September 28, 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: FERMI 2 – EVALUATION OF IN-SERVICE TESTING PROGRAM RELIEF REQUESTS VRR-011, VRR-012, AND VRR-013 (TAC NO. ME2558, ME2557, AND ME2556)

Dear Mr. Davis:

By letter dated November 3, 2009, as supplemented by letter dated May 19, 2010, Detroit Edison Company, the licensee for Fermi 2, submitted eleven requests for the third 10-year inservice testing (IST) program interval. This safety evaluation addresses three of eleven requests, VRR-011, VRR-012, and VRR-013. The licensee requested proposed alternatives from certain IST requirements of the 2004 Edition of the American Society of Mechanical Engineers (ASME) *Code for Operation and Maintenance of Nuclear Power Plants* (OM Code). The Detroit Edison Company third 10-year IST interval for Fermi 2 commenced on February 17, 2010.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Section 50.55a(a)(3)(i), the licensee requested to use proposed alternative in VRR-011 on the basis that the alternative provides an acceptable level of quality and safety. Pursuant to 10 CFR 50.55a(a)(3)(ii), the licensee requested to use proposed alternatives in VRR-012 and VRR-013 since complying with the current ASME OM Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The NRC staff finds that the proposed alternative in request VRR-011 provides an acceptable level of quality and safety. The NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(a)(3)(i), and is in compliance with the ASME OM Code requirements. All other ASME OM Code requirements for which relief was not specifically requested and approved remain applicable.

The NRC staff finds that the proposed alternatives in requests VRR-012 and VRR-013, provide reasonable assurance that the 32 solenoid operated valves noted in paragraph 3.2.2 and the 15 pressure isolation valves noted in paragraph 3.3.2 are operationally ready. All other ASME OM Code requirements for which relief was not specifically requested and approved in the subject request for relief remain applicable. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(a)(3)(ii), and is in compliance with the ASME OM Code requirements.

Therefore, the NRC staff authorizes the alternatives in requests VRR-011, VRR-012, and VRR-013 for the remainder of the Detroit Edison Company third 10-year IST interval for Fermi 2 which commenced on February 17, 2010. The NRC staff review and evaluation is contained in the enclosed safety evaluation.

Sincerely,

R Pascarelli

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
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

ALTERNATIVE REQUEST NOS. VRR-011, VRR-012, AND VRR-013

RELATED TO THE INSERVICE TESTING PROGRAM, THIRD 10-YEAR INTERVAL

DETROIT EDISON COMPANY

FERMI 2

DOCKET NO. 50-341

1.0 INTRODUCTION

By letter dated November 3, 2009 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML093140302), as supplemented by letter dated May 19, 2010 (ADAMS Accession No. ML101400550), Detroit Edison Company (the licensee), submitted eleven requests for the third 10-year inservice testing (IST) program interval. This safety evaluation addresses three of eleven requests, VRR-011, VRR-012, and VRR-013. The licensee requested proposed alternatives from certain IST requirements of the 2004 Edition of the American Society of Mechanical Engineers (ASME) *Code for Operation and Maintenance of Nuclear Power Plants* (OM Code). The Detroit Edison Company third 10-year IST interval for Fermi 2 commenced on February 17, 2010.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Section 50.55a(a)(3)(i), the licensee requested to use proposed alternative in VRR-011 on the basis that the alternative provides an acceptable level of quality and safety.

Pursuant to 10 CFR 50.55a(a)(3)(ii), the licensee requested to use proposed alternatives in VRR-012 and VRR-013 since complying with the current ASME OM Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

In an e-mail dated March 3, 2010 (ADAMS Accession No. ML100630051), the U.S. Nuclear Regulatory Commission (NRC) requested additional information for Relief Request VRR-012. The licensee provided the additional information response in letter dated May 19, 2010.

2.0 REGULATORY EVALUATION

Pursuant to 10 CFR 50.55a(f), "Inservice Testing Requirements," requires, in part, that ASME Class 1, 2, and 3 components must meet the requirements of the ASME OM Code and applicable addenda, except where alternatives have been authorized pursuant to paragraphs (a)(3)(i) or (a)(3)(ii).

In proposing alternatives, a licensee must demonstrate that the proposed alternatives provide an acceptable level of quality and safety, or compliance would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Section 50.55a allows the NRC to authorize alternatives to ASME OM Code requirements upon making necessary findings. NRC guidance contained in NUREG-1482 Revision 1, "Guidance for Inservice Testing at Nuclear Power Plants," provides alternatives to ASME Code requirements which are acceptable.

The NRC's findings with respect to authorizing the alternative to the ASME OM Code are given below.

3.0 TECHNICAL EVALUATION

3.1 Request VR-011

3.1.1 ASME OM Code requirements:

ISTC-3522(c) (Category C Check Valves) states that if exercising is not practicable during operation at power and cold shutdowns, it shall be performed during refueling outages.

ISTC-3700 (Position Verification Testing) states that valves with remote position indicators shall be observed locally at least once every 2 years to verify that valve operation is accurately indicated.

3.1.2 Licensee's Basis For Requesting Alternative Testing

Alternative testing was requested for the following 93 excess flow check valves:

B21F501A	B21F501B	B21F501C	B21F501D	B21F502A	B21F502B
B21F502C	B21F502D	B21F503A	B21F503B	B21F503C	B21F503D
B21F504A	B21F504B	B21F504C	B21F504D	B21F506	B21F507
B21F508	B21F509	B21F510	B21F511	B21F512	B21F513A
B21F513B	B21F513C	B21F513D	B21F514A	B21F514B	B21F514C
B21F514D	B21F515A	B21F515B	B21F515C	B21F515D	B21F515E
B21F515F	B21F515G	B21F515H	B21F515L	B21F515M	B21F515N
B21F515P	B21F515R	B21F515S	B21F515T	B21F515U	B21F516A
B21F516B	B21F516C	B21F517A	B21F517B	B21F517C	B21F517D
B31F501A	B31F501B	B31F501C	B31F501D	B31F502A	B31F502B
B31F502C	B31F502D	B31F503A	B31F503B	B31F504A	B31F504B
B31F505A	B31F505B	B31F506A	B31F506B	B31F510A	B31F510B
B31F511A	B31F511B	B31F512A	B31F512B	B31F515A	B31F515B
B31F516A	B31F516B	E21F500A	E21F500B	E41F500	E41F501
E41F502	E41F503	E51F503	E51F504	E51F505	E51F506
G33F583	N21F539A	N21F539B			

The licensee states:

Excess flow check valves (EFCV) are provided in each instrument process line that is part of the reactor coolant pressure boundary. The excess flow check valve is designed so that it will not close accidentally during normal operation, will close if a rupture of the instrument line occurs downstream of the valve, and can be reopened, when appropriate, after closure from a local panel. These valves have both local position indication and position indication in the control room.

The design and installation of the excess flow check valves at Fermi 2 follow the guidance of Regulatory Guide [(RG) 1.11, "Instrument Lines Penetrating Primary Reactor Containment" (ADAMS Accession No. ML100250396)]. As detailed in the Fermi 2 [Update Final Safety Analysis Report] UFSAR, Detroit Edison has incorporated into the design of each excess flow check valve source line the equivalent of a 0.25-inch restricting orifice. This was done by either the installation of a 0.25-inch orifice, the tap size of the source line being 0.25-inch or in the case of the Feedwater pressure-sensing lines, taking credit for an inboard containment isolation valve. Additionally, the design of each excess flow check valve contains an internal 0.25-inch main body orifice. The restrictions in the source lines of the excess flow check valves limit leakage, in case of a failure to close, to a level where the integrity and functional performance of secondary containment and associated safety systems are maintained. The coolant loss is well within the capabilities of the reactor coolant makeup system, and the potential offsite exposure is substantially below the guidelines of 10 CFR 100.

Excess flow check valves are required to be tested in accordance with ISTC-3522, which requires exercising check valves nominally every three months to the positions required to perform their safety functions. ISTC-3522(c) permits deferral of this requirement to every reactor refueling outage. Excess flow check valves are also required to be tested in accordance with ISTC-3700, which requires remote position indication verification at least once every 2 years.

The EFCVs are classified as ASME Code Category A/C and are also containment isolation valves. However, these valves are excluded from 10 CFR 50 Appendix J Type C leak rate testing, due to the size of the instrument lines and upstream orificing.

The excess flow check valve is a simple and reliable device. The major components are a poppet and spring. The spring holds the poppet open under static conditions. The valve will close upon sufficient differential pressure across the poppet. Functional testing of the valve is accomplished by venting the instrument side of the valve. The resultant increase in flow imposes a differential pressure across the poppet, which compresses the spring and decreases flow through the valve. System design does not include test taps upstream of the EFCV. For this reason, the EFCVs cannot be isolated and tested using a pressure source other than reactor pressure.

Industry experience as documented in GE Nuclear Energy topical report NEDO-32977-A, "Excess Flow Check Valve Testing Relaxation," [ADAMS Accession No. ML003729011] indicates the EFCVs have a very low failure rate. The report indicates similarly that many reported test failures at other plants were related to test methodologies and not actual EFCV failures. The technology for testing these valves is simple and has been demonstrated effectively during the operating history of Fermi 2. Test history at Fermi 2 shows a very low failure rate and no evidence of common mode failure, which is consistent with the findings of NEDO-32977-A. The EFCVs at Fermi 2, consistent with the industry, have exhibited a high degree of reliability, availability, and provide an acceptable level of quality and safety.

3.1.3 Licensee's Proposed Alternative Testing (as stated)

Functional testing with verification that flow is checked will be performed per Technical Specification 3.6.1.3.9 during refueling outages. Surveillance Requirement 3.6.1.3.9 allows a "representative sample" of Excess Flow Check Valves (EFCVs) to be tested every 18 months, such that each EFCV will be tested at least once every ten years (nominal). The six sample groups contain approximately 15 EFCVs each and are selected from different plant locations and operating conditions. The basis for this alternative is that testing a sample of EFCVs each refueling outage provides a level of safety and quality equivalent to that of the Code-required testing.

The EFCVs have position indication in the control room. Check valve remote position indication is excluded from RG 1.97 ["Criteria for Accident Monitoring Instrumentation for Nuclear Power Plants" ADAMS Accession No. ML061580448] as a required parameter for evaluating containment isolation. The remote position indication will be verified accurate at the same frequency as the exercise test prescribed in Technical Specification Surveillance Requirement 3.6.1.3.9. Although inadvertent actuation of an EFCV during operation is highly unlikely due to the spring poppet design, Fermi 2 checks the EFCVs indications on a daily basis as part of the Operations Routines Checklist #26. Corrective Action documents are initiated for any EFCVs with abnormal position indication displays and repairs are scheduled for the next refueling outage.

3.1.4 Staff Evaluation

The licensee is in its third 10-year IST program interval which commenced on February 17, 2010. The licensee has proposed an alternative test in lieu of the requirements found in 2004 Edition of the ASME OM Code Section ISTC-3522(c) and ISTC-3700 for 93 instrument process line excess flow check valves. Specifically, the licensee's proposal to functionally test and verify the 93 EFCVs per Technical Specification (TS) Surveillance Requirement (SR) 3.6.1.3.9. SR 3.6.1.3.9 allows a representative sample of EFCVs to be tested every 18 months, such that each EFCV will be tested at least once every ten years.

EFCVs in reactor instrumentation lines are used to limit the release of fluid from the reactor coolant system in the event of an instrument line break. EFCVs are not required to close in response to a containment isolation signal and are not postulated to operate under post loss of coolant accident (LOCA) conditions. The 93 EFCVs were installed following the guidance of RG 1.11 which states in part that the instrumentation lines penetrating the primary containment that are part of the reactor coolant boundary should be sized or orificed in such a manner as to ensure that, in the event of any breach, the leakage is reduced to the maximum extent practical and that the rate and extent of coolant loss are within the capability of the normal reactor coolant makeup system. In addition, the design of each EFCV contains an internal .25 inch main body orifice and has remote position indication.

TS SR 3.6.1.3.9 was initially proposed and changed during the licensee's second 10-year IST program interval (see ADAMS Accession No. ML993610163 and safety evaluation ADAMS Accession No. ML003691487). The proposal included a request for adopting the test interval of TS SR 3.6.1.3.9 in lieu of the requirements of 1987 Edition with 1988/1989 Addenda of ASME OM Code Part 10, Section 4.3.2.1 which states that Category C check valves shall be exercised nominally every 3 months. The 1987 Edition with 1988/1989 Addenda of ASME OM Code Part 10, Section 4.3.2.1 is equivalent to the 2004 Edition ASME OM Code Section ISTC-3522.

In the previous safety evaluation, the NRC staff concluded that the impact of the increase in EFCV surveillance test intervals to 10 years would result in an increase in the release frequency of about 7.66E-5/year from the current release frequency estimate (for an 18 month surveillance test interval) of about 1.36E-5/year. The NRC staff considered this estimate to be sufficiently low. The NRC staff also noted that the consequence of such an accident is unlikely to lead to core damage. The NRC staff concluded that the consequences of the steam release from the depicted events is bounded by an existing UFSAR analysis and that the increase in risk associated with the licensee's request for relaxation of EFCV surveillance testing is low. A review of today's measures and standards yields no changes to the previous conclusions.

The licensee also requested to use TS SR 3.6.1.3.9 test interval in lieu of the requirements of 2004 Edition of the ASME OM Code Section ISTC-3700 which states that valves with remote position indicators shall be observed locally at least once every 2 years to verify that valve operation is accurately indicated. As noted in the discussion above, EFCVs are not required to close in response to a containment isolation signal and are not postulated to operate under post loss LOCA conditions. Also, check valve remote position indication is excluded from RG 1.97. The check valve position indications are monitored on a daily basis. Abnormal position indications are addressed via the Corrective Action system. The overall performance of the 93 EFCVs has been consistent with industry data yielding very low failure rates, no evidence of common mode failure, and have exhibited a high degree of reliability and availability. Testing and remote position verification of a representative sample of EFCVs every 18 months, such that each EFCV will be tested at least once every 10 years, per TS SR 3.6.1.3.9 provides reasonable assurance that the EFCVs will perform their design function when called upon. The proposed alternative provides an acceptable level of quality and safety.

3.2 Request VR-012

3.2.1 ASME OM Code Requirements

ISTC-3700 (Position Verification Testing) states that valves with remote position indicators shall be observed locally at least once every 2 years to verify that valve operation is accurately indicated.

3.2.2 Licensee's Basis For Requesting Alternative Testing

Alternative testing was requested for the following components:

C5100F002A -	TIP Channel A Ball Valve
C5100F002B -	TIP Channel B Ball Valve
C5100F002C -	TIP Channel C Ball Valve
C5100F002D -	TIP Channel D Ball Valve
C5100F002E -	TIP Channel E Ball Valve
E11F412 -	RHR Div. II Primary Containment Monitoring Isolation Valve
E11F413 -	RHR Div. II Primary Containment Monitoring Isolation Valve
E11F414 -	RHR Div. I Primary Containment Monitoring Isolation Valve
E11F415 -	RHR Div. I Primary Containment Monitoring Isolation Valve
E41F400 -	Primary Containment Monitoring (PCM) – Suppression Pool
E41F401 -	Primary Containment Monitoring (PCM) – Suppression Pool
E41F402 -	Primary Containment Monitoring (PCM) – Suppression Pool
E41F403 -	Primary Containment Monitoring (PCM) – Suppression Pool
P34F401A -	Post Accident Sampling (PAS) V13-7360
P34F401B -	Post Accident Sampling (PAS) V13-7361
P34F403A -	Post Accident Sampling (PAS) V13-7364
P34F403B -	Post Accident Sampling (PAS) V13-7365
P34F404A -	Post Accident Sampling (PAS) V13-7374
P34F404B -	Post Accident Sampling (PAS) V13-7375
P34F405A -	Post Accident Sampling (PAS) V13-7366
P34F405B -	Post Accident Sampling (PAS) V13-7367
P34F406A -	Post Accident Sampling (PAS) V13-7376
P34F406B -	Post Accident Sampling (PAS) V13-7377
P34F407 -	Post Accident Sampling (PAS) V13-7368
P34F408 -	Post Accident Sampling (PAS) V13-7369
P34F409 -	Post Accident Sampling (PAS) V13-7378
P34F410 -	Post Accident Sampling (PAS) V13-7379
T50F412A -	Primary Containment Torus Level Monitoring Div. 1
T50F412B -	Primary Containment Torus Level Monitoring Div. 2
T50F450 -	Primary Containment Radiation Monitoring System Inlet Isolation Valve
T50F451 -	Primary Containment Radiation Monitoring System Outlet Isolation Valve
T50F458 -	Primary Containment Atmospheric Monitoring (PCAM) Division 2 Penetration X-27F Remote Manual Solenoid Valve

The licensee states:

The subject valves are all categorized as A and are all containment isolation valves per the plant safety analysis. All of the subject valves have a safety function to close in order to isolate containment during a Loss of Coolant Accident (LOCA) when required.

Since these valves are containment isolation valves, they are each individually seat leakage tested in accordance with 10 CFR 50 Appendix J.

In 1996, Fermi 2 received a Safety Evaluation (Technical Specification Amendment 108) with approval to implement Option B of the 10 CFR 50 Appendix J Program. This program permits the extension of the Appendix J seat leakage testing to a frequency corresponding to the specific valve performance. Valves whose leakage test results indicate good performance may have their interval of testing increased based on these test results. The Fermi 2 program which implements Appendix J, Option B requires individual containment isolation valves to pass two successful seat leakage tests before it can be placed on extended seat leakage testing frequency. The majority of the listed valves are in good performer status, requiring a seat leakage test every 3 refueling outages.

Each of the subject valves is a solenoid operated valve design such that the position of the valve is not locally observable. The design of these valves is such that the coil position is internal to the valve body and not observable in either the energized or de-energized state.

In accordance with ISTC-3700, where local observation is not possible, other indications shall be used to verify valve position. The method used at Fermi 2 is a pressure test using the local leakage rate testing equipment. This method involves pressurizing the containment penetration volume to approximately 55 psig [pounds per square inch gauge] and verifying the penetration remains pressurized while the valve is indicating closed on the main control room board. The valve is then opened using the control switch in the main control room. A decrease in pressure is then verified along with valve position indicating open in the main control room. This method satisfies the requirement for position indication verification and ensures that the indicating system accurately reflects the valve position.

Since each of these valves is seat leakage tested using local leakage rate testing equipment, the current leakage rate tests have been modified to also perform the position indication verification test at the same time. The individual valve being tested must have its system properly drained, vented, and aligned correctly prior to performing the seat leakage test or the position indication verification. This must be done every two years. Radiation exposure and Operations / Test personnel time / labor involved will be significantly reduced by performing the position indication verification test at the same interval as the Appendix J seat leakage test.

Each of the subject valves is exercised on a quarterly or refueling frequency and their stroke times measured and compared to the ASME OM Code acceptance criteria. In addition, stroke time data is entered into a database where an automatic check for a deviation of more than 12% from the mean of the last 10 years of recorded values is performed. A 12% or greater deviation alerts the IST Engineer of the need to perform a more detailed analysis of the stroke time data. Out of a total of 3119 stroke time tests recorded in the IST database for these 32 SOVs, there have been 23 failures, 15 of which were attributed to limit switch assembly adjustments. The remaining 8 failures were related to SOV sticking problems.

These solenoid-operated valves are also subject to Preventive Maintenance program coverage. Many of these SOVs are periodically replaced to satisfy EQ [environmental qualification] Program criteria. Any maintenance that is performed on these valves which might affect position indication will be followed by applicable PMT [post maintenance test] including position PIT [position indication verification test].

3.2.3 Licensee's Proposed Alternative Testing (as stated)

For the subject valves, Fermi 2 will perform the position indication verification in conjunction with the seat leakage test at a frequency in accordance with 10 CFR 50 Appendix J Option B. This interval may be adjusted to a frequency of testing commensurate with Option B of 10 CFR 50 Appendix J Type C leakage testing based on valve seat leakage performance.

The proposed alternative will provide an acceptable level of quality and safety. Reducing the number of tests involving set-up of Leak Rate Monitors, tubing, etc. every two years will reduce overall dose. Based on actual dose data from past testing it is estimated that alternative testing performed at a 3-cycle interval would result in dose savings of about 600 mRem over three operating cycles.

3.2.4 Staff Evaluation

The licensee has proposed an alternative test in lieu of the requirements found in 2004 Edition of the ASME OM Code Section ISTC-3700 for 32 SOVs. Specifically, the licensee's proposal to functionally test and verify valve operation is accurately indicated on a 10 CFR 50 Appendix J Option B schedule. Valves would initially be tested at the required interval schedule which is currently every refueling outage (RFO) or 2 years as specified by ASME OM Code Section ISTC-3700. Valves that have demonstrated good performance for two consecutive cycles may have their test interval extended to every 3 RFO, not to exceed 60 months. Any position indication verification test failure would require the component to return to the initial interval of every RFO or 2 years until good performance can again be established.

The 32 SOVs are category A containment isolation valves with a leakage rate test requirement specified in ASME OM Code Section ISTC-3620. They are also required to be leak tested in accordance with 10 CFR 50 Appendix J program. The licensee has implemented Option B of 10 CFR 50 Appendix J program. This places the 32 SOV's leakage testing requirements into a performance based program. Valves that have demonstrated a history of good performance may have their leakage test interval extended beyond the normal 2 year test interval requirement. Extension intervals shall not exceed 60 months. The licensee proposes to synchronize the position indication verification test requirements of ISTC-3700 with the leakage rate test requirements of ISTC-3620. Both tests will be performed together on a 10 CFR 50 Appendix J Option B performance based schedule.

Performance data compiled from the IST and maintenance programs for the 32 solenoid valves show that the valves have been relatively maintenance free. Less than 1% of the test population has exhibited failure over the course of 3119 IST tests. Maintaining the current 2 year position indication verification test interval which results in additional personnel radiation exposure represents a hardship or unusual difficulty without increase in the level of quality and safety. Quarterly valve exercise coupled with a 10 CFR 50 Appendix J Option B performance based program to test for leakage and verify valve position indication provides reasonable assurance that the components or systems are operationally ready.

The licensee is authorized to perform position indication verification for the stated 32 SOV's in conjunction with the seat leakage test at a frequency in accordance with 10 CFR 50 Appendix J Option B. This interval may be adjusted to a frequency of testing commensurate with Option B of 10 CFR 50 Appendix J Type C leakage testing based on valve seat leakage performance. The performance based program interval shall not exceed 60 months.

3.3 Request VR-013

3.3.1 ASME OM Code Requirements

ISTC-3630 (Leakage Rate for Other Than Containment Isolation Valves) states that category A valves with a leakage requirement not based on an Owner's 10 CFR 50, Appendix J program, shall be tested to verify their seat leakages are within acceptable limits. Valve closure before seat leakage testing shall be by using the valve operator with no additional closing force applied.

ISTC-3630(a) (Frequency) Tests shall be conducted at least once every 2 years.

3.3.2 Licensee's Basis For Requesting Alternative Testing

Alternative testing was requested for the following components:

E1100F050A - RHR Div. 1 Inboard Isolation Testable Check Valve
E1100F050B - RHR Div. 2 Inboard Isolation Testable Check Valve
E1150F008 - RHR Div. 1 & 2 Shutdown Cooling Outboard Containment Isolation Valve
E1150F009 - RHR Div. 1 & 2 Shutdown Cooling Inboard Containment Isolation Valve
E1150F015A - RHR Div. 1 Low Pressure Coolant Injection (LPCI) Inboard Isolation Valve
E1150F015B - RHR Div. 2 Low Pressure Coolant Injection (LPCI) Inboard Isolation Valve
E1150F608 - RHR Shutdown Cooling Inboard Inlet Isolation Bypass Valve
E2100F006A - Core Spray (CS) Div. 1 Inboard Primary Containment (PC) Check Valve
E2100F006B - Core Spray (CS) Div. 2 Inboard Primary Containment (PC) Check Valve
E2150F005A - Core Spray (CS) Div. 1 Inboard Isolation Valve
E2150F005B - Core Spray (CS) Div. 2 Inboard Isolation Valve
E4150F006 - HPCI Main Pump Outlet to Feedwater Isolation Valve
E4150F007 - HPCI Main Pump Discharge Isolation Valve
E5150F012 - Reactor Core Isolation Cooling (RCIC) Pump Supply To Feedwater Header Isolation Valve
E5150F013 - Reactor Core Isolation Cooling (RCIC) Pump Supply To Feedwater Header Isolation Valve

The licensee states:

ASME OM Code ISTC-3630(a) requires that leakage rate testing (water) for pressure isolation valves (PIVs) be performed at least once every 2 years. Recent historical data was used to identify that PIV testing alone each refuel outage incurs a total dose of approximately 400 mRem. The reason for this relief request is to reduce outage dose.

At Fermi 2, the functional tests for PIVs are performed only at a Cold Shutdown or Refuel Outage frequency. Such testing is not performed online in order to prevent any possibility of an inadvertent Interfacing System Loss of Coolant Accident (ISLOCA) condition. The 18 month functional testing of the PIVs is adequate to identify any abnormal condition that might affect closure capability. Performance of the separate 18 month PIV leak rate testing does not contribute any additional assurance of functional capability, it only verifies the seat tightness of the closed valves.

The primary basis for this relief request is the historically good performance of the PIVs. The only recorded PIV test failures at Fermi 2 were in fact determined to be a result of the test methodology and not due to seating surface condition of the valves. These failures occurred many years ago and, following test procedure enhancements, have not recurred.

NUREG/CR-5928, "Final Report of the NRC-sponsored ISLOCA Research Program" (ADAMS Accession No. ML072430731), evaluated the likelihood and potential severity of ISLOCA events in Boiling Water Reactors (BWR) and Pressurized Water Reactors (PWR). The BWR design used as a reference for this analysis was a BWR-4 with a Mark 1 containment. Fermi 2 was listed as one of the applicable plants. The BWR systems were individually analyzed and in each case the report concluded that the system was "...judged to not be an important consideration with respect to ISLOCA risk." Section 4.3 of the report concluded the BWR portion of the analysis by saying "ISLOCA is not a risk concern for the BWR plant examined here."

The following statement is contained in the Fermi 2 PSA [Probabilistic Safety Analysis]:
"...initiators related to the ECCS [Emergency Core Cooling System] valve test and maintenance activities are the dominant contributors to the interfacing LOCA frequency, while hardware failure induced valve leakage accounted for only 0.3% of the overall interfacing system LOCA frequency. The mean values of frequencies associated with test and maintenance activities and hardware failures are 6.2E-7/year and 2.0E-9/year respectively."

This means that the actual act of testing these valves is a far higher ISLOCA initiation risk than actual valve leakage. Reducing the test frequency would actually reduce the likelihood of an ISLOCA.

The intent of this relief request is simply to allow for a performance-based approach to the scheduling of PIV leakage testing. It has been shown that ISLOCA represents a small risk impact to BWRs such as Fermi 2. Fermi 2 PIVs have an excellent performance history in terms of seat leakage testing. The risks associated with extending the leakage test interval to a maximum of 3 refueling outages are extremely low. This relief will provide significant reductions in radiation dose.

3.3.3 Licensee's Proposed Alternative Testing (as stated)

> Fermi 2 proposes to perform PIV testing at intervals ranging from every refuel to every third refuel. The specific interval for each valve would be a function of its performance and would be established in a manner consistent with the Containment Isolation Valve (CIV) process under 10 CFR 50 Appendix J Option B. Nine of the 15 valves listed are also classified as CIVs and are leak rate tested with air at intervals determined by 10 CFR 50 Appendix J Option B. ISI Leak Rate Program guidance will be established such that if any of those 9 valves fail either the CIV test or their PIV test, the interval for both tests will be reduced to every RFO until they can be re-classified as good performers per the Appendix J, Option B requirements. The test intervals for the valves with a PIV-only function will be determined in the same manner as is done for CIV testing under Option B. That is, the test interval may be extended to every 3 RFO (not to exceed 6 years) upon completion of two consecutive periodic PIV tests with results within prescribed acceptance criteria. Any PIV test failure will require a return to the initial (every RFO) interval until good performance can again be established.

3.3.4 Staff Evaluation

The licensee has proposed an alternative test in lieu of the requirements found in 2004 Edition of the ASME OM Code Section ISTC-3630(a) for 15 PIVs. Nine of the 15 valves also function as CIV. Specifically, the licensee proposes to functionally test and verify the leakage rate of 15 PIVs using 10 CFR 50 Appendix J Option B performance based schedule. Valves would initially be tested at the required interval schedule which is currently every RFO or 2 years as specified by ASME OM Code Section ISTC-3630(a). Valves that have demonstrated good performance for two consecutive cycles may have their test interval extended to every 3 RFO not to exceed 6 years. Any PIV leakage test failure would require the component to return to the initial interval of every RFO or 2 years until good performance can again be established.

Pressure isolation valves are defined as two valves in series within the reactor coolant pressure boundary which separate the high pressure reactor coolant system from an attached lower pressure system. Failure of a PIV could result in an over-pressurization event which could lead to a system rupture and possible release of fission products to the environment. This type of failure event was analyzed under NUREG/CR-5928 Inter System Loss of Coolant Accident (ISLOCA) Research Program (ADAMS Accession No. ML072430731). The purpose of NUREG/CR-5928 was to quantify the risk associated with an ISLOCA event. NUREG/CR-5928 analyzed BWR and PWR designs. Specifically, NUREG/CR-5928 reviewed BWR-4 design which included Fermi 2. The conclusion of the analysis resulted in ISLOCA not being a risk concern for BWR-4 design.

The licensee proposes to initiate a performance based program consistent with 10 CFR 50 Appendix J Option B. The licensee stated that the 15 PIVs would be placed into a performance based program where the component would have to complete two consecutive leakage tests within the acceptance criteria. Upon completion of two successful tests, the component leakage test interval can be extended to 3 RFO intervals not to exceed 6 years. The NRC staff is in agreement with the licensee's proposal of a performance based program, except for extending the leakage test interval to 6 years. Title 10 of CFR 50 Appendix J, Option B notes that specific guidance concerning a performance based leakage test program, acceptable leakage rate test methods, procedures, and analyses that may be used to implement these requirements and criteria are provided in RG 1.163, "Performance-Based Containment Leak-Test Program" (ADAMS Accession No. ML003740058). RG 1.163 endorses Nuclear Energy Institute (NEI) Topical Report 94-01, Revision 0, "Industry Guideline For Implementing Performance-Based Option of 10 CFR Part 50, Appendix J" dated July 26, 1995 with the limitation that Type C components test interval cannot extend greater than 60 months. In addition, NEI 94-01 Revision 2 was recently reviewed by NRC staff on June 25, 2008 (see safety evaluation ADAMS Accession No. ML0811401050) and addressed the limitation of allowing 25% extension of Type C test intervals due to standard scheduling practices. The NRC staff concluded that intervals up to 60 months for Type C tests may be extended by up to 25% of the test interval, not to exceed 9 months.

The 15 PIVs are currently being leak tested every RFO or 2 years. Performance of the leakage test of the 15 PIVs places a burden on test personnel being exposed to radiation. Overall completion of leak test requirements averages a dose of 400 mRem. The valves have maintained a history of good performance. Extending the leakage test interval based on good performance and the low risk factor as noted in NUREG/CR-5928 is a logical progression to a performance based program. To maintain the current RFO or 2 year leakage test interval would represent an undue hardship without an increase in the level of quality and safety. Testing low risk valves on a performance based schedule provides reasonable assurance that the component is operationally ready.

The licensee is authorized to implement a performance based program for the 15 PIVs. The performance based program interval shall not exceed 60 months. Standard scheduling practice may extend the program interval by 25%, not to exceed 9 months.

4.0 Conclusion

As set forth above, the NRC staff finds that the proposed alternative in request VRR-011 provides an acceptable level of quality and safety. The NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(a)(3)(i), and is in compliance with the ASME OM Code requirements. All other ASME OM Code requirements for which relief was not specifically requested and approved remain applicable.

The NRC staff finds that the proposed alternatives in requests VRR-012 and VRR-013, provide reasonable assurance that the 32 solenoid operated valves noted in paragraph 3.2.2 and the 15 pressure isolation valves noted in paragraph 3.3.2 are operationally ready. All other ASME OM Code requirements for which relief was not specifically requested and approved in the subject request for relief remain applicable. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(a)(3)(ii), and is in compliance with the ASME OM Code requirements.

Therefore, the NRC staff authorizes the alternatives in requests VRR-011, VRR-012, and VRR-13 for the remainder of the Detroit Edison Company third 10-year IST interval for Fermi 2 which commenced on February 17, 2010.

Principal Contributor: M. Farnan, NRR

Dated: September 28, 2010

Therefore, the NRC staff authorizes the alternatives in requests VRR-011, VRR-012, and VRR-013 for the remainder of the Detroit Edison Company third 10-year IST interval for Fermi 2 which commenced on February 17, 2010. The NRC staff review and evaluation is contained in the enclosed safety evaluation.

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

Enclosure: Safety Evaluation

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