Joseph H. Plona
Site Vice President

6400 N. Dixie Highway, Newport, MI 48166
Tel: 734.586.5910 Fax: 734.586.4172

DTE Energy

June 19, 2008
NRC-08-0047

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington D.C. 20555

Reference: Enrico Fermi Atomic Power Plant, Unit No.1
NRC Docket No. 50-16
NRC License Number DPR-9

Subject: **Fermi 1 Licensee Event Report 08-001**

Detroit Edison is submitting this Licensee Event Report (LER) as required by Fermi 1 Technical Specifications Section F.7 as a condition reportable in accordance with Section A.4. Section F.7 requires this report contain a description of the occurrence together with the steps taken to correct the situation. The 24 hour verbal notification was made to Mr. William Snell of NRC Region III at 1335 EDT on May 21, 2008.

Fermi 1 was an experimental sodium (Na) cooled, fast breeder reactor permanently shut down in 1972 and is currently in the last stage of SAFSTOR status, deferred decontamination. Its possession only license expires in 2025.

Fermi 1 Technical Specifications Section A.4.a, requires an LER if any uncontrolled or unplanned release of radioactive material occurs from the Fermi 1 facility. At approximately 1400 on May 20, 2008, while processing sodium in Primary Loop # 3 using inerted superheated steam, Fermi 1 experienced a Na fire at a small pipe breach. The fire was described as being similar to cutting with a plasma or oxy/acetylene torch where the sparks are extinguished before they hit the ground. The Fermi 1 Reactor Building (RB) filled with smoke, as expected for a Na fire. It was estimated that approximately 20 pounds of Na burned in this incident. No other combustible material was involved in the fire due to rigorous combustible controls. When the fire was observed, processing was terminated and the fire was out in 10 minutes.

IE22
FSHE

Na processing within the RB has been suspended until corrective actions are in place.

Portable air sampling for radioactivity was performed within the Fermi 1 Steam Generator Building (SGB), Fuel and Repair Building (FARB), and outdoors adjacent to the facility immediately following the event. Sampling data received on May 21, 2008 indicated that an unplanned release of radioactive material from the facility slightly above detection limits had occurred during the event on May 20, 2008. A 24 hour notification to the NRC was performed.

Data from the sample results, effluent system discharge samples, and monitoring in the FARB were used to estimate a total release from the pathways in the FARB, SGB, and trestleway. There was no detectable release through the RB effluent filtration system. The total release was conservatively estimated at 92 μCi Cs-137 and 500 μCi Sr-90 for a total dose to any individual at the site boundary of 8.1 E-4 mrem CEDE. Sr-90 was calculated using a ratio to Cs-137 of 5.48 which was obtained from previous 10 CFR part 61 analysis of reactor internal swipe samples. This is considered conservative since the ratio has varied from different locations including a Sr-90 to Cs-137 ratio of 0.023 elsewhere. Other conservatisms were used in the calculation including concentration at the SGB effluent point and duration of the release through the SGB exhaust fans. Samples have been sent to an offsite laboratory to determine the actual Sr-90 to Cs-137 ratio to confirm that the previous estimates are bounding.

The estimated release duration was 2 hours based on the air monitor indication in the FARB. For comparison purposes, if the release had continued for a full year, the dose to any individual at or beyond the site boundary would still have been less than that allowed by Fermi 1 Technical Specification Section C.2 limit for dose due to gaseous effluents.

A Root Cause Evaluation Team was assembled and determined the cause of the pipe breach to be from high temperatures. The failed pipe was a 2" line installed to allow draining the 14" and 16" pipe sections of Primary Loop # 3, which contained a large quantity of Na, into a larger 30" pipe to be processed. The high temperature in the drain line occurred during subsequent steam processing (reacting) of the remaining Na in the 16" pipe. During this Na and steam reaction a caustic byproduct, Sodium Hydroxide (NaOH), is created. NaOH, which is heavier than Na, sank to the bottom of the pipe allowing some of the remaining Na to overflow into the drain pipe. Following the initial draining of the 14" and 16" pipe sections the heaters on the drain line were turned off, which allowed the drain pipe temperature to drop below the freezing point of Na (208° F). Na froze in the drain causing a blockage. The blockage allowed the Na level to increase as it overflowed from the 16" pipe, resulting in a larger than anticipated Na / Steam reaction in the drain pipe. This reaction is exothermic and high temperatures resulted in localized melting of the schedule 40 carbon steel drain pipe. The melting allowed Na, caustic, and hydrogen to be expelled from the drain and ignite when exposed to air. Na overflow into the 2" drain line while processing the

16" pipe had not been anticipated, therefore, the temperature control, monitoring, and procedural controls were not adequate.

The Fermi 1 RB, with doors and hatches opened, original ventilation system removed, and addition of penetrations through the RB, is not maintained as a sealed containment. This allowed the radioactivity within the smoke to migrate to other buildings and outside of the facility. The RB is ventilated by a temporary filtered effluent system.

Fermi 1 is using the Corrective Action Program to implement the following corrective actions:

- Revise the processing procedure and the work request to require continued heating of the drain lines while processing.
- Revise the processing procedure to require RB to FARB trestleway refueling / equipment hatch opening be sealed during steam processing.
- Replace drain piping to minimize flow restrictions, by limiting use of tees, elbows, and valves.
- Increase quantity of thermocouples on drain piping to allow additional temperature monitoring during processing.
- Seal the FARB trestleway roof vent to eliminate this release pathway.
- Close or seal select release pathways within the RB to allow the installed temporary HEPA ventilation units to minimize potential out leakage from the RB during Na processing evolutions.

If there are any questions, please contact Lynne Goodman, Manager, Fermi 1, at (734) 586-1205.

JP/DB/ljd

Sincerely,

Joseph H. Plona

cc: T. Smith
P. Lee (NRC Region III)
T. Strong (State of Michigan)
Regional Administrator, Region III
NRC Resident Office