



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

November 29, 1999

Mr. Guy G. Campbell, Vice President - Nuclear
FirstEnergy Nuclear Operating Company
5501 North State Route 2
Oak Harbor, OH 43449-9760

SUBJECT: GENERIC LETTER 97-01, "DEGRADATION OF CRDM/CEDM NOZZLE AND OTHER VESSEL CLOSURE HEAD PENETRATIONS": REVIEW OF THE RESPONSES FOR THE DAVIS-BESSE NUCLEAR POWER STATION, UNIT 1 (TAC NO. M98561)

Dear Mr. Campbell:

This letter provides the NRC staff's assessment of your April 23 and July 28, 1997, responses to Generic Letter (GL) 97-01, "Degradation of CRDM/CEDM Nozzle and Other Vessel Closure Head Penetrations," and your January 14, 1999, response to the staff's request for additional information (RAI) dated September 8, 1998. Your responses provided your proposed program and efforts to address the potential for primary water stress corrosion cracking (PWSCC) to occur in the control rod drive mechanism (CRDM) nozzles at the Davis-Besse Nuclear Power Station, Unit 1 (DBNPS).

On April 1, 1997, the staff issued GL 97-01, "Degradation of CRDM/CEDM Nozzle and Other Vessel Closure Head Penetrations," requesting that addressees provide a description of their plans to inspect the vessel head penetrations (VHPs) at their respective pressurized-water reactor (PWR) designed plants. In the discussion section of the GL, the staff indicated that it did not object to individual PWR licensees basing their inspection activities on an integrated, industry-wide inspection program.

The Babcock and Wilcox Owners Group (B&WOG), in coordination with the Nuclear Energy Institute (NEI) and the other PWR Owners Groups (the Westinghouse Owners Group [WOG] and Combustion Engineering Owners Group [CEOG]), developed a cooperative integrated inspection program in response to GL 97-01. On July 25, 1997, the B&WOG submitted Topical Report BAW-2301, "B&WOG Integrated Response to Generic Letter 97-01, Degradation of Control Rod Drive Mechanism Nozzle and Other Vessel Closure Head Penetrations," on behalf of its members. In this report, the B&WOG provided a description of the EPRI/Dominion Engineering CIRSE Model (crack initiation and growth susceptibility model) that was used to rank the VHPs at the participating plants in the owners group. In your 30-day and 120-day responses to GL 97-01, dated April 23 and July 28, 1997, respectively, you indicated that you were a participant in the B&WOG's integrated program and that you endorsed the model in BAW-2301 as being applicable to DBNPS.

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The staff performed a review of BAW-2301 and your April 23 and July 28, 1997, letters and determined that additional information was needed. On September 8, 1998, the staff issued an RAI requesting: (1) a description of the probabilistic susceptibility ranking for a plant's VHPs to undergo PWSCC relative to the rankings for the rest of the industry; (2) a description of how the respective susceptibility models were benchmarked; (3) a description of how the variability in the product forms, material specifications, and heat treatments used to fabricate a plant's VHPs were addressed in the susceptibility models; and (4) a description of how the models would be refined in the future to include plant-specific inspection results. As was the case for the earlier responses to the GL, the staff encouraged a coordinated, generic response to the requests in the RAI.

On December 11, 1998, NEI submitted a generic, integrated response to the RAIs on GL 97-01 on behalf of the PWR-industry and the utility members in the owners groups. In the generic submittal, NEI informed the staff that it normalized the susceptibility rankings for the industry based on a calculation of the time it would take for a VHP of a subject plant to have the same predicted probability of containing a 75 percent through-wall flaw as the "worst-case flawed" VHP at D.C. Cook, Unit 2. The normalized ranking for a plant's nozzles was then grouped by histogram into one of three time-dependent susceptibility groupings: (1) those plants whose 75 percent through-wall probability would occur within 5 years of January 1, 1997 (e.g., plants with high susceptibility VHPs); (2) those plants whose 75 percent through-wall probability would occur within 5-15 years of January 1, 1997 (e.g., plants with moderate susceptibility VHPs); and (3) those plants whose 75 percent through-wall probability would occur at a time beyond 15 years of January 1, 1997 (e.g., plants with low susceptibility VHPs).

The generic response to the RAIs also provided sufficient information to answer the information requests in the RAIs, and emphasized that the integrated program is an ongoing program that will be implemented in conjunction with EPRI, the PWR Owners Groups, the participating utilities, and the Material Reliability Projects' Subcommittee on Alloy 600. By letter dated March 21, 1999, the staff informed NEI that the integrated program was an acceptable approach for addressing the potential for PWSCC to occur in the VHPs of PWR-designed nuclear plants, and that licensees responding to the GL could refer to the integrated program as a basis for assessing the potential for PWSCC in PWR-design VHPs.

To date, all utilities have implemented VT-2 type visual examinations of their VHPs in compliance with the ASME requirements specified in Table IWB-2500 for Category B-P components. Most utilities, if not all, have also performed visual examinations as part of plant-specific boric acid wastage surveillance programs. In addition, the following plants have completed voluntary, comprehensive augmented volumetric inspections (eddy current examinations or ultrasonic testing examinations) of their CRDM nozzles:

- 1994 - Point Beach, Unit 1 (Westinghouse design)
- 1994 - Oconee, Unit 2 (B&W design)
- 1994 - D.C. Cook, Unit 2 (Westinghouse design)
- 1996 - North Anna, Unit 1 (Westinghouse design)
- 1998 - Millstone, Unit 2 (a CE design)
- 1999 - Ginna (a Westinghouse design)

The following plants have also completed voluntary, limited augmented volumetric inspections of their VHPs:

- 1995 - Palisades - eight instrument nozzles (CE design)
- 1996 - Oconee, Unit 2 - reinspection of two CRDM nozzles (B&W design)
- 1997 - Calvert Cliffs, Unit 2 - vessel head vent pipe (CE design)

The majority of these plants have been ranked as having the more susceptible VHPs in the industry. Of these inspections, only the inspections at D.C. Cook, Unit 2, have identified PWSCC type flaw indications. The current program includes additional commitments to perform further volumetric inspections of the CRDM nozzles at Oconee, Unit 2 (a reinspection of 2-12 nozzles in 1999), Crystal River, Unit 3 (in 2001, a B&W design), Diablo Canyon, Unit 2 (in 1999, a Westinghouse design), Farley, Unit 2 (in 2001, a Westinghouse design), and San Onofre, Unit 3 (in 2002-2008, a CE design). These plants are currently ranked in either the high or moderate susceptibility categories.

In your January 14, 1999, response to the staff's RAI, you endorsed the NEI submittal of December 11, 1998, and indicated that you were a participant in the NEI/B&WOG integrated program. Since the additional volumetric inspections performed to date have confirmed that PWSCC is not an immediate safety concern with respect to the structural integrity of VHPs in domestic PWRs, and since we have approved the integrated program for implementation, we conclude that the integrated program provides an acceptable basis for evaluating your VHPs. You may refer to the integrated program when submitting VHP-related licensing action submittals for the remainder of the current 40-year licensing period. Furthermore, if you are considering applying for license renewal of your facilities, your application will need to address the following items: (1) an assessment of the susceptibility of your VHPs to develop PWSCC during the extended license terms for the facilities; (2) a confirmation that the VHPs at your facilities are included under the scope of your boric acid corrosion inspection program, and (3) a summary of the results of any inspections that have been completed on your VHPs prior to the license renewal application, as appropriate.

This completes the staff's efforts relative to your responses to GL 97-01. Thank you for your consideration and efforts in addressing this issue. If you have any questions, please call me at (301) 415-1321.

Sincerely,



Stewart Bailey, Project Manager, Section 2
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-346

cc: See next page

Mr. Guy G. Campbell
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Davis-Besse Nuclear Power Station, Unit 1

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DOCUMENT NAME: G:\PDIII-2\DAVISBES\LTR98561.wpd
 ORIGINATOR NAME: S. Bailey
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 SUBJECT: GENERIC LETTER 97-01, DEGRADATION OF CRDM/CEDM
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 PENETRATIONS": REVIEW OF THE RESPONSES FOR THE
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NAME	DATE
1. S. Bailey	11/ /99

CONSIDERED OTHERS IMPACTED BY STAFF ACTION (2.206 PETITIONS, OPEN ALLEGATIONS, CONGRESSIONAL OR PUBLIC INQUIRIES, SIGNIFICANT ENFORCEMENT ACTIONS, INSPECTION ACTIVITIES, COMMISSION POLICIES, STAFF POSITIONS, OWNERS GROUP ACTIVITIES): YES ___ NO ___ INITIAL: PM ___ SC ___
 COMMUNICATED W/IDENTIFIED STAKEHOLDER(S): YES ___ NO ___ INITIAL: PM ___ SC ___
 CONSIDERED APPROPRIATENESS OF ASSESSMENT OF EXCEPTIONALLY GOOD OR WEAK LICENSEE PERFORMANCE: INITIAL: PM ___ PD ___

2. LA T. Harris	11/ /99
3. A. Mendiola	11/24/99
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SEs need to be E-mailed to R. Scholl.

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Sincerely,

Original signed by:
Stewart Bailey, Project Manager, Section 2
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-346

cc: See next page

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