

File Center



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

November 15, 1999

Mr. Garry L. Randolph  
Vice President and Chief Nuclear Officer  
Union Electric Company  
Post Office Box 620  
Fulton, MO 65251

SUBJECT: GENERIC LETTER 97-01, "DEGRADATION OF CRDM/CEDM NOZZLE AND OTHER VESSEL CLOSURE HEAD PENETRATIONS" - REVIEW OF THE RESPONSES FOR CALLAWAY PLANT, UNIT 1 (TAC NO. M98551)

Dear Mr. Randolph:

Enclosed is the NRC staff's assessment of your letters of May 1 and July 17, 1997 (ULNRC- 3571 and -3619, respectively), which provided your 30-day and 120-day responses to Generic Letter (GL) 97-01, "Degradation of CRDM/CEDM Nozzle and Other Vessel Closure Head Penetrations," and your letters of November 9, 1998 (ULNRC-03917) and January 11, 1999 (ULNRC-03947), which provided your response to the staff's request for additional information (RAI) dated August 20, 1998, relative to the issuance of the GL. 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 Callaway Plant, Unit 1.

On April 1, 1997, the staff issued GL 97-01, "Degradation of CRDM/CEDM Nozzle and Other Vessel Closure Head Penetrations," 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 [B&WOG] and Combustion Engineering Owners Group [CEOG]), 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 EPRI/Dominion Engineering CIRSE model (i.e., 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. In your 30-day and 120-day 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 WCAP-14901, Revision 0, as being applicable to the assessment of VHPs at the Callaway Plant, Unit 1.

**NRC FILE CENTER COPY**

PDR A Doc

DFO 1

The staff performed a review of your responses of May 1 and July 17, 1997, and the applicable WCAP for your facility and determined that some additional information was needed for completion of the review. Therefore, on August 20, 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. 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 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 (CE design)
- 1999 - Ginna (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 Unit 3 (in 2001, B&W design), Diablo Canyon Unit 2 (in 1999, Westinghouse design), Farley Unit 2 (in 2001, Westinghouse design), and San Onofre Unit 3 (in 2002-2008, CE design). These plants are currently ranked in either the high or moderate susceptibility categories.

On November 9, 1998 and January 11, 1999, you provided your response to the staff's RAI. In your letter, 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 VHP-related licensing action submittals for the remainder of the current 40-year licensing period. However, if you are considering applying for license renewal for Callway Plant, Unit 1, 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 Callaway Plant, Unit 1; (2) a confirmation that the VHPs at Callaway Plant, Unit 1 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 and closes out our work for TAC M98551. Thank you for your consideration and efforts in addressing this issue. If you have any questions, please contact me at 301-415-1307 or through the internet at jnd@nrc.gov.

Sincerely,



Jack Donohew, Senior Project Manager, Section 2  
Project Directorate IV & Decommissioning  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket No. 50-483

cc: See next page

DISTRIBUTION:

- File Center
- PUBLIC
- PDIV-2 Reading
- SRichards
- OGC
- ACRS
- JHarold
- JMedoff
- WJohnson, Region IV

To receive a copy of this document, indicate "C" in the box					
OFFICE	PDIV-2/PM	C	PDIV-2/LA	C	PDIV-2/SC
NAME	JDonohew		EPeyton		SDembek
DATE	11/12/99		11/10/99		11/15/99

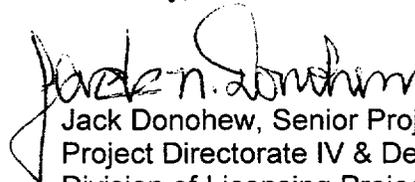
November 15, 1999

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, B&W design), Diablo Canyon Unit 2 (in 1999, Westinghouse design), Farley Unit 2 (in 2001, Westinghouse design), and San Onofre Unit 3 (in 2002-2008, CE design). These plants are currently ranked in either the high or moderate susceptibility categories.

On November 9, 1998 and January 11, 1999, you provided your response to the staff's RAI. In your letter, 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 VHP-related licensing action submittals for the remainder of the current 40-year licensing period. However, if you are considering applying for license renewal for Callaway Plant, Unit 1, 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 Callaway Plant, Unit 1; (2) a confirmation that the VHPs at Callaway Plant, Unit 1 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 and closes out our work for TAC M98551. Thank you for your consideration and efforts in addressing this issue. If you have any questions, please contact me at 301-415-1307 or through the internet at [jnd@nrc.gov](mailto:jnd@nrc.gov).

Sincerely,



Jack Donohew, Senior Project Manager, Section 2  
Project Directorate IV & Decommissioning  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket No. 50-483

cc: See next page

Callaway Plant, Unit 1

cc:

Professional Nuclear  
Consulting, Inc.  
19041 Raines Drive  
Derwood, Maryland 20855

John O'Neill, Esq.  
Shaw, Pittman, Potts & Trowbridge  
2300 N. Street, N.W.  
Washington, D.C. 20037

Mr. H. D. Bono  
Supervising Engineer  
Quality Assurance Regulatory Support  
Union Electric Company  
Post Office Box 620  
Fulton, Missouri 65251

U.S. Nuclear Regulatory Commission  
Resident Inspector Office  
8201 NRC Road  
Steedman, Missouri 65077-1302

Mr. J. V. Laux, Manager  
Quality Assurance  
Union Electric Company  
Post Office Box 620  
Fulton, Missouri 65251

Manager - Electric Department  
Missouri Public Service Commission  
301 W. High  
Post Office Box 360  
Jefferson City, Missouri 65102

Regional Administrator, Region IV  
U.S. Nuclear Regulatory Commission  
Harris Tower & Pavilion  
611 Ryan Plaza Drive, Suite 400  
Arlington, Texas 76011-8064

Mr. Ronald A. Kucera, Deputy Director  
Department of Natural Resources  
P.O. Box 176  
Jefferson City, Missouri 65102

Mr. Otto L. Maynard  
President and Chief Executive Officer  
Wolf Creek Nuclear Operating Corporation  
Post Office Box 411  
Burlington, Kansas 66839

Mr. Dan I. Bolef, President  
Kay Drey, Representative  
Board of Directors Coalition  
for the Environment  
6267 Delmar Boulevard  
University City, Missouri 63130

Mr. Lee Fritz  
Presiding Commissioner  
Callaway County Court House  
10 East Fifth Street  
Fulton, Missouri 65151

Mr. Alan C. Passwater, Manager  
Licensing and Fuels  
Union Electric Company  
Post Office Box 66149  
St. Louis, Missouri 63166-6149