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

October 1, 2010

Mr. Jack M. Davis
Senior Vice President and
Chief Nuclear Officer
Detroit Edison Company
Fermi 2 - 210 NOC
6400 North Dixie Highway
Newport, MI 48166

SUBJECT: RELIEF REQUEST RR-A36 FOR FERMI 2 RE: EVALUATION OF ALTERNATIVE PRESSURE TESTING REQUIREMENTS FOR THE REACTOR PRESSURE VESSEL FLANGE LEAK-OFF PIPING (TAC NO. ME3118)

Dear Mr. Davis:

By letter dated January 20, 2010, Detroit Edison (the licensee), submitted Relief Request number RR-A36 related to the American Society of Mechanical Engineers *Boiler and Pressure Vessel Code* (ASME Code), Section XI requirements for the third 10-year interval inservice inspection (ISI) program for the Fermi Nuclear Power Plant, Unit 2 (Fermi 2). In RR-A36, the licensee requested relief from performing an end of interval system leakage test of the reactor pressure vessel flange seal leak detection piping at the ASME Code-required test pressure corresponding to 100 percent rated reactor power

The Nuclear Regulatory Commission (NRC) staff has reviewed the submittal and determined that compliance to Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Therefore, pursuant to Title 10 of the *Code of Federal Regulations* 50.55a(a)(3)(ii), the NRC staff authorizes the ISI program alternatives proposed in RR-A36 for the third 10-year ISI interval of the Fermi 2, which began on May 2, 2009, and is scheduled to end on May 1, 2019. The NRC staff review and evaluation is contained in the enclosed safety evaluation.

If you have any questions, please contact Mahesh Chawla of my staff at (301) 415-8371.

Sincerely,

Robert J. Pascarelli, Branch Chief
Plant Licensing Branch III-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-341

Enclosure: Safety Evaluation

cc w/encl: Distribution via ListServ

UNITED STATES
NUCLEAR REGULATORY COMMISSION
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

FOR THE THIRD 10-YEAR INSERVICE INSPECTION INTERVAL

RELIEF REQUEST RR-A38

FERMI 2

DETROIT EDISON

DOCKET NUMBER 50-341

1.0 INTRODUCTION

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed and evaluated the information provided by Detroit Edison (the licensee) in its letter dated January 20, 2010 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML100220171), related to the American Society of Mechanical Engineers *Boiler and Pressure Vessel Code* (ASME Code), Section XI requirements for the third 10-year interval inservice inspection (ISI) program for the Fermi Nuclear Power Plant, Unit 2 (Fermi 2). In RR-A36, the licensee requested relief from performing the system leakage test of the reactor pressure vessel (RPV) flange seal leak detection system at the ASME Code-required test pressure corresponding to 100 percent rated reactor power. This relief is requested for the third 10-year ISI interval which began on May 2, 2009 and is scheduled to end on May 1, 2019.

2.0 REGULATORY REQUIREMENTS

Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(g) requires that ISI of ASME Code Class 1, 2, and 3 components be performed in accordance with Section XI of the ASME Code and applicable addenda, except where specific written relief has been granted by the NRC pursuant to 10 CFR 50.55a(g)(6)(i). According to 10 CFR 50.55a(a)(3), alternatives to the requirements of paragraph 50.55a(g) may be used, when authorized by the NRC if an applicant demonstrates that the proposed alternatives would provide an acceptable level of quality and safety or if the specified requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection (ISI) of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that ISI of components and system pressure tests conducted during the first

Enclosure

10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b) 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The ISI Code of Record for the third 10-year inservice inspection interval for the Fermi 2 is the 2001 Edition of the ASME Code, Section XI through 2003 Addenda.

3.0 TECHNICAL EVALUATION

System/Component(s) for Which Relief is Requested

Reactor Pressure Vessel (RPV) Flange Seal Leak Detection Piping

ASME Code Requirements

Table IWB-2500-1, Code Category B-P, Item Number 15.10 requires that all Class 1 pressure retaining components be visually (VT-2) examined during system leakage test conducted during each refueling outage. IWB-5221(a) states that the system leakage test be conducted at a pressure not less than the pressure corresponding to 100 percent rated reactor power. In IWB - 5222(b), the pressure retaining boundary during the system leakage test conducted at or near the end of each inspection interval is required to extend to all Class 1 pressure retaining components within the system boundary.

Licensee's Request for Relief

Relief is requested from performing the system leakage test at a pressure corresponding to nominal operating pressure during system operation. The licensee proposed an alternative pressure testing requirement in lieu of the system leakage test required under IWB-5221(a) for the RPV flange seal leak detection piping.

Licensee's Basis for Requesting Relief

The RPV flange seal leak detection piping is separated from the reactor pressure boundary by one passive membrane, which is an O-ring, located on the vessel flange. A second O-ring is located on the opposite side of the tap in the vessel flange. This piping is required during plant operation in order to indicate failure of the inner flange seal O-ring. Failure of the O-ring would result in the annunciation of an alarm in the Control Room. Failure of the inner O-ring is the only condition under which this line is pressurized. If the annunciator ceases to be in alarm, it would indicate that the outer O-ring or the leak detection line had failed and resulted in a reactor coolant pressure boundary leak. This would require immediate plant shutdown.

The configuration of this piping precludes system pressure testing while the vessel head is removed because the odd configuration of the vessel tap, coupled with the high test pressure requirement, prevents the tap in the flange from being temporarily plugged or connected to other piping. The opening in the flange is smooth walled, making the effectiveness of a temporary seal very limited. Failure of this seal could possibly cause ejection of the device used for plugging or connecting to the vessel.

The configuration also precludes pressure testing with the vessel head installed because the seal prevents complete filling of the piping, which has no vent available. The top head of the vessel contains two grooves that hold the O-rings. The O-rings are held in place by a series of retainer clips that are housed in recessed cavities in the flange face. If a pressure test was performed with the head on, the inner O-ring would be pressurized in a direction opposite to what it would see in normal operation. This test pressure would result in a net inward force on the inner O-ring that would tend to push it into the recessed cavities that house the retainer clips. The thin O-ring material would very likely be damaged by this inward force.

Operational testing of this line is precluded, because the line will only be pressurized in the event of a failure of the inner O-ring. It is impracticable to purposely fail the inner O-ring in order to perform a pressure test.

Licensee's Proposed Alternative

The system leakage test to be conducted for Fermi 2 would not achieve the Code-required test pressure in the RPV flange seal leak detection piping since the leak-tight integrity of the inner O-ring would be maintained during the test. The licensee has implemented a periodic Preventive Maintenance Event (PM Event B564) to pressurize an isolable section of RPV flange seal leak detection piping which will verify that the pressure switch in the system is functional and in calibration. Further, the system leakage test and the VT-2 visual examination will be performed on the RPV flange seal leak detection piping during flood-up of the refueling pool during every refueling outage. The hydrostatic head developed due to the water above the vessel flange during flood-up will allow for the detection of any gross leakage in the piping.

4.0 STAFF EVALUATION

The ASME Code, Section XI of record requires that all Class 1 components within the reactor coolant system boundary undergo a system leakage test during each refueling outage. In relief request RR-A36, the licensee requested relief from performing a system leakage test of the Reactor Vessel Head Flange Seal Leak Detection Piping at the Code required test pressure corresponding to the nominal operating pressure during system operation. The piping is located between the inner and the outer O-ring seals of the vessel flange and is required during plant operation in order to detect failure of the inner flange seal O-ring. The configuration of this line makes the Code-required system leakage test difficult either with the vessel head in place or removed. The piping cannot be filled completely with water since it cannot be vented to remove entrapped air from the line either with the vessel head in place or removed due to its configuration. If a pressure test were to be performed with the head in place, the space between the inner and the outer O-ring seals would be pressurized. The test pressure would exert a net inward force on the inner O-ring that would tend to push it into the recessed cavities that house the retainer with the possibility of damaging the inner O-ring seal. The configuration of this piping also precludes system pressure testing while the vessel head is removed because the odd configuration of the vessel tap coupled with the high test pressure requirement prevents the tap in the flange from being temporarily plugged or connected to other piping. The opening in the flange is smooth walled, making the effectiveness of a temporary seal very limited. Failure of this seal could possibly cause ejection of the device used for plugging or connecting to the vessel.

If the licensee were to perform the system leakage test in accordance with the Code requirement by pressurizing the space between the inner and the outer O-ring seals, it will likely fail the inner O-ring and subsequently require replacement of the damaged O-ring with a new O-ring. This will result in loss of outage time and at the same time expose the test crew to additional radiation in the process of de-tensioning and removal of the reactor vessel head, replacement of the inner O-ring and the installation of the reactor vessel head. This evolution would create extreme hardship to the licensee without a compensating increase in the level of quality and safety. The licensee, however, has proposed to perform a VT-2 visual examination of the Reactor Vessel Head Flange Seal Leak Detection Piping during a refueling outage. The NRC staff believes that the hydrostatic head developed due to water above the vessel flange during flood-up will allow for the detection of any gross inservice flaws if present in the subject piping and the proposed testing would provide reasonable assurance of structural integrity. Therefore, it is acceptable.

5.0 CONCLUSION

Based on NRC staff's evaluation, a system leakage test of the Reactor Vessel Head Flange Seal Leak Detection Piping at the Code-required test pressure corresponding to the nominal operating pressure during system operation would cause hardship to the licensee without a compensating increase in the level of quality and safety. The licensee's proposed alternative provides reasonable assurance of structural integrity. Therefore, pursuant to 10 CFR 50.55a(a)(3)(ii), the proposed alternative in relief request RR-A36 is authorized for the third 10-year ISI interval of Fermi 2, which began on May 2, 2009, and is scheduled to end on May 1, 2019. All other requirements of the ASME Code, Section XI for which relief has not been specifically requested remain applicable, including a third party review by the Authorized Nuclear Inservice Inspector.

6.0 REFERENCES

1. Letter from Mr. Joseph H. Plona, Site Vice President dated January 20, 2010 to the U.S. Nuclear Regulatory Commission, Subject: Submittal of the Inservice Inspection/Nondestructive Examination Program Relief Requests for the Third Ten-year Interval

2. American Society of Mechanical Engineers *Boiler and Pressure Vessel Code*, Section XI, 2001 Edition through 2003 Addenda

3. Title 10 to *Code of Federal Regulations* (10 CFR) Parts 1 to 50

Principal Contributor: Pat Patnaik, NRR

Date: October 1, 2010

If you have any questions, please contact Mahesh Chawla of my staff at (301) 415-8371.

Sincerely,

/RA/

Robert J. Pascarelli, Branch Chief
Plant Licensing Branch III-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-341

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