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

Subject: Davis-Besse Nuclear Power Station
Supplemental Information for 10 CFR 50.55a Request Regarding Inservice Inspection Requirements for the Third Ten-Year Interval (RR-A29)
(TAC No. MD0683)

Ladies and Gentlemen:

By letter dated March 29, 2006 (Serial Number 3248), as supplemented by letter dated March 31, 2006 (Serial Number 3249), the FirstEnergy Nuclear Operating Company (FENOC) submitted a 10 CFR 50.55a request regarding American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI inservice inspection requirements for the third ten-year interval for the Davis-Besse Nuclear Power Station (DBNPS). The March 29, 2006 letter described a proposed full structural overlay repair for an axial indication found on a Reactor Coolant System (RCS) Loop 1 cold leg drain line during the Fourteenth Refueling Outage (14RFO). The letter further noted that the repair would be conducted in accordance with ASME Code Case N-504-2, with modifications. The March 31 supplemental letter committed to providing the NRC with a summary of the analyses performed in support of the repair. Enclosure 1 provides this information.

Following completion of the repair and prior to restart from 14RFO, the NRC staff, via conference call on April 5, 2006, provided verbal authorization for the March 29 request.

As further discussed during the April 5, 2006 conference call, FENOC will evaluate the DBNPS Alloy 600 Program susceptibility ranking, inspection plan, and mitigation/repair matrix to incorporate lessons-learned from the 14RFO repair of the RCS Loop 1 cold leg drain line.

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Attachment 1, Commitment List, identifies the commitments contained in this letter. If there are any questions or if additional information is required, please contact Mr. Gregory A. Dunn, Manager – FENOC Fleet Licensing, at (330) 315-7243.

Mark B. Bezilla, Vice President-Nuclear

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Enclosures

cc: Regional Administrator, NRC Region III
NRC/NRR Project Manager
NRC Senior Resident Inspector
Utility Radiological Safety Board

SUMMARY OF ANALYSES IN SUPPORT OF WELD OVERLAY REPAIR DAVIS-BESSE NUCLEAR POWER STATION

INTRODUCTION

During the Fourteenth Refueling Outage (14RFO) for the FirstEnergy Nuclear Operating Company (FENOC) Davis-Besse Nuclear Power Station (DBNPS), ultrasonic examinations were performed on the Class 1 Reactor Coolant System (RCS) Loop 1 cold leg drain lines. During these examinations, an axial indication was identified in a nozzle-to-elbow weld in one of the drain lines. Specifically, the indication was found in the nozzle weld butter material of the dissimilar metal, nozzle-to-elbow weld in the Reactor Coolant Pump 1-1 inlet cold leg drain line, weld RC-40-CCA-18-1-FW2.

As there is no qualified manual depth sizing procedure for dissimilar metal welds (DMW), the axial indication was deemed unacceptable and required repair. Since the indication is in a material that is susceptible to primary water stress corrosion cracking (PWSCC), FENOC decided to perform a full structural overlay to restore the integrity of the pressure boundary and to mitigate any potential PWSCC.

The structural weld overlay of the cold leg drain nozzle was designed consistent with the requirements of the ASME Code, Section XI, Code Case N-504-2 and Nonmandatory Appendix Q, as supplemented by additional design considerations specific to the unique nature of the geometry and materials of the DBNPS cold leg drain nozzle-to-elbow weld. These additional considerations are documented in 10 CFR 50.55a request RR-A29 for the third ten-year interval, submitted by letter dated March 29, 2006 (Serial No. 3248), and supplemented by letter dated March 31, 2006 (Serial 3249). In the March 31 supplemental letter, FENOC committed to provide the NRC with a summary of the analyses performed for the repair.

CALCULATION SUMMARY

The following table summarizes the calculation packages that were prepared to document the design and analysis of the DBNPS Reactor Coolant Pump 1-1 inlet cold leg drain line nozzle-to-elbow weld overlay:

Code Case N-504-2 Governing Paragraph[1]	Calculation Number	Title and Purpose	Summary of Results
(f)(1) [Same as Q-3000(a), (b)]	DB-06Q-301, Rev. 2	*Weld Overlay Sizing for RCS-1-1 Cold Leg Drain Nozzle* Determine the required size (thickness and length) for a full structural (standard) overlay repair based on plant specific nozzle geometry and loadings, and ASME Code, Section XI Code Case N-504-2.	The minimum required thickness and length of the overlay meets the structural integrity and inspection requirements of Code Case N-504-2 and Nonmandatory Appendix Q.
(f)(1) [Same as Q-3000(a), (b)]	DB-06Q-302, Rev. 1	*Finite Element Models of the Davis Besse Unit 1 Reactor Coolant Cold Leg Drain Nozzle with Weld Overlay Repair Using Design Dimensions* Develop finite element models of the overlaid drain nozzle configuration, based upon the design provided in DB-06Q-301. The models are used in subsequent calculations to calculate stresses.	Finite element models were developed for use in calculating mechanical, thermal and residual stresses.
(f)(1), (g)(2) [Same as Q-3000(b)(1), (b)(3)]	DB-06Q-303, Rev. 1	*Thermal and Mechanical Stress Analyses of Cold Leg Letdown Nozzle with Weld Overlay Repair* Analyze the finite element models for design bases loading conditions, and produce stress results for use in ASME Code Section III stress and fatigue evaluations, and Section XI crack growth evaluations.	Design basis loads were applied to the finite element models and stresses calculated for those loading conditions.
(f)(1) [Same as Q-3000(b)(1)]	DB-06Q-304, Rev. 1	*RCS Cold Leg Letdown Line Nozzle Weld Overlay Repair ASME Code Section III Evaluation* Perform an ASME Code, Section III, Class 1 evaluation for the repaired configuration by comparing primary and secondary stress intensities calculated in DB-06Q-303 to appropriate Section III acceptance criteria, and perform a fatigue evaluation in accordance with Section III criteria.	The required evaluations were performed and all ASME Code stress and fatigue acceptance criteria were met.

Code Case N-504-2 Governing Paragraph[1]	Calculation Number	Title and Purpose	Summary of Results
(g)(3) [Same as Q-3000(b)(4)]	DB-06Q-305, Rev. 1	*RCS Letdown Nozzle Weld Shrinkage Analysis* Determine maximum stresses developed in the reactor coolant drain and letdown piping system due to the effects of the observed weld shrinkage associated with the weld overlay repair.	Piping system stresses resulting from the measured axial shrinkage associated with the weld overlay repair were small compared to the load carrying capability of the system.
(g)(2)	DB-06Q-306, Rev. 1	*Residual Stress Evaluation of the Davis Besse Unit 1 Reactor Coolant Cold Leg Drain Nozzle with Weld Overlay Repair Using Design Dimensions* Analyze the finite element model for weld residual stresses resulting from the initial butt weld and a postulated repair, as well as for the application of the weld overlay.	The weld residual stresses at and near the inside surface of the PWSCC susceptible material were reversed from tensile to compressive after application of the weld overlay.
(g)(3)	DB-06Q-307, Rev. 0	*Predicting Fatigue Crack Growth for the DB Unit 1 RCP 1-1 Cold Leg Drain Nozzle With Design Weld Overlay* Address the potential crack growth due to both stress corrosion and fatigue utilizing initial (or postulated) crack geometry, and the stress fields generated in DB-06Q-303 and DB-06Q-306.	Crack growth is not considered to be a significant factor affecting the weld overlay design based on the compressive stresses present in the nozzle weld due to the presence of the overlay.
(f)(1), (g)(2), (g)(3) [Q-3000(a), (b)]	SIR-06-148, Rev. 0	*Weld Overlay Design and Analysis for Reactor Coolant Pump 1-1 Inlet Cold Leg Drain Nozzle-to-Elbow Weld at Davis-Besse Nuclear Power Station* Provides a summary of the technical basis and the supporting design and analyses of the cold leg drain nozzle overlay, as provided in the applicable calculation packages.	All design requirements of the ASME Code, Section XI, Code Case 504-2 were met by the overlay design.

[1] Corresponding Nonmandatory Appendix Q paragraph indicated in brackets.

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 Gregory A. Dunn, Manager – FENOC Fleet Licensing (330-315-7243) of any questions regarding this document or associated regulatory commitments.

COMMITMENTS	DUE DATE
FENOC will evaluate the DBNPS Alloy 600 Program susceptibility ranking, inspection plan, and mitigation/repair matrix to incorporate lessons-learned from the 14RFO repair of the RCS Loop 1 cold leg drain line.	In accordance with the DBNPS Corrective Action Program