



EXT-98-0402

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

September 8, 1998



Mr. John K. Wood
Vice President - Nuclear, Davis-Besse
Centerior Service Company
c/o Toledo Edison Company
Davis-Besse Nuclear Power Station
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," REQUEST FOR ADDITIONAL INFORMATION, DAVIS-BESSE NUCLEAR POWER STATION, UNIT NO. 1 (TAC NO. M98561)

Dear Mr. Wood:

On April 1, 1997, the staff issued Generic Letter (GL) 97-01, "Degradation of CRDM/CEDM Nozzle and Other Vessel Closure Head Penetrations," to the industry requesting in part that addressees provide a description of the plans to inspect the vessel head penetration nozzles (VHPs) at their respective pressurized water reactor (PWR) plants. With respect to the issuance of the GL, the staff required the addressees to submit an initial response within 30 days of issuance informing the staff of the intent to provide requested information and a follow-up response within 120 days of issuance containing the technical details to the staff's information requests. In the discussion section of the GL, the staff stated that "individual licensees may wish to determine their inspection activities based on an integrated industry inspection program..." and indicated that it did not object to individual PWR licensees basing their inspection activities on an integrated industry inspection program.

As a result, the B&W Owners' Group (B&WOG) determined that it was appropriate for its members to develop a cooperative integrated inspection program in response to GL 97-01. The B&WOG program is documented in Topical Report BAW-2301, "Degradation of CRDM/CEDM Nozzle and Other Vessel Closure Head Penetrations," which was prepared by Framatome Technologies, Incorporated (FTI) on behalf of the B&WOG and the following B&WOG member utilities and plants:

General Public Utilities - Three Mile Island, Unit 1
Duke Power Company - Oconee Nuclear Station, Units 1, 2, and 3
Entergy Operations, Inc. - Arkansas Nuclear One, Unit 1
Centerior Energy Corp. - Davis Besse Nuclear Power Station, Unit 1
Florida Power Corporation - Crystal River, Unit 3.

The B&WOG submitted its integrated program and Topical Report BAW-2301 to the staff on July 25, 1997.

Based on your responses dated April 23 and July 28, 1998, concerning the Davis-Besse Nuclear Power Station, the staff has determined that you are a participant in the B&WOG integrated program that was developed to address the staff's requests in GL 97-01. In your responses, you also indicated that the information in Topical Report BAW-2301 is applicable with respect to the assessment of VHP nozzles at Davis-Besse.

The staff has initiated a review of your responses and requires additional information to complete the review.

The methodology developed by Framatome Technology Incorporated (FTI) for predicting the degradation susceptibility of vessel head penetration nozzles in B&WOG plant designs is provided in Appendix B to the report, "Description of CRDM Nozzle PWSCC Inspection and Repair Strategic Evaluation Model." The CRDM Nozzle PWSCC Inspection and Repair Strategic Evaluation (CIRSE) methodology for crack initiation is dependent on the calculation of a Relative Susceptibility Factor (RSF), which in part is a function of a number of multiplicative adjustment factors (for example, the material factors, fabrication factors, and water chemistry factors). FTI has assumed that there is little variability in the alloying chemistries and microstructures of the heats used to fabricate the B&W CRDM penetration and thermocouple nozzles, and has therefore set the values for these multiplicative adjustment factors to a value of 1.0. This simplifies the CIRSE crack initiation model to one that is simply based on the applied nozzle stresses and nozzle operating temperatures. The approach taken does not appear to be consistent with the ranges of data provided in Table 1 of the report, "CRDM Nozzle Heats at B&W-Design Plant," which provides the yield strengths, ultimate tensile strengths, and carbon contents for the B&W CRDM penetration nozzle material heats. The data in Table 1 of the report imply that there may be some variability in the chemistries and microstructures of the Alloy 600 material heats used to fabricate the B&W CRDM penetration nozzles.

Topical Report No. BAW-2301 also provides the B&WOG's inspection schedule and scope for VHP nozzles in B&W-designed plants. In this section, the B&WOG indicated that the schedule for VHP nozzle inspections was developed based on the susceptibility assessments of the B&W CRDM penetration nozzles and thermocouple nozzle heats. The specific results of the CRDM penetration nozzle susceptibility rankings for the B&WOG plants were not provided in the report. However, the B&WOG has indicated that additional inspections of the B&W-fabricated CRDM penetration nozzles have been scheduled for the 1999 refueling outages (RFOs) of Oconee Nuclear Station, Unit 2 (ONS-2) and Crystal River, Unit 3 (CR-3) plants. In addition, FTI has also indicated that additional inspections of the thermocouple nozzles at Three Mile Island, Unit 1 (TMI-1) and Oconee Nuclear Station Unit 1 (ONS-1) are tentatively scheduled for the year 2001.

Therefore, with respect to the design of the CIRSE crack initiation and crack growth models, the susceptibility rankings for vessel head penetrations in B&W-designed plants, the proposed CRDM nozzle inspections at ONS-2 and CR-3, and the postulated inspections of the instrumentation nozzles at TMI-1 and ONS-1, the staff requests the following information:

1. Provide a description of how the various product forms, material specifications, and heat treatments used to fabricate each CRDM penetration nozzle are handled in the CIRSE model.
2. Provide any additional information, if available, regarding how the model will be refined to allow the input of plant-specific inspection data into the model's analysis methodology.
3. Describe how FTI's crack initiation and crack growth models for assessing postulated flaws in vessel head penetration nozzles were bench-marked, and provide a listing and discussion of the standards the models were bench-marked against.
4. Provide the latest CIRSE model susceptibility rankings of B&W-designed facilities based on the CIRSE model analysis results compiled from the analyses of the CRDM and instrumentation nozzles at the facilities.

Please respond to this request within 90 days of the date of this letter. Similar staff requests are being issued to the other B&WOG member utilities. The staff encourages you to address these inquiries in integrated fashion with the B&WOG. The staff also requests that you identify any deviations from the B&WOG's integrated program that may be specific to your facility.

Sincerely,



Allen G. Hansen, Project Manager
Project Directorate III-3
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Docket No. 50-346

cc: See next page