or inspections) involve any actions other than visual observations? If not, explain how will cracks associated with incipient fatigue failures or with bolt cracking be detected.

b. What parameters will be reviewed and/or inspected and what acceptance criteria will be used?

c. Please clarify how the baseline procedure implements expansion of the sample size and scope based on the findings from the initial sampling? For example, if an age related degradation mechanism (ARDM) is identified for a specific support-type sample, then will all supports for that "type" be inspected and will the scope be increased for other support types having a similar environment, design, or loading?

d. General corrosion of steel is identified as an ARDM that applies to all support types. Will every support be included in the baseline walkdown/inspection? If not, describe the process and the basis that will be used to determine the walkdown/inspection sample size?

e. The LRA states that follow-on will be undertaken if evidence of significant aging is found. Clarify what is meant by significant aging? Provide examples of "significant aging" and what elements would be included in the follow-on actions. Also, what actions are taken if the identified ARDM is not significant at the time of baseline inspection?

17. Table 3.1-3 lists potential and plausible ARDMs for component supports. Please clarify the following related to the headings and potential ARDMs.

a. Provide the basis for excluding mechanical wear as an ARDM for supports containing pins, springs, sliding plates, etc., from an AMR.

b. For general corrosion of steel, is corrosion attack by any medium other than water or moisture considered (e.g., chemical attack due to leaks, spills, or effluents)?

c. Are any materials other than steel and elastomer elements used in component supports (e.g., Teflon coated or Lubrite plates)?

d. Did you include thermal striping and thermal stratification in your assessment of thermal expansion loading? If not, provide a justification for excluding these ARDMs from the scope of your AMR.

e. Referring to the ARDMs shown in Table 3.1-3, discuss the consideration given to possible interaction between individual ARDMs. (As an example, vibratory loads in conjunction with irradiation embrittlement might be a very critical combination.)

18. Please clarify the following concerns regarding the information described in Table 3.1-3:

a. The loading due to rotating/reciprocating machinery has the potential to affect many of the supports listed in the table. Provide the basis for the "N/A" and "not plausible" determination for supports other than electrical raceways, electrical cabinets and instruments, and tanks potentially affected by rotating/reciprocating machinery loads.

b. Provide the basis for the "not plausible" determination for piping frame and stanchion supports and for metal spring isolators and fixed base supports potentially affected by loading due to hydraulic vibration or waterhammer.

c. Provide the basis for the "not plausible" and "N/A" determination for piping frame and stanchion supports, for metal spring isolators and fixed base supports, and for loss-of-coolant accident restraints potentially affected by loading due to thermal expansion of piping and/or components.

d. Provide the basis for the "not plausible" determination for supports potentially affected by stress corrosion cracking of high strength bolts.

e. Provide the basis for the "not plausible" determination for supports potentially affected by radiation embrittlement of steel.

f. Provide the basis for the "not plausible" determination for supports potentially affected by grout/concrete local deterioration.

g. Provide the basis for the "not plausible" determination for supports potentially affected by lead anchor creep.

19. Based on the staff's experience, a large number of frame types of piping supports are fabricated with threaded fasteners. If the bolted piping frame supports are used, clarify the basis for the following conclusion: "the aging effects are not expected to prevent the piping frames from performing their intended support function," described on page 3.1-11; and the conclusion, "while hydraulic vibration or water hammer and thermal expansion have been observed, the aging effects are not expected to prevent the pipe frames from performing their intended support function and these ARDMs are considered to be not plausible for this kind of supports," on page 3.1-12.

20. A statement was made in the application that the American Society of Mechanical Engineers (ASME) Section XI inservice inspection for component supports includes a visual examination of a prescribed sampling of the systems covered by the program. In addition to the sampling criteria adopted from the ASME Code, Section XI (as stated in the last paragraph of Page 3.1-14), provide a description of the criteria for sample expansion

(how the sample size of component supports are to be expanded when degradations are identified discussed on Page 3.1-15)

21. With regard to the description in the second paragraph of Page 3.1-17, please clarify the following:

    a. The second sentence states that the sample approach will be comparable to the approach required by ASME Section XI for piping supports of ASME Class 3 systems. Clarify the definition of the word "Comparable." Identify the specific differences and describe why are these differences being implemented.

    b. The fourth and fifth sentence state that these walkdowns document the condition of the piping supports within the scope of license renewal for all piping support types, except piping frames outside the containment. If an active corrosion mechanism is found during the additional sampling baseline walkdowns for pipe hangers outside the containment, then the inspection scope for that system would be expanded to pipe frame supports outside containment. Provide justification why the pipe frame supports outside the containment are included in the scope only when an active corrosion mechanism is found during the additional sampling baseline walkdowns for pipe hangers outside the containment.

22. Page 3.1-18 states that "None of the failure modes is expected to be affected by age-related effects, such as anchor-bolt relaxation or concrete shrinkage because:" bolt preload in the anchor is not counted on for anchor function. Once an anchor is "set" by torque, anchor function is maintained by the irreversible expansion of the anchor expansion ring or cone into the concrete. Summarize the information that provides the basis for this conclusion. Based on the staff's experience, once the anchor bolt is "set," the result of anchor-bolt relaxation or concrete shrinkage will cause the anchor-bolt function change due to the reduction of anchor-bolt stiffness (the stiffness of anchor-bolt systems will decrease with time, and only the anchor strength is maintained.) and, in turn, the reduction of anchor-bolt stiffness will modify the dynamic behavior of the supported components.

23. Page 3.1-23 states that the Group 2 "support/ARDM combination" includes all 15 component support types within the three component support groups (cable-tray supports, HVAC ducting supports, and equipment supports). This section also provides a description on page 3.1-26 that the aging management approach for the three component support groups rely on inspections performed by the seismic verification program (SVP) for eight support-types, inspections performed by the inservice inspection (ISI) program for three support-types, and additional sampling baseline walkdowns for two support-types. Please clarify what are the two support types that are not covered by these three baseline walkdown activities. Are they the two support types for which no baseline walkdowns were required? If so, what is the basis for this determination?

24. Normally, resistance or susceptibility to stress corrosion cracking of high strength steel bolts is established by hardness of the bolt material. Discuss what plans, if any, do you have to check the hardness of the bolts either from in-place bolts or bolting in the

warehouse. If applicable, provide hardness data for the bolting material as necessary to support the response.

25. Describe the visual inspection activities performed during the SVP walkdown that were used to identify potential ARDM effects such as loosening of bolted connections or loss of weld integrity. Please identify what documentation is used to implement these inspection activities.

26. Section 3.1.A.2 indicates that piping segment beyond the safety-related/nonsafety-related (SR/NSR) boundary to the first seismic restraint is considered as structural support for the system pressure boundary isolation valve. Therefore, piping segments beyond the SR/NSR boundary are classified as Seismic Category I up to and including the first seismic anchor. This section further states that given the similarity of the piping materials for piping within the SR pressure boundary, to these outside this boundary that are designed and maintained to SR requirements, any material degradation identified on the piping segments within the SR pressure boundary would lead to an evaluation for generic implications on the NSR side of this boundary. The staff interprets this statement as a commitment that the licensee will evaluate these NSR piping segments only if some aging degradation has been identified on the SR piping segments. Since these NSR piping segments have the intended safety function of providing structural support to the SR piping and boundary isolation valves, provide a justification for not performing the applicable aging management activities for detecting applicable aging effects of the NSR piping independent of degradation identified with the SR piping.

27. Section 3.1.2 states that some supports are inaccessible either because they are located underwater (in spent fuel pools or refueling water storage tanks), or because they are located in high radiation areas. The section further states that it may not be possible to perform a visual walkdown of these supports. However, other inspection techniques (e.g., remote video) may be recommended under the age-related degradation inspection (ARDI) program if they are viable. The ARDI program will either sample some of these supports, sample other accessible supports that are similar in design and/or environment, or will provide an analysis that will document why any inspection is not required. Please summarize the scope of the inspection activities, the inspection methods to be used, the frequency of inspections, the criteria used to determine that frequency, and the basis for this criteria related to the visual inspections/walkdowns activities. If an analysis has been used to determine that an inspection is not needed, provide sufficient information related to the analysis to justify this determination.

28. Are there any parts of the systems, structures, or components described in this section 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: (1) Preventive

actions that will mitigate or prevent aging degradation; (2) Parameters monitored or inspected relative to degradation of specific structure and component intended functions; (3) Detection of aging effects before loss of structure and component intended functions; (4) Monitoring, trending, inspection, testing frequency, and sample size to ensure timely detection of aging effects and corrective actions; (5) Acceptance criteria to ensure structure and component intended functions; and (6) Operating experience that provides objective evidence to demonstrate that the effects of aging will be adequately managed.