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Docket Number 50-346

10 CFR 50.54(f)

License Number NPF-3

Serial Number 2994

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United States Nuclear Regulatory Commission
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Subject: Revised Response to NRC Generic Letter 98-04: Potential for Degradation of the Emergency Core Cooling System and the Containment Spray System After a Loss-of-Coolant Accident Because of Construction and Protective Coating Deficiencies and Foreign Material in Containment

Ladies and Gentlemen:

Nuclear Regulatory Commission (NRC) Generic Letter (GL) 98-04, "Potential for Degradation of the Emergency Core Cooling System and the Containment Spray System After a Loss-of-Coolant Accident Because of Construction and Protective Coating Deficiencies and Foreign Material in Containment," dated July 14, 1998, requested information to evaluate licensees' programs for ensuring that Service Level 1 protective coatings inside the containment vessel do not detach from their substrate during a design basis loss-of-coolant accident (LOCA) and interfere with the operation of the Emergency Core Cooling System (ECCS) and the Containment Spray System (CSS). The Davis-Besse Nuclear Power Station, Unit 1 (DBNPS) provided a response to GL 98-04 in a letter dated November 11, 1998 (DBNPS letter Serial Number 2571).

During the ongoing Thirteenth Refueling Outage (13RFO), the FirstEnergy Nuclear Operating Company (FENOC) identified via the FENOC corrective action program that significant amounts of unqualified coating materials were applied to components inside the containment vessel.¹ FENOC informed the NRC by letter dated September 15, 2003 (FENOC letter Serial Number 1-1328) that incomplete or inaccurate information was provided in the DBNPS response to GL-98-04. The purpose of this letter is to revise the DBNPS GL 98-04 response to incorporate corrections determined to be necessary as a result of the 13RFO activities.

¹ Licensee Event Report (LER) 2002-005 dated November 4, 2002, and supplements dated December 11, 2002, and May 21, 2003.

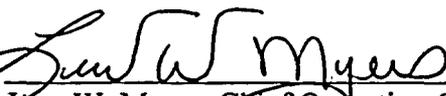
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If you have any questions or require further information please contact Mr. Kevin L. Ostrowski, Manager - Regulatory Affairs, at (419) 321-8450.

The statements contained in this submittal, including its associated enclosure and attachment, are true and correct to the best of my knowledge, information and belief. I declare under penalty of perjury that the foregoing is true and correct.

Executed on: 11/26/03

By: 
Lew W. Myers, Chief Operating Officer

CWS

Attachment
Enclosure

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

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DAVIS-BESSE NUCLEAR POWER STATION, UNIT 1
REVISED RESPONSE TO GENERIC LETTER 98-04, "POTENTIAL FOR
DEGRADATION OF THE EMERGENCY CORE COOLING SYSTEM AND
THE CONTAINMENT SPRAY SYSTEM AFTER A LOSS-OF-COOLANT ACCIDENT
BECAUSE OF CONSTRUCTION AND PROTECTIVE COATING DEFICIENCIES AND
FOREIGN MATERIAL IN CONTAINMENT"

The following provides FirstEnergy Nuclear Operating Company's (FENOC's) revised response to each NRC-requested item as applicable to the Davis-Besse Nuclear Power Station, Unit 1 (DBNPS).

- (1) [Provide a] summary description of the plant-specific program or programs implemented to ensure that Service Level 1 protective coatings used inside the containment are procured, applied, and maintained in compliance with applicable regulatory requirements and the plant-specific licensing basis for the facility. Include a discussion of how the plant-specific program meets the applicable criteria of 10 CFR Part 50, Appendix B, as well as information regarding any applicable standards, plant-specific procedures, or other guidance used for: (a) controlling the procurement of coatings and paints used at the facility, (b) the qualification testing of protective coatings, and (c) surface preparation, application, surveillance, and maintenance activities for protective coatings. Maintenance activities involve reworking degraded coatings, removing degraded coatings to sound coatings, correctly preparing the surfaces, applying new coatings, and verifying the quality of the coatings.**

Response

Service Level 1 coatings are used in areas inside containment where the coating failure could adversely affect the operation of post-accident fluid systems and thereby impair the ability to maintain safe shutdown. As discussed below, the DBNPS has implemented controls for the procurement, application, and maintenance of Service Level 1 protective coatings used inside the containment vessel in a manner that is consistent with the licensing basis and regulatory requirements applicable to the DBNPS. The requirements of 10 CFR Part 50 Appendix B are implemented through specification of appropriate technical and quality requirements for the Service Level 1 coatings program which includes ongoing maintenance activities.

For the DBNPS, Service Level 1 coatings are subject to the requirements of Regulatory Guide 1.54 (6/73), "Quality Assurance Requirements for Protective Coatings Applied to Water-Cooled Nuclear Power Plants," and ANSI N 101.4-1972, "Quality Assurance for Protective Coatings Applied to Nuclear Facilities" as described in the DBNPS Updated Safety Analysis Report (USAR), Section 6.1.1, "Protective Coating Systems (Paints) – Organic Materials."

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Two Design Basis Accident (DBA) qualified coating systems are currently used on ferrous metal and concrete surfaces within the containment vessel. The first system consists of an inorganic zinc primer followed by an epoxy topcoat. This system is applied to the containment vessel, structural steel, and equipment. The second system consists of an epoxy primer and epoxy topcoat. This system is applied to ferrous metal surfaces and concrete surfaces.

Assurance that the applicable requirements for the procurement, application, inspection, and maintenance of Service Level 1 coatings are implemented is provided by procedures and programmatic controls, approved under the DBNPS Quality Assurance program. The guidance provided in the Electric Power Research Institute (EPRI) "Guideline on Nuclear Safety-Related Coatings," Revision 1 (formally TR-109937), 1003102, November 2001, has been applied by the DBNPS staff to further assess these procedures and controls. A nuclear safety-related protective coatings program (DBNPS procedure NG-EN-00360) has been implemented which places coating material procurement, application and training under the oversight of a single owner.

- (a) Service Level 1 coatings used for new applications or repair/replacement activities are procured from a vendor(s) having a Quality Assurance program meeting the applicable requirements of 10 CFR Part 50, Appendix B. The applicable technical and quality requirements that the vendor is required to meet for coatings are specified in the DBNPS procurement documents. The coatings used inside the containment vessel are procured, handled and stored in accordance with the DBNPS Specification A-024Q, "Specification for Operational Phase For Field Coating Inside Containment for the Toledo Edison Company Davis-Besse Nuclear Power Station Unit 1 Oak Harbor, Ohio." This specification defines the technical and quality requirements for coatings used within the containment vessel or coating of items that will be placed within the containment vessel consistent with the DBNPS commitments to Regulatory Guide 1.54 (6/73) and ANSI N101.4-1972. Acceptance activities are conducted in accordance with procedures that are consistent with ANSI N45.2.2-1978, "Packaging, Shipping, Receiving, Storage and Handling of Items for Nuclear Power Plants," requirements (e.g., receipt inspection, etc.).
- (b) Although the DBNPS is not committed to ANSI N101.2-1972, "Protective Coatings (Paints) for Light Water Nuclear Reactor Containment Facilities," the DBNPS Specification A-024Q requires qualification testing of Service Level 1 coatings used for new applications or repair/replacement activities inside the containment vessel (except as noted below) to be prequalified to DBA test criteria per ANSI N101.2-1972.

Exceptions to Regulatory Guide 1.54 (6/73), as described in USAR Section 6.1.1, have been taken for the following surfaces within the containment vessel: surfaces to be insulated; surfaces contained within a cabinet or enclosure; repair/touch-up areas less than thirty square inches or surfaces such as cut ends, bolt heads, nuts and miscellaneous fasteners, damage from tack, spot or arc welding; small items such as small motors,

handwheels, electrical cabinets, control panels, loud speakers, motor operators, etc., where special painting requirements would be impractical; stainless steel or galvanized surfaces; and banding that is used for insulating pipe.

- (c) The surface preparation, application and surveillance during installation of Service Level 1 coatings used for new applications or repair/replacement activities inside the containment vessel meet the applicable portions of Regulatory Guide 1.54 (6/73) and ANSI N101.4-1972 with the exceptions noted above.

Application of protective coatings inside the containment vessel is described in DBNPS procedure DB-MS-09252, "Application of Protective Coatings Inside Containment." This procedure provides guidance for the initial application and repair of protective coatings to surfaces inside the containment vessel and for applying coatings to components that will be installed inside the containment vessel. This procedure contains guidance for personnel qualification, material storage and shelf life, surface preparation, monitoring of application environment (e.g., temperature, relative humidity, dew point), coating application, drying and cure time, post-application testing (i.e., film thickness), and acceptance criteria. Where the requirements of the Regulatory Guide or ANSI standard do not address, or are not applicable to repair/replacement activities, these activities are permitted to be performed in a manner consistent with generally accepted practices for coatings repair/replacement (e.g., various ASTM standards and coating practice guidelines issued by industry organizations). Documentation of completion of these activities is performed consistent with the applicable requirements of Regulatory Guide 1.54 (6/73) and ANSI N101.4-1972 as implemented by DB-MS-09252.

Periodic condition assessments (currently on a refueling outage frequency) of Service Level 1 coatings inside the containment vessel are conducted as part of 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," as implemented at the DBNPS by DB-PF-00003, "Maintenance Rule," and are required by DBNPS procedure NG-EN-00360. As localized areas of degraded coatings (e.g., paint chips and flakes) are identified (e.g., in accordance with DBNPS procedure EN-DP-01508, "Containment Protective Coatings Condition Assessment Inspections"), those areas are evaluated and scheduled for repair or replacement, as necessary. The periodic condition assessments, and the resulting repair/replacement activities, provide assurance that the amount of Service Level 1 coatings which may be susceptible to detachment from the substrate during a Loss-of-Coolant Accident (LOCA) event is minimized.

- (2) [Provide information demonstrating compliance with item (i) or item (ii):**

- (i) For plants with licensing-basis requirements for tracking the amount of unqualified coatings inside the containment and for assessing the impact of potential coating debris on the operation of safety-related SSCs during a**

postulated DB LOCA, the following information shall be provided to demonstrate compliance:

- (a) The date and findings of the last assessment of coatings, and the planned date of the next assessment of coatings.**
 - (b) The limit for the amount of unqualified protective coatings allowed in the containment and how this limit is determined. Discuss any conservatism in the method used to determine this limit.**
 - (c) If a commercial-grade dedication program is being used at your facility for dedicating commercial-grade coatings for Service Level 1 applications inside the containment, discuss how the program adequately qualifies such a coating for Service Level 1 service. Identify which standards or other guidance are currently being used to dedicate containment coatings at your facility; or,**
- (ii) For plants without the above licensing-basis requirements, information shall be provided to demonstrate compliance with the requirements of 10 CFR 50.46(b)(5), "Long-term cooling," and the functional capability of the safety-related [Containment Spray System (CSS)] as set forth in your licensing basis. If a licensee can demonstrate this compliance without quantifying the amount of unqualified coatings, this is acceptable. The following information shall be provided:**
- (a) If commercial-grade coatings are being used at your facility for Service Level 1 applications, and such coatings are not dedicated or controlled under your Appendix B Quality Assurance Program, provide the regulatory and safety basis for not controlling these coatings in accordance with such a program. Additionally, explain why the facility's licensing basis does not require such a program.**

Response

The DBNPS does not have licensing basis requirements for tracking the amount of unqualified coatings inside the containment vessel and for assessing the impact of potential coating debris on the operation of safety-related structures, systems, and components (SSCs) during a postulated design basis (DB) LOCA; therefore, a response to 2(ii) is provided. The DBNPS does not currently employ commercial grade dedication for Service Level 1 coatings used inside the containment vessel. The Service Level 1 protective coatings used inside the containment vessel at the DBNPS are qualified with the exceptions noted in the response to Item 1 and as follows.

In response to the exceptions taken to Regulatory Guide 1.54 (6/73), small equipment (motors, handwheels, cabinets, etc.) are not necessarily procured with qualified coatings. These exceptions are described in USAR Section 6.1.1. As a result of inspections performed by FENOC during the ongoing 13RFO, FENOC has identified other unqualified coatings in the DBNPS containment vessel. These are being addressed via the DBNPS 10 CFR 50 Appendix B corrective action program and were reported to the NRC in Licensee Event Report (LER) 2002-005 supplements dated December 11, 2002, and May 21, 2003. As a corrective measure, unqualified coating material on the Core Flood tanks, the Reactor Vessel Head Service Structure, and Service Water piping inside the containment vessel has been removed. Design basis accident qualified coating materials have been applied to these components. In addition, a non-DBA qualified protective coatings inventory has been developed to quantify and track the amount of unqualified coatings inside the containment vessel. Coating material exclusions to this inventory include surfaces which are insulated or are contained within a cabinet or enclosure. The documented quantity of non-DBA qualified coating material must remain below the limit of coating material debris identified by the Containment Vessel Emergency Sump debris analysis.

The following descriptions and referenced materials describe the licensing basis for the DBNPS relative to conformance with 10 CFR 50.46(b)(5) with regard to the DBNPS's ability to provide extended decay heat removal, including related assumptions for debris that could block the containment vessel emergency sump screens:

The Emergency Core Cooling System (ECCS) is described in USAR Section 6.3, "Emergency Core Cooling System." The ECCS provides the capability to meet the functional requirements over both the short and long term duration of the accident.

The Containment Spray System (CSS) is described in USAR Section 6.2.2, "Containment Vessel Heat Removal Systems." Clogging of the containment spray nozzles was evaluated and is described in USAR Table 6.2-21, "Single Failure Analysis-Containment Vessel Heat Removal Systems." This evaluation concluded that the large number of nozzles on each of two headers renders clogging of a significant number of nozzles as incredible.

The Containment Vessel Emergency Sump was extensively modified during 13RFO as a corrective measure in response to the discovery that significant amounts of unqualified coating materials were applied to components inside the containment vessel.¹ The modified Containment Vessel Emergency Sump is described in USAR Section 6.2.2.6, "Containment Vessel Emergency Sump." The modified Containment Vessel Emergency Sump provides a significantly improved screen surface area to provide adequate flow without a loss of net positive suction head (NPSH) for the associated pumps.

¹ Licensee Event Report (LER) 2002-005 dated November 4, 2002, and supplements dated December 11, 2002, and May 21, 2003.

Adequate free flow area is provided to ensure minimal flow resistance under conservative debris loading conditions following a LOCA. A system of trash racks is provided in key passageways inside the containment vessel to intercept large debris before reaching the sump area. The strainer is designed to accommodate postulated accident conditions inside the containment vessel under which transient materials (fibrous and metallic insulation) and coating debris are created. The strainer was specifically designed to preclude these items from jeopardizing sump performance and long term recirculation operation. However, the High Pressure Injection pumps were subsequently determined to be susceptible to failure as a result of debris that could pass through the Containment Vessel Emergency Sump strainers.¹ This susceptibility is currently being corrected in accordance with the FENOC 10 CFR 50, Appendix B Corrective Action Program and is being tracked by the NRC as Inspection Manual Chapter 0350 Restart List Item 2.e.

Summary

In summary, the majority of the coatings used in the containment vessel are qualified, with the exceptions as noted for small equipment such as motors, handwheels, electrical cabinets, loud speakers, etc. In addition, during the ongoing 13RFO FENOC identified unqualified coating material applied to some components and equipment. Much of this material was removed and the remaining unqualified material is tracked by the non-DBA qualified protective coatings inventory. If some of the unqualified coating were to become loose, a portion could reach the Containment Vessel Emergency Sump elevation. The strainer was significantly modified, however, during 13RFO to accommodate postulated accident conditions inside the containment vessel under which transient materials (fibrous and metallic insulation) and coating debris are created. The strainer was specifically designed to preclude these items from jeopardizing sump performance and long term recirculation operation. Paint debris fragments that are small enough to pass through the 3/16-inch emergency sump strainer openings would not clog CSS nozzles or damage pumps following correction of the susceptibility of the High Pressure Injection pumps to such fragments, as discussed above.

Periodic evaluations of coatings inside the containment vessel are conducted as part of the DBNPS Maintenance Rule Program. As localized areas of degraded coatings are identified, those areas are evaluated and repaired or replaced. The periodic condition assessments, and the resulting repair/replacement activities, assure that the amount of Service Level 1 coatings which may be susceptible to detachment from the substrate during a LOCA event is acceptable.

¹ LER 2003-002, dated May 5, 2003

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COMMITMENT LIST

THE FOLLOWING LIST IDENTIFIES THOSE ACTIONS COMMITTED TO BY THE DAVIS-BESSE NUCLEAR POWER STATION (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 THE MANAGER – REGULATORY AFFAIRS (419-321-8450) AT THE DBNPS OF ANY QUESTIONS REGARDING THIS DOCUMENT OR ANY ASSOCIATED REGULATORY COMMITMENTS.

COMMITMENTS	DUE DATE
The surface preparation, application and surveillance during installation of Service Level 1 coatings used for new applications or repair/replacement activities inside the containment vessel meet the applicable portions of Regulatory Guide 1.54 (6/73) and ANSI N101.4-1972 with the exceptions noted above.	Completed (Reference NG-EN-00360)