UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

November 5, 2019

Mr. Peter Dietrich
Senior Vice President and
Chief Nuclear Officer
DTE Electric Company
Fermi 2 - 260 TAC
6400 North Dixie Highway
Newport, MI 48166

SUBJECT: FERMI 2 - ISSUANCE OF AMENDMENT NO. 214 RE: TECHNICAL SPECIFICATIONS TASK FORCE (TSTF) TSTF-564, "SAFETY LIMIT MINIMUM CRITICAL POWER RATIO" (EPID L-2019-LLA-0028)

Dear Mr. Dietrich:

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed amendment No. 214 to Renewed Facility Operating License No. NPF-43 for Fermi 2 Power Plant (Fermi 2). This amendment consists of changes to the technical specifications (TSs) in response to your application dated February 8, 2019.

The amendment revises the TSs for Fermi 2 by changing requirements related to the safety limit minimum critical power ratio (MCPR) and the core operating limits report and is based on Technical Specification Task Force (TSTF) traveler TSTF-564, Revision 2, "Safety Limit MCPR." This amendment also makes changes to requirements that are outside the scope of TSTF-564.

A copy of the related Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

Sujata Goetz, Project Manager
Plant Licensing Branch III
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-341,

Enclosures:
Amendment No. 214 to NPF-43

cc: Listserv

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

DTE ELECTRIC COMPANY

DOCKET NO. 50-341

FERMI 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 214
Renewed License No. NPF-43

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by DTE Electric Company (DTE, the licensee), dated February 8, 2019, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Renewed Facility Operating License No. NPF-43 is hereby amended to read as follows:

   (2) Technical Specifications and Environmental Protection Plan

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 214, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated into this renewed license. DTE Electric Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. The license amendment is effective as of its date of issuance and shall be implemented within 45 days.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA Scott P. Wall for/

Nancy L. Salgado, Branch Chief
Plant Licensing Branch III
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Renewed Facility
Operating License No. NPF-43
and Technical Specifications

Date of Issuance: November 5, 2019

ATTACHMENT TO LICENSE AMENDMENT NO. 214

RENEWED FACILITY OPERATING LICENSE NO. NPF-43

FERMI 2

DOCKET NO. 50-341

Replace the following pages of the Renewed Facility Operating License No. NPF-43 and Appendix A, Technical Specifications, with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Renewed Facility Operating License No. NPF 43

REMOVE	INSERT
- 4 -	- 4 -

Technical Specifications

REMOVE	INSERT
2.0-1	2.0-1
5.0-21	5.0-21

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 214, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated into this renewed license. DTE Electric Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

(3) Antitrust Conditions

DTE Electric Company shall abide by the agreements and interpretations between it and the Department of Justice relating to Article I, Paragraph 3 of the Electric Power Pool Agreement between DTE Electric Company and Consumers Power Company as specified in a letter from The Detroit Edison Company to the Director of Regulation, dated August 13,1971, and the letter from Richard W. McLaren, Assistant Attorney General, Antitrust Division, U.S. Department of Justice, to Bertram H. Schur, Associate General Counsel, Atomic Energy Commission, dated August 16, 1971.

(4) Deleted

(5) Deleted

(6) Deleted

(7) Deleted

(8) Deleted

(9) Modifications for Fire Protection (Section 9.5.1, SSER #5 and SSER #6)*

DTE Electric Company shall implement and maintain in effect all provisions of the approved fire protection program as described in its Final Safety Analysis Report for the facility through Amendment 60 and as approved in the SER through Supplement No. 5, subject to the following provision:

(a) DTE Electric Company may make changes to the approved fire protection program without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

* The parenthetical notation following the title of many license conditions denotes the section of the Safety Evaluation Report (SER) and/or its supplements wherein the license condition is discussed.

2.0 SAFETY LIMITS (SLs)

2.1 SLs

2.1.1 Reactor Core SLs

2.1.1.1 With the reactor steam dome pressure < 785 psig or core flow < 10% rated core flow:

THERMAL POWER shall be ≤ 25% RTP.

2.1.1.2 With the reactor steam dome pressure ≥ 785 psig and core flow ≥ 10% rated core flow:

MCPR shall be ≥ 1.07.

2.1.1.3 Reactor vessel water level shall be greater than the top of active irradiated fuel.

2.1.2 Reactor Coolant System Pressure SL

Reactor steam dome pressure shall be ≤ 1325 psig.

2.2 SL Violations

With any SL violation, the following actions shall be completed within 2 hours:

2.2.1 Restore compliance with all SLs; and

2.2.2 Insert all insertable control rods.

5.6 Reporting Requirements (continued)

5.6.4 Deleted

5.6.5 CORE OPERATING LIMITS REPORT (COLR)

a. Core operating limits shall be established prior to each reload cycle, or prior to any remaining portion of a reload cycle, and shall be documented in the COLR for the following:

LCO 3.2.1, "AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)";
LCO 3.2.2, "MINIMUM CRITICAL POWER RATIO (MCPR)";
LCO 3.2.3, "LINEAR HEAT GENERATION RATE (LHGR)"; and
LCO 3.3.2.1, "Control Rod Block Instrumentation."

The $MCPR_{99.9\%}$ value used to calculate the LCO 3.2.2, "MCPR," limit shall be specified in the COLR.

b. The analytical methods used to determine the core operating limits shall be those previously reviewed and approved by the NRC, specifically those described in the following documents:

1. NEDE-24011-P-A, "General Electric Standard Application for Reactor Fuel," (latest approved version); and

2. NEDE-23785-1-PA, "The GESTR-LOCA and SAFER Models for the Evaluation of the Loss-of-Coolant-Accident - SAFER/GESTR, Application Methodology," (the approved version at the time reload analyses are performed).

c. The core operating limits shall be determined such that all applicable limits (e.g., fuel thermal mechanical limits, core thermal hydraulic limits, Emergency Core Cooling Systems (ECCS) limits, nuclear limits such as SDM, transient analysis limits, and accident analysis limits) of the safety analysis are met.

d. The COLR, including any midcycle revisions or supplements, shall be provided upon issuance for each reload cycle to the NRC.

(continued)

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 214

TO RENEWED FACILITY OPERATING LICENSE NO. NPF-43

DTE ELECTRIC COMPANY

FERMI 2

DOCKET NO. 50-341

1.0 INTRODUCTION

By application dated February 8, 2019 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML19039A126), DTE Electric Company (DTE, the licensee) submitted a license amendment request (LAR) for Fermi 2, which is a boiling-water reactor (BWR).

The proposed amendment to the Fermi 2, technical specifications (TSs) would revise the reactor core safety limit for the minimum critical power ratio (MCPR), which protects against boiling transition on the fuel rods in the core. The current MCPR safety limit for Fermi 2 ensures that 99.9 percent of the fuel rods in the core are not susceptible to boiling transition. The revised MCPR safety limit would ensure that there is a 95-percent probability at a 95-percent confidence level (95/95) that no fuel rods will be susceptible to boiling transition based on a statistical analysis of critical power ratio (CPR) data. The TS requirements for the core operating limits report (COLR) would also be modified.

The proposed amendment is based on Technical Specification Task Force (TSTF) traveler TSTF-564, Revision 2, "Safety Limit MCPR" (ADAMS Accession No. ML18297A361). The U.S. Nuclear Regulatory Commission (NRC or the Commission) approved TSTF-564, Revision 2, by letter dated November 16, 2018 (ADAMS Package Accession No. ML18299A048). The proposed amendment for Fermi 2 also proposes different numbering than the Standard Technical Specifications[1] (STS) on which TSTF-564 was based. Specifically, Fermi 2 TS 5.6.5, corresponds to STS 5.6.3, "Core Operating Limits Report." The NRC staff determined that this difference is editorial in nature and does not affect the applicability of TSTF-564 to the Fermi 2 TS.

[1] Fermi 2 is a General Electric Company (GE) single-cycle, forced-circulation boiling water reactor (BWR) of the BWR 4 Class, i.e. a BWR/4. The Commission published guidance on the content of technical specifications for BWR/4 plants in "Standard Technical Specifications, General Electric Plants BWR/4," NUREG-1433, Volume 1, "Specifications," and Volume 2, "Bases," Revision 4.0, April 2012 (ADAMS Accession Nos. ML12104A192 and ML12104A193).

2.0 REGULATORY EVALUATION

2.1. Background on Boiling Transition

During steady-state operation in a BWR, most of the coolant in the core is in a flow regime known as annular flow. In this flow regime, a thin liquid film is pushed up the surface of the fuel rod cladding by the bulk coolant flow, which is mostly water vapor with some liquid water droplets. This provides effective heat removal from the cladding surface. However, under certain conditions, the annular film may dissipate, which reduces the heat transfer and results in an increase in fuel cladding surface temperature. This phenomenon is known as boiling transition or dryout. The elevated surface temperatures resulting from dryout may cause fuel cladding damage or failure.

2.2 Background on Critical Power Correlations

For a given set of reactor operating conditions (i.e., pressure, flow, etc.), dryout will occur on a fuel assembly at a certain power, known as the critical power. Because the phenomena associated with boiling transition are complex and difficult to model purely mechanistically, thermal-hydraulic test campaigns are undertaken using electrically heated prototypical fuel bundles to establish a comprehensive database of critical power measurements for each BWR fuel product. These data are then used to develop a critical power correlation that can be used to predict the critical power for assemblies in operating reactors. This prediction is usually expressed as the ratio of the actual assembly power to the critical power predicted using the correlation known as the critical power ratio (CPR).

One measure of the correlation's predictive capability is based on its validation relative to the test data. For each point "j" in a correlation's test database, the experimental critical power ratio (ECPR) is defined as the ratio of the measured critical power to the calculated critical power, or:

$$ECPR_j = \frac{\text{Measured Critical Power}_j}{\text{Calculated Critical Power}_j}$$

For ECPR values less than or equal to 1, the calculated critical power is greater or equal to the measured critical power and the prediction is nonconservative. Because the measured critical power includes random variations due to various uncertainties, evaluating the ECPR for all the points in the dataset (or, ideally, a subset of points that were not used in the correlation's development) results in a probability distribution. This ECPR distribution allows the predictive uncertainty of the correlation to be determined. This uncertainty can then be used to establish a limit above which there can be assumed that boiling transition will not occur (with a certain probability and confidence level).

2.3 Background on Thermal-Hydraulic safety limit

To protect against boiling transition, BWRs have established MCPR safety limits in their TS. The current MCPR safety limit for Fermi 2 is based on preventing 99.9 percent of the fuel in the core from being susceptible to boiling transition. Such limits are typically developed by considering various cycle-specific power distributions and uncertainties and they are highly dependent on the cycle-specific radial power distribution in the core. As such, the limit may

need to be updated as frequently as every cycle. As described in Section 15.0 of Fermi 2's Updated Final Safety Analysis, Rev. 22, April 26, 2019 (ADAMS Accession No. ML19128A089):

> The performance of the anticipated operational occurrences (moderate frequency events) were evaluated with the methodologies described in [General Electric Standard Application for Reactor Fuel (GESTAR II)]. The limiting events analyzed are determined by a sensitivity study ... that examines the impact of minimum critical power ratio (MCPR) due to the change in fuel design. Based on results of the study, several limiting events have been identified and analyzed using the appropriate input parameters. The MCPR results of these limiting transients form the basis of the MCPR operating limits. Implementation of these MCPR operating limits in the Core Operating Limits Report ensures that the MCPR safety limit for normal conditions (dual loop operation) and for single loop operation will not be exceeded during the most severe anticipated operational occurrences.

The Fermi 2 TS also include MCPR operating limits as limiting condition for operation (LCO) that must be met to ensure that anticipated operational occurrences do not result in fuel damage. As described in Section 4.4.4.1.2. "MCPR Operating Limit Calculation Procedures" of Fermi 2's UFSAR:"

> A plant-unique MCPR operating limit is established to provide adequate assurance that the cycle specific fuel cladding integrity safety limit for that plant is not exceeded for any moderate frequency AOO [anticipated operational occurrences]. This operating requirement is obtained by addition of the maximum ΔCPR value for the most limiting AOO (including any imposed adjustment factors) from conditions postulated to occur at the plant to the cycle specific fuel cladding integrity safety limit.

2.4 Changes Based on TSTF-564, Revision 2

DTE proposed to revise the MCPR safety limit to make it cycle-independent, consistent with the method described in traveler TSTF-564, Revision 2. The current MCPR safety limit (also referred to as the $MCPR_{99.9\%}$) ensures that 99.9 percent of the fuel rods in the core are not susceptible to boiling transition. The revised MCPR safety limit ($MCRP_{95/95}$) would ensure that there is a 95-percent probability at a 95-percent confidence level that no fuel rods will be susceptible to boiling transition.

The proposed TS changes replace the value of the MCPR safety limit for Fermi 2 with the $MCPR_{95/95}$ value associated with the current fuel loading. Since the revised MCPR safety limit is no longer dependent on the number of recirculation loops in operation, Fermi 2 also proposed to eliminate the separate MCPR safety limit for single and two recirculation loop operation. These changes are shown in Table 1 below.

Table 1: Changes to the TS MCPR Safety Limit

Current TS	Proposed TS
Fermi 2 TS 2.1.1.2	
With the reactor steam dome pressure ≥ 785 psig* and core flow ≥ 10% rated core flow: MCPR shall be ≥ 1.08 for two recirculation loop operation or ≥ 1.09 for single recirculation loop operation.	With the reactor steam dome pressure ≥ 785 psig and core flow ≥ 10% rated core flow: MCPR shall be ≥ 1.07.

* The pressure units are pounds per square inch gauge (psig).

The $MCPR_{99.9\%}$ is also used to determine the MCPR operating limits in LCO 3.2.2. DTE did not propose any changes to the MCPR definition nor the methods for calculating the $MCPR_{99.9\%}$ and the MCPR operating limits. Rather, DTE proposed to change the TS requirements for the core operating limits report (COLR) to require the $MCPR_{99.9\%}$ value used in calculating the MCPR operating limits to be included in the cycle-specific COLR.

The $MCPR_{99.9\%}$ (i.e., the current MCPR safety limit) is used to determine the MCPR operating limit in Fermi 2 LCO 3.2.2, "Minimum Critical Power Ratio (MCPR)," for cycle specific COLR.

The $MCPR_{99.9\%}$ is also used to determine the MCPR operating limits in Fermi 2 LCO 3.2.2. DTE did not propose any changes to the MCPR definition nor the methods for calculating the $MCPR_{99.9\%}$ and the MCPR operating limits.

2.5 Regulatory Requirements and Guidance

The regulations in Title 10 of the *Code of Federal Regulations* (10 CFR) 50.36 "Technical specifications," establish the regulatory requirements related to the content of TSs. Section 50.36(a)(1) requires an applicant for an operating license to include proposed TSs. A summary statement of the bases or reasons for such specifications, other than those covering administrative controls, shall also be included in the application but shall not become part of the TSs.

Pursuant to 10 CFR 50.36, TSs for operating reactors are required to include items in the following five specific categories: (1) safety limits, limiting safety system settings, and limiting control settings; (2) LCOs; (3) surveillance requirements; (4) design features; and (5) administrative controls. Section 50.36(c)(1)(i)(A) of 10 CFR states, in part:

> Safety limits for nuclear reactors are limits upon important process variables that are found to be necessary to reasonably protect the integrity of certain of the physical barriers that guard against the uncontrolled release of radioactivity. If any safety limit is exceeded, the reactor must be shut down. The licensee shall notify the Commission, review the matter, and record the results of the review, including the cause of the condition and the basis for corrective action taken to preclude recurrence. Operation must not be resumed until authorized by the Commission.

In accordance with 10 CFR 50.36(c)(2), LCOs are the lowest functional capability or performance levels of equipment required for safe operation of the facility. When LCOs are not

met, the DTE shall shut down Fermi 2 or follow any remedial action permitted by the TSs until the LCO can be met. Paragraph 50.36(c)(5) of 10 CFR states that "[a]dministrative controls are the provisions relating to organization and management, procedures, recordkeeping, review and audit, and reporting necessary to assure operation of the facility in a safe manner."

Appendix A, "General Design Criteria (GDC) for Nuclear Power Plants," to 10 CFR Part 50 establishes the minimum requirements for the principal design criteria for water-cooled nuclear power plants. the GDC were originally published in the *Federal Register* (36 FR 12733) on February 20, 1971 and became effective on May 21, 1971. GDC 10, "Reactor design," states:

> The reactor core and associated coolant, control, and protection systems shall be designed with appropriate margin to assure that specified acceptable fuel design limits are not exceeded during any condition of normal operation, including the effects of anticipated operational occurrences.

Acceptance criteria for the NRC staff's review of fuel design limits is provided in Section 4.4, "Thermal and Hydraulic Design," Revision 2 (ADAMS Accession No. ML070550060), of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR [Light-Water Reactor] Edition" (SRP). This guidance provides the following two examples of acceptable approaches to meeting the SRP acceptance criteria for establishing fuel design limits:

A. For the departure from nucleate boiling ratio, critical heat flux ratio, or CPR correlations, there should be a 95-percent probability at the 95-percent confidence level that the hot rod in the core does not experience a departure from nucleate boiling or boiling transition condition during normal operation or anticipated operational occurrences.

B. The limiting (minimum) value of the departure from nucleate boiling ratio, critical heat flux ratio, or CPR correlations is to be established such that at least 99.9 percent of the fuel rods in the core will not experience a departure from nucleate boiling or boiling transition during normal operation or anticipated operational occurrences.

3.0 TECHNICAL EVALUATION

The proposed amendment is primarily based on the NRC-approved TSTF-564, Revision 2. The NRC staff's evaluation of the proposed amendments relies upon the staff's previous approval of the methodology and $MCPR_{95/95}$ safety limits for certain fuel types described in TSTF-564, Revision 2. The staff also considered the regulations and guidance discussed in Section 2.5 of this SE in its review. DTE identified that there was a numbering difference between the TSs for Fermi 2 and the BWR standard technical specifications,[2] upon which TSTF-564 is based. The NRC staff determined that these differences do not affect the applicability of TSTF-564.

---

[2] U.S. Nuclear Regulatory Commission, "Standard Technical Specifications, General Electric Plants BWR/4," NUREG-1433, Volume 1, "Specifications," and Volume 2, "Bases," Revision 4.0, April 2012 (ADAMS Accession Nos. ML12104A192 and ML12104A193).
U.S. Nuclear Regulatory Commission, "Standard Technical Specifications, General Electric Plants BWR/6," NUREG-1434, Volume 1, "Specifications," and Volume 2, "Bases," Revision 4.0, April 2012 (ADAMS Accession Nos. ML12104A195 and ML12104A196).

3.1 MCPR Safety Limit Calculation

As discussed in SE Section 2.3, the current MCPR safety limits (i.e., the $MCPR_{99.9\%}$ safety limits) for Fermi 2 are dependent on the cycle-specific core design, especially the core power distribution, fuel types, and the power-to-flow operating domain. As such, it is often necessary to change the MCPR safety limit to accommodate new core designs. Changes to the MCPR safety limit are usually determined late in the design process and necessitate an accelerated NRC review and approval of an amendment to support the subsequent fuel cycle.

DTE proposed to change the calculation for the MCPR safety limits so that they are no longer cycle dependent. The proposed bases for the MCPR safety limits align them with the departure from nucleate boiling ratio safety limit used in pressurized-water reactors, which ensures that no fuel rods will experience departure from nucleate boiling with a 95-percent probability at a 95-percent confidence level.

The proposed calculation for the revised MCPR safety limit is acceptable to the NRC staff as it is consistent with the SRP Section 4.4 acceptance criteria for establishing fuel design limits (see Example A in Section 2.5 of this SE).

3.2 Revised MCPR Safety Limit Calculational Method

As discussed in SE Section 2.2, the ECPR distribution is used to quantify the uncertainty associated with the critical power correlation. TSTF-564, Revision 2, provides the following formula for determining $MCPR_{95/95}$ for a given fuel type (i):

$$MCPR_{95/95}(i) = \mu_i + k_i\sigma_i$$

where μ_i is the mean ECPR and σ_i is the standard deviation of the ECPR distribution. The statistical parameter (κ_i) is selected, based on the number of samples in the critical power database, to provide the one-sided upper tolerance limit with a 95-probability at a 95-percent confidence level. This is a commonly used statistical formula to determine a one-sided upper tolerance limit for a normal distribution, which is appropriate for the situation under consideration. For reactor cores loaded with a single fuel type, the $MCPR_{95/95}$ safety limit is the $MCPR_{95/95}$(i) value for the fuel type.

In the SE approving TSTF-564, the NRC staff determined that the formula for determining $MCPR_{95/95}$ will appropriately establish a 95/95 upper tolerance limit on the critical power correlation and that any issues in the underlying correlation will be addressed through adjustments to the correlation mean and standard deviation, as necessary to ensure appropriate conservatism. Therefore, the NRC staff concluded that the proposed method of determining $MCPR_{95/95}$ can be used to establish acceptable fuel design limits.

3.3 Determination of Revised MCPR Safety Limit for Mixed Cores

Section 3.1 of TSTF-564, Revision 2, states, in part:

> For cores with a mix of fuel products, the corresponding [$MCPR_{95/95}$ safety limit] is based on the largest (i.e., most limiting) of the $MCPR_{95/95}$(i) values for the product lines that are fresh or once-burnt at the start of the cycle. The $MCPR_{95/95}$(i) values for product lines that are twice-burnt or more at the start of the cycle may

be ignored, as these higher exposure bundles operate with considerable MCPR margin relative to the more limiting fresh and once-burnt bundles.

Fuel that is twice-burnt or more has a probability of boiling transition that is very small compared to the limiting bundle and can be neglected in determining the safety limit. In its letter dated May 29, 2018 (ADAMS Accession No. ML18149A320) the TSTF provided results of a study that confirmed this is valid even for fuel operated on short (12-month) reload cycles. Fuel that is twice-burnt or more is included in the cycle-specific evaluation of the $MCPR_{99.9\%}$ and the MCPR operating limits. If a fuel bundle that is twice-burnt or more is found to be limiting, it would be governed by the MCPR operating limits, which will always be more restrictive than both the $MCPR_{95/95}$ safety limit and the $MCPR_{99.9\%}$ value.

The NRC staff reviewed the information provided by the TSTF and determined that the process for establishing the $MCPR_{95/95}$ safety limit for mixed cores to be acceptable. Specifically, the NRC staff found it acceptable, based on the information above, to determine the $MCPR_{95/95}$ safety limit for the core based on the most limiting value of the $MCPR_{95/95}$ for the fresh and once-burnt fuel in the core.

3.4 Relationship Between MCPR Safety and Operating Limits

As discussed in the TSTF, the current $MCPR_{99.9\%}$ safety limits are greater than the proposed $MCPR_{95/95}$ safety limits because (1) the $MCPR_{99.9\%}$ includes uncertainties not factored into the $MCPR_{95/95}$ and (2) even if these additional uncertainties are neglected, a statistical comparison shows that the $MCPR_{99.9\%}$ is more conservative than the $MCPR_{95/95}$. The level of conservatism in the $MCPR_{95/95}$ safety limit is appropriate because the lead fuel rod in the core (i.e., the limiting fuel rod for the MCPR) is used to evaluate whether any fuel rods in the core are susceptible to boiling transition. This is consistent with evaluations performed for pressurized-water reactors using a 95/95 upper tolerance limit on the correlation uncertainty as a safety limit.

Consistent with TSTF-564, Revision 2, the MCPR operating limit for LCO 3.2.2 would continue to be evaluated using the $MCPR_{99.9\%}$ as an input. The $MCPR_{99.9\%}$ will continue to be evaluated in the same way as it is currently, using the whole core.

Consistent with TSTF-564, Revision 2, Fermi 2 would continue to determine the MCPR operating limits for LCO 3.2.2 using the $MCPR_{99.9\%}$ as an input. DTE proposed to revise the COLR TSs (i.e., TS 5.6.5) to require the cycle-specific value of the $MCPR_{99.9\%}$ to be determined for the LCO for the MCPR operating limits and included in the COLR. DTE did not propose any changes to how it determines the $MCPR_{99.9\%}$. The analytical methods for determining $MCPR_{99.9\%}$ are included in the list of COLR references currently contained in the COLR TSs. These proposed changes to the COLR TSs will ensure that the uncertainties being removed from the MCPR safety limits are still included as part of the MCPR operating limits and will continue to appropriately inform plant operation. Therefore, the NRC staff concludes that the TSs for Fermi 2 would continue to provide appropriate administrative controls in accordance with 10 CFR 50.36(c)(5).

The NRC staff determined that, with the proposed changes, the TS safety limits for the MCPR will retain an adequate level of conservatism and the plant- and cycle-specific uncertainties will be appropriately retained in the MCPR operating limits. The $MCPR_{95/95}$ safety limit represents a lower limit on the value of the $MCPR_{99.9\%}$, because the $MCPR_{99.9\%}$ should always be higher since it accounts for numerous uncertainties that are not included in the $MCPR_{95/95}$.

3.5 Implementation of the Revised MCPR Safety Limit in the TSs

DTE proposed to replace the MCPR safety limit in the TS for Fermi 2 with the $MCPR_{95/95}$ safety limit associated with the current fuel loading. Since the revised MCPR safety limit is no longer dependent on the number of recirculation loops in operation, DTE also proposed to eliminate the separate MCPR safety limits for single and two recirculation loop operation. Table 1 of TSTF-564, Revision 2, states that the $MCPR_{95/95}$ safety limit is 1.06 for GE14 fuel and 1.07 for GNF3 fuel. As discussed in TSTF-564, Revision 2, the derivation of these values using the methodology described in the TSTF was provided to the NRC in a proprietary letter from the fuel vendor (ADAMS Package Accession No. ML18212A017).

DTE stated that Fermi 2 is currently fueled with GE14 fuel bundles and proposed to revise the TS MCPR safety limit to 1.07 consistent with Table 1 of TSTF-564, Revision 2. DTE stated:

> The Fermi 2 reactor is currently fueled with GE14 fuel bundles and will be fueled with GNF3 fuel bundles starting in the spring of 2020. The proposed Safety Limit in SL 2.1.1.2 is 1.07, consistent with Table 1 of TSTF-564 for Global Nuclear Fuel GNF3 fuel bundles. The larger (i.e., most limiting) safety limit of 1.07 for GNF3 was selected, consistent with TSTF-564 guidance for cores loaded with a mix of fuel types and to eliminate the need for a future license amendment request when Fermi 2 loads fresh GNF3 fuel into the reactor in 2020.

The NRC staff reviewed DTE's proposed TS changes to the MCPR safety limits for Fermi 2 to reflect the change to $MCPR_{95/95}$ safety limits. The staff found the proposed changes acceptable because they are consistent with TSTF-564, Revision 2, as approved by the NRC staff. In addition, DTE eliminated the separate MCPR safety limits for single and two recirculation loop operation as the $MCPR_{95/95}$ safety limits do not depend on the number of recirculation loops in operation. In addition, the proposed $MCPR_{95/95}$ safety limit values for Fermi 2 are consistent with the value in Table 1 of TSTF-564, Revision 2, for reactors fueled with GE 14 fuel. DTE also appropriately selected the more limiting $MCPR_{95/95}$ safety limit value for the mixed core of GE14 fuel currently in the reactor, and this value will also be appropriate for the full core of GE14 and GNF3 fuel planned for the 2020 refueling outage. Therefore, the NRC staff concludes that the proposed $MCPR_{95/95}$ safety limit for Fermi 2 is an acceptable fuel design limit, and 10 CFR 50.36(c)(1)(i)(A) will be met since the limit will reasonably protect the integrity of the fuel cladding to guard against the uncontrolled release of radioactivity.

5.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Michigan State official was notified on June 13, 2019, of the proposed issuance of the amendment. The State official had no comments.

6.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding

published in the *Federal Register* on April 9, 2019 (84 FR 14142). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

7.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributors: T. Brimfield and R. Anzalone

Date of issuance: November 5, 2019

SUBJECT: FERMI 2 - ISSUANCE OF AMENDMENT 214 RE: TECHNICAL SPECIFICATIONS TASK FORCE (TSTF) TSTF-564, "SAFETY LIMIT MINIMUM CRITICAL POWER RATIO" (EPID L-2019-LLA-0028) DATED NOVEMBER 5, 2019

DISTRIBUTION:
PUBLIC
PM File Copy
RidsACRS_MailCTR Resource
RidsNrrDSS Resource
RidsNrrDorlLpl3 Resource
RidsNrrDssSrxb Resource
RidsNrrPMFermi2 Resource
RidsNrrLASRohrer Resource
RidsRgn3MailCenter Resource
SGoetz, NRR
TBrimfield, NRR
RAnzalone, NRR

ADAMS Accession No. ML19189A004 ***by email**

OFFICE	NRR/DORL/LPL3/PM	NRR/DORL/LPL3/LA	NRR/DSS/SRXB	NRR/DSS/STSB/
NAME	SGoetz	SRohrer	JBorromeo	VCusumano
DATE	7/11/19	7/11/19	6/10/2019	9/11/2019
OFFICE	OGC – NLO*	NRR/DORL/LPL3/BC	NRR/DORL/LPL3/PM	
NAME	KGamin	NSalgado (SWall for)	SGoetz	
DATE	10/04/2019	11/05/19	11/05/19	

OFFICIAL RECORD COPY