J. Todd Conner
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DTE Energy

Proprietary Information – Withhold Under 10 CFR 2.390

10 CFR 50.90

July 15, 2013
NRC-13-0035

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, "License Amendment Request for Measurement Uncertainty Recapture (MUR) Power Uprate," NRC-13-0004, dated February 7, 2013 (ML13043A659)

Subject: Response to Request for Additional Information for Measurement Uncertainty Recapture Power Uprate License Amendment Request

In Reference 2, DTE Electric Company (DTE) submitted a license amendment request for Measurement Uncertainty Recapture (MUR) power uprate for Fermi 2. In two emails dated June 3, 2013 (ML13156A486) and June 5, 2013 (ML13157A118) from Mr. Mahesh Chawla of the NRC to Mr. Alan Hassoun of DTE, NRC staff requested additional information to complete the review of the license amendment request.

DTE responses to the requests for additional information (RAIs) are enclosed. Enclosure 1 contains responses to Mechanical and Civil Engineering Branch (EMCB) RAIs 1.b, 4, and 5, as well as responses to Electrical Engineering Branch (EEEB) RAIs 1 through 6, and 8. Enclosure 2 contains proprietary responses, provided by GEH, to EMCB RAIs 1.a, 2, and 3, and EEEB RAI 7. Enclosure 3 includes an affidavit from GEH requesting withholding the proprietary information from public disclosure. Enclosure 4 is a non-proprietary version of Enclosure 2.

No new commitments are being made in this submittal.

Enclosure 2 contains Proprietary Information – Withhold Under 10 CFR 2.390.
When separated from Enclosure 2, this document is decontrolled.

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

Sincerely,

Enclosure 1: Response to EMCB RAIs 1.b, 4, 5, EEEB RAIs 1, 2, 3, 4, 5, 6, and 8

Enclosure 2: Response to EMCB RAIs 1.a, 2, and 3, and EEEB RAI 7 (Proprietary)

Enclosure 3: GEH Affidavit for Enclosure 1 of GEH-FERMI-AEP-203

Enclosure 4: Response to EMCB RAIs 1.a, 2, and 3, and EEEB RAI 7 (Non-Proprietary)

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 15th day of July, 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.

Sharon S. Marshall
Notary Public

SHARON S. MARSHALL
NOTARY PUBLIC, STATE OF MI
COUNTY OF MONROE
MY COMMISSION EXPIRES Jun 14, 2019
ACTING IN COUNTY OF Monroe

Enclosure 1 to
NRC-13-0035

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

Response to EMCB and EEEB RAIs

EMCB-RAI-1b
EMCB-RAI-4
EMCB-RAI-5
EEEB-RAI-1
EEEB-RAI-2
EEEB-RAI-3
EEEB-RAI-4
EEEB-RAI-5
EEEB-RAI-6
EEEB-RAI-8

Response to Request for Additional Information

MUR-EMCB-RAI-1

Section 5.5.1.2 of NEDC-32938P-A, "Generic Guidelines and Evaluations for General Electric Boiling Water Reactor Thermal Power Optimization" (Reference 1 or the TLTR), indicates that the structural evaluations performed for the reactor pressure vessel (RPV), to support the implementation of an MUR power uprate, typically involve the reanalysis of the feedwater (FW) nozzles, main steam (MS) nozzles and the FW sparger. Table 3-4 of the Thermal Power Optimization Safety Analysis Report (TSAR), included as Enclosure 7 to the February 7, 2013, LAR submitted by DTE for Fermi 2 (Reference 2), presents the results of the stress and fatigue reconciliations for the RPV, performed to support the implementation of the proposed MUR power uprate at Fermi 2. Please address the following items related to the aforementioned table:

b) *Note 2 to the aforementioned table states that the provisions of ASME Code Case 1441, "Waiving of 3Sm Limit for Section III Construction," were used to demonstrate the acceptability of the recirculation nozzle following the failure of the component to satisfy the 3Sm limit. Confirm that this Code Case is part of the Fermi 2 licensing basis or provide the regulatory basis for its use in this application. Additionally, please submit a copy of the ASME Code Case 1441.*

Response:

1.b. The use of ASME Code Case 1441 was described in Section 5.2.1.4 and Table 5.2-3 of the Fermi 2 Final Safety Analysis Report (FSAR). Review and NRC acceptance of the code cases in Table 5.2-3 is documented in Section 3.2.2 of the NRC Safety Evaluation Report for Fermi 2 (NUREG-0798). The Fermi 2 Updated FSAR, with regard to the use of ASME Code Case 1441, has not been changed since original licensing. Thus, ASME Code Case 1441 is part of the Fermi 2 licensing basis.

Because ASME Code Case 1441 is subject to copyright laws, a copy is not being submitted. However, a copy is available on site for review.

MUR-EMCB-RAI-4

Section 3.5.2 of the TSAR indicates that the balance-of-plant (BOP) portion of the FW piping from the Number 6 FW heater to the containment required re-analysis in order to be qualified for operation at the proposed power level. Please state whether this "re-analysis" refers to the procedure outlined in Appendix K of the TLTR, which essentially scales the applicable piping stress equations associated with the "Code of Record" for the piping, or whether this re-analysis refers to a different procedure used to qualify this portion of BOP piping. If a procedure other than that prescribed by Appendix K in the TLTR was utilized, please provide additional information regarding why the guidance in the TLTR could not be utilized to qualify the piping and provide a summary of the results of the piping re-analysis which quantitatively demonstrates that the piping is qualified for the proposed power level.

Response:

It was unnecessary to use the methods described in Appendix K of the TLTR for evaluation of this piping. In the Fall of 2010, DTE Electric Company (DTE) installed a Leading Edge Flow Meter (LEFM) at Fermi 2 and began work on an application for a Measurement Uncertainty Recapture (MUR) power uprate. As part of the LEFM installation, spool pieces were installed in the feedwater piping between the No. 6 Feedwater Heaters and the primary containment. The piping computer models were re-analyzed and stress calculations were revised to incorporate the effects of the spool piece installation and, in anticipation of the MUR power uprate application, were performed at the uprated plant conditions.

The results of the revised piping stress analyses demonstrate that the maximum stresses are within the allowable stresses specified in Section III of the 1977 Edition of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Subsections NB-3650 and NC-3650 and ANSI B31.1 Power Piping Code 1977 Paragraph 104.8, as appropriate for the piping quality group classification.

MUR-EMCB-RAI-5

Section 3.4.2 of Enclosure 1 to Reference 2 discusses the potential adverse flow effects resulting from the proposed power uprate. The submittal notes that an independent analysis was performed to demonstrate that the stresses induced in the steam dryer at the proposed power level will remain within allowable limits. Confirm that the increased steam flow rate accompanying the proposed power uprate does not result in the generation of acoustic resonances resulting from flow over any MS branch connections (e.g., safety-relief valve standpipes) and describe the method or methods used to make this determination.

Response:

Measurements taken at current licensed thermal power (CLTP) conditions indicate that an acoustic resonance currently exists at Fermi 2. Analysis and test data indicate that the resonance is the double vortex mode from the Target Rock Safety Relief Valves (SRVs) and the fourteen inch main steam line drain pots.

The natural frequencies predicted analytically for the SRV standpipes are 146 Hz with the onset of single vortex mode above 3,952 MWt reactor power total steam flow and the predicted onset of double vortex mode resonance at approximately 2,300 MWt total steam flow. A subscale test was conducted to confirm the analytical predictions for the SRV standpipes. The measured natural frequency for the SRV standpipes was between 143 and 153 Hz. No single vortex mode resonance was measured up to air flow Mach numbers consistent with 3,952 MWt total steam flow. The onset of double vortex mode resonance for the SRV standpipes was measured at air flow Mach numbers consistent with 3,090 MWt total steam flow.

The natural frequencies predicted analytically for the four fourteen inch main steam line drain pots are 104, 134, 133, and 147 Hz with the onset of single vortex mode above 3,952 MWt total steam flow and the onset of double vortex mode resonance between approximately 2,600 and 3,600 MWt total steam flow. In the subscale test the measured natural frequency for the second and third fourteen inch main steam line drain pots was 137 Hz. A natural frequency was not measured for the first and fourth fourteen inch main steam line drain pots. No single vortex mode resonance was measured up to air flow Mach numbers consistent with 3,952 MWt total steam flow. The onset of double vortex mode resonance for the second and third fourteen inch main steam line drain pots was measured at air flow Mach numbers consistent with 3,530 MWt total steam flow.

Additionally, Fermi 2 has a twenty inch capped standpipe branch off main steam line "C" near the header for the turbine stop valves. The natural frequency predicted analytically for this twenty inch standpipe is 125 Hz with the predicted onset of single vortex mode resonance above 3,952 MWt total steam flow and the predicted double vortex mode resonance at 3,400 MWt total steam flow. In the subscale test, the measured natural frequency of this twenty inch standpipe was 125 Hz, no single vortex mode resonance was measured up to air flow Mach numbers consistent with 3,952 MWt total steam flow, and the onset of double vortex resonance was at air flow Mach numbers consistent with power levels greater than 3,488 MWt total steam flow.

The test data from the subscale tests was overlaid onto test data collected during power ascension to 3,430 MWt in spring 2012 to demonstrate consistent behavior between the subscale tests and plant data. Evaluation of the results of the subscale and power ascension testing provides the following observations regarding operation at MUR power level:

- Loads on the steam dryer will increase by velocity squared. A 3.4% increase in stress is expected due to velocity squared increases.

- At 140 Hz, an extrapolation of the plant data from power ascension to 3,430 MWth reveals that steam dryer loads are expected to have an additional increase. Utilizing a comparison between Fermi 2 and a sister plant that has undertaken full dryer stress analysis associated with ascending to EPU conditions, a stress increase of 169 psi is predicted due to the 140 Hz double vortex mode resonance, which equates to about 1.2% of the high cycle fatigue limit of 13,600 psi. Single vortex modes are not predicted to be active below 3,952 MWt total steam flow.

The results of the analysis indicate that although steam dryer loads and stresses increase slightly due to the MUR uprate conditions, they remain within allowable limits. Based on this analysis and since no evidence of dryer indication has resulted from operation at CLTP with the current acoustic resonance described above, operation at MUR power levels will not adversely affect the steam dryer at Fermi 2.

MUR-EEEB-RAI-1

On page 6-2 of Enclosure 7 of the LAR, the licensee stated that the only identifiable changes in electrical load demand are associated with the condenser pump, heater feed pumps, and heater drain pumps. The licensee noted changes in the brake horsepower (BHP) for each of these pumps. Provide the nameplate rating for each of these components and the BHP at the Current Licensed Thermal Power (CLTP) and Thermal Power Optimization (TPO) power uprate.

Response:

The nameplate ratings and brake horsepower (BHP) loads for both CLTP and TPO conditions are provided in the table below for each type of pump (i.e., Condenser, Heater Feed, and Heater Drain).

Pump	Nameplate Rating (HP)	CLTP Load (BHP)	TPO Load (BHP)	% Increase of Nameplate Rating
Condenser	1500	1179	1186	0.47
Heater Feed	3000	2594	2625	1.03
Heater Drain	1750	1648	1645	-0.17

MUR-EEEB-RAI-2

Provide a discussion on any changes identified for the protective relays settings due to the TPO uprate?

Response:

The TPO power uprate has no impact on protective relaying design. The protective devices, including breakers, relays, fuses and current transformers, are selected and their settings determined, based upon equipment nameplate ratings. The equipment nameplate ratings remain unchanged for TPO conditions. Existing protective relays and their settings are adequate for TPO conditions.

MUR-EEEB-RAI-3

On page 6-1 of Enclosure 7 of the LAR, the licensee stated that the main generator will be operating within the existing generating capability curve for TPO uprate, and, for the summer and winter operations, the gross generator Megawatts electric (MWe) output is on the existing generator capability curve at a rated power factor of 0.90. Provide the gross generator MWe output for summer and winter operations at CLTP and TPO uprate conditions. Also, provide a copy of the main generator capability curve, to show that the generator will continue to operate within the limits of its capability curve.

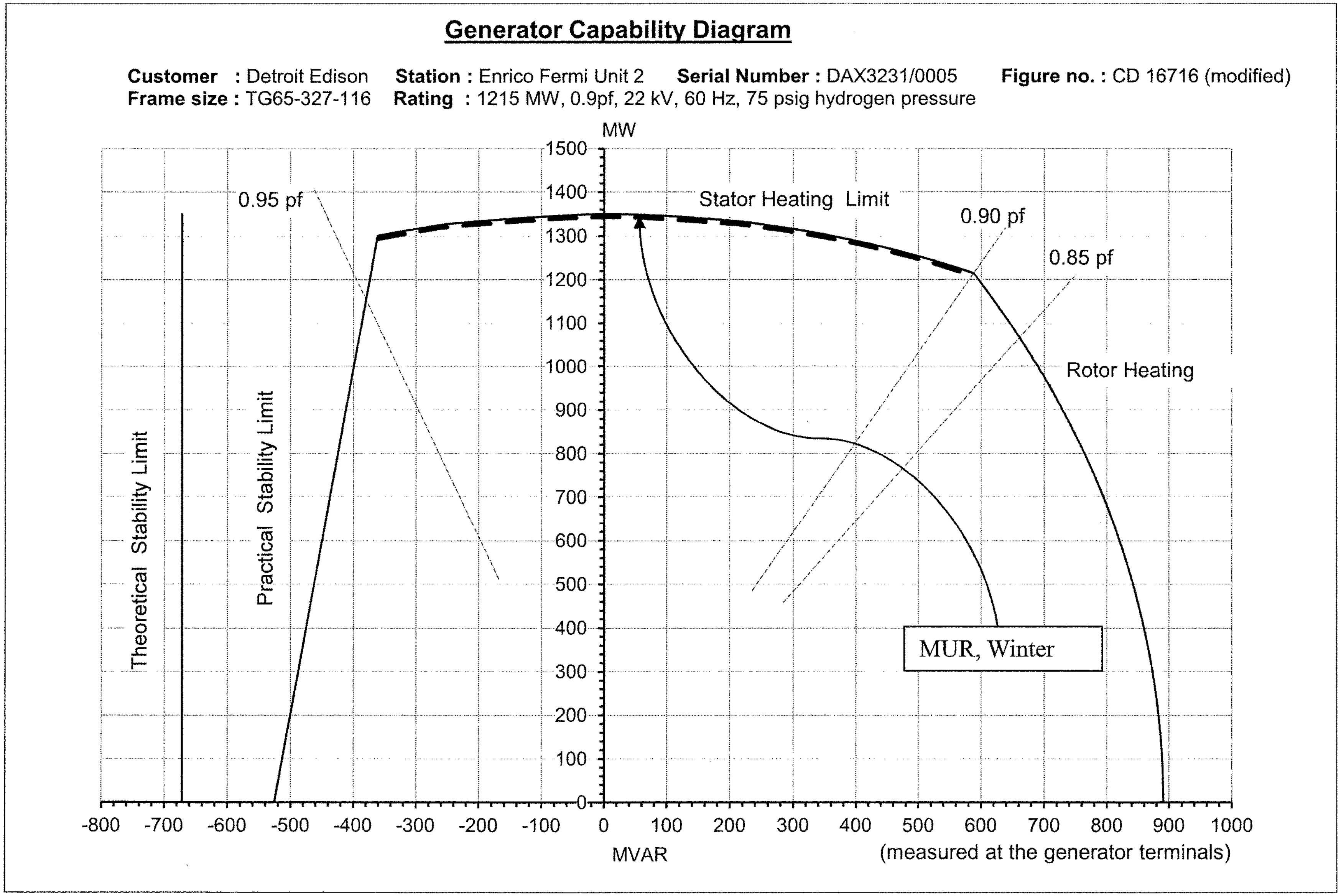
Response:

The gross generator output for summer and winter operations at TPO uprate conditions and the nominal gross generator output at CLTP are provided in the table below.

Thermal Power Level	Rated Generator Output (MWe)	Nominal Generator Output (MWe)	Summer Generator Output (MWe)	Winter Generator Output (MWe)
CLTP	1215	1184.59	1184.59[1]	1184.59[1]
TPO	1215	1206.02	1182.19	1208.29[2]

[1] Seasonal output values are not available. The nominal CLTP output is utilized.
[2] The MWe output during the winter is the highest seasonal output and, therefore, the highest anticipated operating output at TPO conditions. Winter generator output is utilized in the determination of margin at TPO conditions.

The main generator capability curve is provided below.


Generator Capability Diagram
Customer : Detroit Edison Station : Enrico Fermi Unit 2 Serial Number : DAX3231/0005 Figure no. : CD 16716 (modified)
Frame size : TG65-327-116 Rating : 1215 MW, 0.9pf, 22 kV, 60 Hz, 75 psig hydrogen pressure
MW
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
0.95 pf
Stator Heating Limit
0.90 pf
0.85 pf
Rotor Heating
Theoretical Stability Limit
Practical Stability Limit
MUR, Winter
-800
-700
-600
-500
-400
-300
-200
-100
0
100
200
300
400
500
600
700
800
900
1000
MVAR
(measured at the generator terminals)

MUR-EEEB-RAI-4

On page 6-1 of Enclosure 7 of the LAR, the licensee stated that the isolated phase bus duct's main bus is rated at 37,000 ampere (A) and the transformer bus subsections are rated at 18,500 A. Provide the CLTP and TPO uprate loadings for the main and branch sections of the isolated phase bus.

Response:

The tables below provide a comparison of the electrical characteristics of the isolated phase bus duct main bus and transformer subsections, and demonstrate that margin still exists between the ratings and loads provided for the isolated phase bus duct's main bus and the transformer bus subsections. Winter conditions for the main generator at TPO conditions are used for this comparison, as they are the most limiting. The table values reflect the following:

- The generator is operating at a power factor (PF) of 0.9.
- The Generator Output Current, for conservatism, reflects the current increase associated with a degraded grid condition where the minimum continuous voltage is in effect.
- The sharing of load between the 2A and 2B transformers is unequal due to mismatched impedances.

Main Bus

Generator Output Conditions	Generator Electrical Output (MWe)	Generator Electrical Output (MVA)	Generator Output Current (A)	Isolated Phase Bus Duct Rating (A)	Margin to Rating (%)
Nominal Generator Output at CLTP	1184.59	1316.2	35,108	37,000	5.11
Winter Generator Output at TPO	1208.29	1342.5	35,804	37,000	3.23

Transformer Bus Subsections

Transformer and Conditions	Electrical Load (MWe)	Electrical Load (MVA)	Electrical Load (A)	Isolated Phase Bus Duct Rating (A)	Margin to Rating (%)
Transformer 2B at Nominal CLTP Conditions	607.34	674.82	18,000	18,500	2.70
Transformer 2A at Nominal CLTP Conditions	577.22	641.36	17,108	18,500	7.52
Transformer 2B at Winter TPO Conditions	619.49	688.32	18,357	18,500	0.77
Transformer 2A at Winter TPO Conditions	588.77	654.18	17,447	18,500	5.69

MUR-EEEB-RAI-5

On page 6-10 of Enclosure 7 of the LAR, the licensee presents in table format the ratings for main generator step-up transformers 2A and 2B and station service transformers #65 and #64. Provide the CLTP and TPO uprate loadings for these transformers.

Response:

The CLTP and TPO uprate loads (MVA) for main generator step-up transformers 2A and 2B are provided in the table below.

Power Level	MUT 2A (MVA)	MUT 2B (MVA)
CLTP	641.36	674.82
TPO	654.18	688.32

The information provided in TSAR Table 6-3a and Table 6-3b in the MVA Loading column reflects the load associated with the main generator being operated at its nameplate rating of 1350 MVA, otherwise referred to as the design loading for the step up transformers. There is an approximate 4 MVA difference between the loading at TPO (~654 MVA) and the design load (658 MVA) for Step-up Transformer 2A. The 710 MVA value listed as the Design MVA in that same table is the transformer design rating and it bounds both of the loads (both TPO operation and generator nameplate operation). The same reasoning applies to Table 6-3b.

For the Station Service Transformers (#65 and #64), the Existing MVA Loading column in TSAR Tables 6-4a and 6-4b is a value calculated at CLTP conditions that assumes all connected loads are operating at their nameplate ratings. This loading bounds any increase in loading associated with plant operation at TPO conditions. For additional conservatism, a small load increase as a result of TPO is added to the existing CLTP loading to demonstrate that even then, the subsequent resulting load is still bounded by the station service transformer ratings.

MUR-EEEB-RAI-6

On page 6-1 of Enclosure 7 of the LAR, the licensee stated that the main transformers and the associated switchyard components (rated for maximum generator output) are adequate for the TPO uprate-related transformer output. Provide analysis of switchyard components at TPO uprate, and show adequate margin between the maximum worst case steady-state load and equipment ratings.

Response:

Using the maximum generator output current based upon the generator nameplate rating of 1350 MVA, the maximum load current for the 345 kV switchyard (SWYD) is 2296 A assuming degraded grid conditions (lower continuous voltage than rated). Based on that maximum current load, adequacy of the 345 kV SWYD equipment is as discussed below.

All circuit breakers are rated for 3000 A. The 5" AL Bus is rated for 3660 A. The 2000 A Type RDA-1 disconnect switches are rated for 2690 A (Summer Normal) based on switch rating methodology by ITC Holding Corp who owns and operates the SWYD equipment and also recommended by East Central Area Reliability (ECAR). Trainers 2-1590 MCM per phase are rated for 3080 A. Overhead 2-1431 ASCR per phase are rated for 3730 A. Current Transformers are rated for 3000/5 MR. Therefore these components have adequate margin.

The switchyard disconnect switches, during a condition where a single main generator output breaker (CM or CF) is closed (as opposed to a normal switchyard configuration when both breakers are closed), must be able to carry the main generator output current, which is 2283 A at TPO power during degraded grid conditions. These disconnect switches are rated at 2690 A, and are therefore acceptable.

Since the Fermi 2 120 kV switchyard is not directly connected to the main generator, all factors associated with the switchyard load flow and short circuit calculations, including the four connected gas turbine generators, remain unchanged for TPO conditions. The maximum output current of the four combustible turbine generators (18,824 kVA) is 390 A at degraded grid conditions (93% voltage minimum). This current is lower than the 120 kV switchyard equipment ratings, and the 120kV switchyard components are therefore acceptable. Those equipment ratings are as follows:

Overhead conductors associated with 120 kV are: 1-1000 MCM AL, 1-2500 MCM SAC AL, and 1590 MCM SAC AL. The current carrying capacity of 1000 MCM (minimum of all three sizes) is 990 A, which is more than the 390 A discussed above. Therefore, all the above overhead conductors have adequate margin.

Current Transformers (CTs) associated with 120 kV are: 3000/5, 2000/5, 1200/5, 600/5, and 400/5. They are all adequate to carry maximum current of 390 A.

Disconnect switches associated with 120 kV are: 600 A WECO Type R, 1200 A Delta Star PM40, 1200 TTT-5, and 2000 A Type RDA-1 switches. The minimum rating of the above switches is 600 A, which is adequate to carry maximum current of 390 A.

Circuit Breakers associated with 120 kV are: 800 A GECO Type FK-439, 2000 A ITE Type 145KM63-20C, and 3000 A SF-6 ABB Type PM. The minimum rating of the above breakers is 800 A, which is also adequate to carry the maximum current of 390 A.

MUR-EEEB-RAI-8

On page 10-3 of Enclosure 7 of the LAR, the licensee states that because the TPO uprate does not increase the nominal vessel dome pressure, there is a very small effect on pressure and temperature conditions experienced by equipment during normal operation and accident conditions. Provide temperature, pressure and radiation levels (curves or tables) to demonstrate that environmental qualification of all equipment, inside and outside containment, remains bounding for both normal operation and under accident conditions for the proposed TPO uprate.

Response:

The equipment that is subject to the Environmental Qualification (EQ) program was reviewed to ensure that existing environmental qualification for normal and accident conditions adequately encompass TPO conditions. The small effect on pressure and temperature conditions discussed in the MUR LAR is encompassed by the current environmental condition parameters. Conservatisms in the equipment qualifications conditions evaluated at CLTP remains bounding, for both normal operation and accident conditions, for the proposed TPO uprate as discussed below.

Temperature and Pressure

Inside Containment

Containment parameters for the CLTP evaluation of accident temperature and pressure conditions for Post LOCA response inside containment assumed a 3,499 MWt core thermal power. Thus the CLTP accident temperature and pressure evaluation is bounding for TPO uprate and TPO has no impact on the qualification temperature and pressure values used in the Fermi EQ program for qualification of equipment inside containment.

Outside Containment

The Main Steam line break remains bounding for the Steam Tunnel and first floor Auxiliary Building environmental responses for TPO uprate. A bounding Main Steam system pressure of 1060 psia is used in the CLTP calculations evaluating the temperature and pressure impacts associated with this line break in these sub compartments. The slightly higher enthalpy in feedwater (404.7 BTU lbm^{-1} at TPO compared to 402.6 BTU lbm^{-1} for CLTP) is within the margin of the evaluations performed at 1060 psia. Given the TPO uprate is a constant pressure uprate, the temperature and pressure used in the CLTP calculations remain bounding for TPO uprate.

A bounding system pressure of 1060 psia is used in the CLTP calculations evaluating the temperature and pressure impacts associated with line breaks for the HPCI, RCIC, and RWCU sub compartments. Given the TPO uprate is a constant pressure uprate, the temperature and pressure used in the CLTP calculations remain bounding for TPO uprate.

Normal Operating Conditions

Under non-accident conditions, the operating environmental conditions (e.g., pressure, temperature, humidity) are not a "profile"; rather, they are based on a single value or range of values. There is no change to the EQ normal operating environmental conditions for TPO. Changes in environmental conditions parameters due to TPO are considered acceptable for EQ if the heating, ventilation, and air conditioning (HVAC) systems can maintain environmental conditions within the normal range of fluctuations caused by expected changes in external conditions. The capability of the HVAC systems was evaluated for TPO and the HVAC systems were found to be capable of maintaining environmental conditions within their normal ranges, as described in Section 6.6 of the TSAR. All of these changes are within the range of normal fluctuations due to changes in external conditions and are thus considered inconsequential. No ambient pressure changes are expected.

Note also that these expected changes are consistent with those stated in the TPO licensing topical report, "Generic Guidelines and Evaluations for General Electric Boiling Water Reactor Thermal Power Optimization," Section 5.11.2, "Environmental Qualification Criteria," which states that no significant change in normal operating conditions is expected for a TPO uprate.

Radiation Levels

Normal and accident radiation values for all EQ zones, inside and outside containment, in the Fermi EQ program for currently licensed thermal power (CLTP) were updated in 2006 for a 3,952 MW core thermal power. A review of the EQ program radiation dose bases was performed to support the TPO uprate and confirmed the 3,952 MWt basis. Components qualified for accident radiation levels for 3,952 MWt are qualified at TPO power level. Thus, no changes were implemented for the EQ conditions of accident and normal radiation values inside or outside containment from CLTP to TPO licensed thermal power (TLTP).

Conclusion

While tables of temperature, pressure and radiation levels are not included in this response, the above discussion demonstrates that environmental qualification parameters, inside and outside containment, remain bounding for both normal operation and under accident conditions for the proposed TPO uprate. The CLTP analysis utilizes bounding parameters; e.g. 3,499 MWt and 1,060 psia (temperature and pressure evaluations) or 3,952 MWt (radiation level evaluations), for EQ condition parameters of temperature, pressure and radiation levels. There is no change in the EQ parameters for the TPO uprate.

Enclosure 3 to
NRC-13-0035

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

GEH Affidavit for Enclosure 1 of GEH-FERMI-AEP-203

Affidavit for Enclosure 2 of NRC-13-0035

Enclosure 3
GEH-FERMI-AEP-203

GEH Affidavit for Enclosure 1

GE-Hitachi Nuclear Energy Americas LLC

AFFIDAVIT

I, James F. Harrison, state as follows:

(1) I am the Vice President, Regulatory Affairs, Fuel Licensing, of GE-Hitachi Nuclear Energy Americas LLC ("GEH"), and have been delegated the function of reviewing the information described in paragraph (2) which is sought to be withheld, and have been authorized to apply for its withholding.

(2) The information sought to be withheld is contained in Enclosure 1 of GEH letter, GEH-FERMI-AEP-203, "GEH Responses to Fermi 2 TPO RAIs," dated June 25, 2013. The GEH proprietary information in Enclosure 1, which is entitled "GEH Responses to Fermi 2 TPO RAIs" is identified by a dotted underline inside double square brackets. [[This sentence is an example.{3}]] In each case, the superscript notation {3} refers to Paragraph (3) of this affidavit, which provides the basis for the proprietary determination.

(3) In making this application for withholding of proprietary information of which it is the owner or licensee, GEH relies upon the exemption from disclosure set forth in the *Freedom of Information Act* ("FOIA"), 5 U.S.C. Sec. 552(b)(4), and the *Trade Secrets Act*, 18 U.S.C. Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4), and 2.390(a)(4) for trade secrets (Exemption 4). The material for which exemption from disclosure is here sought also qualifies under the narrower definition of trade secret, within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975 F.2d 871 (D.C. Cir. 1992), and Public Citizen Health Research Group v. FDA, 704 F.2d 1280 (D.C. Cir. 1983).

(4) The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs (4)a. and (4)b. Some examples of categories of information that fit into the definition of proprietary information are:

a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by GEH's competitors without license from GEH constitutes a competitive economic advantage over other companies;

b. Information that, if used by a competitor, would reduce their expenditure of resources or improve their competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product;

c. Information that reveals aspects of past, present, or future GEH customer-funded development plans and programs, resulting in potential products to GEH;

d. Information that discloses trade secret or potentially patentable subject matter for which it may be desirable to obtain patent protection.

(5) To address 10 CFR 2.390(b)(4), the information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GEH, and is in fact so held. The information sought to be withheld has, to the best of my

knowledge and belief, consistently been held in confidence by GEH, not been disclosed publicly, and not been made available in public sources. All disclosures to third parties, including any required transmittals to the NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary or confidentiality agreements that provide for maintaining the information in confidence. The initial designation of this information as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in the following paragraphs (6) and (7).

(6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, who is the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge, or who is the person most likely to be subject to the terms under which it was licensed to GEH. Access to such documents within GEH is limited to a "need to know" basis.

(7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist, or other equivalent authority for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GEH are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary or confidentiality agreements.

(8) The information identified in paragraph (2), above, is classified as proprietary because it contains the detailed GEH methodology for thermal power optimization for the GEH Boiling Water Reactor (BWR). These methods, techniques, and data along with their application to the design, modification, and analyses associated with thermal power optimization were achieved at a significant cost to GEH.

The development of the evaluation processes along with the interpretation and application of the analytical results is derived from the extensive experience databases that constitute a major GEH asset.

(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GEH's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of GEH's comprehensive BWR safety and technology base, and its commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and includes development of the expertise to determine and apply the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC-approved methods.

The research, development, engineering, analytical and NRC review costs comprise a substantial investment of time and money by GEH. The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial. GEH's competitive advantage will be lost if its competitors are able to use the results of the GEH experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

The value of this information to GEH would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive GEH of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing and obtaining these very valuable analytical tools.

I declare under penalty of perjury that the foregoing affidavit and the matters stated therein are true and correct to the best of my knowledge, information, and belief.

Executed on this 24th day of June 2013.

James F. Harrison

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Enclosure 4 to
NRC-13-0035

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

Response to EMCB and EEEB RAIs – Non-Proprietary

EMCB-RAI-1a
EMCB-RAI-2
EMCB-RAI-3
EEEB-RAI-7

Enclosure 3 to GEH-FERMI-AEP-203
GEH Responses to Fermi 2 TPO RAIs
Non-Proprietary Information

Enclosure 2

GEH-FERMI-AEP-203

GEH Responses to Fermi 2 TPO RAIs

Non-Proprietary Information-Class I (Public)

Non-Proprietary Notice

This is a non-proprietary version of Enclosure 1 of GEH-FERMI-AEP-203 which has the proprietary information removed. Portions of the document that have been removed are indicated by an open and closed bracket as shown here [[ ]].

NRC RAI 1

Section 5.5.1.2 of NEDC-32938P-A, "Generic Guidelines and Evaluations for General Electric Boiling Water Reactor Thermal Power Optimization" (Reference 1 or the TLTR), indicates that the structural evaluations performed for the reactor pressure vessel (RPV), to support the implementation of an MUR power uprate, typically involve the reanalysis of the feedwater (FW) nozzles, main steam (MS) nozzles and the FW sparger. Table 3-4 of the Thermal Power Optimization Safety Analysis Report (TSAR), included as Enclosure 7 to the February 7, 2013, LAR submitted by DTE for Fermi 2 (Reference 2), presents the results of the stress and fatigue reconciliations for the RPV, performed to support the implementation of the proposed MUR power uprate at Fermi 2. Please address the following items related to the aforementioned table:

a) *The table shows that the primary plus secondary stress intensity calculated for the recirculation outlet nozzle (nozzle end) increased from 75.9 kips per square inch (ksi) at the current power level to 85.3 ksi at the proposed power level, the latter value of which exceeds the $3S_m$ limit prescribed by the American Society of Mechanical Engineers (ASME) Boiler & Pressure Vessel Code (the Code). Additionally, the liner portion of the recirculation inlet nozzle is shown to have an increase in the primary plus secondary stress intensity of almost 10 ksi upon implementation of the MUR power uprate; this increase also exceeds the $3S_m$ stress limit. State why the stress intensities for these two components have increased by approximately 12% each, considering that the TLTR indicates that this should not be expected for an MUR power uprate.*

GEH Response

[[ ]] However, the P + Q results for the recirculation inlet and outlet nozzles are for the higher operating conditions of 4,031 MWt core thermal power and include bounding conditions beyond those required in the analysis of record at current licensed thermal power (CTLP) (e.g., [[ ]] at 4,031 MWt). These higher operating conditions and the [[ ]] utilized to update the analysis for 4,031 MWt caused the increases in the stress documented in TSAR Table 3-4.

NRC RAI 2

Table 3-5 of the TSAR indicates that the FW sparger was qualified for operation at the proposed MUR power level using a qualitative assessment. As indicated above, Section 5.5.1.2 of the TLTR notes that the FW sparger is a component which may require re-analysis in support of the implementation of an MUR power uprate. Please discuss the qualitative assessment which was performed for the FW sparger and provide a technical justification for the conclusion reached in this assessment which provides reasonable assurance that the FW sparger is acceptable for use at the proposed power level. This justification should adequately demonstrate that the design basis requirements related to the FW sparger will remain satisfied at the proposed power level.

GEH Response

A qualitative evaluation on the FW sparger was performed due to the following reasons:

- The loads at the proposed TPO power level are bounded by the design basis loads.
- The change in load due to the proposed TPO power with respect to CLTP is deemed insignificant.

The loads applicable to the FW sparger are deadweight, seismic, thermal, annulus pressurization (AP), and flow loads. The FW sparger is primarily subject to the cyclical loading due to system thermal transients, hence, fatigue is the most significant parameter in the evaluation.

Deadweight, seismic, and AP loads remain the same because there are no hardware changes, no fuel changes, and the AP was evaluated at 102% CLTP. The RPV/shroud annulus temperature essentially remains the same. The proposed TPO power has no effect on the system transients such as turbine roll, hot standby, and turbine trip, which are major contributors to fatigue. The only changes due to the proposed TPO power with respect to the CLTP are the FW flow and FW temperature.

FW flow due to the proposed TPO power increased with respect to CLTP. However, the FW flow at the proposed TPO power is bounded by the design basis value. Additionally, the stress due to the hydraulic load of FW flow is small because the main contributors to FW sparger stress are thermal, seismic, and AP loads. The stress increase due to the hydraulic load increase of FW flow is insignificant.

FW temperature due to the proposed TPO power increased with respect to CLTP from 424.5°F to 426.5°F. The temperature increase reduces thermal stress. The final FW temperature reduction (FFWTR) (-50°F) option of the proposed TPO power was considered in the design basis. FFWTR has no effect on the temperature step changes of turbine roll and hot standby transients used in the design basis calculation because conservative temperature step changes were evaluated in the design basis evaluation.

In summary, all applicable TPO based loads for the FW sparger at Normal, Upset, Emergency, and Faulted conditions are bounded by the corresponding CLTP and design basis loads or remain unaffected with respect to the CLTP or design basis. Therefore, the FW sparger remains qualified for the proposed TPO power condition.

 Non-Proprietary Information-Class I (Public)

NRC RAI 3

Section 3.4 of the TSAR discusses the flow-induced vibration (FIV) evaluations performed for the piping and piping components at the proposed power level. The TSAR states that the MS and FW piping experience increased vibration levels as a result of the increased MS and FW flow rates accompanying the proposed power uprate. Provide the acceptance criteria used to determine that the piping vibration levels at the proposed power level will be acceptable. Confirm that the vibration assessments performed in support of the proposed Fermi 2 MUR power uprate were performed consistent with the methods outlined in the TLTR for evaluating piping vibration levels.

GEH Response

The TPO piping evaluation is based on startup test results and the original designation acceptance criteria. The acceptance criteria for Fermi-2 piping FIV is based on ASME OM-S/G-1982, Part 3, "Requirements for Pre-operational and Initial Startup Vibration Testing of Nuclear Power Plant Piping Systems", paragraph 3.2.1.2.

The steady state vibration stress limits are

$S_{alt} \leq k*S_A/\alpha$, and

S_{alt} =0.8*12,500/1.3=7,690 (psi) for carbon steel with UTS <80 ksi

S_{alt} =0.6*26,000/1.3=12,000 (psi) for stainless steel

These stress amplitudes represent values based on 80 percent of the alternating stress intensity at 10^6 cycles for carbon steels and 60 percent of the alternating stress intensity at 10^6 cycles for stainless steels divided by a factor of safety (α) of 1.3. The alternating stress intensity S_A is taken from Table I-9.1 or Figures I-9.1 and I-9.2 of Appendix I of ASME B&PV Code Section III, 1980.

The above stress limits of 7,690 (psi) for carbon steel and 12,000 (psi) for stainless steel are the same as those in Section 3.9.1.1.5.2, Steady-State Vibration Acceptance Criteria of Fermi-2 FSAR 1984 and Fermi-2 UFSAR 1987.

The acceptance criteria are based on ASME Code and have been approved by NRC. The MS and FW piping FIV startup test showed that vibration levels were within the acceptance criteria. The vibration amplitudes on the piping under TPO are based on extrapolating the measured steady state vibration data from the startup test. The MS and FW piping vibration under the TPO is expected to increase about 15% above OLTP, or 4% above CLTP. [[

]]. Therefore, the primary FW and MS system piping are structurally adequate to withstand the effects of FIV under the specified TPO conditions.

The TLTR process determines the percent increases above the analysis basis and compares the highest calculated stress to the allowable stress. The evaluation method and analysis bases used in the TPO evaluation are in accordance and consistent with the methods outlined in the TLTR for evaluating piping vibration levels.

NRC RAI 7

On page 9-7 of Enclosure 7 of the LAR, regarding station blackout (SBO) the licensee identified the following considerations which were evaluated:

The adequacy of the condensate/reactor coolant inventory.

The capacity of the Class 1E batteries.

The SBO compressed Nitrogen requirements.

The ability to maintain containment integrity.

The effect of loss of ventilation on rooms that contain equipment essential for plant response to a SBO event.

For each of these considerations provide a detailed discussion on the licensee's evaluation. Include CLTP and TPO uprate capacities and margins."

GEH Response

The change in station blackout (SBO) response to a TPO uprate was evaluated for the development of NEDC-32938P-A as referenced in the Fermi 2 license amendment request (LAR). Specifically, Appendix L.5 of this licensing topical report (LTR) provided a generic evaluation of the potential loss of all alternating current power supplies based on previous plant response and coping capability analyses for typical power uprate projects done by GEH. These previous power uprate projects were performed using the guidance of RG 1.155 and/or NUMARC 87-00. As stated in Appendix L.5, the following main considerations were evaluated:

- The adequacy of the condensate/reactor coolant inventory.
- The capacity of the Class 1E batteries.
- The SBO compressed Nitrogen requirements.
- The ability to maintain containment integrity.
- The effect of the loss of ventilation on rooms that contain equipment essential for plant response to a SBO event, for example:
  - Control room, battery rooms, and other auxiliary electrical rooms.
  - Reactor core isolation cooling (RCIC) and high pressure coolant injection (HPCI) room(s) as applicable
  - Primary containment (drywell and suppression chamber)

The conclusion of the evaluation of previous uprates is summarized in Appendix L.5 along with a statement that the (plant-specific) TSAR will document one of three bases for dispositioning the SBO based on the power level of the previous SBO analysis or the available condensate inventory and ability to maintain containment integrity. In section 5.11.7 of the NRC's safety evaluation report (SER) for NEDC-32938P-A, the staff concluded that the TSAR shall state the category to which a plant's SBO evaluation is dispositioned, and will state whether the plant can meet the 10 CFR 50.63 requirements at uprated conditions.

The Fermi 2 TSAR text was not intended to convey that an additional Fermi 2 plant specific analysis was conducted. Rather, the Fermi 2 TSAR provides appropriate confirmation that Fermi has sufficient condensate inventory and containment integrity margin (values greater than those listed in the SER) to assure that RCIC can provide core cooling during the coping period, and that containment integrity will be maintained during the coping period. Accordingly, the subject of battery capacity, nitrogen requirements, and the effect of the loss of ventilation were not re-evaluated specifically for the Fermi TSAR as these had already been generically dispositioned for TPO uprates. The language used to disposition the TPO uprate effect on the Fermi SBO response is consistent with the submittals of other licensees that used the same method (e.g. Cooper Nuclear Station, LaSalle County Station).