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Calvert Cliffs Nuclear Power Plant  
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410 495-4455



May 25, 1999

U. S. Nuclear Regulatory Commission  
Washington, DC 20555

**ATTENTION:** Document Control Desk

**SUBJECT:** Calvert Cliffs Nuclear Power Plant  
Unit Nos. 1 & 2; Docket Nos. 50-317 & 50-318  
Response to Request for Additional Information - License Amendment Request:  
Tube Repair Using Leak Limiting Alloy 800 Sleeves

**REFERENCE:** (a) Letter from Mr. C. H. Cruse (BGE) to NRC Document Control Desk,  
dated November 30, 1998, License Amendment Request: Tube Repair  
Using Leak Limiting Alloy 800 Sleeves

By letter dated November 30, 1998 (Reference a), Baltimore Gas and Electric Company (BGE) submitted a license amendment request to the Nuclear Regulatory Commission (NRC) to allow the repair of defective steam generator tubes with leak-limiting Alloy 800 repair sleeves. This letter responds to the Commission's request for additional information made during a teleconference held on March 22, 1999, between the NRC staff and BGE.

**NRC REQUEST No. 1**

*The Calvert Cliffs Technical Specification 5.5.9.d.9, Tube Inspection, page 5.0-18, specifies that a tube is inspected from the point of entry (hot leg side) completely around the U-bend to the top support of the cold leg. This requirement may need to be changed to include inspection of entire length of a tube in case a sleeve is installed in the region below the top support of the cold leg.*

**RESPONSE**

Technical Specification 5.5.9.d.9 specifies the minimum inspection requirement. However, BGE is committed to implementing both Nuclear Energy Institute (NEI) 97-06, "Steam Generator Program Guidelines," and the Electric Power Research Institute's "PWR [Pressurized Water Reactor] Steam Generator Examination Guidelines," which require inspection of the entire length of the tube. Therefore, we believe there is no need for changing the Technical Specification requirement to ensure inspection of the entire length of the tube in the event Leak Limiting Alloy 800 Sleeves are installed in the cold leg side. It is also noteworthy to mention the ongoing NRC/industry effort that will eventually remove the kind of detailed inspection requirement specified in Technical Specification 5.5.9.d.9 out of the Technical Specifications.

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**NRC REQUEST No. 2**

*The November 30, 1998 letter stated that sleeve locations are from the fourth eggcrate support down to the top of the tubesheet. This restriction was not specified in the Asea Brown Boveri, Inc.-Combustion Engineering, Inc. [ABB-CE] report. Why is this restriction applied to Calvert Cliffs Units 1 and 2 steam generators?*

**RESPONSE**

Page 2-2, Paragraph 1 of the ABB CE report states that the eggcrate support sleeve may be installed up to and including the fourth eggcrate support. Therefore, the restriction is not unique to Calvert Cliffs' application.

**NRC REQUEST No. 3**

*Describe how sleeve indications will be dispositioned in Calvert Cliffs. ABB-CE recommends plugging on detection. Would the licensee follow the practice of plug on detection or some other practice, e.g., sizing technique? Where would the licensee document its practice on disposition of sleeve indications?*

**RESPONSE**

Baltimore Gas and Electric Company will plug, on detection, any Alloy 800 sleeve that exhibits credible indication without relying to sizing techniques. Plugging on detection will be documented in the Steam Generator Program Document. The inspection practices for Alloy 800 sleeves will be addressed in the Calvert Cliffs Steam Generator Eddy Current Guidelines.

**NRC REQUEST No. 4**

*On Page 2-1 (second to the last paragraph), 2-2 (second paragraph), and 3-2 (item 5) of the ABB-CE report, it is stated that the corrosion test is ongoing and there are tests still in process. What is the status of the corrosion test and clarify the tests that are still in process.*

**RESPONSE**

The corrosion tests are completed and Report No. 98-FSW-021 has been issued and is included as Attachment (1) to this letter.

**NRC REQUEST No. 5**

*On Page 5-2 of the ABB-CE report, the use of plus point probe for inspecting sleeves is discussed. The staff noted that in a domestic nuclear plant, a routine sleeve (not Alloy 800 sleeve) inspection showed that a large indication having large voltage responses in the tube masked the voltage responses from smaller indications in the sleeve when both sleeve indication and tube indication occur on the same elevation of the tube. The problem was resolved by combining a high frequency coil with the existing low frequency coil in the probe. What are the inspection procedures implemented to avoid the same problem?*



#### **RESPONSE**

ABB-CE has adopted a high frequency coil as part of the inspection technique in the Tungsten Inert Gas-welded sleeve program. This technique will be continued for the Alloy 800 Program.

#### **NRC REQUEST No. 6**

*On Page 7-2 of the ABB-CE report: (1) The mechanical tests used expansion transition zone (ETZ) samples but there was no discussion of eggcrate support (ECS) samples being used in the mechanical tests. It is not clear that the results of ETZ sample tests are applicable to ECS sleeves, because ETZ sleeves contain hard rolled joint, whereas ECS sleeves do not. (2) The effect of the yield strength of the tube on contact stress and load carry capability was discussed. However, the effect of the sleeve yield strength was not discussed. Discuss the effect of the sleeve yield strength on the overall sleeve-tube assembly. (3) The location of the flaw in the test specimen was in the middle of the sleeve and not at the transition zone of a hydraulic expansion joint. It is not clear if the flaw location in the specimen is at a structurally weak point, or a point where actual flaw would most likely to occur. Discuss the validity of the flaw location.*

#### **RESPONSE**

1. Leak rate tests were performed on both ETZ and ECS samples. The results of these tests are summarized in Tables 7-2 and 7-3 of the ABB-CE report. The mechanical tests were performed on full-length samples, and the loading was applied to both the rolled joint and the hydraulically-expanded joint. Afterward, the tube was severed between the joints, and only the hydraulically-expanded joint was loaded. These test results then apply to both types of sleeve joints since the hydraulic expansions are identical for both.
2. Report No. 98-TR-FSW-005 (Reference 7.5.9 of the ABB-CE Report) discusses the testing that was performed on low yield strength tubing. Report No. 98-TR-FSW-005, Revision 00, is included as Attachment (2) to this letter.
3. The "flaw" in these test specimens was a drilled hole in the parent tube between the joints. This hole was made in order to measure leak rates across the hydraulically-expanded joint during leak rate testing. The hole was not placed in the tube with the intent of simulating a flaw.

#### **NRC REQUEST No. 7**

*Table 7-1 of the ABB-CE Report shows results of mechanical testing. The staff needs more details of the tests. (1) Provide a list of a matrix of each test. For each test, identify each sample, and provide corresponding numerical tests results. (2) For each sample, identify whether it is an ETZ sleeve sample or ECS sleeve sample. (3) Identify the location and size of the simulated flaws in each sample. (4) For each test results, indicate whether safety margins in Regulatory Guide 1.121 (Bases for Plugging Degraded PWR Steam Generator Tubes ) were satisfied.*

#### **RESPONSE**

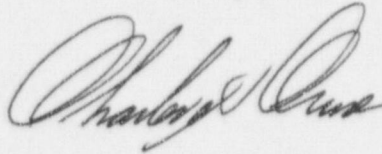
1. The table below summarizes the type and number of tests that were performed. As discussed in the test report, tests were performed on specimens that had the parent tube severed between the upper and lower joints in order to load the hydraulically-expanded joint. There were also tests performed on the lower rolled joint, as discussed in the report. The actual test values are reported in Section 7 of the report.

2. The samples tested were hard-rolled joint samples. Therefore, they cannot be identified as ETZ or ECS sleeve samples.
3. See response to Request No. 6, Item 3 above.
4. The test program was designed to meet the requirements of Regulatory Guide 1.121. Table 3-1 in the ABB-CE report summarizes the acceptance criteria and refers to the applicable section of the report.

TEST TYPE	NUMBER OF SPECIMENS
<b>Room Temperature (RT)</b>	
Cyclic Loading (Wear Test)	1 (132,000 cycles)
Cyclic Loading (Axial Load)	1 (136,000 cycles)
<b>Operating Temperature (OT)</b>	
Axial Loading	6
Sleeve Burst	1
Sleeve Collapse	2
Cyclic Loading	2
Thermal & Load Cycling	2
Sleeve Collapse	2
Various Leak (RT to OT)	40
<b>Low Yield Strength Tubes</b>	
Leak	6
Thermal & Load Cycling	2

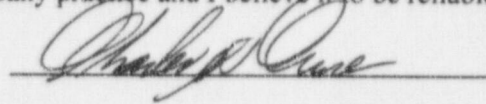
The above responses do not change the No Significant Hazards Determination previously provided. Should you have questions regarding this matter, we will be pleased to discuss them with you.

Very truly yours,

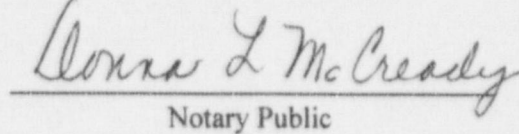


STATE OF MARYLAND :  
                              : TO WIT:  
COUNTY OF CALVERT :

I, Charles H. Cruse, being duly sworn, state that I am Vice President, Nuclear Energy Division, Baltimore Gas and Electric Company (BGE), and that I am duly authorized to execute and file this response on behalf of BGE. To the best of my knowledge and belief, the statements contained in this document are true and correct. To the extent that these statements are not based on my personal knowledge, they are based upon information provided by other BGE employees and/or consultants. Such information has been reviewed in accordance with company practice and I believe it to be reliable.

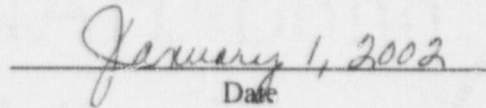


Subscribed and sworn before me, a Notary Public in and for the State of Maryland and County of Calvert, this 25<sup>th</sup> day of May, 1999.

  
Notary Public

WITNESS my Hand and Notarial Seal:

My Commission Expires:

  
Date

CHC/GT/dlm

- Attachments: (1) ABB-CE Report No. 98-FSW-021  
(2) ABB-CE Report No. 98-FSW-005

cc: **(With Attachments)**  
A. W. Dromerick

**(Without Attachments)**  
R. S. Fleishman, Esquire  
J. E. Silberg, Esquire  
S. S. Bajwa, NRC  
H. J. Miller, NRC

Resident Inspector, NRC  
R. I. McLean, DNR  
J. H. Walter, PSC  
E. P. Kurdziel, ABB-CE



**ATTACHMENT (2)**

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**ABB-CE Report No. 98-FSW-005**

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**Baltimore Gas & Electric Company  
Docket Nos. 50-317 and 50-318  
May 25, 1999**