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SUBJECT: Forwards response to two items noted in GL 97-01, "Degradation of Control Rod Drive Mechanism Nozzle & Other Vessel Closure Head Penetrations," dtd 970401.

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August 1, 1997

AEP:NRC:1218C

Docket Nos.: 50-315
50-316

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555

Gentlemen:

Donald C. Cook Nuclear Plant Units 1 and 2
GENERIC LETTER 97-01, "DEGRADATION OF CONTROL ROD DRIVE
MECHANISM NOZZLE AND OTHER VESSEL CLOSURE HEAD PENETRATIONS"
120 DAY RESPONSE

This letter and its attachments respond to the two items noted in generic letter (GL) 97-01, "Degradation of Control Rod Drive Mechanism Nozzle and Other Vessel Closure Head Penetrations," dated April 1, 1997.

Attachment 1 contains the responses to the items as applicable to Cook Nuclear Plant. Attachment 2 contains WCAP-14901, "Background and Methodology for Evaluation of Reactor Vessel Closure Head Penetration Integrity for the Westinghouse Owners Group," dated July 1997.

As noted in our initial response, we are a member of the Westinghouse Owners Group, and are participating in the Nuclear Energy Institute-sponsored industry group to develop an integrated industry program for future inspections. The integrated industry program plan will be submitted to the NRC by the end of 1997. We are conducting a records search to determine past resin ingress into the reactor coolant system. Due to the volume of records, we are requesting an extension to October 30, 1997, to respond to this issue.

Sincerely,

E E Fitzpatrick

E.E.Fitzpatrick
Vice President

SWORN TO AND SUBSCRIBED BEFORE ME

THIS 1st DAY OF AUGUST 1997

Linda L. Boelcke
Notary Public

My Commission Expires 1-21-2001

vlb

Attachments

c: A. A. Blind
A. B. Beach
MDEQ - DW & RPD
NRC Resident Inspector
J. R. Padgett

LINDA L. BOELCKE
Notary Public, Berrien County, MI
My Commission Expires January 21, 2001

ADOCK, Proj

Proj. LBW

per: D. Hoover DF01

ATTACHMENT 1 TO AEP:NRC:1218C

DONALD C. COOK NUCLEAR PLANT UNITS 1 AND 2
GENERIC LETTER 97-01
"DEGRADATION OF CONTROL ROD DRIVE MECHANISM NOZZLE
AND OTHER VESSEL CLOSURE HEAD PENETRATIONS"
120 DAY RESPONSE

Introduction

The NRC generic letter (GL) 97-01, "Degradation of Control Rod Drive Mechanism Nozzle and Other Vessel Closure Head Penetrations," was issued to request licensees to describe their programs for ensuring the timely inspection of pressurized water reactor (PWR) control rod drive mechanism (CRDM) and other vessel closure head penetrations. This response provides the information requested by the GL as applicable to Cook Nuclear Plant.

We continue to work with the Westinghouse Owners Group (WOG), the Electric Power Research Institute (EPRI), and the Nuclear Energy Institute (NEI) to understand the issues associated with the degradation of CRDM head penetration tubes. Several tasks have been initiated in the areas of operational experience, technical issues, cause factors, relative importance, and solutions. One of these tasks was the development of a safety evaluation by Westinghouse Electric Corporation that characterized crack initiation, propagation, and consequences. This safety evaluation is contained in Westinghouse report WCAP-13565 and is applicable to Cook Nuclear Plant. The NRC reviewed the Westinghouse safety evaluation and issued a safety evaluation report (SER) on November 19, 1993, that concluded primary water stress corrosion cracking (PWSCC) of reactor pressure vessel (RPV) head penetrations is not an immediate safety issue. The Westinghouse safety evaluation and the NRC SER establish the basis for continued operation of the plant.

The following responses are offered to the information requested in GL 97-01.

1.1 **A description of inspections of all CRDM nozzle and other VHPs performed to the date of this generic letter, including the results of these inspections.**

Response - Unit 1

The requirements of GL 88-05, "Boric Acid Corrosion of Carbon Steel Reactor Boundary Components in PWR Plants," have been incorporated in plant procedure 12-PMP 5030.001.001, "Boric Acid Corrosion of Ferritic Steel Components and Materials," and visual inspections have been performed regularly during the refueling outages. This procedure establishes the guidelines for the identification, examination, and evaluation of boric acid induced corrosion of ferritic steel components within the reactor coolant system (RCS) pressure boundary and other plant systems that see borated water service. If identified, an evaluation of the material wastage would be performed and a recommended course of action developed. Corrective maintenance would be performed, as required, thus preventing RCS pressure boundary degradation. Examinations conducted as part of GL 88-05 have not revealed any RPV head penetration leakage.

The in-service inspection (ISI) visual inspection requirements to identify RCS leakage are set forth in procedure 12-QHP 5070 NDE.001, "RCS System Leakage Test." This procedure demonstrates by visual VT-2 examination the integrity of the RCS by performing a system leakage test at system operating pressure and temperature conditions in mode 3, prior to returning the unit to service. The

procedure satisfies the testing and documentation requirements set forth in ASME section XI, articles IWA-5000, IWB-2500, IWB-5000, code cases N-498-1, N-416-1, and N-533. This system leakage test is performed prior to start-up following each refueling outage, and following the opening and closing of a component in the system. RCS leakage tests have not identified any RPV head penetration leakage.

A liquid penetrant inspection of the RPV head CRDM penetrations' bi-metallic welds are performed during each ten year ISI interval in accordance with the requirements of ASME section XI, table IWB-2500-1, examination category B-O, item no. B14.10. Liquid penetrant inspection of the RPV head penetrations' bi-metallic welds during the first and second ten year ISI interval has not identified any bi-metallic weld degradation.

During the unit 1 1994 refueling outage, using a remote camera, 33 outer RPV head penetrations were visually inspected to identify RCS leakage. No evidence of RCS leakage was identified.

Response - Unit 2

As a result of a voluntary commitment to inspect RPV head CRDM penetrations, 71 of the 78 unit 2 RPV head penetrations were inspected during the 1994 unit 2 refueling outage. Spare penetrations at locations 22, 23, 25, 26, 27, 28, and 29 were not inspected due to accessibility problems resulting from installed part length drive shafts. Of the 71 penetrations inspected, 70 penetrations exhibited no indications and 1 penetration exhibited 3 indications. The indications were detected in an outer row penetration 75.

In addition, during the unit 2 1996 refueling outage, the 5 outer RPV head CRDM penetrations, including penetration 75, were reinspected. Reinspection of penetration 75 identified no significant flaw growth and no additional indications were identified in the other outer penetrations. Penetration 75 was repaired following the reinspection. Using the Westinghouse probabilistic model for susceptibility and plant specific data, a probabilistic assessment was performed for the 78 RPV head penetrations. The results identified the 5 outer penetrations as most susceptible and the 7 spare penetrations not inspected during the 1996 unit 2 refueling outage as low susceptibility. The results of these inspections were submitted to the NRC via letter AEP:NRC:1218, dated October 26, 1994, and letter AEP:NRC:1218A, dated March 12, 1996.

The requirements of GL 88-05, "Boric Acid Corrosion of Carbon Steel Reactor Boundary Components in PWR Plants," have been incorporated in plant procedure 12-PMP 5030.001.001, "Boric Acid Corrosion of Ferritic Steel Components and Materials," and visual inspections have been performed regularly during the refueling outages. This procedure establishes the guidelines for the identification, examination, and evaluation of boric acid induced corrosion of ferritic steel components within the RCS pressure boundary and other plant systems that see borated water service. If identified, an evaluation of the material wastage would be performed and a

recommended course of action developed. Corrective maintenance would be performed as required, thus ensuring RCS pressure boundary integrity. Examinations conducted as part of GL 88-05 have not revealed any RPV head penetration leakage.

The ISI visual inspection requirements to identify RCS leakage are set forth in procedure 12-QHP 5070 NDE.001, "RCS System Leakage Test." This procedure demonstrates, by visual VT-2 examination, the integrity of the RCS by performing a system leakage test at system operating pressure and temperature conditions in mode 3 prior to returning the unit to service. The procedure satisfies the testing and documentation requirements set forth in ASME section XI, articles IWA-5000, IWB-2500, IWB-5000, code cases N-498-1, N-416-1, and N-533. This system leakage test is performed prior to start-up following each refueling outage, and following the opening and closing of a component in the system. RCS leakage tests have not identified any RPV head penetrations leakage.

A liquid penetrant inspection of the RPV head penetrations' bi-metallic welds are performed during each ten year ISI interval in accordance with the requirements of ASME section XI, table IWB-2500-1, examination category B-O, item no. B14.10. Liquid penetrant inspection of the RPV head penetrations' bi-metallic welds during the first and second ten year ISI interval has not identified any bi-metallic weld degradation.

1.2 **If a plan has been developed to periodically inspect the CRDM nozzle and other VHPs:**

a. **Provide the schedule for the first, and subsequent, inspections of the CRDM nozzle and other VHPs, including the technical basis for the schedule.**

b. **Provide the scope for the CRDM nozzles and other VHP inspections, including the total number of penetrations (and how many will be inspected), which penetrations have thermal sleeves, which are spares, and which are instrument or other penetrations.**

Response

We are participating in the WOG/NEI RPV head penetration industry integrated inspection program, as discussed in our response to item 1.4.

1.3 **If a plan has not been developed to periodically inspect the CRDM nozzle and other VHPs, provide the analysis that supports why no augmented inspection is necessary.**

Response

We are participating in the WOG/NEI RPV head penetration industry integrated inspection program, as discussed in our response to item 1.4.

1.4 **In light of the degradation of CRDM nozzle and other VHPs described above, provide the analysis that supports the**

selected course of action as listed in either 1.2 or 1.3 above. In particular, provide a description of all relevant data and/or tests used to develop crack initiation and crack growth models, the methods and data used to validate these models, the plant specific inputs to these models, and how these models substantiate the susceptibility evaluation. Also, if an integrated inspection program is being relied on, provide a detailed description of this program.

Response

We are a participant in the WOG/NEI RPV head penetration integrated inspection program as identified in WCAP 14901, attachment 2. The Westinghouse Owners Group (WOG), Babcock and Wilcox Owners Group (BWOG), Combustion Engineering Owners Group (CEOG), and EPRI agreed to combine their efforts as part of the NEI alloy 600 CRDM head penetration cracking task force. This industry integrated program includes volumetric inspections of head penetrations that have been performed, (see attachment 2, section 1.3), and additional volumetric inspections that will be performed. Present plans call for two CE-designed plants and two B&W-designed plants to be inspected over the next three years. Additionally, Westinghouse-designed plants are likely to be added to the list over the next few months.

The crack growth rate model, crack initiation model development, and crack initiation testing are discussed in WCAP 14901, sections 2 and 3, respectively. The technical description of the probabilistic model is discussed in WCA-14901, section 4.

We believe the number of plants that have been or will be inspected is sufficient to demonstrate the adequacy of the WOG/NEI industry integrated inspection program. The need and schedule for initial and subsequent inspections will be based on an evaluation of the inspection results from the integrated inspection program.

NEI is integrating, for all PWR RPV head penetrations (nozzles), the estimated time to initiate and propagate a PWSCC flaw 75% through wall. This integrated information with an evaluation of its significance will be provided to the NRC by the end of 1997.

2. **Provide a description of any resin bead intrusions, as described in IN 96-11, that have exceeded the current EPRI PWR Primary Water Chemistry Guidelines recommendations for primary water sulfate levels, including the following information:**

2.1 **Were the intrusions cation, anion, or mixed bed?**

Response

We are currently reviewing the plant records using the intrusion volume criteria agreed upon by the industry. This data search is structured to identify all resin intrusion events into the primary coolant system with a magnitude greater than 1 ft^3 (7.48 gallons). The threshold of 1 ft^3 was chosen as a conservative lower bound because it represents

less than 15% of the estimated volume of resin released in the reactor coolant system during the events at Jose Cabrera. The value of 1 ft^3 was selected as a screening limit by the NEI alloy 600 RPV head penetration cracking task force.

Due to the volume of records, we are requesting an extension to complete the review of the plant records and to determine any resin ingress occurrences that exceeded the industry criteria as noted above. We will submit the results of our review to the NRC by October 30, 1997.

2.2 **What were the durations of these intrusions?**

Response

Due to the volume of records, we are requesting an extension to complete the review of the plant records and to determine whether any resin ingress occurred that exceeded the industry criteria as noted above. We will submit the results of our review to the NRC by October 30, 1997.

2.3 **Does the plant's RCS water chemistry Technical Specifications follow the EPRI guidelines?**

Response

Cook Nuclear Plant's RCS water chemistry specifications follow the RCS control parameters in EPRI primary water chemistry guidelines, revision 2, issued in November 1990.

2.4 **Identify any RCS chemistry excursions that exceed the plant administrative limits for the following species: sulfates, chlorides or fluorides, oxygen, boron, and lithium.**

Response

We believe that it is unnecessary to review plant records for boron, chlorides, and oxygen because these species are not viewed as valid indicators of cation resin ingress and degradation within the primary coolant system of a PWR. Due to the volume of records, we are requesting an extension to complete the review of the plant records with respect to sulfates, flourides and lithium. We will submit the results of our review to the NRC by October 30, 1997.

2.5 **Identify any conductivity excursions which may be indicative of resin intrusions. Provide a technical assessment of each excursion and any follow-up actions.**

Response

Due to the volume of records, we are requesting an extension to complete the review of the plant records. We will submit the results of our review to the NRC by October 30, 1997.

2.6 Provide an assessment of the potential for any of these intrusions to result in a significant increase in the probability for IGA of VHPs and any associated plan for inspections.

Response

Due to the volume of records, we are requesting an extension to complete the review of the plant records. We will submit the results of our review to the NRC by October 30, 1997.

ATTACHMENT 2 TO AEP:NRC:1218C

WCAP-14901, "BACKGROUND AND METHODOLOGY FOR EVALUATION OF REACTOR VESSEL CLOSURE HEAD PENETRATION INTEGRITY FOR THE WESTINGHOUSE OWNERS GROUP", DATED JULY 1997