J. Todd Conner
Site Vice President

DTE Energy Company
6400 N. Dixie Highway, Newport, MI 48166
Tel: 734.586.4849 Fax: 734.586.5295
Email: connerj@dteenergy.com

DTE Energy

10 CFR 50.90

September 27, 2013
NRC-13-0053

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) DTE Electric Company Letter to NRC, "Proposed License Amendment to Revise the Fermi 2 Licensing Bases for Protection from Tornado-Generated Missiles," NRC-13-0002, dated January 11, 2013 (ADAMS Accession No. ML13011A377)

Subject: Response to Request for Additional Information (RAI) Regarding the License Amendment Request to Revise the Fermi 2 Licensing Bases for Protection from Tornado-Generated Missiles

In Reference 2, DTE Electric Company (DTE) requested NRC approval of a proposed license amendment request to revise the Fermi 2 licensing bases for protection from tornado-generated missiles. In an email dated August 7, 2013 (ADAMS Accession No. ML13219A643) from Ms. Jeanne Dion of the NRC to Mr. Alan Hassoun of DTE, the NRC staff requested additional information to complete the review of the license amendment request.

The Enclosure to this letter provides DTE's response to the RAI.

No new commitments are being made in this submittal.

Should you have any questions or require additional information, please contact Mr. Zackary Rad of my staff at (734) 586-5076.

Sincerely,

Enclosure: Response to Request for Additional Information (RAI) Regarding the License Amendment Request to Revise the Fermi 2 Licensing Bases for Protection from Tornado-Generated Missiles

cc: NRC Project Manager
NRC Resident Office
Reactor Projects Chief, Branch 5, Region III
Regional Administrator, Region III
Supervisor, Electric Operators,
Michigan Public Service Commission

I, J. Todd Conner, do hereby affirm that the foregoing statements are based on facts and circumstances which are true and accurate to the best of my knowledge and belief.

J. Todd Conner
Site Vice President, Nuclear Generation

On this 27th day of September, 2013 before me personally appeared J. Todd Conner, being first duly sworn and says that he executed the foregoing as his free act and deed.

Angela R Crone
Notary Public
County of Lenawee
My Commission expires 4/4/20
Angela R. Crone

Enclosure to
NRC-13-0053

Fermi 2 NRC Docket No. 50-341
Operating License No. NPF-43

Response to Request for Additional Information (RAI) Regarding the License Amendment Request to Revise the Fermi 2 Licensing Bases for Protection from Tornado-Generated Missiles

Response to Request for Additional Information (RAI) Regarding the License Amendment Request to Revise the Fermi 2 Licensing Bases for <u>Protection from Tornado-Generated Missiles</u>

RAI 1

Section 2.0, 2nd paragraph states: "…methodology, the probability of multiple missile strikes causing unacceptable damage to unprotected, safety-related plant features…"

> *Describe what Fermi has done to address the potential damage of safety-related equipment caused by the failure of non-safety related equipment due to a tornado missile strike. An example would be a tornado missile that damages a non-safety related tank and causes water leakage which subsequently damages safety-related cables.*

Response

Prior to performing the tornado missile hazard analysis, the site conducted a tornado missile hazard assessment. The purpose of the assessment was to identify and evaluate any vulnerable situations that may affect the protection of safety-related equipment from potential hazards resulting from damage caused by a tornado strike. This assessment identified several instances of potential weaknesses of non-safety related structures having the potential to impact safety-related equipment. The potential weaknesses were addressed by installing engineered protection to eliminate the threat or protect the impacted equipment. Where the threats were eliminated, the features were generally not represented in the TORMIS modeling. The following are examples of actions taken to protect several features:

a. Large lightning rods on the roof of the Residual Heat Removal (RHR) complex were determined to be potential missile threats to the RHR cooling towers. Accordingly, a modification was made to restrain the rods to preclude them from creating missile threats.
b. Safety-related piping located at the interior interface between the non-safety-related turbine building and safety-related auxiliary building was determined to be at risk due to tornado missiles originating from the turbine building. In this instance a missile shield was erected to protect against the potential threat.
c. The steel access doors on the east set of north and south mechanical draft cooling tower fan motor enclosures were identified as having insufficient capability to protect the motors from all missiles. Additional reinforcement was designed and added to augment the missile protection capability of these doors.
d. One 18-inch diameter pipe penetration and a 10 ft x 10 ft removable access panel in the south wall of the reactor and auxiliary buildings were reinforced against damage from design basis tornado missiles.
e. Penetrations in the RHR complex west wall associated with the non-safety-related EDG fuel supply equipment were included as TORMIS targets and reflected in the submitted plant risk value.

The Fermi 2 Condensate Storage Tank (CST) and Condensate Return Tank (CRT) are located away from the plant near ground elevation. The Emergency Diesel Generators (EDGs) at Fermi 2 are elevated above ground such that they would not be impacted by the site maximum probable flood level. The only safety-related equipment located near the non-safety related CST is the level instrumentation that is used to transfer the High Pressure Coolant Injection (HPCI) system and Reactor Core Isolation Cooling (RCIC) system suction lines from their normal alignment to the CST to the suppression pool suction paths. The failure modes of these instrumentation circuits have been evaluated such that their inundation with water, de-energization due to a missile strike, or the occurrence of a tank low level will result in a suction swap to the qualified suppression pool suction source. This was also discussed in Item 2e on page 14 of Enclosure 1 of Reference 2.

RAI 2

Section 3.0, page 6, states "Missile sources (building…) were catalogued and modeled to a distance of approximately 2,500 feet."

What is the basis of 2,500 feet?

Response

The 2,500 feet maximum missile source distance is derived from EPRI NP-769, Section 2.3.3, Off-Site Missile Assessment, on pages 2-22 and 2-23. The section of the original research that produced TORMIS describes a trajectory simulation study which determined the appropriate distance to survey missile sources to analyze a plant. The conclusion was that 2,000 feet would cover the statistically significant missile sources in terms of missile impact risk. The Fermi 2 analysis used 2,500 feet. This distance is computed from the perimeter of a safety polygon that is drawn around the safety-related targets at the plant. Therefore, the distances from various safety targets to the edge of the missile origin zones are a minimum of 2,500 feet. Missiles were not considered to originate in Lake Erie since there are no structures in the lake to form any missiles. Figure 1 below shows the missile origin zones that were considered in the TORMIS analysis.

Figure 1. Missile Source Zones for Fermi 2 TORMIS Analysis

RAI 3

Section 3.0, page 13 states:

> …the EDG fuel oil tank vents and the EDG exhaust stacks, which are located on the roof of the RHR complex. Both of these rooftop features are provided with tornado missile shield protection specifically designed to prevent vertically traveling missiles from entering the RHR complex and damaging the EDG fuel oil tanks and diesel engines.

Are the vent stacks protected from horizontally traveling missiles? A missile traveling horizontally could crimp the vent to significantly reduce air flow and prevent the EDG fuel oil tanks and diesel engines from functioning properly.

Response

Substantial tornado missile protection of the EDG fuel oil tank vents and the EDG exhaust stacks exists by virtue of the immediate adjacent reinforced concrete enclosures and the elevated location on the roof of the RHR complex (Figures 2 through 4). The safety-related EDG exhaust silencers are enclosed on the top and three sides (North, South, and West) by thick reinforced concrete enclosures which protect the exhaust penetrations from tornado missile strike. The attached non-safety related exhaust extensions (stacks) that extend beyond the silencers have been analyzed to ensure that they can withstand tornado winds and to verify compliance to seismic II/I criteria such that they will not crumple and crimp to block diesel exhaust flow. As provided in the list of excluded targets in Enclosure 4 of Reference 2, for targets 41 through 44 and 75 through 78, the configuration of the EDG exhaust stacks, fuel oil tank vent stacks and associated missile protection barriers are part of the original plant licensing bases.

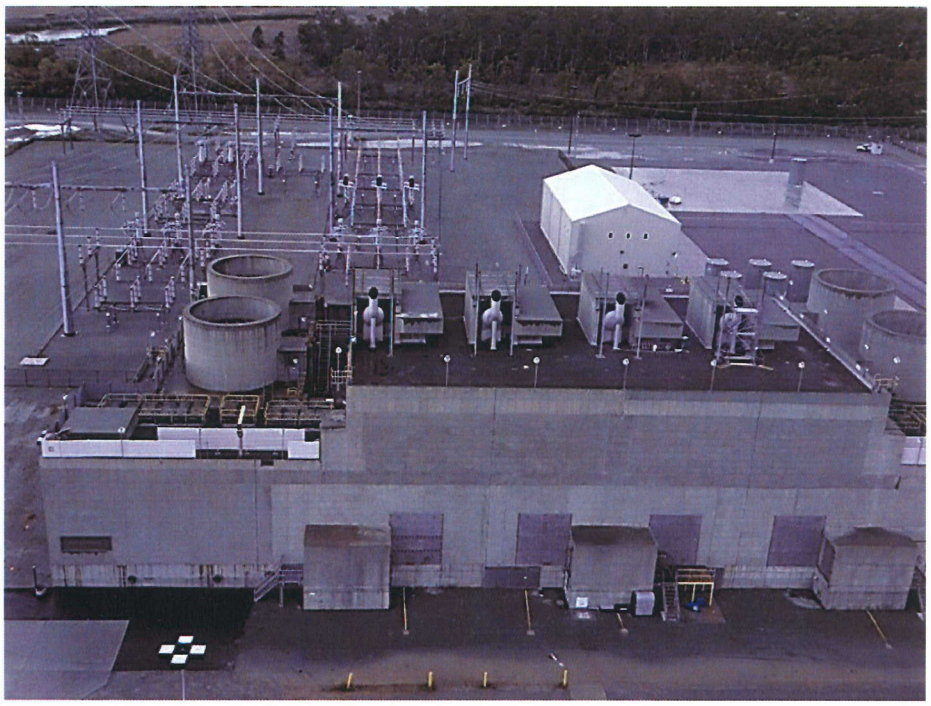

Figure 2. RHR Complex Roof

The design and configuration of the fuel oil tank vents can tolerate significant deformation and crimping without impacting the required venting function. With respect to the EDG fuel oil tank vents, the design fuel oil consumption rate corresponds to approximately 0.5 cubic foot/minute. Initial flow from the main tank to the day tank is approximately twice this rate until the day tank is filled and the excess flows back to the main tank. The day tank and main tank vents are 4 inch and 8 inch diameter respectively, having respective cross sectional areas of 12.5 and 50 square inches. If the day tank vent were to be crushed to one thousandth of its original area, the additional day tank pressurization during the initial fill period is estimated to be less than 0.15 psi. If the main tank vent were to be crushed to one thousandth of its original area, the drop in tank pressure is estimated to be approximately 0.04 psi. These conditions would have a negligible impact on the operation of the fuel oil transfer capability which is accomplished with positive displacement pumps that are not impacted by fuel oil level or pressure in the tank. Therefore, it is not considered credible for a horizontal missile strike to flatten and effectively seal these openings to prevent the fuel oil tanks from functioning properly.

Figure 3. Typical EDG Fuel Oil Tank Vent Arrangement

The exhaust stacks would have to sustain significant damage before the function of an EDG would be impacted. Specifically, the vendor specified maximum EDG exhaust backpressure is 12 inches water column (WC). Based on the typical exhaust configuration the expected backpressure under rated load is approximately 7.8 inches WC. Treated as an orifice, the 30 inch diameter exhaust stack would have to be crimped to 73% of its normal cross-sectional area to induce an additional 4.2 inches of back-pressure. Thus, due to the protection from several directions by the concrete barriers, the robust design for wind pressure and seismic loads, and the fact that large, high-energy missiles capable of producing such damage at that location and elevation is highly unlikely, this scenario was determined to not be credible.

Figure 4. EDG Exhaust Stacks

RAI 4

Clarify if the methodology used in this submittal for calculating the mean aggregate tornado missile damage probability uses any logic (e.g., AND gates) that requires damaging multiple targets simultaneously for establishing a damaged state. If multiple targets need to be simultaneously struck, please summarize the guidelines used to identify such groups and explain how they are modeled in TORMIS.

Response

No "AND" Boolean operations, which require damage to multiple targets in the same tornado event, were used for the TORMIS analysis of the targets that were included in the analysis. The reported aggregated value of 6.82E-07 per year is a summation over all targets and does not consider any redundancy or AND operations; hence, multiple targets did not need to be simultaneously struck in the TORMIS analysis.