November 7, 2002

MEMORANDUM TO: William H. Ruland, Director
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

FROM: Drew Holland, Project Manager, Section 2 **/RA/**
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

SUBJECT: SUMMARY OF OCTOBER 9, 2002, MEETING REGARDING THE EMBEDDED FLAW PROCESS FOR REPAIR OF REACTOR VESSEL HEAD PENETRATIONS

The Westinghouse Electric Company (W) had an open meeting with the NRC staff on October 9, 2002, to discuss issues related to the embedded flaw process for repair of reactor vessel head penetrations. This meeting was available for teleconferencing by remote listeners. It was mentioned that W submitted a generic relief request for an embedded flaw repair that could be applied to control rod drive mechanism/control element drive mechanism (CRDM/CEDM) J-weld surfaces (penetration attachments). The embedded flaw method has been previously approved and applied at one nuclear plant in the inner diameter region of head penetrations. This repair method uses Alloy 52 weld metal to cover Alloy 82/182 material. The purpose of this meeting was to determine if there were any questions from the staff on this methodology.

W explained that the embedded flaw weld repair process had been applied on the J-weld surfaces for 3 CRDM penetrations on the North Anna 2 reactor vessel head in 2001. As a result of observed leakage on one of these penetrations in 2002, all 3 penetrations were re-examined and revealed flaws. An evaluation of two of the repairs has shown that the two repairs did not achieve full coverage of the alloy 82/182 wetted surface. The location of indications found in the repaired welds in 2002 were in these exposed surfaces. It was pointed out that lessons learned and corrective actions have been identified and are being implemented.

W stated that the embedded flaw weld repair procedure provides a local and 360 degree weld repair on both flawed and unflawed material and is consistent with ASME Section XI rules. A mathematical relationship between flaw distance to the surface and the half width of the embedded flaw was then provided. The weld thickness of the repair is .125 inches. W explained that the local repairs can be performed uphill and downhill. Weld overlay on an electro discharge machining notch showed no cracks or indications generated in the surrounding area. For the case of the 360 degree repair, acceptable dimension changes in the penetration tubes were noted. The conclusions that W drew were that:

- the embedded flaw repair isolates the cracking from the reactor coolant system environment and stops further propagation of existing cracks,

- the method minimizes examination and repair time,

- leaves acceptable surface for post repair nondestructive examination, and
- previous Westinghouse Owners Group experimental work demonstrates qualification of the methodology.

W then described the properties of alloy 52/152. Their chemical composition is very similar to alloy 690 with slightly higher chromium with controlled additions of aluminum and titanium. It was explained that alloy 52 was developed to minimize issues related to hot cracking and stress corrosion cracking of alloy 82/182. It was explained that a 1996 embedded flaw repair was made at D.C. Cook Unit 2. A reinspection in 2002 revealed no indications on the weld repair.

The discussion went on to describe tooling, personnel certifications, the repair process, and repair weld geometry. The 2001 repair implementation at North Anna 2 was then discussed. Followup inspection results for embedded flaw repairs were then provided. Lessons learned include recognition that uncertainties exist in the location of the interface between the stainless steel clad and the alloy 82/182 material. A second lesson learned was that through review of manufacturing records, latitude existed in the application of J-weld that could vary the interface location. W described their corrective actions to include:

- consideration of two approaches to assure complete coverage of alloy 182/82 buttering and J-weld, and
- for future inspections, both manufacture and record reviews and onsite inspections will be performed to locate this interface.

W then concluded with statements that: the weld repairs on penetrations 51, 62, and 63 at North Anna Unit 2 did not cover all of the exposed alloy 82/182 material; an evaluation of all relevant data demonstrates that the exposed alloy 82/182 material is the only plausible leakage path in penetration 51; and, the boat sample analysis demonstrates that the two layer alloy 52 weld repair material is in good condition.

No regulatory decisions were made at the meeting. The staff thanked W for the presentation. An attendance list is attached. The presentation slides used at the meeting are located in ADAMS under Accession No. ML022940642.

Project No. 700

Attachment: Meeting Attendees

cc w/att: See next page

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MEETING NOTICE: ML022760373
ADAMS ACCESSION NO. : ML023160204 PACKAGE: ML022980232 NRC-001

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DATE	11/6/2002	10/ 29 /2002	11/6/2002	11/6/2002	11/7/2002

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MEETING WITH WESTINGHOUSE ELECTRIC COMPANY

OCTOBER 9, 2002

ATTENDANCE LIST

WESTINGHOUSE

B. Bevilacqua
E. Siegel
W. Bamford
R. Gold
C. Brinkman
P. Evans
W. Gahwiller
J. Crane
C. Hoffmann
D. Adamonis

OTHER

L. Spain, Dominion Generation
E. Caba, Progress Energy
V. Wagoner, Progress Energy
K. Cozens, NEI
E. Schoonover, Southern California Edison
G. Geiken, RG&E
A. Butcavage, RG&E
D. Miller, Entergy
A. Wyche, SERCH
C. Willbanks, Scientech
D. Killian, Framatome
D. Waskey, Framatome
P. Kreitman, Westinghouse/PCI

NRC

G. Shukla
S. Dembek
T. Chan
E. Andruszkiewicz
A. Hiser
T. Steingass
K. Wichman
N. Sanfilippo
D. Naujock
C. Long

DISTRIBUTION FOR MEETING SUMMARY WITH WESTINGHOUSE ELECTRIC COMPANY ON OCTOBER 9, 2002

Dated: November 7, 2002

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