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DTE Energy

10 CFR 50.90

January 10, 2012
NRC-12-0005

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington D C 20555-0001

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

Subject: Proposed License Amendment to Revise the Residual Heat Removal Suppression Pool Cooling Flow Rate in Technical Specification Surveillance Requirement 3.6.2.3.2

Pursuant to 10 CFR 50.90, Detroit Edison hereby proposes to amend the Fermi 2 Plant Operating License, Appendix A, Technical Specifications (TS), to revise the Residual Heat Removal (RHR) Suppression Pool Cooling Surveillance Requirement (SR) 3.6.2.3.2 flow requirement from greater than or equal to 10,000 gallons per minute (gpm) to greater than or equal to 9,250 gpm. This change is consistent with the RHR suppression pool cooling flow rate associated with the RHR heat exchanger minimum thermal performance requirements. Additionally, this proposed license amendment clarifies that SR 3.6.2.3.2 applies only to pumps required for meeting the Limiting Condition of Operation (LCO).

Enclosure 1 provides an evaluation of the proposed license amendment, including an analysis of the issue of significant hazards consideration using the standards of 10 CFR 50.92. Detroit Edison has concluded that the change proposed in this submittal does not result in a significant hazards consideration. Enclosure 2 provides a marked up page of the existing Technical Specifications to show the proposed change. Enclosure 3 provides a typed version of the affected Technical Specifications page with the proposed change incorporated. Enclosure 4 provides a copy of the current Technical Specification Bases page associated with this change for information only.

Detroit Edison has reviewed the proposed change against the criteria of 10 CFR 51.22 and has concluded that it meets the criteria provided in 10 CFR 51.22(c)(9) for a categorical exclusion from the requirements for an Environmental Impact Statement or an Environmental Assessment.

Detroit Edison requests NRC approval of this license amendment by January 15, 2013 with an implementation date within 60 days of NRC approval.

No new commitments are being made in this submittal.

In accordance with 10 CFR 50.91, a copy of this application, with attachments, is being provided to the designated Michigan State Official.

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

Sincerely,

Enclosures:

1. Evaluation of Proposed License Amendment
2. Markup of Existing TS Pages
3. Revised (Clean) TS Pages
4. Markup of Existing TS Bases Pages (For Information Only)

cc: NRC Project Manager
NRC Resident Office
Reactor Projects Chief, Branch 4, Region III
Regional Administrator, Region III
Supervisor, Electric Operators,
Michigan Public Service Commission

I, Joseph H. Plona, 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.

Joseph H. Plona
Joseph H. Plona
Site Vice President, Nuclear Generation

On this 10th day of January, 2012 before me personally appeared Joseph H. Plona, being first duly sworn and says that he executed the foregoing as his free act and deed.

ANGELA R CRONE
NOTARY PUBLIC - STATE OF MICHIGAN
COUNTY OF MONROE
My Commission Expires April 4, 2013

Angela R Crone
Notary Public

Enclosure 1 to
NRC-12-0005

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

Proposed License Amendment To Revise The
Residual Heat Removal Suppression Pool Cooling Flow Rate In Technical Specification
Surveillance Requirement 3.6.2.3.2

Evaluation Of The Proposed License Amendment

Evaluation of the Proposed License Amendment

1.0 Description

The proposed amendment would modify Fermi 2 Plant Operating License, Appendix A, Technical Specifications (TS) Surveillance Requirement (SR) 3.6.2.3.2 in TS 3.6.2.3, "RHR Suppression Pool Cooling." This proposed amendment would align the Residual Heat Removal (RHR) Suppression Pool Cooling flow rate in the SR with the required flow associated with the RHR heat exchanger minimum thermal performance requirements as defined in the plant design basis documents. This change is requested to increase the operating margin to the RHR Suppression Pool Cooling SR. This proposed amendment also clarifies that SR 3.6.2.3.2 applies only to RHR pumps required for meeting Limiting Condition of Operation (LCO) 3.6.2.3.

2.0 Proposed Change

Current Fermi 2 TS Surveillance Requirement 3.6.2.3.2 requires verifying that each RHR pump develops a flow through the associated heat exchanger while operating in the Suppression Pool Cooling mode. The proposed SR flow value is revised from greater than or equal to 10,000 gallons per minute (gpm) to greater than or equal to 9,250 gpm.

Additionally, the SR 3.6.2.3.2 wording "Verify each RHR pump develops a flow…" would be revised to "Verify each required RHR pump develops a flow…" to clarify that the SR only applies to RHR pumps that are required for a suppression pool cooling subsystem to be OPERABLE.

3.0 Background

Following a Design Basis Accident (DBA), the RHR Suppression Pool Cooling System removes heat from the suppression pool. The suppression pool is designed to absorb the sudden input of heat from the primary system. In the long term, the pool continues to absorb residual heat generated by fuel in the reactor core. Pursuant to 10 CFR 50, Appendix A, General Design Criteria (GDC) 38, a means must be provided to remove heat from the suppression pool so that the temperature inside the primary containment remains within design limits. This function is provided by two redundant RHR suppression pool cooling subsystems.

Each RHR suppression pool cooling subsystem takes suction from the suppression pool, pumps the water through the associated divisional RHR heat exchanger and returns the water to the suppression pool via the divisional RHR test return lines. Portions of the supply piping are also used in supporting the higher flow requirements of the Low Pressure Coolant Injection function of the RHR and are necessarily of large diameter. In order to maintain the flow through the RHR heat exchanger within the design maximum values, the RHR suppression pool cooling test return piping is fitted with multi-stage orifices sized to deliver flow near to the current 10,000 gpm suppression pool cooling subsystem flow requirement. While the heat transfer capacity of each RHR heat exchanger has significant demonstrated margin, typical recorded flow results for TS SR 3.6.2.3.2 are near this required value. Because the Suppression Pool Cooling System return lines were designed to deliver approximately 10,000 gpm and the TS SR requires the same 10,000 gpm, the SR currently specified in the TS is not able to make use of other system margins to optimize flow testing margins.

Additionally, it was identified in the corrective action program that the calibration of the flow element used to measure RHR flow is based on higher post-accident fluid temperatures during testing. As a result, indicated flows during surveillance tests performed under cooler test fluid conditions are biased upwards by approximately 200 gpm. Correction for the known calibration bias effectively eliminates all remaining operating margin to the TS SR required minimum flow.

Although the TS SR requires a measured flow of 10,000 gpm, the analytical requirement has been established based on 9,250 gpm. System performance relative to the proposed SR flow is sufficient to account for factors such as test instrument uncertainty, allowed pump degradation, and Emergency Diesel Generator (EDG) frequency tolerances. The requested change to TS SR 3.6.2.3.2 to a flow value of greater than or equal to 9,250 gpm is consistent with demonstration that the identified design and operating considerations are satisfied without unnecessarily challenging operability under the Technical Specifications.

Each of the two divisions of the RHR system contains two pumps and one heat exchanger. The two suppression pool cooling subsystems perform the suppression pool cooling function by circulating water from the suppression pool through the RHR heat exchangers and returning it to the suppression pool. RHR Service Water (RHRSW), circulating through the tube side of the heat exchangers, exchanges heat with the suppression pool water and discharges this heat to the RHR reservoir, the Fermi 2 ultimate heat sink.

The heat removal capability of a single RHR pump in a single suppression pool cooling subsystem is sufficient to meet the overall post-accident suppression pool cooling requirements. The LCO section of TS 3.6.2.3 Bases states that an RHR suppression pool cooling subsystem is OPERABLE when one of the pumps, the heat exchanger, and associated piping, valves, instrumentation, and controls are OPERABLE. Although each RHR suppression pool cooling subsystem requires only one pump to meet the post-accident cooling requirement, the current wording in SR 3.6.2.3.2 requires verifying that each pump achieves the specified flow to meet the SR. Failure of one pump in one subsystem to meet the SR in Modes 1, 2 or 3 would imply that LCO 3.6.2.3 is not met.

4.0 Technical Analysis

Following a DBA, the RHR Suppression Pool Cooling System removes heat from the suppression pool. The suppression pool is designed to absorb the sudden input of heat from the primary system as the reactor pressure vessel is depressurized. In the long term, the pool continues to absorb residual heat generated by fuel in the reactor core. RHR suppression pool cooling is the means provided to remove heat from the suppression pool so that the temperature inside the primary containment remains within design limits.

The post DBA-Loss of Coolant Accident (LOCA) long-term suppression pool temperature response analyzed using the approved General Electric-Hitachi SHEX model yields a peak post DBA/LOCA pool temperature of 196.5°F. This temperature shows that margin remains to the controlling limit of 198°F. RHR system thermal performance in SHEX is represented by a single coefficient (referred to as the K-factor) having units of btu/sec/°F multiplied by the difference in the inlet temperatures between RHR and RHRSW fluids. The heat removed from the suppression pool varies with the changing temperature profiles of RHR and RHRSW.

The ability to achieve the specified K-factor is a function of the physical characteristics of the RHR heat exchanger (i.e. number and dimensions of the tubes and shell-side configuration) and fluid operating conditions (i.e. overall unit fouling, fluid temperatures, and specified RHR and RHRSW flow rates). Actual Fermi 2 RHR heat exchanger thermal performance is periodically evaluated against the minimum thermal performance assumed in the containment analysis. Each one of the two divisional RHR heat exchangers is tested every other refueling outage while operating in the RHR system shutdown cooling mode. Testing consists of measuring heat exchanger inlet and outlet fluid temperatures and flows and using these results to determine an overall heat exchanger performance (fouling factor) based on standard heat exchanger modeling methods. This fouling factor is used to extrapolate unit thermal performance to specified design accident conditions to demonstrate that the heat exchanger meets the minimum required thermal performance needed to satisfy the containment cooling safety analysis.

Currently, measured RHR heat exchanger thermal performance is extrapolated to the following accident conditions:

Process Stream	**RHR (Shell Side)**	**RHRSW (Tube Side)**
Fluid Quantity, Total (GPM)	9,250	8,250
Number of Active Tubes (design assumes 51 tubes plugged)	N/A	1015
Design Q (MBTU/hr)	147.6	147.6
Inlet Temperature (°F)	196.5	89.0

These conditions impose a minimum required thermal performance greater than that assumed in the original containment safety analysis, and thereby allow for less shell side flow with no loss in the design rate of heat exchange. Whereas the original RHR heat exchanger design was based on nominal RHR flow of 10,000 gpm and RHRSW flow of 9,000 gpm, the test extrapolation assumes reduced heat exchanger flows that have the effect of imposing a stricter control on overall unit fouling in order to meet the required minimum thermal performance. This license amendment proposes that the flow rate requirement in TS SR 3.6.2.3.2 be reduced from greater than or equal to 10,000 gpm to greater than or equal to 9,250 gpm, consistent with the value assumed for extrapolation of measured thermal performance to accident conditions.

In practice the acceptance criteria in the procedure used to perform this surveillance test must include corrections to account for allowable pump degradation, EDG frequency tolerance, test instrument accuracy, and temperature-flow bias, such that the ability to meet the TS SR required value is always assured under accident conditions. Therefore, the surveillance procedure acceptance criterion used to demonstrate compliance with the proposed TS SR value of 9,250 gpm is necessarily greater than 9,250 gpm and is defined in the RHR system hydraulic design basis documentation.

This evaluation provides the technical basis to support a revision of Fermi 2 TS SR 3.6.2.3.2 to reduce the required flow that each required RHR pump operating in suppression pool cooling must provide from greater than or equal to 10,000 gpm to greater than or equal to 9,250 gpm. The containment analysis is not impacted because the reduced flow rate is consistent with that assumed for analysis during periodic verification of actual RHR heat exchanger thermal performance against the minimum performance assumed in the analysis of maximum post-accident suppression pool temperature.

The proposed change in the wording of the SR from "each RHR pump" to "each required RHR pump" is justified based on the definition of each subsystem of the RHR Suppression Pool Cooling System in TS 3.6.2.3.2 Bases. This change will restore consistency with the requirement for OPERABILITY of a subsystem as defined in the TS Bases.

Several Boiling Water Reactors (BWRs) have TS SR 3.6.2.3.2, already worded with "each required RHR pump," such as:

- James A. Fitzpatrick Nuclear Power Plant
- Dresden Generating Station, Units 2 and 3
- Edwin I. Hatch Nuclear Plant, Units 1 and 2
- LaSalle County Generating Station, Units 1 and 2
- Monticello Nuclear Generating Plant
- Nine Mile Point Nuclear Station, Unit 2
- Peach Bottom Atomic Power Station, Units 2 and 3
- Quad Cities Generating Station, Units 1 and 2

5.0 Regulatory Safety Analysis

5.1 No Significant Hazards Consideration

In accordance with 10 CFR 50.92, Detroit Edison has made a determination that the proposed amendment involves no significant hazards consideration. The proposed change to the RHR suppression pool cooling pump required flow in Technical Specification (TS) Surveillance Requirement (SR) 3.6.2.3.2 from greater than or equal to 10,000 gallons per minute (gpm) to greater than or equal to 9,250 gpm and the change in the applicability of the surveillance to each required RHR pump does not involve a significant hazards consideration for the following reasons:

1. The proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

   The proposed TS SR 3.6.2.3.2 minimum flow of greater than or equal to 9,250 gpm is consistent with that assumed for accident extrapolation calculations of measured thermal performance obtained during RHR heat exchanger testing. This testing is performed to periodically demonstrate that the actual heat exchanger thermal performance exceeds that assumed for establishing the maximum post-accident bulk average suppression pool temperature. Therefore, the change in required RHR suppression pool cooling flow will not result in any increase in post-accident suppression pool temperature above that already evaluated for demonstrating adequate Net Pump Suction Head (NPSH) for any Emergency Core Cooling System (ECCS) pump. The change in the applicability of the surveillance to each required RHR pump provides consistency with the design of the system and maintains full capability of each RHR suppression pool cooling subsystem to provide post accident design basis cooling.

   Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. The proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

   The proposed change revises TS SR 3.6.2.3.2 for RHR suppression pool cooling flow to be consistent with that assumed for evaluating measured heat exchanger thermal performance against the minimum requirements of the plant safety analysis. Changing the applicability of the surveillance to each required RHR pump is consistent with the system design requirement and maintains full capability of each RHR suppression pool cooling subsystem to provide the post accident cooling function. No physical changes are being made to the installed RHR system or the manner in which it is operated. No new or different accident scenarios are created by this change.

   Therefore, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. The proposed change does not involve a significant reduction in the margin of safety.

   The RHR system has historically been capable of meeting TS SR 3.6.2.3.2. This Surveillance requires demonstration of a system flow, in conjunction with a prescribed RHR heat exchanger capacity that ensures the overall suppression pool cooling capacity meets the requirements of the safety analysis. However, the lack of available operating margin inherent in the design orifices of the RHR suppression pool cooling test return line and identification of a non-conservative bias in the test flow instrument calibration have eroded the flow test margin such that it is possible that the TS SR may not be satisfied in the future even though a large margin is maintained compared to the minimum performance assumed in the containment safety analyses. The proposed change makes the margin between TS SR 3.6.2.3.2 and the performance assumed in the plant safety analyses available as a design and operating margin. This is ensured by establishing a higher level of required heat exchanger performance, where ample margin is available. Heat exchanger testing is conducted in accordance with existing testing standards as prescribed by EPRI TR-107397, Service Water Heat Exchanger Testing Guidelines. The minimum required flow rate necessary to satisfy RHR suppression pool cooling TS SR 3.6.2.3.2 will be documented in the plant design basis with the minimum required flow adjusted upward as necessary to account for instrument uncertainty and bias as well as differences between assumed accident and actual test operating conditions.

The change in the applicability of the surveillance to each required RHR pump is consistent with the design basis of the plant and maintains full capability of the system to provide its safety related cooling function following a design basis accident. Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, Detroit Edison has determined that the proposed license amendment does not involve a significant hazards consideration.

5.2 Applicable Regulatory Requirements

The design of the containment heat removal system is required to meet the requirements of 10 CFR 50 Appendix A, General Design Criterion (GDC) 38, "Containment Heat Removal."

> A system to remove heat from the reactor containment shall be provided. The system safety function shall be to reduce rapidly, consistent with the functioning of other associated systems, the containment pressure and temperature following any loss-of-coolant accident and maintain them at acceptably low levels.

In the event of a Loss of Coolant Accident (LOCA) within the reactor containment, the pressure suppression system will rapidly condense the steam to prevent containment overpressure. The containment feature of pressure suppression employs two separate compartmented sections of the primary containment: the drywell that houses the nuclear system and the suppression chamber containing a large volume of water. Any increase in pressure in the drywell from a leak in the nuclear system is relieved below the surface of the suppression chamber water pool by connecting vent lines, thereby condensing steam being released to the drywell. Any pressure buildup in the suppression chamber is equalized with the drywell by a vent line and vacuum breaker arrangement. Cooling systems remove heat from the reactor core, the drywell, and water in the suppression pool during accident conditions. Thus, continuous cooling of the primary containment is provided.

The Emergency Core Cooling System (ECCS) is actuated to provide core cooling in the event of a LOCA. Low water level in the reactor pressure vessel or high pressure in the drywell will initiate the ECCS to prevent excessive fuel temperature. Sufficient water is provided in the suppression pool to accommodate the initial energy that can transiently be released into the drywell from the postulated pipe failure.

The suppression chamber is sized to contain this water, in addition to the water displaced from the reactor primary system, together with the free air initially contained in the drywell.

Either or both RHR suppression pool cooling subsystems, which include the heat exchangers, can be manually activated to remove energy from the containment. The redundancy and capability of the offsite and onsite electric power systems to provide power for the RHR system are presented in the Criterion 34, "Conformance Evaluation," and provide assurance that system safety functions can be accomplished.

6.0 Environmental Considerations

Detroit Edison has reviewed the proposed change against the criteria of 10 CFR 51.22 for environmental considerations. The proposed change does not involve a significant hazards consideration, nor does it significantly change the types or significantly increase the amounts of effluents that may be released offsite. The proposed change does not significantly increase individual or cumulative occupational radiation exposures. Based on the foregoing, Detroit Edison concludes that the proposed change meets the criteria provided in 10 CFR 51.22(c)(9) for a categorical exclusion from the requirements for an Environmental Impact Statement or an Environmental Assessment.

Enclosure 2 to
NRC-12-0005

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

Proposed License Amendment To Revise The
Residual Heat Removal Suppression Pool Cooling Flow Rate In Technical Specification
Surveillance Requirement 3.6.2.3.2

Marked-Up TS Page

3.6-34

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.2.3.1	Verify each RHR suppression pool cooling subsystem manual, power operated, and automatic valve in the flow path that is not locked, sealed, or otherwise secured in position is in the correct position or can be aligned to the correct position.	31 days
SR 3.6.2.3.2	Verify each required RHR pump develops a flow rate ≥ ~~10,000~~ 9,250 gpm through the associated heat exchanger while operating in the suppression pool cooling mode.	In accordance with the Inservice Testing Program

Enclosure 3 to
NRC-12-0005

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

Proposed License Amendment To Revise The
Residual Heat Removal Suppression Pool Cooling Flow Rate In Technical Specification
Surveillance Requirement 3.6.2.3.2

Clean TS Page

3.6-34

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.2.3.1	Verify each RHR suppression pool cooling subsystem manual, power operated, and automatic valve in the flow path that is not locked, sealed, or otherwise secured in position is in the correct position or can be aligned to the correct position.	31 days
SR 3.6.2.3.2	Verify each required RHR pump develops a flow rate ≥ 9,250 gpm through the associated heat exchanger while operating in the suppression pool cooling mode.	In accordance with the Inservice Testing Program

Enclosure 4 to
NRC-12-0005

Fermi 2 NRC Docket No. 50-341
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Proposed License Amendment To Revise The
Residual Heat Removal Suppression Pool Cooling Flow Rate In Technical Specification
Surveillance Requirement 3.6.2.3.2

TS Bases Page
(For Information Only)

B 3.6.2.3-4

BASES

SURVEILLANCE REQUIREMENTS (continued)

manually initiated. This SR does not require any testing or valve manipulation; rather, it involves verification that those valves capable of being mispositioned are in the correct position. This SR does not apply to valves that cannot be inadvertently misaligned, such as check valves.

The Frequency of 31 days is justified because the valves are operated under procedural control, improper valve position would affect only a single subsystem, the probability of an event requiring initiation of the system is low, and the subsystem is a manually initiated system. This Frequency has been shown to be acceptable based on operating experience.

required

9,250

SR 3.6.2.3.2

Verifying that each RHR pump develops a flow rate ≥ ~~10,000~~ gpm while operating in the suppression pool cooling mode with flow through the associated heat exchanger ensures that pump performance has not degraded during the cycle. Flow is a normal test of centrifugal pump performance required by ASME Code, Section XI (Ref. 2). This test confirms one point on the pump design curve, and the results are indicative of overall performance. Such inservice inspections confirm component OPERABILITY, trend performance, and detect incipient failures by indicating abnormal performance. The Frequency of this SR is in accordance with the Inservice Testing Program.

REFERENCES

1. UFSAR, Section 6.2.

2. ASME, Boiler and Pressure Vessel Code, Section XI.