



## **Constellation Nuclear**

### **Calvert Cliffs Nuclear Power Plant**

*A Member of the  
Constellation Energy Group*

October 18, 2001

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  
Reply to a Notice of Violation – NRC Inspection Report 50-317/01-009

**REFERENCES:**

- (a) Letter from Mr. W. D. Lanning (NRC), to Mr. C. H. Cruse, dated August 24, 2001, Calvert Cliffs Unit 1 - NRC Inspection Report 50-31701-009
- (b) Letter from Mr. H. J. Miller (NRC) to Mr. C. H. Cruse (CCNPP), dated September 19, 2001, Final Significance Determination for a Yellow Finding and Notice of Violation at Calvert Cliffs Unit 1 (NRC Inspection Report 50-317/01-009)

This letter provides Calvert Cliffs Nuclear Power Plant's response to References (a) and (b), which identified a Notice of Violation associated with a yellow finding. This Notice of Violation involved a failure of No. 11 Auxiliary Feedwater turbine outboard bearing on May 16, 2001. The response to this Notice of Violation is provided in Attachment (1).

Should you have questions regarding this matter, we will be pleased to discuss them with you.

Very truly yours,

CHC/CDS/bjd

Attachment: (1) NRC Region I Inspection Report No. 50-317-01-009, Response to Violation 01-009-02

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**ATTACHMENT (1)**

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**NRC REGION I INSPECTION REPORT NO. 50-317-01-009**

**RESPONSE TO VIOLATION 01-009-02**

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## ATTACHMENT (1)

### **NRC REGION I INSPECTION REPORT NO. 50-317-01-009 RESPONSE TO VIOLATION 01-009-02**

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*10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," requires, in part, that activities affecting quality shall be accomplished in accordance with documented instructions, procedures, or drawings of a type appropriate to the circumstances.*

*Maintenance Order No. 1199804675, "Inspect AFW Pump Turbine Bearings," provided instructions to reassemble the No. 11 auxiliary feedwater pump (AFW) turbine bearings, an activity affecting quality. Step 80, for outboard bearing reassembly, references Vendor Technical Manual 12083-010, "Steam Generator, Auxiliary Feedwater Pump," pages 5-8 and 5-8A, which state, in part, that sealant application should be limited to a thin film to prevent anything blocking bearing oil flow.*

*Contrary to the above, on March 25, 2000, the reassembly of the No. 11 AFW pump outboard bearing housing was not accomplished in accordance with Maintenance Order No. 1199804675, Step 80, in that sealant was not limited to a thin film. As a result, excessive sealant was applied that contaminated the bearing oil and resulted in a loss of lubricating oil to, and the subsequent failure of, the outboard bearing on the No. 11 AFW pump turbine on May 16, 2001.*

#### **REASON FOR THE VIOLATION**

Failure to properly reassemble No. 11 Auxiliary Feedwater (AFW) turbine outboard bearing housing, in accordance with maintenance order instructions, was the result of human error. Mechanics who assembled the No. 11 AFW turbine outboard bearing housing on March 25, 2000 did not follow the applicable maintenance instructions for sealant application. They did not limit sealant application to a thin film. Rather, the mechanics were focused on prevention of potential oil leaks from the bearing housing and applied an excessive amount of sealant. The mechanics did not recognize that the amount of sealant used was excessive and could become a source of foreign material and threaten oil flow to the bearing.

Sometime after the March 25, 2000 reassembly of No. 11 AFW turbine outboard bearing housing, Calvert Cliffs maintenance mechanics were advised by a vendor representative that they were using excessive amounts of sealant on the AFW turbine bearing housings. This information was applied during subsequent reassemblies of 12, 21, and 22 AFW turbine bearing housings. Disassembly and inspection of the 12, 21, and 22 AFW turbine pump bearing housings during investigation of this event revealed that appropriate amounts of sealant had been applied to their bearing housings.

We identified the following generic problems associated with this event and its follow-up activities:

- A. Human performance errors during the conduct of maintenance have resulted in equipment unavailability, plant transients, and trips.
- B. The importance of critical equipment has not been effectively communicated to maintenance personnel.
- C. The causal analysis process performed in response to some equipment failures has not always been effective in the prevention of recurring failures.

#### **CORRECTIVE STEPS THAT HAVE BEEN TAKEN AND RESULTS ACHIEVED**

The following event-specific actions have been taken to raise awareness of the No. 11 AFW turbine bearing failure and to mitigate improper sealant application to plant equipment in the future.

1. Number 11 AFW turbine outboard bearing was replaced and the housing reassembled using the proper amount of sealant. Number 11 AFW pump was returned to service on May 18, 2001.



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2. The other AFW turbine bearing housings (12, 21, and 22) were disassembled, inspected, and reassembled. In each case, the bearing housings for 12, 21, and 22 AFW turbines were found to have been assembled with the proper amount of sealant during their last reassembly. Each of these bearings was reassembled using the proper amount of sealant.
3. This issue was discussed with the mechanics qualified to perform work on AFW turbines, and training was conducted for appropriate craft personnel. The training covered the root causes of this event, corrective actions taken, importance of procedure adherence, and the use of wet film thickness gauges.
4. A site-wide communications message was distributed describing this event and its causes.
5. The vendor technical manual for the AFW turbines was revised to incorporate more specific requirements for sealant application to the AFW turbine bearing housings. The new recommendations now specify the following:
  - Only apply sealant to the pedestal-bearing cap;
  - Apply sealant to bearing cap in a thin transparent layer (not to exceed .005 inches wet film thickness);
  - Apply sealant from the outer edge of the bearing cap toward the inner edge, not to exceed half the sealing surface width or ¼ inch; and
  - Ensure sealant is of uniform thickness.
6. The AFW turbine overhaul procedures were revised to incorporate cautionary instructions and specific requirements regarding the use of sealant on the bearing housings.
7. A review of other applicable procedures that incorporate the use of sealants was conducted. Appropriate changes to these procedures were made to minimize the potential for sealants to become foreign material and cause equipment to become inoperable.

The following actions have been taken to address the generic problems identified as a result of this event.

- A. Maintenance general supervision communicated to all maintenance craft that human performance weaknesses have been identified. The maintenance general supervisors discussed specific workmanship examples relative to their discipline, including the expectation for verbatim compliance with plant procedures, and emphasizing their personal standards of conduct and craftsmanship.
- B. The importance of critical systems that would pose the greatest risk to nuclear safety and unit reliability was clearly communicated to the Plant Engineering Section. This has improved awareness of and sensitivity to critical systems.
- C1. A summary of procedural requirements and expectations concerning the conduct of root cause analyses was developed and presented to plant engineering personnel. These expectations will also be delivered to other site personnel who conduct root cause analyses.
- C2. We have implemented a root cause analysis grading sheet reflecting the procedural requirements and expectations for conducting root cause analyses. Root cause analyses are graded by individuals specifically trained in the conduct of root cause analyses. The results are provided to personnel performing root cause analyses, the root cause approval authority, the issue sponsor, and causal



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analysis mentors. This grading sheet is an effective tool to emphasize areas where improvements are necessary.

#### **CORRECTIVE STEPS THAT WILL BE TAKEN TO AVOID FURTHER VIOLATIONS**

1. The design and testing of the AFW pumps is being reviewed to identify potential improvements that could increase AFW reliability.
2. During the next disassembly of each AFW turbine bearing housing, mechanics will verify that the amount of sealant used during the last reassembly did not result in sealant extruding over the bearing housing internal wall. This verification will ensure that the new requirements for sealant application are effective.

The following actions will be taken to correct the generic problems identified as a result of this event.

- A.1 Expectations will be reinforced in the Maintenance Section concerning compliance with plant standards, procedures, and maintenance order work instructions through training, procedure changes, and other site processes that facilitate change.
- A.2 A "skills" based assessment will be performed for routine maintenance tasks. These assessments will then be used to determine what additional training and procedures are needed to ensure these tasks are performed correctly.
- A.3 Pre-job brief sheets will be revised to ensure maintenance craft understand their specific roles (performer, verifier) when performing a two-person activity. The clarification of roles and responsibilities must be fully understood prior to working on critical equipment. This will provide a broader and deeper understanding of the potential effects and consequences of maintenance activities.
- A.4 A set of maintenance quality performance indicators will be developed and implemented.
- B.1 An expectation will be established that maintenance supervisors will either be present at pre-job briefs or provide supervisory oversight of maintenance field activities associated with critical equipment.
- B.2 Awareness training will be provided to all disciplines in maintenance and planning on Probabilistic Risk Assessment and critical systems and components. This training will result in a better understanding of the potential effects and consequences of maintenance activities.
- C.1 The standard issue report resolution document form will be revised to better prompt users on the procedural expectations for root cause analyses.
- C.2 We plan to improve procedural expectations for quarantine of equipment and move these expectations to earlier in the corrective action process.
- C.3 We plan to institute a formal mechanism to summarize causal analysis results into their underlying causes and behaviors and distribute them to causal analysis sponsor organizations.



**ATTACHMENT (1)**

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**DATE WHEN FULL COMPLIANCE WILL BE ACHIEVED**

Calvert Cliffs is currently in compliance with maintenance instructions concerning application of sealant to AFW turbine bearing housings. All AFW turbine bearings have been reassembled using an appropriate amount of sealant.