



UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

October 2, 1998

50-302

Mr. John Paul Cowan, Vice President
Nuclear Operations (NA2E)
Florida Power Corporation
Crystal River Energy Complex
15760 W. Power Line Street
Crystal River, Florida 34428-6708

SUBJECT: GENERIC LETTER 97-01, "DEGRADATION OF CRDM/CEDM NOZZLE AND OTHER VESSEL CLOSURE HEAD PENETRATIONS," RESPONSES FOR CRYSTAL RIVER UNIT 3 (TAC NO. M98558)

Dear Mr. Cowan:

On April 1, 1997, the staff issued Generic Letter (GL) 97-01, "Degradation of CRDM/CEDM [Control Rod Drive Mechanism/Control Element Drive Mechanism] Nozzle and other Vessel Closure Head Penetrations," to the industry requesting in part that addressees provide a description of plans to inspect the vessel head penetration (VHP) nozzles at their respective pressurized water reactor (PWR) designed plants. The staff requested addressees to submit an initial response within 30 days of issuance of the GL, informing the staff whether the requested information would be provided and submittal of the detailed information requested by the staff within 120 days of issuance of the GL. 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 Babcock & Wilcox 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 Plant
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.

As stated in Florida Power Corporation (FPC) letters dated May 1 and July 29, 1997, Crystal River Unit 3 (CR-3) was a participant in the B&WOG integrated program that was developed to address the staff's requests in GL 97-01. In these letters it was indicated that the information in Topical Report BAW-2301 is applicable with respect to the assessment of VHP nozzles at CR-3.

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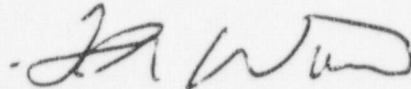
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The staff has reviewed the May 1 and July 29, 1997, responses to GL 97-01, and requires further information to complete its review of the responses as they relate to the B&WOG's integrated program for assessing VHP nozzles at B&WOG member plants, and to the contents of Topical Report No. BAW-2301.

The requested information is identified in the enclosed request for additional information (RAI). A response to this RAI is requested within 90 days of the date of this letter. It should be noted that similar staff requests have been issued to the other B&WOG member utilities. This RAI and the requested response date were discussed and agreed to by Mr. Tim Catchpole of your staff. As was the staff's position before, the staff encourages you to address these inquiries in an integrated fashion with the B&WOG; however, the staff also requests that you identify any deviations from the B&WOG's integrated program that may be specific to your facility. The staff appreciates the effort expended with respect to this matter.

Sincerely,



Leonard A. Wiens, Senior Project Manager
Project Directorate II-3
Division of Reactor Projects I/II
Office of Nuclear Reactor Regulation

Docket: 50-302

Enclosure: Request for Additional
Information

cc w/enc!: See next page

Mr. John Paul Cowan

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Sincerely,

Original signed by:

Leonard A. Wiens, Senior Project Manager
Project Directorate II-3
Division of Reactor Projects I/II
Office of Nuclear Reactor Regulation

Docket: 50-302

Enclosure: Request for Additional Information

cc w/encl: See next page

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Mr. John Paul Cowan
Florida Power Corporation

**CRYSTAL RIVER UNIT NO. 3
GENERATING PLANT**

cc:

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Request for Additional Information for Utilities Participating
in the Babcock and Wilcox Owners Group (B&WOG)
Integrated Response to Generic Letter (GL) 97-01,
"Degradation of CRDM/CEDM Nozzle and Other
Vessel Closure Head Penetrations"

Applicability of Topical Report Number BAW-2301 to the
Plant-Specific Responses to GL 97-01 for Participating
Member Utilities and Plants in the B&WOG

The methodology developed by Framatome Technology Incorporated (FTI) for predicting the susceptibility of vessel head penetration nozzles in Babcock & Wilcox Owners Group (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 (e.g., 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 vessel head penetration (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 the Oconee Nuclear Station Unit 2 (ONS-2) and at 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 at Crystal River Unit 3 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 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.