FENOC
FirstEnergy Nuclear Operating Company

5501 North State Route 2
Oak Harbor, Ohio 43449

Mark B. Bezilla
Vice President - Nuclear

419-321-7676
Fax: 419-321-7582

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U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

Subject: Davis-Besse Nuclear Power Station (DBNPS)
Supplemental Information Regarding NRC Bulletin 2004-01, "Inspection of Alloy 82/182/600 Materials Used in the Fabrication of Pressurizer Penetrations and Steam Space Piping Connections at Pressurized-Water Reactors"
(TAC MC3475)

Ladies and Gentlemen:

By letter dated July 26, 2004 (DBNPS Letter Serial Number 3064), FirstEnergy Nuclear Operating Company (FENOC) submitted the response for the DBNPS to Nuclear Regulatory Commission (NRC) Bulletin (BL) 2004-01, "Inspection of Alloy 82/182/600 Materials Used in the Fabrication of Pressurizer Penetrations and Steam Space Piping Connections at Pressurized-Water Reactors," requested information item (1). The letter contained a description of the pressurizer penetrations and steam space connections at the DBNPS, and a description of the inspection program for these pressurizer penetrations and steam space connections. The letter also explained how the FENOC inspection program meets the applicable regulatory requirements and ensures the integrity of the DBNPS Reactor Coolant Pressure Boundary.

By facsimile dated December 17, 2004, the NRC staff submitted a Request for Additional Information (RAI) containing four questions. By telephone call on January 3, 2005, the NRC staff submitted an additional question, and provided clarification of question 1 from the December 17, 2004 RAI. These questions, and FENOC's responses, are provided in Attachment 1.

A list of regulatory commitments made in this letter is included in Attachment 2.

If you have any questions or require further information, please contact Mr. Henry L. Hegrat, Supervisor-Fleet Licensing, at (330) 315-6944.

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The statements contained in this submittal, including its associated enclosures and attachments are true and correct to the best of my knowledge and belief. I am authorized by the FirstEnergy Nuclear Operating Company to make this submittal. I declare under penalty of perjury that the foregoing is true and correct.

Executed on: February 25, 2005

By: Barry S. Allen for Mark B. Bezilla
Mark B. Bezilla, Vice President-Nuclear

MSH

Attachment 1: Response to Request for Additional Information

Attachment 2: Commitment List

cc: J. L. Caldwell, Regional Administrator, NRC Region III
J. B. Hopkins, DB-1 Senior NRC/NRR Project Manager
C. S. Thomas, DB-1 NRC Senior Resident Inspector
Utility Radiological Safety Board

REQUEST FOR ADDITIONAL INFORMATION
BULLETIN 2004-01 RESPONSE
DAVIS-BESSE NUCLEAR POWER STATION

1. **In Bulletin 2004-01, the NRC staff stated that with minor modifications, the WOG recommendations for Combustion Engineering (CE) plants would constitute an effective Degradation Management Program for all Alloy 82/182/600 covered under the scope of the bulletin. Item (3) of the WOG plan included immediate notification of the NRC, if NDE defined a flaw as potential circumferential cracking below the sleeve attachment weld. One of the staff modifications was "...the NRC staff believes that the topic of NDE scope expansion should be discussed with the NRC staff if circumferential PWSCC is observed in either the pressure boundary or non-pressure boundary portions of any locations covered under the scope of this bulletin..."**

   Your response did not address notification to the NRC upon discovery of circumferential cracking. Please specifically provide your plans, if any, for notifying the NRC of circumferential cracking covered by this bulletin.

   FENOC RESPONSE

   If circumferential primary water stress corrosion cracking is observed in either the pressure boundary or non-pressure boundary portions of any locations covered under the scope of NRC Bulletin 2004-01, FENOC will develop plans to perform an extent-of-condition evaluation and discuss those plans with the NRC staff prior to restarting the unit.

2. **Item (1)(d) of NRC Bulletin 2004-01, requested an explanation as to why your inspection program described in response to item (1)(c) is adequate for the purpose of maintaining the integrity of the RCPB and for meeting all applicable regulatory requirements.**

   Your response described how you meet applicable regulatory requirements, but did not contain an overall evaluation addressing how your inspection program provides adequate assurance of RCPB integrity. Please provide such an assessment specifically addressing adequacy of frequency of planned inspections.

   FENOC RESPONSE

   FENOC's July 26, 2004 response described Davis-Besse's compliance with the regulatory requirements discussed in Bulletin 2004-01. These requirements establish the minimum actions necessary to ensure integrity of the Reactor Coolant Pressure Boundary. As described in the response, the DBNPS inspection program for the Pressurizer penetrations exceeds these minimum requirements in the following areas:

   - A bare metal examination of all Alloy 600 Pressurizer penetrations is conducted each refueling outage.

   - The dissimilar metal butt welds on the 2½-inch relief nozzle and the two 3-inch relief nozzles (one weld each) receive an augmented ultrasonic examination utilizing Performance Demonstration Initiative (PDI) qualified procedures and personnel in addition to the Code required surface examination.

   - There are four dissimilar metal butt welds (the three described above and the 4-inch spray nozzle) located on the Pressurizer head. This area adjoins the Pressurizer steam space and represents the hottest area on the Pressurizer. These welds utilized Alloy 600 materials in their fabrication and are subjected to similar environmental and operating conditions; therefore, the Davis-Besse inspection program requires at least one of the four welds be examined each refueling outage.

   These additional examinations as well as those required to comply with regulatory requirements provide assurance that the integrity of the Pressurizer pressure boundary will be maintained. Recent industry operating experience suggests that bare metal visual examinations of the Pressurizer penetrations within the scope of this Bulletin will be effective in maintaining RCPB integrity and a low probability of leakage as required by GDC 14 and 10 CFR 50.55a, if performed every refueling outage.

The Electric Power Research Institute (EPRI) Materials Reliability Program (MRP) document MRP-112[1] considered five different plant butt weld locations in Babcock and Wilcox designed nuclear power plants. Critical flaw sizes were determined, and crack growth analyses were performed to estimate the time required for a postulated small circumferential flaw to grow to a through-wall flaw. Another analysis estimated the time required for a detectable size flaw to grow to a critical size flaw. In addition, a flaw size versus leakage relationship was developed. These analyses showed that the margin between a flaw that gives detectable leakage and the critical flaw size is very large for larger diameter welds. For the case of axial-through-wall flaws, the calculated critical flaw length was greater than or equal to 11.4 inches. Since the maximum length of any axial flaw is limited to the width of the weld metal (approximately 2 to 2½ inches), there is no safety concern relative to rupture from an axial flaw. Also, it is expected that the plant's on-line leakage detection program would detect a through-wall axial flaw. The MRP concluded that axial and circumferential PWSCC flaws that propagate through-wall in Alloy 82/182 butt welds in operating Babcock and Wilcox designed nuclear power plants will produce leakage that can be detected in service before exceeding available structural margins. The only exception was the pressurizer relief nozzle discussed above.

Industry experience to date and the slow crack growth rates associated with PWSCC show that sufficient margin exists between the discovery of leakage and gross rupture, such that the performance of bare metal visual examinations every refueling outage minimizes the probability of rapidly propagating failure as defined by GDC 31. Therefore, FENOC believes that the frequency of planned inspections provides adequate assurance of RCPB integrity.

[1] EPRI MRP-112, *Materials Reliability Program: Alloy 82/182 Pipe Butt Weld Safety Assessment for US PWR Plant Designs: Babcock & Wilcox Design Plants*, September 2004.

3. **Item (1)(c) in Bulletin 2004-01 states in part, "Provide your plans for expansion of the scope of NDE to be performed if circumferential flaws are found in any portion of the leaking pressurizer penetrations or steam space connections."**

   Provide further information concerning your planned corrective actions when visual examination shows evidence of potential reactor coolant pressure boundary leakage. Specifically, address whether NDE capable of determining crack orientation will be performed to characterize the flaw, including its orientation and its extent.

FENOC RESPONSE

If J-groove weld leakage is noted, FENOC plans to remove the J-groove weld from service by severing the penetration and establishing a new pressure boundary weld on the Pressurizer OD through the use of the Half Nozzle OD Pad repair technique similar to that performed by other utilities on leaking Pressurizer penetrations. The repair will include an assessment to leave the J-groove weld in its as-found condition. Only that NDE necessary to accomplish this repair and assessment will be performed; therefore, characterization of flaw orientation and extent may or may not be performed, depending on individual circumstances.

If visual evidence of leakage is noted at butt welded penetrations, FENOC plans to perform supplemental ultrasonic and/or surface examinations in accordance with IWB-3200 to determine the character of the flaw (i.e., size, shape, and orientation). The flaw will be evaluated in accordance with IWB-3130.

These actions are subject to change, based on the discussion described in response to Question 1.

4. From our review of your response to item (1)(a), please provide the following information:

a. How many heaters does the Davis-Besse pressurizer have?

FENOC RESPONSE

The Davis Besse Pressurizer has 3 Heater Bundles. Each bundle has 39 stainless steel immersion heaters for a total of 117.

b. Do these heater assemblies have heater sleeves?

FENOC RESPONSE

No. The immersion heaters are inserted directly into the Pressurizer as part of the Heater Bundle.

c. Have these heater assemblies ever been examined?

FENOC RESPONSE

FENOC is not aware of any past examinations of these heater assemblies. However, it is possible that examinations may have been performed during the early operating history of the plant.

d. If yes, what examination methods were used?

FENOC RESPONSE

This item is not applicable. See 4.c.

e. What were the results of the examinations?

FENOC RESPONSE

This item is not applicable. See 4.c.

5. For pressurizer steam space examinations, when we do the examination, will we be looking at just welds, or welds and base metal?

FENOC RESPONSE

For bare metal visual examinations, the base material and welds exposed by the insulation removal are examined.

For Code and augmented volumetric examinations, the examination volume is as described in the PDI Procedure PDI-UT-10, "Generic Procedure for the Ultrasonic Examination of Dissimilar Metal Piping Welds." This examination volume includes welds and base metal.

For surface examinations, the examination surface includes the weld/buttering and base material one half inch from the weld/butter. These procedures expand the examination volume and surfaces described in Table IWB-2500-1 to include the weld buttering.

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Attachment 2

COMMITMENT LIST

The following list identifies those actions committed to by the Davis-Besse Nuclear Power Station, Unit Number 1, (DBNPS) in this document. Any other actions discussed in the submittal represent intended or planned actions by the DBNPS. They are described only for information and are not regulatory commitments. Please notify Henry L. Hegrat, Supervisor–Licensing (330-315-6944) of any questions regarding this document or associated regulatory commitments.

COMMITMENTS	DUE DATE
If circumferential primary water stress corrosion cracking is observed in either the pressure boundary or non-pressure boundary portions of any locations covered under the scope of NRC Bulletin 2004-01, FENOC will develop plans to perform an extent-of-condition evaluation and discuss those plans with the NRC staff prior to restarting the unit.	If conditions exist, prior to restarting the unit.