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**DTE Energy**

GL 2003-01

May 25, 2005
NRC-05-0042

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

References: 1) Fermi 2
NRC Docket No. 50-341
NRC License No. NPF-43

2) Detroit Edison's Letter to NRC, "Detroit Edison's 180-Day Response to Generic Letter 2003-01, Control Room Habitability," NRC-03-0090, dated December 8, 2003

Subject: Supplemental Response to Generic Letter 2003-01, "Control Room Habitability"

The purpose of this letter is to provide supplemental information in response to NRC Generic Letter (GL) 2003-01 for the Fermi 2 Nuclear Power Plant.

On June 12, 2003, the NRC issued GL 2003-01, "Control Room Habitability," requesting licensees to provide information to confirm that the control rooms at their facilities meet the applicable habitability regulatory requirements and that the control room habitability systems are designed, constructed, configured, operated, and maintained in accordance with the facility's design and licensing bases.

In Reference 2, Detroit Edison provided the requested information with the exception of information related to confirming that the most limiting unfiltered inleakage into the Control Room Envelope (CRE) is no more than the value assumed in the design basis radiological analyses. This exception was based on the need to conduct a CRE baseline integrated inleakage test using the American Society for Testing and

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Materials (ASTM) standard E741-00 before the remaining information could be provided.

Enclosure 1 to this letter provides the remainder of the information requested in the GL, including the results of the baseline tracer gas testing of the CRE performed in March 2005.

Should you have any questions or require additional information, please contact Mr. Norman K. Peterson of my staff at (734) 586-4258.

Sincerely,

William J. O'Connor Jr.

Enclosure

cc: D. P. Beaulieu
E. R. Duncan
NRC Resident Office
Regional Administrator, Region III
Supervisor, Electric Operators,
Michigan Public Service Commission

**ENCLOSURE 1 TO**
**NRC-05-0042**

**FERMI 2 NRC DOCKET NO. 50-341**
**OPERATING LICENSE NO. NPF-43**

**SUPPLEMENTAL RESPONSE TO GENERIC LETTER 2003-01, "CONTROL ROOM HABITABILITY"**

# SUPPLEMENTAL RESPONSE TO GENERIC LETTER 2003-01, "CONTROL ROOM HABITABILITY"

Generic Letter (GL) 2003-01 requested addressees to submit information that demonstrates that the control room at each of their respective facilities complies with applicable regulatory requirements and with the current licensing and design bases. The GL also requested information on suitable design, maintenance and testing control measures in place for maintaining this compliance.

In Reference 2, Detroit Edison provided the requested information in GL 2003-01 with the exception of information related to Control Room Envelope (CRE) unfiltered inleakage since the baseline integrated inleakage test had not been performed at that time. In March 2005, baseline tracer gas inleakage testing of the Fermi 2 CRE was satisfactorily performed. The remainder of the requested information in GL 2003-01 and the results of the tracer gas testing are provided below. The information provided herein supplements the information provided in Reference 2 and completes the response to the GL for Fermi 2.

## Information Requested in the GL

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 Control Room Habitability Systems (CRHSs) are designed, constructed, configured, operated, and maintained in accordance with the facility's design and licensing bases.*

## Response:

All requested information was previously provided in Reference 2 except for information related to compliance with GDC 19.

## Compliance with GDC 19: Control Room

GDC 19 states:

*A control room shall be provided from which actions can be taken to operate the nuclear power unit safely under normal conditions and to maintain it in a safe condition under accident conditions, including loss-of-coolant accidents. Adequate radiation protection shall be provided to permit access and occupancy of the control room under accident conditions without personnel receiving radiation exposures in excess of 5 rem whole body, or its equivalent to any part of the body, for the duration of the accident. Equipment at appropriate locations outside the control room shall be provided (1) with a design capability for prompt hot shutdown of the reactor, including necessary instrumentation and controls to maintain the unit in a safe condition during*

*hot shutdown, and (2) with a potential capability for subsequent cold shutdown of the reactor through the use of suitable procedures.*

*Applicants for and holders of construction permits and operating licenses under this part who apply on or after January 10, 1997, applicants for design certifications under part 52 of this chapter who apply on or after January 10, 1997, applicants for and holders of combined licenses under part 52 of this chapter who do not reference a standard design certification, or holders of operating licenses using an alternative source term under §50.67, shall meet the requirements of this criterion, except that with regard to control room access and occupancy, adequate radiation protection shall be provided to ensure that radiation exposures shall not exceed 0.05 Sv (5 rem) total effective dose equivalent (TEDE) as defined in §50.2 for the duration of the accident.*

The design of the Fermi 2 main control room allows continuous occupancy by operating personnel under all operating and accident conditions, including a Loss of Coolant Accident (LOCA). All switches, control stations and indicators necessary to safely operate and shut down the plant are located in the control center.

Shielding is provided to limit the exposure of control center personnel to a level below the regulatory radiation dose limits. The redundant control center heating, ventilation and air conditioning system provides temperature and humidity control, air filtration, and recirculation to ensure that the control center remains habitable at all times. Air recirculation of the control room envelope is initiated upon detection of high radiation levels in the normal outside air intake. Makeup outside air selected from the emergency intake with the lower radiation level is used to pressurize the envelope. Control room entrance and exit are controlled in emergency situations to limit control room personnel dose for the duration of the accident.

The current Fermi 2 licensing basis reflects a selective implementation of the Alternative Source Term (AST) methodology in accordance with 10 CFR 50.67 and Regulatory Guide (RG) 1.183 (Reference 3). The LOCA and Fuel Handling Accident (FHA) are analyzed using AST provisions and; therefore, are shown to result in a radiation dose to the control room occupants below 5 rem TEDE. All other radiological accidents are analyzed using the TID-14844 (Reference 4) source term and are shown to limit control room occupants dose below 5 rem whole body, or its equivalent to any part of the body, for the duration of the accident. Also, the latter dose limit criterion is applied to FHA analyses involving fuel that does not meet the burnup or power limitations in Footnote 11 of RG 1.183.

Because of the shielding and ventilation systems provided, evacuation of the main control room is a highly improbable event. However, if evacuation is required, hot and cold shutdown of the reactor can be accomplished from a remote shutdown station as discussed in Reference 2 under subtitle "Alternative Shutdown Capability."

Fermi 2 control room is in full compliance with GDC 19.

GL Requested Information

*Emphasis should be placed on confirming:*

*Item 1.(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, tests, and measurements for this confirmation.*

Response:

General descriptions of the Fermi 2 control room envelope, the Control Center Air Conditioning System (CCACS) and the Control Room Emergency Filtration (CREF) System were provided in Reference 2. The CREF system is designed to maintain a positive pressure in the control center while operating in the recirculation mode to prevent unfiltered inleakage from entering the envelope. However, the limiting design basis radiological analysis for the LOCA conservatively assumes that the unfiltered inleakage into the CRE is equal to 600 cubic feet per minute (cfm).

Chapter 15 of the Updated Final Safety Analysis Report (UFSAR) describes analyses of the most limiting transients and accidents that are postulated to occur during the licensed life of the plant. For each postulated transient or accident, a sequence of events is presented and a discussion of the normal and emergency safety systems assumed to operate to mitigate the consequences of the event is provided. The most limiting events are the ones associated with postulated fuel failure that results in the release of nuclear fission products to the environment. These events include LOCA, FHA, Control Rod Drop Accident (CRDA) and the Main Steam Line Break (MSLB).

Operation of the CREF system in the recirculation mode to mitigate the consequences of an accident is only credited in the LOCA analysis. The LOCA analysis is also the only accident that assumes a specific value for CRE unfiltered inleakage (600 cfm). For all other accident analyses, CREF is assumed to operate in the normal mode with fresh air taken in from outside the building to pressurize the CRE, bypassing the emergency makeup and recirculation filters.

The current design basis analysis of the LOCA is based on Regulatory Guide 1.183 (Reference 3) and was approved by the NRC in License Amendment No. 160 (Reference 5).

Tracer Gas Testing:

Baseline Tracer Gas testing of the Fermi 2 CRE was performed between March 7 and 10, 2005. Detroit Edison contracted NUCON International, Inc. to perform the test in accordance with the Constant Injection method of American Society for Testing and Materials (ASTM) Standard E741-00 (Reference 6). The tracer gas used in the test was Sulfur Hexafluoride ($SF_6$) with a

target concentration level of 50 parts per billion. Details of the test configuration, system lineup, data collection, analysis and results are provided below.

Testing was performed separately on Divisions 1 and 2 of the CREF system while operating in the recirculation mode. For each division test, only dampers associated with the same division were used to provide isolation. To simulate radiological accident conditions, both the Turbine Building and Reactor Building ventilation systems were shut down during the tests and a division of the Standby Gas Treatment System (SGTS) was started. These conditions resemble system lineup during an emergency and provide conservative CRE inleakage results since the Turbine Building is maintained at atmospheric instead of the normally negative pressure.

Initially, a high concentration "puff" of tracer gas was injected into the emergency makeup airflow to bring up gas concentration in the envelope to the desired target level. Injection gas was then changed to a lower concentration and maintained at a constant injection rate until sufficient time had passed for the tracer gas to achieve homogeneity. Air samples were then taken from various locations throughout the envelope for analysis of gas concentration and verification of spatial uniformity.

Certain doors within the envelope were blocked open and air-circulating fans were placed in various locations to provide adequate circulation and to ensure complete mixing throughout the CRE. Once the gas had adequately dispersed and the criterion for equilibrium within the envelope was met, a series of timed samples were taken from the makeup air and from the return air from the CRE. Measured concentrations of tracer gas in these samples were used in conjunction with the measured makeup flow and the constant rate of injected gas to calculate the CRE unfiltered inleakage.

Tracer Gas testing determined CRE unfiltered inleakage to be 18 cfm (+/- 17 cfm) for Division 1 of the CREF System and 59 cfm (+/- 20 cfm) for Division 2. The uncertainties were calculated with a 95 percent confidence level. RG 1.197 (Reference 7) states that test uncertainty may be an issue when reporting inleakage test results for pressurized CREs with low leakage. It also states that for such cases the uncertainty may approach the nominal value of inleakage; therefore, the RG concludes that including the uncertainty for facilities that demonstrate a CRE inleakage less than 100 cfm is optional. Based on the RG position, uncertainties reported above are provided for reference.

The results of the measured CRE unfiltered inleakage indicate that a significant margin is available between the test values and the 600 cfm value assumed in the LOCA radiological analysis.

<u>GL Requested Information</u>

*Emphasis should be placed on confirming:*

*Item 1.(b): That the most limiting unfiltered inleakage into your CRE is incorporated into your hazardous chemical assessment. This inleakage may differ from the value assumed in your design basis radiological analyses. Also confirm that the reactor capability is maintained from either the control room or the alternate shutdown panel in the event of smoke.*

Response:

All requested information was previously provided in Reference 2. As discussed in Reference 2, there are no credible scenarios for toxic chemical release which require an automatic or manual operator action to isolate the control room to mitigate the consequences of the release. Therefore, although procedures include provisions for taking certain actions such as placing the CCACS in the chlorine mode and donning Self Contained Breathing Apparatus (SCBA) units, these measures are taken as extra precautions and are not part of the design basis for mitigating the consequences of a toxic gas release. There are no assumed limits on CRE inleakage in the toxic gas design basis analyses.

GL Requested Information

*Emphasis should be placed on confirming:*

*Item 1.(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 specification 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 integrity, explain how and at what frequency you confirm your CRE integrity and why this is adequate to demonstrate CRE integrity.*

Response:

References 2 and 8 provided information on Technical Specification (TS) Surveillance Requirements (SR) related to CRE integrity and discussed several license amendment proposals submitted by Detroit Edison to revise these requirements to better align them with the latest NRC

position regarding CRE testing and verification of unfiltered inleakage. The information provided herein updates the previously submitted response to this item of the GL.

On October 25, 2004, the NRC issued License Amendment No. 162 (Reference 9), approving a revision to the Fermi 2 TS to delete SR 3.7.3.6 which required the verification that unfiltered inleakage from CREF System duct work outside the CRE, that is at negative pressure during accident conditions, is within limits. The same amendment also added License Condition 2.C.(22) requiring the performance of an integrated tracer gas test of the CRE using methods described in ASTM E741-00 by March 31, 2005. The baseline integrated tracer gas test of the Fermi 2 CRE was successfully performed between March 7 and 10, 2005.

License Condition 2.C.(22) also requires the performance of periodic assessments and testing in accordance with the guidance provided in RG 1.197 (Reference 7). In accordance with this RG, a self assessment will be required after three years and a periodic test after 6 years.

Therefore, License Condition 2.C.(22) provides adequate requirements for using acceptable methodology to verify the integrity of the CRE and the assumed unfiltered inleakage in design basis analyses; however, as previously stated in Reference 10, Detroit Edison intends to request removal of License Condition 2.C.(22) upon resolution of generic industry issues associated with TS Task Force (TSTF) Change Traveler No. 448.

GL Requested Information

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.*

Response:

Full response was provided in Reference 2. No compensatory measures are currently in use to demonstrate control room habitability at Fermi 2.

GL Requested Information

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.*

Response:

Fermi 2 meets the intent of the GDCs associated with control room habitability. The information pertaining to compliance of Fermi 2 control room with GDCs 1, 3, 4 and 5 were provided in Reference 2. Compliance with GDC 19 is discussed above in this letter.

With the information provided in this letter, Detroit Edison's response to GL 2003-01 for the Fermi 2 nuclear power plant is complete.

This letter also fulfills the commitment made in Reference 10 for providing the results of the baseline CRE tracer gas test and the remaining information requested in GL 2003-01 by May 31, 2005.

References:

1. NRC Generic Letter Number 2003-01, "Control Room Habitability," dated June 12, 2003

2. Detroit Edison's Letter to NRC, "Detroit Edison's 180-Day Response to Generic Letter 2003-01, Control Room Habitability," NRC-03-0090, dated December 8, 2003

3. NRC Regulatory Guide 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," dated July 2000

4. U. S. Atomic Energy Commission (now NRC), "Calculation of Distance Factors for Power and Test Reactor Sites," TID-14844, dated 1962

5. NRC Letter to Detroit Edison, "Fermi 2 – Issuance of Amendment Re: Selective Implementation of Alternative Radiological Source Term Methodology (TAC No. MB7794)," License Amendment No. 160, dated September 28, 2004

6. American Society for Testing and Materials (ASTM), "Standard Test Method for Determining Air Change in a Single Zone by Means of a Tracer Gas Dilution," E 741-00, dated January 2001

7. NRC Regulatory Guide 1.197, "Demonstrating Control Room Envelope Integrity at Nuclear Power Reactors," dated May 2003

8. Detroit Edison's Letter to NRC, "Detroit Edison's 60-Day Response to Generic Letter 2003-01, Control Room Habitability," NRC-03-0060, dated August 11, 2003

9. NRC Letter to Detroit Edison, "Fermi 2 – Issuance of Amendment Re: Addition of a License Condition and Deletion of Control Room Emergency Filtration System Technical Specification Surveillance Requirement 3.7.3.6 (TAC No. MC3922)," License Amendment No. 162, dated October 25, 2004

10. Detroit Edison Letter to NRC, "Proposed License Amendment for the Addition of a License Condition and Deletion of Control Room Emergency Filtration System Technical Specification Surveillance Requirement 3.7.3.6," NRC-04-0043, dated July 30, 2004