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

December 16, 1999

Mr. Charles M. Dugger  
Vice President Operations  
Entergy Operations, Inc.  
P. O. Box B  
Killona, LA 70066

SUBJECT: WATERFORD STEAM ELECTRIC STATION, UNIT 3 RE: GENERIC LETTER 97-01, "DEGRADATION OF CONTROL ROD DRIVE MECHANISM NOZZLE AND OTHER VESSEL CLOSURE HEAD PENETRATIONS" (TAC NO. M98610)

Dear Mr. Dugger:

This letter provides the U. S. Nuclear Regulatory Commission (NRC) staff's assessment of your letters dated April 30 and July 28, 1997, which provided your 30-day and 120-day responses to Generic Letter (GL) 97-01, subject as above, and your letter dated December 9, 1998, which provided your response to the NRC staff's request for additional information (RAI) dated September 10, 1998, relative to the issuance of the generic letter. 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 Waterford Steam Electric Station, Unit 3 (Waterford 3).

On April 1, 1997, the staff issued GL 97-01 to the industry, 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 generic letter, the NRC staff indicated that it did not object to individual PWR licensees basing their inspection activities on an integrated, industry-wide inspection program.

The Combustion Engineering Owners Group (CEOG), in coordination with the efforts of the Nuclear Energy Institute (NEI) and the other PWR Owners Groups (i.e., the Westinghouse Owners Group [WOG] and Babcock and Wilcox Owners Group [BWO]), 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 CEOG submitted Topical Report CE-NPSD-1085, "CEOG Response to NRC Generic Letter 97-01, Degradation of CEDM Nozzle and Other Vessel Closure Head Penetrations," on behalf of the utility members in the CEOG. In this report, the CEOG provided a description of the CEOG timing model (crack initiation and growth susceptibility model) that was used to rank the VHPs at the participating plants in the owners group. As part of the CEOG's coordinated effort, you provided your 30-day and 120-day responses for Waterford 3 on April 30 and July 28, 1997. The combined information in these responses indicated that you were a participant in the CEOG's integrated program for evaluating the potential for PWSCC to occur in the VHPs of CE designed PWRs, and that you were endorsing the probabilistic susceptibility model in Topical Report CE-NPSD-1085 as applicable to the assessment of VHPs at the Waterford 3.

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The staff performed a review of both Topical Report CE-NPSD-1085 and your responses of April 30 and July 28, 1997, and determined that some additional information was needed for completion of the review. Therefore, on September 10, 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; (4) a description of how the models would be refined in the future to include plant-specific inspection results; (5) a request for confirmation that you had decided to apply the susceptibility model in BWOG Topical Report BAW-2301 to the evaluation of VHPs at the Waterford 3 in lieu of using the model summarized in CEOG Report CE-NPSD-1085; and (6) a request for confirmation that the VHPs at the Waterford 3 had been re-evaluated (re-ranked) through application of the susceptibility model as described in Topical Report BAW-2301 (i.e., the Electric Power Research Institute (EPRI) model). As was the case for the earlier responses to the generic letter, the staff encouraged a coordinated generic response to the RAIs.

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 NRC staff that it normalized the susceptibility rankings for the industry. 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 the EPRI, the PWR Owners Groups, the participating utilities, and the Material Reliability Projects' Subcommittee on Alloy 600. By letter dated March 21, 1999, the NRC 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 generic letter could refer to the integrated program as a basis for assessing the postulated occurrence of PWSCC in PWR-designed 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 (CE design)
- 1999 - Ginna (Westinghouse design)

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

- o 1995 - Palisades - eight instrument nozzles (CE design)
- o 1996 - Oconee, Unit 2 - reinspection of two CRDM nozzles (B&W design)
- o 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, 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.

On December 9, 1998, you provided your response to the NRC staff's RAI of September 10, 1998. In your letter of December 9, 1998, you endorsed the NEI submittal of December 11, 1998, and indicated that you were a participant in the NEI/CEOG 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 VHPs-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,

ORIGINAL SIGNED BY  
 Chandu P. Patel, Project Manager, Section 1  
 Project Directorate IV & Decommissioning  
 Division of Licensing Project Management  
 Office of Nuclear Reactor Regulation

Docket No. 50-382

cc: See next page

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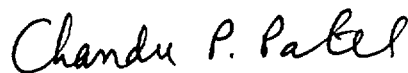
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Docket No. 50-382

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