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TS 5.6.6
10 CFR 50.46

April 27, 2016
NRC-16-0026

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

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

Subject: Submittal of 2015 Safety Relief Valve Challenge Report,
Main Steam Bypass Lines Report, and ECCS Cooling
Performance Evaluation Model Changes or Errors Report

The Fermi 2 Technical Specifications (TS) contain a requirement for submitting an annual report for safety relief valve challenges (TS 5.6.6). Enclosure 1 provides the Safety Relief Valve Challenge Report for 2015.

Enclosure 2 provides the Service Life of the Main Steam Bypass Lines Report for 2015. This satisfies the commitment stated in Detroit Edison's letter to the NRC dated November 7, 1986 (VP-86-0154).

Enclosure 3 provides the Emergency Core Cooling System (ECCS) Cooling Performance Evaluation Model Changes or Errors Report for 2015. This report is provided in accordance with 10 CFR 50.46(a)(3)(ii).

No new commitments are being made in this submittal.

Should you have any questions or require additional information, please contact me at (734) 586-5076.

Sincerely,

A handwritten signature in dark ink that reads "Scott A. Maglio". The signature is written in a cursive style with a large, sweeping flourish at the end.

Scott A. Maglio
Manager – Nuclear Licensing

Enclosures:

1. Safety Relief Valve Challenge Report 2015
2. Service Life of Main Steam Bypass Lines Report 2015
3. ECCS Cooling Performance Evaluation Model Changes or Errors Report 2015

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

**Enclosure 1 to
NRC-16-0026**

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

Safety Relief Valve Challenge Report 2015

Safety Relief Valve Challenges (January 1, 2015 to December 31, 2015)

On September 13, 2015, a reactor scram occurred from full power due to a loss of Turbine Building Closed Cooling Water (TBCCW). The loss of TBCCW tripped all Station Air Compressors, which caused Instrument Air header pressure to degrade and resulted in the manual closure of the Main Steam Isolation Valves (MSIVs). During the response to this event, all Safety Relief Valves (SRVs) were cycled. The SRVs did not open due to exceeding lift pressure, but were manually operated to control pressure. There were 303 total SRV cycles. The number of cycles for each SRV are given below. For each SRV, the cycles occurred between approximately 2300 hours on September 13, 2015 and approximately 1400 hours on September 15, 2015, and are based upon data from the Sequence of Events Recorder (SOER).

- SRV B2104F013A cycled 1 time
- SRV B2104F013B cycled 44 times
- SRV B2104F013C cycled 32 times
- SRV B2104F013D cycled 46 times
- SRV B2104F013E cycled 10 times
- SRV B2104F013F cycled 32 times
- SRV B2104F013G cycled 5 times
- SRV B2104F013H cycled 17 times
- SRV B2104F013J cycled 14 times
- SRV B2104F013K cycled 29 times
- SRV B2104F013L cycled 4 times
- SRV B2104F013M cycled 29 times
- SRV B2104F013N cycled 11 times
- SRV B2104F013P cycled 17 times
- SRV B2104F013R cycled 12 times

No other SRV challenges occurred during 2015.

**Enclosure 2 to
NRC-16-0026**

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

Service Life of Main Steam Bypass Lines Report 2015

Service Life of Main Steam Bypass Lines (through December 31, 2015)

In accordance with Detroit Edison's letter to the NRC dated November 7, 1986 (VP-86-0154), the cumulative time the main steam bypass lines are operated with the bypass valves between 30 and 45 percent open will be reported annually. A cumulative value of 100 days is not to be exceeded without prior NRC notification.

As discussed in Detroit Edison's letter number VP-86-0154, the bypass lines are acceptable for safe operation when operated within the 100 day constraint.

As of December 31, 2015, the main steam bypass lines cumulative usage was 46.44 days.

**Enclosure 3 to
NRC-16-0026**

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

ECCS Cooling Performance Evaluation Model Changes or Errors Report 2015

Emergency Core Cooling System (ECCS) Cooling Performance Evaluation Model - Analysis of Record

On June 23, 2008, DTE Energy submitted a re-analysis of the SAFER/GESTR Loss of Coolant Accident (LOCA) (Reference 1). This re-analysis established a new licensing basis Peak Clad Temperature (PCT) of 1990°F which was associated with the Upper Bound analysis of the limiting small break LOCA.

ECCS Cooling Performance Evaluation Model Changes or Errors

Since the time of the submittal of the analysis of record identified above, General Electric - Hitachi (GEH) and Global Nuclear Fuel (GNF) have issued notifications which indicated that changes had been made in the ECCS-LOCA analyses inputs that affect Fermi 2. The notification letters below affect the Licensing Basis PCT for GNF 10x10 fuel type used at Fermi 2.

2008-01	November 25, 2008	Reference 2
2011-02	July 20, 2011	Reference 3
2011-03	July 20, 2011	Reference 4
2012-01	November 29, 2012	Reference 8
2013-01	January 15, 2013	Reference 9
2014-01	May 21, 2014	Reference 12
2014-02	May 21, 2014	Reference 13
2014-03	May 21, 2014	Reference 14
2014-04	May 21, 2014	Reference 15

Additionally, DTE Energy determined that the Low Pressure Coolant Injection (LPCI) pump performance curve used in Reference 1 to predict LPCI injection flow as a function of Reactor Pressure Vessel pressure was potentially non-conservative in that it did not allow for normal component degradation near pump shutoff consistent with that allowed under the design at rated flow conditions. Therefore, a design provision for degradation near shutoff was made and the impact on the limiting analyses was performed and documented in Reference 5. The net estimated impact on the analysis of record associated with this condition and the 2008 and 2011 notifications was reported in accordance with 10 CFR 50.46 on August 19, 2011 (Reference 6) and again in the annual reports issued on April 26, 2012 (Reference 7). GNF notifications, 2012-01 (Reference 8) and 2013-01 (Reference 9), which occurred subsequent to these communications were reported in accordance with 10 CFR 50.46 in the annual reports issued on April 26, 2013 (Reference 10).

A tabulated summary of the impacts of all errors is provided on the following page.

Current LOCA Model Assessment for GE14 Fuel

Description	GE14 PCT
10CFR 50.46 Baseline Licensing Basis PCT (Reference 5)	PCT = 1990°F
10 CFR 50.46 Notification Letter 2008-01 dated November 25, 2008, Impact of Steam Flow Induced Error on Level 3 Setpoint for Small Break LOCA Analysis	Δ PCT = 5°F
10 CFR 50.46 Notification Letter 2011-02 dated July 20, 2011, Impact of Database Error for Heat Deposition on the Peak Cladding Temperature (PCT) for 10x10 fuel bundles	Δ PCT = 40°F
10 CFR 50.46 Notification Letter 2011-03 dated July 20, 2011, Impact of Updated Formulation for Gamma Heat Deposition to Channel Wall for 9x9 and 10x10 Fuel Bundles	Δ PCT = -15°F
Self-identified non-conservative assumption regarding LPCI pump degradation at shutoff pressure (Reference 5)	Δ PCT = 57°F
10 CFR 50.46 Notification Letter 2012-01 dated November 29, 2012, PRIME Fuel Properties Implementation for Fuel Rod T/M Performance, replacing GESTR Fuel Properties	Δ PCT = 0°F
10 CFR 50.46 Notification Letter 2013-01 dated January 15, 2013, Low Pressure Core Spray (LPCS) injection to the vessel based on a quadratic pump curve	Δ PCT = 30°F
10 CFR 50.46 Notification Letter 2014-01 dated May 21, 2014, SAFER04A E4-Maintenance Update Changes	Δ PCT = 0°F
10 CFR 50.46 Notification Letter 2014-02 dated May 21, 2014, SAFER04A E4-Mass Non-Conservatism	Δ PCT = 10°F
10 CFR 50.46 Notification Letter 2014-03 dated May 21, 2014, SAFER04A E4-Minimum Core DP Model	Δ PCT = -10°F
10 CFR 50.46 Notification Letter 2014-04 dated May 21, 2014, SAFER04A E4-Bundle/Lower Plenum CCFL Head	Δ PCT = 5°F
Net PCT	PCT = 2112°F

While the net PCT of 2112°F provides a 88°F margin to the 2200°F PCT limit in 10 CFR 50.46, this result is based on a core power assumed to correspond to extended power uprate values of 3952 MWth (Nominal)/4031 MWth (Appendix K). This is greater than the Fermi 2 current licensed thermal power of 3486 MWth (Reference 11). As such, there is additional margin that is not represented in the results above.

DTE Energy has received a re-baseline of the current analysis of record from GEH using SAFER/PRIME methodology that includes incorporation of the above listed corrections and changes. The revised baseline assumes a core thermal power that more closely corresponds to the current licensed thermal power. DTE Energy is in the process of developing the documentation to officially adopt the results of this analysis into the plant design basis. This new analysis will be transmitted to the NRC upon completion of these activities.

References

1. Detroit Edison Letter to USNRC, "Submittal of Plant Specific Emergency Core Cooling System (ECCS) Evaluation Model Reanalysis," NRC-08-0046, dated June 23, 2008. (ML081830408)
2. General Electric-Hitachi, "10 CFR 50.46 Notification Letter 2008-01, Revision 1," dated November 25, 2008.
3. General Electric-Hitachi, "10 CFR 50.46 Notification Letter 2011-02," dated July 20, 2011.
4. General Electric-Hitachi, "10 CFR 50.46 Notification Letter 2011-03," dated July 20, 2011.
5. Evaluation Report - GEH Report No. 0000-0121-0144-R1, "DTE Energy Enrico Fermi 2 - Reduced LPCI Flow GE11 and GE14 ECCS-LOCA Evaluation," dated July 2010 (GEH Proprietary).
6. Detroit Edison Letter to USNRC, "30-Day 10 CFR 50.46 Report - Plant Specific ECCS Evaluation Change," NRC-11-0042, dated August 19, 2011. (ML112340598)
7. Enclosure 3 of Detroit Edison Letter to USNRC, "Submittal of 2011 Safety Relief Valve Challenge Report, Main Steam Bypass Line Report, and ECCS Cooling Performance Evaluation Model Changes or Errors Report," NRC-12-0025, dated April 26, 2012. (ML12118A147)
8. General Electric-Hitachi, "10 CFR 50.46 Notification Letter 2012-01," dated November 29, 2012.
9. General Electric-Hitachi, "10 CFR 50.46 Notification Letter 2013-01," dated January 15, 2013.
10. Enclosure 3 of DTE Letter to USNRC, "Submittal of 2012 Safety Relief Valve Challenge Report, Main Steam Bypass Line Report, and ECCS Cooling Performance Evaluation Model Changes or Errors Report," NRC-13-0017, dated April 26, 2013. (ML13119A106)
11. USNRC Letter, "Fermi 2 - Issuance of Amendment Re: Measurement Uncertainty Recapture Power Uprate (TAC NO. MF0650)," dated February 10, 2014. (ML13364A131)
12. General Electric-Hitachi, "10 CFR 50.46 Notification Letter 2014-01," dated May 21, 2014.

13. General Electric-Hitachi, "10 CFR 50.46 Notification Letter 2014-02," dated May 21, 2014.
14. General Electric-Hitachi, "10 CFR 50.46 Notification Letter 2014-03," dated May 21, 2014.
15. General Electric-Hitachi, "10 CFR 50.46 Notification Letter 2014-04," dated May 21, 2014.
16. Enclosure 3 of DTE Letter to USNRC, "Submittal of 2013 Safety Relief Valve Challenge Report, Main Steam Bypass Line Report, and ECCS Cooling Performance Evaluation Model Changes or Errors Report," NRC-14-0030, dated April 28, 2014.
(ML14118A274)
17. Enclosure 3 of DTE Letter to USNRC, "Submittal of 2014 Safety Relief Valve Challenge Report, Main Steam Bypass Line Report, and ECCS Cooling Performance Evaluation Model Changes or Errors Report," NRC-15-0043, dated April 28, 2015.
(ML15118A554)