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United States Nuclear Regulatory Commission
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Subject: Final Response to Generic Letter 2003-01: "Control Room Habitability" (TAC No. MB 9796)

Ladies and Gentlemen:

The NRC issued Generic Letter (GL) 2003-01, "Control Room Habitability," dated June 12 2003, to alert addressees to findings at U.S. power reactor facilities suggesting that the Control Room licensing and design bases and applicable regulatory requirements may not be met, and that Technical Specification surveillance requirements may not be adequate.

The Generic Letter also emphasized the importance of reliable and comprehensive surveillance testing to verify Control Room Habitability. The GL requested information to confirm that the facility's Control Room meets applicable habitability requirements with emphasis placed on inleakage testing, radiological analyses, hazardous chemical and smoke assessments, and to confirm the adequacy of Technical Specifications. The GL also requested the design criteria to which the facility is licensed, and clarification as to whether any compensatory measures are currently in place that maintain the Control Room habitable.

By letter dated August 11, 2003 (Serial Number 2974), the FirstEnergy Nuclear Operating Company (FENOC) submitted a 60-day response to the generic letter for the Davis-Besse Nuclear Power Station (DBNPS), committing to take several actions including control room analysis and testing. A schedule for meeting these requirements was provided in the initial response. By letter dated August 13, 2004 (Serial Number 3056) FENOC provided a revised schedule for the performance of the tracer gas test. The integrated tracer gas test was performed in November 2005 to verify unfiltered inleakage assumptions in design basis documents. Official results of the integrated tracer gas inleakage test were received in January 2006.

Attachment 1 provides the FENOC final response to GL 2003-01 for DBNPS. The review concludes that the Control Room Habitability Systems remain in accordance with design and licensing bases and meet the applicable regulatory requirements. Final modifications to

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the DBNPS Technical Specifications will be evaluated upon completion of industry proposals to modify improved Standard Technical Specifications. FENOC considers all activities to be complete, with the exception of updates to the licensing bases as described in Attachment 1.

Attachment 2 provides a list of regulatory commitments made in this submittal. 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.

Very truly yours,

TSC

Attachment 1 – Davis-Besse Nuclear Power Station Final Response to NRC GL 2003-01: "Control Room Habitability"
Attachment 2 – Commitment List

cc: Regional Administrator, NRC Region III
NRC/NRR Senior Project Manager
NRC Region III, DB-1 Senior Resident Inspector
Utility Radiological Safety Board

DAVIS-BESSE NUCLEAR POWER STATION
FINAL RESPONSE TO NRC GL 2003-01: "CONTROL ROOM HABITABILITY"

Through Generic Letter 2003-01, licensees were requested to provide information on three issues relating to the importance of ensuring that the Control Room envelope is operated and maintained in accordance with the facility design and licensing bases. The information requested (in bold type) and the specific FENOC responses for DBNPS to the questions are provided below.

1. Provide confirmation that your facility's control room meets the applicable habitability regulatory requirements (e.g., GDC 1, 3, 4, 5, and 19) and that the CRHSs (Control Room Habitability Systems) are designed, constructed, configured, operated, and maintained in accordance with the facility's design and licensing bases.

In response to this Generic Letter, the Design and Licensing Bases for Control Room Habitability Systems (CRHSs) were validated. Various drawings, specifications, procedures, calculations, reports, correspondence, test results, and historical data have been identified, reviewed, and documented to ensure consistency with the Updated Safety Analyses Report (USAR) in regard to CRHSs. Additional testing of the control room boundary was performed to verify unfiltered in-leakage rate assumptions in the control room habitability analyses. These reviews indicated that the CRHSs meet the applicable requirements of General Design Criteria (GDC) 1, 3, 4, 5 and 19. Compliance with applicable GDC is discussed in USAR Appendix 3D.1. The following provides a discussion of how CRHSs are operated and maintained in accordance with the Davis-Besse design and licensing bases.

The Control Room Normal Ventilation System (CRNVS) and the Control Room Emergency Ventilation System (CREVS) are designed to provide a suitable environment for equipment and station operator comfort and safety. The operation of the CREVS is also required to mitigate the consequences of design basis accidents. The CREVS is designed with absolute and carbon filtration and equipment redundancies for use as conditions require.

The CRNVS consists of redundant air-handling units with heating and cooling coils. Each air-handling unit has a prefilter, final filter, hot water preheat coil, and a cooling coil. One unit will be operating with the other unit available for manual actuation in the event of a failure of the operating unit.

The Control Room Emergency Ventilation System (CREVS) consists of two 100 percent-capacity redundant fan-filter assemblies. Each filter system includes a roughing filter, high-efficiency filter, and charcoal adsorber. The system is capable of filtering 3300 cfm of control room air in a recirculation mode or introducing up to 300 cfm of outside air and 3000 cfm of recirculated air into the control room after filtering. The system is capable of maintaining 0.125 inches w.g. positive pressure in the control room envelope with an intake of 300 cfm outside air. The systems are designated as Seismic Class I and seismic failure is not considered credible.

In the Davis-Besse design, the Control Room Normal Ventilation System (CRNVS) will be automatically isolated upon Safety Features Actuation System (SFAS) actuation or detection of high radiation by the station vent radiation monitors. Closure of the normal ventilation system dampers to accomplish isolation of the control room is described in Chapter 15 of the USAR. Isolation of CRNVS does not result in automatic initiation of the Control Room Emergency Ventilation System (CREVS). The CREVS filters have a total efficiency not less than 95 percent so that the limits of Criterion 19 of the 10CFR50 Appendix A are met. The CREVS can either be operated in the recirculation mode or outside air intake (pressurization) mode. However, to minimize the unfiltered inleakage into the control room, the CREVS is operated in the outside air intake mode following a LOCA.

Emphasis should be placed on confirming:

a) That the most limiting unfiltered inleakage into your CRE (and the filtered inleakage if applicable) is no more than the value assumed in your design basis radiological analyses for control room habitability. Describe how and when you performed the analyses, test, and measurements for this confirmation.

Analyses presented in USAR section 15.4.6.8.4 for control room habitability assumed an unfiltered in-leakage of 55.4 CFM or 0.06 air changes per hour into the control room when the control room is not pressurized. The analyses assume that the CREVS is initiated in the pressurization mode (with 300 cfm filtered outside air) approximately 10 minutes after the accident and continues for 30 days. Therefore the CREVS operates in the pressurization mode for the majority of time following an accident.

In order to confirm that the most limiting in-leakage into the control room does not exceed the USAR assumed value, Davis-Besse Nuclear Power Station contracted NCS Corporation and Lagus Applied Technology to perform an integrated tracer gas inleakage test and flow measurement for the Davis-Besse control room envelope. Prior to performing these tests, the control room boundary was inspected and penetrations were sealed as required. This configuration forms the basis for future inspections as required by the control room habitability program that was developed to assure that CRHSs are properly maintained and operated.

The tracer gas in-leakage test was performed and successfully completed from November 10 through November 16, 2005. NCS provided Davis-Besse with a written test report in January 2006, detailing the methodology and the results of the tracer gas test.

Due to relatively low makeup flow rates at DBNPS, the time required to reach an equilibrium concentration of tracer gas in the control room is excessive if concentration buildup/steady state technique is used to measure the in-leakage rates. Therefore a slightly different technique, Makeup Flowrate/Concentration Decay Test, as suggested in ASTM E741 was used in the measurement of In-leakage during the pressurization mode of CREVS operation. For this test a value of 55,400 cubic feet was used for control room volume. For the purposes of uncertainty analysis, a five percent uncertainty in the value of the CRE volume was assumed.

Two Concentration Decay Tests were undertaken to infer the inleakage rate into the CRE with the CREVS operating in the Recirculation Mode. In a Concentration Decay Test, a fixed quantity of tracer gas is injected initially into an Air Handling Unit (AHU) fan and is dispersed throughout the CRE. After waiting for adequate mixing to occur, a series of concentration versus time points are obtained and regression analysis on the logarithm of concentration versus time is performed to find the best straight-line fit to the data.

A total four tracer gas tests (i.e., two distinct tests for each train) were performed. These tests measured the in-leakage rates in to the control room with CREVS in the pressurization mode (where CREVS takes suction from outside to maintain a positive pressure in the control room) and in the recirculation mode (where CREVS does not bring in outside air).

The tracer gas tests performed during the month of November 2005 showed that the unfiltered in-leakage into the Control Room when the control room is pressurized is zero CFM. Since the dose calculations assumed a 10-CFM in-leakage when the control room is pressurized, the test results are enveloped by the analysis assumptions used in the analysis for the pressurization mode.

The tracer gas tests performed with CREVS in the recirculation mode (to simulate the in-leakage measurements into an unpressurized control room) indicated that for train 1 the in-leakage rate is 37 CFM or 0.04 air changes per hour and for train 2 the in-leakage rate is 60 CFM or 0.065 air changes per hour. Therefore the measured in-leakage for train 2 is slightly higher than the value assumed in the analyses. However, since the CREVS will be initiated in the pressurization mode in approximately 10 minutes, there is no significant impact on control room doses due to slightly higher unfiltered in-leakage rate than assumed in the analyses. A small increase in the in-leakage rate during the first 10 minutes of the accident will not impact the ability of the CREVS to maintain the doses below the GDC 19 guidelines. A review of the dose calculations indicated that the thyroid dose is 1.84 REM during the first 10 minutes with a 30 day dose of 19.8 REM. An increase in unfiltered in-leakage during the first 10 minutes from 55.4 CFM to 60 CFM will increase the calculated thyroid dose by 0.15 REM resulting in a 30-day dose of approximately 20 REM. This value is well within the GDC 19 guideline value of 30 REM to thyroid. Changes to the governing dose calculations are being completed under the FENOC Corrective Action Program, and the resulting changes to the USAR will include in-leakage assumptions that fully bound measured unfiltered and filtered in-leakage rates.

By letter dated November 17, 1995, the NRC issued License Amendment 202 to the DBNPS Technical Specification 3/4.9.4, Refueling Operations, to allow both doors of the containment personnel airlocks to be open during core alterations or movement of irradiated fuel within the containment, provided that certain specified conditions are met. The supporting dose analyses performed for the fuel handling accident (FHA) assumed an unfiltered in-leakage rate of 55.4 CFM for the duration of the accident without taking credit for filtration by the CREVS filters. Even at the measured in-leakage rate of 60 CFM the doses will be below GDC 19 guidelines. If credit for CREVS filters is considered the control room doses will be well below GDC 19 guidelines. It is noted that the NRC SER for Amendment 202 credits use of CREVS filters for FHA.

The control room doses are also presented in the USAR for the Waste Gas Decay Tank Rupture analysis. Since Waste Gas Decay Tanks do not contain a significant quantity of iodine activity, unfiltered in-leakage is not a major concern for this accident. A review of calculations indicated that even without the control room isolation the calculated doses are well below the GDC 19 guidelines.

The control room doses are not provided for a Main Steam Line Break (MSLB) accident in the USAR. However, USAR section 15.4.4.2.6.1 states that the control room doses following a MSLB are less than the doses presented in the USAR for a Loss of Coolant Accident (LOCA). A review of dose calculations indicated that the statement is valid and that control room doses will be within the guidelines of GDC 19.

The USAR does not include a specific evaluation of the Control Room dose due to ECCS leakage outside containment following a LOCA. The impact of increased (40 gph) ECCS leakage into auxiliary building and ECCS leakage into

Borated Water Storage Tank (BWST) have been evaluated in accordance with the FENOC Corrective Action Program, to verify that the Control Room doses will be less than GDC 19 guideline values.

Potential radioactive material accumulated on Control Room Emergency Ventilation system charcoal adsorbers and the Emergency Ventilation System charcoal adsorbers were not considered as radiological sources when evaluating whole body gamma dose to the control room operators. Preliminary assessments concluded that consideration of the two additional sources (EVS and CREVS) would not cause GDC 19 guidelines to be exceeded for the worst case applicable control room doses specified in the USAR.

The above described calculations and licensing basis analyses will be revised as necessary by December 31, 2006.

b) That the most limiting unfiltered inleakage into your CRE is incorporated into your hazardous chemical assessments. This inleakage may differ from the value assumed in your design basis radiological analyses. Also, confirm that the reactor control capability is maintained from either the control room or the alternate shutdown panel in the event of smoke.

Hazardous Chemical Assessment
The hazardous chemical evaluations for Davis-Besse do not take credit for automatic isolation of normal control room ventilation system. Both off-site and onsite stationary and mobile hazardous chemical sources were evaluated. These evaluations show that the two minute toxicity limit as defined in the Regulatory Guide 1.78 is not exceeded in the control room even if it is not isolated. Therefore unfiltered in-leakage is not relevant to the toxic gas assessments. Procedural guidance exists to manually isolate the control room in the event of a toxic chemical release and adequate quantity of self contained breathing apparatus are provided in the control room for emergency use.

Smoke Evaluation
As a result of GL 2003-01, qualitative evaluation of smoke management capabilities was performed in accordance with the guidance provided in Reg Guide 1.196. This evaluation concluded that the control room operators have the capability to safely shutdown the plant from either the control room or the alternate shutdown locations during a single credible smoke event originating either inside or outside of the control room.

c) That your technical specifications verify the integrity of the CRE, and the assumed inleakage rates of potentially contaminated air. If you currently have a ΔP surveillance requirement to demonstrate CRE integrity, provide

the basis for your conclusion, that it remains adequate to demonstrate CRE integrity in light of the ASTM E741 testing results. If you conclude that your ΔP surveillance requirement is no longer adequate, provide a schedule for 1) revising the surveillance requirement in your technical specifications to reference an acceptable surveillance methodology (e.g., ASTM E741), and 2) making any necessary modifications to your CRE so that compliance with your new surveillance requirement can be demonstrated. If your facility does not currently have a technical specification surveillance requirement for your CRE, explain how and on what frequency you confirm your CRE integrity.

The DBNPS does not have a technical specification surveillance requirement for CRE integrity. Although technical specifications do not require a pressurization test, procedures are in place to periodically test the leak tightness of the control room boundary to verify that the control room can be pressurized to +1/8 inch water gauge using outside air makeup of 300 cubic feet per minute ±10%. This test is performed at least every refueling interval. The recent tracer gas tests demonstrate that the in-leakage rates are in line with the leakage rates assumed in the analyses. A Control Room Habitability program has been created that includes periodic assessments and in-leakage tests. This program is based on recommendations contained in Regulatory Guides 1.196 and 1.197. This program will assure that the CRH boundary integrity will be maintained.

In response to generic concerns raised regarding control room habitability, the industry is developing a proposal to change the Standard Technical Specifications (Technical Specification Task Force Traveler TSTF-448). In addition to new testing requirements, the TSTF proposes revised actions to perform when CRE integrity has been lost. FENOC will evaluate the incorporation of appropriate changes to DBNPS Technical Specifications following the resolution of NRC and industry issues and NRC approval of TSTF-448.

2. If you currently use compensatory measures to demonstrate control room habitability, describe the compensatory measures at your facility and the corrective actions needed to retire these compensatory measures.

There are no compensatory measures in effect at Davis-Besse Nuclear Power Station with regards to control room habitability. However there are open corrective actions and administrative controls in place to limit leakage area during maintenance activities.

3. If you believe that your facility is not required to meet either the GDC, the draft GDC, or the "Principal Design Criteria" regarding control room

habitability, in addition to responding to 1 and 2 above, provide documentation (e.g. Preliminary Safety Analysis Report, Final Safety Analysis Report sections, or correspondence) of the basis for this conclusion and identify your actual requirements.

The Davis-Besse Nuclear Power Station is required to meet the GDC regarding Control Room Habitability. Therefore, this item is not applicable to the DBNPS.

Docket Number 50-346
License Number NPF-3
Serial Number 3240
Attachment 2

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

COMMITMENT	DUE DATE
As described in Attachment 1 to this letter Calculations and Licensing Bases Analyses will be revised as necessary.	December 31, 2006
FENOC will evaluate the incorporation of appropriate changes to DBNPS Technical Specifications following the resolution of NRC and Industry Issues and NRC Approval of TSTF-448.	Within 90 days after NRC Approval of TSTF-448