January 12, 2000

Mr. L. W. Myers
Senior Vice President
Beaver Valley Power Station
Post Office Box 4
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SUBJECT: BEAVER VALLEY 1 AND 2 - REVIEW OF THE RESPONSES FOR GENERIC LETTER 97-01, "DEGRADATION OF CRDM/CEDM NOZZLE AND OTHER VESSEL CLOSURE HEAD PENETRATIONS," (TAC NOS. M98545 AND M98546)

Dear Mr. Myers:

This letter provides the Nuclear Regulatory Commission (NRC) staff's assessment of Duquesne Light Company's (DLC's) letters of April 30, and July 30, 1997, which provided the 30-day and 120-day responses to Generic Letter (GL) 97-01, "Degradation of CRDM/CEDM Nozzle and Other Vessel Closure Head Penetrations," and DLC's letters of November 20, 1998, and January 7, 1999, which provided responses to the NRC staff's request for additional information (RAI) dated August 24, 1998, relative to GL 97-01. DLC's responses provided the 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 BVPS-1 and 2.

On the dates of the April 30 and July 30, 1997, November 20, 1998, and January 7, 1999, letters, DLC was the licensed operator for the Beaver Valley Power Station, Unit Nos. 1 and 2 (BVPS-1 and BVPS-2). On December 3, 1999, DLC's ownership interests in both BVPS-1 and BVPS-2 were transferred to the Pennsylvania Power Company (Penn Power), and DLC's operating authority for BVPS-1 and BVPS-2 was transferred to FirstEnergy Nuclear Operating Company (FENOC). By letter dated December 13, 1999, FENOC requested that the NRC continue to review and act upon all items before the commission which had been submitted by DLC. Accordingly, the NRC staff has completed its review of the proposed program and efforts to address the potential for primary water stress corrosion cracking (PWSCC) to occur in the CRDM nozzles at BVPS-1 and 2.

On April 1, 1997, the staff issued GL 97-01 to the industry, requesting that addressees provide a description of the 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 Westinghouse Owners Group (WOG), in coordination with the efforts of the Nuclear Energy Institute (NEI) and the other PWR Owners Groups (the Babcock and Wilcox Owners Group and Combustion Engineering Owners Group), determined that it was appropriate for its members to develop a cooperative integrated inspection program in response to GL 97-01. Therefore, on July 25, 1997, the WOG submitted two Topical Reports, WCAP-14901, Revision 0, and WCAP-14902, Revision 0, on behalf of the member utilities in the WOG. In these reports, the WOG provided descriptions of the two models, the Electric Power Research

Institute/Dominion Engineering CIRSE Model (crack initiation and growth susceptibility model) and the Westinghouse Model, that were being used to rank the VHPs at the participating plants in the owners group. The 30-day and 120-day responses for BVPS-1 and 2 were provided on April 30, and July 30, 1997. In these responses, you indicated that you were a participant in the WOG's integrated program for evaluating the potential for PWSCC to occur in the VHPs of Westinghouse designed PWRs, and that you were endorsing the probabilistic susceptibility model in Westinghouse's Topical Report, WCAP-14901, as being applicable to the assessment of VHPs at BVPS-1 and 2.

The staff performed a review of your responses of April 30, and July 30, 1997, and the applicable WCAP for your facility and determined that some additional information was needed for completion of the review. Therefore, on August 24, 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 relative as the "worst-case flawed" VHP at DC 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 postulated occurrence of PWSCC in PWR-design VHPs.

To date, all utilities have implemented VT-2 type visual examinations of their VHPs in compliance with the American Society of Mechanical Engineers' 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)

In addition, the following plants have completed voluntary, limited augmented volumetric inspections of their VHPs as well:

- 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 resulted in the identification of any domestic 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 3 (in 2001, a B&W design), Diablo Canyon Unit 2 (in 2001, a Westinghouse design), Farley Unit 2 (in 2002, 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.

On November 20, 1998, and January 7, 1999, you provided your responses to the staff's RAI of August 24, 1998. In your letter of January 7, 1999, you endorsed the NEI submittal of December 11, 1998, and indicated that you were a participant in the NEI/WOG integrated program. Since the additional voluntary 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 related VHP-related licensing action submittals for the remainder of the current 40-year licensing period. However, 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.

Sincerely,

/RA/

Daniel S. Collins, Project Manager, Section 1
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

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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.

Sincerely,

/RA/

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Office of Nuclear Reactor Regulation

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