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DTE Energy

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NRC-15-0048

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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 the NRC, "License Amendment Request to Revise Technical Specifications by Relocating Surveillance Frequencies to Licensee Control in Accordance with TSTF-425, Revision 3," NRC-14-0065, dated September 16, 2014 (ML14259A564)

3) NRC Email to DTE Electric Company, "FERMI 2 - Request for Additional Information regarding the License Amendment Request to Adopt TSTF-425, "Relocate Surveillance Frequencies to Licensee Control – RITSTF Initiative 5b" (MF4859), dated March 20, 2015 (ML15082A124)

Subject: Response to Request for Additional Information (RAI) Regarding the License Amendment Request to Revise Technical Specifications by Relocating Surveillance Frequencies to Licensee Control in Accordance with TSTF-425, Revision 3

In Reference 2, DTE Electric Company (DTE) submitted a license amendment request for Fermi 2 to revise Technical Specification Surveillance Requirements in accordance with TSTF-425, Revision 3. In Reference 3, the NRC staff requested additional information to complete the review of Reference 2. The enclosure of this letter provides DTE's response to the NRC staff request.

This letter contains no new regulatory commitments.

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

I declare under penalty of perjury that the foregoing is true and correct.

Executed on April 17, 2015

Vito A. Kaminskas
Site Vice President

Enclosure: Response to Request for Additional Information (RAI) Regarding the License Amendment Request to Revise Technical Specifications by Relocating Surveillance Frequencies to Licensee Control in Accordance with TSTF-425, Revision 3

cc: NRC Project Manager
NRC Resident Office
Reactor Projects Chief, Branch 5, Region III
Regional Administrator, Region III
Michigan Public Service Commission
Regulated Energy Division (kindschl@michigan.gov)

Enclosure to
NRC-15-0048

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 Technical Specifications by Relocating Surveillance Frequencies to Licensee Control in Accordance with TSTF-425, Revision 3

RAI-1

As specified in LAR dated September 16, 2014, the SFCP at Fermi 2 will follow the guidance provided in Nuclear Energy Institute (NEI) 04-10, Revision 1, "Risk-Informed Technical Specifications Initiative 5b, Risk-Informed Method for Control of Surveillance Frequencies." NEI 04-10 endorses the guidance provided in Regulatory Guide (RG) 1.200, Revision 1, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities." RG 1.200 endorses, with exceptions and clarifications ASME/ANS RA-Sa-2009, "Addenda to RA-S-2008 Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications," (Probabilistic Risk Assessment (PRA) Standard). Section 1-5, "PRA Configuration Control" of the PRA Standard states that the PRA configuration control program shall include a process that ensures the cumulative impact of pending plant changes or model improvements is considered when applying the PRA.

Based on Page 3 of Enclosure 2 in the LAR, the Fermi 2 PRA Maintenance and Configuration Control Program tracks issues that could potentially affect the PRA models (e.g., due to plant changes, errors or limitations identified in the model, industry operating experience). It is clear on Page 4 of Enclosure 2 of the LAR that plant changes not yet incorporated into the PRA model will be reviewed and assessed for their impact on the PRA results for each surveillance test interval (STI) change request. However, it is not clear whether other tracking issues that could potentially affect the PRA models will be assessed.

Please clarify whether other tracking issues that could potentially affect the PRA models (e.g., errors or limitations identified in the model, industry operating experience) will be reviewed and assessed for impact on the PRA results for each STI change request.

RAI-1 Response

The Fermi 2 Probabilistic Risk Assessment (PRA) models are reviewed to identify issues that could potentially affect the PRA model. Per Fermi 2 Probabilistic Safety Assessment (PSA) work instruction PSA-WI-008 "PSA Model Maintenance and Configuration Control," these reviews include plant changes, model errors, and industry operating experience. As part of the PRA evaluation for each Surveillance Test Interval (STI) change request all non-incorporated plant changes, identified model errors, and industry operating experience will be reviewed and assessed for impact on the PRA model.

RAI-2

As specified in the LAR dated September 16, 2014, the SFCP at Fermi 2 will follow the guidance provided in NEI 04-10, Revision 1. Part 4 in Section 3.0 of NEI 04-10 states, "The PRA used to support this change will, at a minimum, address CDF and LERF for power operation. External event risk and shutdown considerations will be addressed through quantitative or qualitative

means." Step 10 in Section 4.0 of NEI 04-10 provides guidance on the initial assessment of internal events, external events, and shutdown events.

The licensee discusses the assessment of internal events and external events in Enclosure 2 of the LAR, but does not address shutdown event considerations.

Please describe how shutdown events will be assessed as part of the Fermi 2 SFCP. If the licensee has developed shutdown PRA models that they are proposing to use, then describe these PRA models and submit documentation that identifies technical characteristics of these models consistent with RG 1.200, Revision 2, Section 1.2, "Technical Elements of a PRA and Associated Characteristics and Attributes" and Section 1.3, "Level of Detail of a PRA."

RAI-2 Response

Fermi 2 does not have a shutdown PRA model. Instead, Fermi 2 has a qualitative shutdown safety program and model developed to support implementation of NUMARC 91-06. Per NEI 04-10, Revision 1, this shutdown safety model will be used to perform a qualitative evaluation of the STI change. Application specific shutdown analysis may also be used.

RAI-3

As specified in the LAR dated September 16, 2014, the SFCP at Fermi 2 will follow the guidance provided in NEI 04-10, Revision 1. NEI 04-10 endorses the guidance provided in RG 1.200, Revision 1. RG 1.200 describes a peer review process utilizing ASME/ANS RA-Sa-2009 as one acceptable approach for determining the technical adequacy of the PRA once acceptable consensus approaches or models have been established for evaluations that could influence the regulatory decision. The primary results of a peer review are the Findings and Observations (F&Os) recorded by the peer review and the subsequent resolution of these F&Os.

A full-scope peer review of the internal events, at-power PRA (i.e., PRA version FermiV8) was performed in August 2012, and the gaps to meet Capability Category II of the PRA Standard are listed in Table 2, "Resolution of Fermi 2 Internal Events Peer Review F&Os Associated with not Meeting Capability Category II" of the LAR. Three of those gaps are associated with human reliability analysis (HRA) dependency analysis. Later in 2013, the HRA dependency analysis was upgraded using a different methodology (i.e., PRA version FermiV10) and a focused-scope peer review of the upgraded HRA dependency analysis was performed in February 2014.

Given the upgraded HRA dependency analysis in the FermiV10 PRA, please clarify whether the resolutions to the following F&Os/supporting requirements in Table 2 of the LAR are applicable to the FermiV10 PRA: 1-22/QU-C2, 2-16/HR-G7, and 3-28/HR-G7. Also, were these supporting requirements peer reviewed during the focused-scope peer review of the HRA dependency analysis in February 2014.

RAI-3 Response

The resolutions to Findings and Observations (F&Os) 1-22 (affecting supporting requirement QU-C2), 2-16 (affecting supporting requirement HR-G7), and 3-28 (affecting supporting requirement HR-G7) are not applicable to the FermiV10 PRA model. Following the August 2012 Internal Events Peer Review of the draft FermiV9 model, a project was initiated to re-perform the HRA dependency analysis using a new methodology. Based on this new methodology, F&Os 1-22, 2-16, and 3-28 were no longer applicable. This new methodology was considered a model upgrade for the HRA dependency analysis so a new focused scope peer review of the HRA dependency analysis was performed in February 2014. This focused scope peer review included review of supporting requirements QU-C2 and HR-G7 and found both to be met (Cat 1-3). This HRA dependency analysis is incorporated in a draft FermiV10 model, which has not yet been made the model of record due to current software limitations.

RAI-4

As specified in the LAR dated September 16, 2014, the SFCP at Fermi 2 will follow the guidance provided in NEI 04-10, Revision 1. NEI 04-10 endorses the guidance provided in RG 1.200, Revision 1. RG 1.200 describes a peer review process utilizing ASME/ANS RA-Sa-2009 as one acceptable approach for determining the technical adequacy of the PRA once acceptable consensus approaches or models have been established for evaluations that could influence the regulatory decision. The primary results of a peer review are the F&Os recorded by the peer review and the subsequent resolution of these F&Os.

In Table 2 of the LAR, F&O 4-16 stated the following regarding the Quantification Notebook:

> *However, this comparison fails to explain why the CDF at Fermi 2 is less than or equal to half the CDF of all of the other plants. In addition, there is no breakdown of how the various initiators compare to the other plants such as turbine trip, loss of condenser, etc. that could be used to explain where the major reductions in CDF at Fermi 2 come from and why they are appropriate.*

In the resolution to this F&O, the licensee stated that "[t]he Quantification Notebook was revised to reference the comparison of the results from a similar plant included in the Uncertainty Analysis Notebook and to explicitly discuss the significant differences." However, a discussion of these results is not provided in the resolution.

Please summarize the comparison of results from the similar plant and the discussion of the significant differences.

RAI-4 Response

The Fermi 2 results are compared with a typical Boiling Water Reactor (BWR) to determine if there are significant differences that should be highlighted for investigation or to alert decision-

makers. The identified differences are all well within the uncertainties for the initiating events and resulting accident sequences or represent insignificant contributors to the results.

Accident Sequences

Fermi 2 and a typical BWR/4 plant are compared in Table RAI-04-01 because they have similar NSSS system configurations. The observations based on this core damage frequency (CDF) comparison include the following:

- The total CDF is comparable,
- The principal contributors to the CDF are approximately the same, and
- No significant differences are identified that raise questions regarding the reasonableness of the Fermi 2 results.

The frequency of loss of high pressure injection makeup leading to core damage (Class IA) is lower for Fermi 2 because it has two Standby Feedwater pumps located in the Turbine Building. The Standby Feedwater system is comprised of two motor driven pumps that can provide both high and low pressure injection. These pumps (and associated valves) receive power from sources independent of the emergency safety system. These pumps provide redundant capability for reactor pressure vessel (RPV) injection in response to most transient initiators.

The frequency of Class II (loss of decay heat removal leading to core damage) is comparable between the two plants. There are some differences in the physical configuration of the torus cooling that favor Fermi 2. A principal feature that enhances the decay heat removal (DHR) capability at Fermi 2 is the separate diverse residual heat removal (RHR) complex reservoir (independent from the main condenser heat sink); however, other requirements on the reservoir, e.g., the need for mechanical draft cooling towers, also limit the benefit.

The frequency of Anticipated Transient Without Scram (ATWS) sequences leading to core damage (Class IV) is comparable for the two plants.

One additional area where the design difference comes into play in reducing the CDF in comparison with the "typical" plant is the frequency of internal floods leading to core damage. Compared to the typical plant, Fermi 2 has no large water systems in the reactor/auxiliary building. As only finite sources are in these buildings, the frequency of floods that result in core damage are greatly reduced. The result is the following:

Plant	Internal Flood CDF (/yr)
Fermi 2	3.1E-7
Typical BWR	8.5E-7

This is a significant difference in the calculated risk profile.

Initiating Event Frequencies

The comparisons with the typical plant show reasonable agreement. Some of the larger differences are:

Main Steam Isolation Valve (MSIV) closure: The comparison plant had plant specific events that increased the assessed frequency of the event relative to the generic data and to Fermi 2.

Loss of off-site power (LOSP): The Fermi 2 plant is in a different grid region than the comparison plant. This caused a large increase in the assessed frequency of the event for Fermi 2 relative to the comparison plant.

Break Outside Containment (BOC) events: The latest available data on common cause failures of isolation valves used for Fermi 2 leads to a reduction in the assessed frequency of an unisolated BOC relative to the assumptions used in the comparison plant.

Fermi 2 manual shutdown frequency is based on operating experience and reflects the operating record of Fermi 2 over the last 5 years.

Loss of Turbine Building Closed Cooling Water (TBCCW) and Reactor Building Closed Cooling Water (RBCCW) initiating event fault tree models appear more conservative than those for the comparison plant.

No other significant differences in the initiating event frequencies are identified that are not explained by plant or modeling differences.

The transient initiating event frequencies are derived based on a Bayesian update of generic initiating event frequencies. As such, the Fermi 2 initiating event frequency does not vary substantially from that used for most BWRs.

The loss of coolant accident (LOCA) frequencies have been normalized to the generic LOCA frequencies. Therefore, no significant difference in results is derived from these initiating event frequencies.

The station black-out (SBO) frequencies are similar for both plants despite significant configuration differences. These differences tend to offset each other. Consider the following competing effects:

- The typical plant grid is found to have a significantly lower failure rate than the Fermi 2 grid based solely on the NUREG/CR-6890 data. This older data reflected past performance of these grids and their failure rates.

- The typical BWR/4 SBO contribution is low because the DC battery life is quite long (> 8 hrs) compared with Fermi 2 (4 hrs) giving a much greater chance for AC power recovery at the typical plant.
- Fermi 2 has significantly more on-site AC power sources compared with the typical BWR/4 (more Emergency Diesel Generators and on-site Combustion Turbine Generators). This results in greater capability to prevent a full SBO or mitigate other LOSP events.

Additional insights to be aware of with respect to LOSP/SBO events are as follows:

- The grid reliability for Fermi 2 has been quantified using the NUREG/CR-6890 data which included the 2003 Northeast Blackout.
- The reliability councils have changed since that time and there have been significant upgrades by the grid operator which serves Fermi 2. Therefore, the values used in the Fermi 2 model may be conservative.

Table RAI-04-01: COMPARISON OF FERMI 2 PRA AND TYPICAL BWR/4 PRA LEVEL 1 CDF BY ACCIDENT CLASS

Class	Level 1 Class Description	CDF (/yr)		% of CDF	
		Fermi 2 Version 9	Typical BWR/4	Fermi 2 Version 9	Typical BWR/4
CLS-IA	Loss of Makeup at High RPV Pressure (Transient Initiators)	4.23E-07	3.35E-06	32%	53%
CLS-IBE	Early Station Blackout (less than 4 hours)	2.60E-09	9.34E-08	5%	1%
CLS-IBL	Late Station Blackout (greater than 4 hours)	8.17E-08	1.01E-07	5%	2%
CLS-IC	Loss of Makeup (ATWS)	9.57E-08	1.89E-08	8%	<1%
CLS-ID	Loss of Makeup at Low RPV Pressure (Transient Initiators)	1.44E-07	8.89E-07	9%	14%
CLS-II	Loss of Decay Heat Removal (IIA, IIL, IIV)	1.08E-07	7.35E-07	9%	12%
		1.59E-09	2.52E-09		
		1.55E-08	3.93E-09		
	Class IIT	2.46E-09	NA		
CLS-IIIB	Loss of Makeup at High RPV Pressure (LOCA Initiators)	7.79E-08	1.90E-07	6%	3%
CLS-IIIC	Loss of Makeup at Low RPV Pressure (LOCA Initiators)	6.64E-08	5.10E-07	5%	8%
CLS-IIID	Loss of Vapor Suppression	2.09E-08	1.16E-07	2%	2%
CLS-IV	Loss of Adequate Reactivity Control (ATWS)	2.44E-07	2.21E-07	19%	4%
CLS-V	Containment Bypass	5.93E-08	1.26E-07	5%	2%
	Total CDF	1.50E-06	6.32E-06	100%	100%

RAI-5

As specified in the LAR dated September 16, 2014, the SFCP at Fermi 2 will follow the guidance provided in NEI 04-10, Revision 1. NEI 04-10 endorses the guidance provided in RG 1.200, Revision 1. RG 1.200 endorses, with exceptions and clarifications, PRA standard ASME/ANS RA-Sa-2009. Section 1-5.4, "PRA Maintenance and Upgrades" of the PRA Standard states:

> *Changes in PRA inputs or discovery of new information identified pursuant to 1-5.3 shall be evaluated to determine whether such information warrants PRA maintenance or PRA upgrade. (See Section 1-2 for the distinction between PRA maintenance and PRA upgrade.) [Appendix 1-A of the PRA Standard provides additional information and examples on PRA maintenance and PRA upgrade.]*
>
> *Upgrades of a PRA shall receive a peer review in accordance with the requirements specified in the Peer Review Section of each respective Part of this Standard, but limited to aspects of the PRA that have been upgraded.*

The below summarizes the staff's understanding of the development of the internal events, at-power Fermi 2 PRA. The summary was based on Page 4 and Table 1, "History of the Major Fermi 2 PRA Model Updates" of Enclosure 2 in the LAR.

- *August 2012: Performed a full-scope peer review of the FermiV8 PRA (i.e., internal events, at-power Fermi 2 PRA, Version FermiV8).*
- *April 2013: Completed the FermiV9 PRA. This included: addressing the gaps identified from the August 2012 peer review, and "upgraded" the initiating events, success criteria, data, system notebooks, HRA, internal flooding, MAAP 4.0.7 Analysis, and Level 2/LERF analysis.*
- *Later in 2013: Completed the FermiV10 PRA, which upgraded the HRA dependency analysis to a different methodology.*
- *February 2014: Performed a focused-scope peer review of the HRA dependency analysis in the FermiV10 PRA, which was determined to meet Capability Category II.*

Based on the discussion above and with the exception of the HRA dependency analysis, it appears that the FermiV9 PRA (and subsequently the FermiV10 PRA) includes "upgrades" that were not peer reviewed (i.e., Table 1 of the LAR listed the following upgrades for the FermiV9 PRA: initiating events, success criteria, data, system notebooks, HRA, internal flooding, MAAP 4.0.7 Analysis, and Level 2/LERF analysis). Therefore, it is unclear whether the latest Fermi 2 PRA (i.e., FermiV10) fully meets Capability Category II.

Please provide the following additional information:

1. *Describe the changes made between the FermiV8 and FermiV9 PRAs. This description should be of sufficient detail to assess whether these changes are PRA maintenance or PRA upgrades as defined in Section 1-5.4 of the PRA Standard. Since the following may indicate a PRA upgrade, include in your discussion: any new methodologies, changes in scope that impacts the significant accident sequences or the significant accident progression sequences, changes in capability that impacts the significant accident sequences or the significant accident progression sequences.*

2. *Indicate, and provide justification, whether the changes described in RAI 05, number 1 above, are PRA maintenance or PRA upgrades as defined in Section 1-5.4 of the PRA Standard.*

3. *Indicate whether a peer review has been performed for those PRA upgrades identified in RAI 05, number 2 above. As applicable, provide a list of the F&Os from these peer reviews that do not meet Capability Category II, and explain how the F&Os were dispositioned for this application.*

4. *Discuss whether the PRA upgrades identified in RAI 05, number 2 above meet Capability Category II.*

RAI-5 Response

In order to better understand the responses to RAI-5, the following timeline is provided to clarify the Fermi PRA model history:

February 2010: PRA model version FermiV8 was released in February 2010. This version was a PRA maintenance release and had no peer review performed against the ASME/ANS standard.

February 2010 – August 2012: A project was started to upgrade the full power internal events model to meet the Regulatory Guide 1.200, Revision 1, requirements. This project was a PRA upgrade as defined in Section 1-5.4 of the PRA standard for all model aspects including initiating events, success criteria, component data, system modeling, HRA, internal flooding, and Level 2/LERF. The resulting model was identified as the draft FermiV9 model.

August 2012: A peer review was performed in August 2012 on the draft FermiV9 model. This peer review was a complete review of all supporting requirements of the ASME/ANS standard to review all upgrades. All F&Os that did not meet Capability Category II from this peer review of the draft FermiV9 model were provided in Table 2 of Reference 2.

April 2013: PRA model version FermiV9 was released in April 2013. This release provided resolution to the F&Os identified by the peer review team in August 2012 on the draft FermiV9 model. No PRA upgrades were instituted into the FermiV9 model following the August 2012

peer review. All changes made to the model to resolve the F&Os identified in Table 2 of Reference 2 were defined as PRA maintenance because there were no new methodologies or significant changes in scope or capability that affected the significant accident sequences. Therefore, no further peer reviews were required on the FermiV9 model.

February 2014: Following release of FermiV9 in April 2013, the HRA dependency analysis was re-performed to support modeling of the Fermi 2 fire PRA and seismic PRA and incorporated into a draft FermiV10 model. This HRA dependency analysis was considered an upgrade per the PRA standard because a new methodology was instituted. In February 2014, a focused scope peer review of the draft FermiV10 model HRA dependency analysis was performed. This peer review concluded that all reviewed supporting requirements met Capability Category II. This HRA dependency analysis is incorporated in a draft FermiV10 model, which has not yet been made the model of record due to current quantification software limitations which are being resolved by EPRI.

Based on this timeline, the following responses are provided:

1. There were many changes made between FermiV8 and the draft FermiV9 model. These changes included new methodologies, and significant changes in scope and capability that impacted the significant accident sequences. Changes included re-evaluation of initiating events, success criteria, component data, system modeling, HRA, internal flooding, and Level 2/LERF to current industry standards.

2. DTE considered all changes incorporated into the draft FermiV9 model as PRA upgrades as defined in Section 1-5.4 of the PRA standard as there were significant changes that impacted the significant accident sequences and accident progression sequences.

3. A peer review was performed in August 2012 on the draft FermiV9 model. This peer review was a complete review of all supporting requirements of the ASME/ANS standard to review all upgrades. All F&Os that did not meet Capability Category II from this peer review of the draft model and their resolution were provided in Table 2 of Reference 2.

4. All F&Os from the August 2012 peer review of the draft FermiV9 model were addressed in the FermiV9 model released in April 2013. All changes made to the draft FermiV9 model were defined as PRA maintenance because there were no new methodologies or significant changes in scope or capability that affected the significant accident sequences. With the release of the FermiV9 model, DTE has determined that all PRA upgrades from RAI 05, number 2 meet Capability Category II.