



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

REGION III
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August 9, 2017

Mr. Paul Fessler, Senior VP
and Chief Nuclear Officer
DTE Energy Company
Fermi 2 – 210 NOC
6400 North Dixie Highway
Newport, MI 48166

SUBJECT: FERMI POWER PLANT, UNIT 2—NRC INTEGRATED INSPECTION REPORT
05000341/2017002

Dear Mr. Fessler:

On June 30, 2017, the U.S. Nuclear Regulatory Commission (NRC) completed an integrated inspection at your Fermi Power Plant, Unit 2 (Fermi 2). On July 10, 2017, the NRC inspectors discussed the results of this inspection with Mr. K. Polson and other members of your staff. The inspectors documented the results of this inspection in the enclosed inspection report.

The NRC inspectors documented two findings of very low safety significance (Green) in this report. Both of these findings involved violations of NRC requirements. In addition, one licensee-identified violation was documented in this report. The NRC is treating each of these violations as Non-Cited Violations consistent with Section 2.3.2.a of the NRC Enforcement Policy.

If you contest the violations or significance of the Non-Cited Violations, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with copies to: (1) the Regional Administrator, Region III; (2) the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and (3) the NRC Resident Inspector at the Fermi 2 Power Plant.

In addition, if you disagree with the cross-cutting aspect assignment to any finding in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region III, and the NRC Resident Inspector at the Fermi 2 Power Plant.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at <http://www.nrc.gov/reading-rm/adams.html> and at the NRC Public Document Room in accordance with 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

/RA/

Billy Dickson, Chief
Branch 2
Division of Reactor Projects

Docket No. 50-341
License No. NPF-43

Enclosure:
Inspection Report 05000341/2017002

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Letter to Paul Fessler from Billy Dickson dated August 9, 2017

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No: 50-341
License No: NPF-43

Report No: 05000341/2017002

Licensee: DTE Energy Company

Facility: Fermi Power Plant, Unit 2

Location: Newport, MI

Dates: April 1 through June 30, 2017

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Enclosure

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SUMMARY

Inspection Report 05000341/2017002; 04/01/2017 – 06/30/2017; Fermi Power Plant, Unit 2; Maintenance Effectiveness, Surveillance Testing.

This report covers a 3-month period of inspection by the resident inspectors and announced baseline inspections by regional inspectors. Two Green findings, both of which had an associated Non-Cited Violation (NCV) of the U.S. Nuclear Regulatory Commission (NRC) regulations, were identified. The significance of inspection findings is indicated by their color (i.e., greater than Green, or Green, White, Yellow, Red) and determined using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process," dated October 8, 2015. Cross-cutting aspects are determined using IMC 0310, "Aspects within the Cross-Cutting Areas," dated December 4, 2014. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy, dated November 1, 2016. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," dated July 2016.

NRC-Identified and Self-Revealed Findings

Cornerstone: Mitigating Systems

Green. A finding of very low safety significance with an associated Non-Cited Violation of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," was self-revealed when plant operators were not able to shut down emergency diesel generator (EDG) 14 using the manual emergency stop button during surveillance testing. Consequently, operators shut down the engine and removed it from service. The licensee failed to have work instructions for maintenance on the safety-related EDG appropriate to ensure the emergency overspeed switch (EOS) oil seal was properly installed to prevent oil intrusion into the switch housing. The licensee entered this violation into its corrective action program for evaluation and identification of appropriate corrective actions. The licensee replaced the EOS and revised the maintenance procedure and work order guidance for proper oil seal installation on the EOS.

The finding was of more than minor safety significance because it was associated with the Equipment Performance attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the EOS failure during surveillance testing due to oil intrusion resulted in unplanned inoperability and unavailability of an onsite emergency power source. The finding was determined to be of very low safety significance because it did not represent an actual loss of function of a single train for greater than its Technical Specification (TS) allowed outage time nor did it represent a loss of function of a non-TS train designated as high safety significant in accordance with the licensee's Maintenance Rule Program. The inspectors concluded this finding affected the cross-cutting area of human performance and the cross-cutting aspect of documentation. Plant activities are governed by comprehensive, high-quality, programs, processes and procedures. In this case, the licensee determined its maintenance procedure and work order guidance were not adequate to ensure the EOS oil seal and upper air start distributor gasket were properly installed to prevent oil leakage from the air start distributor from getting into the EOS housing. (IMC 0310, H.7) (Section 1R12.b.1)

Cornerstone: Barrier Integrity

Green. The inspectors identified a finding of very low safety significance with an associated Non-Cited Violation of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings." The licensee failed to establish an adequate procedure to perform required stroke time testing for high pressure coolant injection (HPCI) turbine barometric condenser condensate drain line inboard isolation valve E4100-F026. The surveillance test procedure resulted in unacceptable preconditioning of the valve prior to the stroke time test measurement. The licensee entered this issue into its corrective action program for evaluation and initiated a corrective action to revise the test procedure.

The finding was of more than minor significance because it was associated with the Procedure Quality attribute of the Barrier Integrity Cornerstone and adversely affected the cornerstone objective to provide reasonable assurance that physical design barriers protect the public from radionuclide releases caused by accidents or events. Specifically, cycling the air-operated valve prior to performing the stroke time measurement masked the actual as-found condition of the valve, invalidating the test results. Because the preconditioning altered the as-found condition of the valve, the data collected through the performance of the surveillance test was not fully indicative of the true valve performance trend. Therefore, this performance deficiency had a direct effect on the licensee's ability to trend as-found data for the purpose of assessing the reliability of the air-operated valve. The finding was a licensee performance deficiency of very low safety significance because it represented only a degradation of the radiological barrier function provided for the auxiliary building and was not an actual loss of the barrier function provided by the HPCI system pressure boundary as a closed system outside containment. The inspectors concluded this finding affected the cross-cutting area of problem identification and resolution, in particular the cross-cutting aspect of resolution. The organization takes effective corrective actions to address issues in a timely manner, commensurate with their safety significance. Corrective actions resolve and correct the identified issues, including causes and extent of condition. In this case, corrective actions for the previous inspector-identified preconditioning issue did not effectively address the extent of condition involving potential preconditioning of other HPCI system air-operated valves in other surveillance testing procedures. (IMC 0310, P.3) (Section 1R22.b. 1)

Licensee-Identified Violations

A violation of very-low safety significance or Severity Level IV that was identified by the licensee has been reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. The violation and corrective action tracking numbers are listed in Section 4OA7 of this report.

REPORT DETAILS

Summary of Plant Status

Fermi Power Plant was shut down for the Cycle 18 refueling outage (F2RF18) at the beginning of the inspection period. On April 18, 2017, the licensee performed a reactor startup and synchronized the unit to the electrical grid on April 20, completing a 33-day refueling outage. The unit reached 100 percent power on April 22. The unit was operated at or near 100 percent during the remainder of the inspection period with the following exceptions:

- On April 26, the licensee reduced power to about 85 percent to perform a control rod pattern adjustment and reactor recirculation pump motor generator set scoop tube positioner testing. The unit was returned to full power later the same day.
- On April 29, the licensee reduced power to about 66 percent to perform reactor recirculation system performance data gathering and a control rod pattern adjustment. The unit was returned to full power the following day.
- On May 13, the licensee reduced power to about 62 percent to replace belts on an isolation phase bus duct cooling fan motor due to high vibration. The unit was returned to full power the following day.
- On May 20, the licensee reduced power to about 30 percent to attempt repair of a steam leak on a main steam line maintenance isolation valve and to perform additional maintenance. The unit was returned to full power the following day.
- On May 22, the licensee reduced power to about 80 percent to perform a control rod pattern adjustment. The unit was returned to full power later the same day.
- On May 23, the licensee reduced power to about 92 percent to perform a control rod pattern adjustment. The unit was returned to full power later the same day.

1. **REACTOR SAFETY**

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity, and Emergency Preparedness

1R01 Adverse Weather Protection (71111.01)

.1 Readiness of Offsite and Alternate AC Power Systems

a. Inspection Scope

The inspectors evaluated the licensee's plant features and procedures for operation and continued availability of offsite and alternate AC [alternating current] power systems. The inspectors interviewed plant personnel and reviewed the licensee's communications protocols between the Transmission System Operator (TSO) and the plant to verify the appropriate information was being exchanged when issues arose that could impact the offsite power system. Aspects considered in the inspectors' review included:

- The actions to be taken when notified by the TSO that the post-trip voltage of the offsite power system at the plant will not be acceptable to assure the continued

operation of the safety-related loads without transferring to the onsite power supply;

- The compensatory actions identified to be performed if it is not possible to predict the post-trip voltage at the plant for the current grid conditions;
- The required re-assessment of plant risk based on maintenance activities that could affect grid reliability, or the ability of the transmission system to provide offsite power; and
- The required communications between the plant and the TSO when changes at the plant could impact the transmission system, or when the capability of the transmission system to provide adequate offsite power is challenged.

During the week of May 29 through June 2, the inspectors performed a walkdown of the switchyards and transformers to observe the material condition of the offsite power sources and also reviewed the status of outstanding work orders (WOs) to assess whether corrective actions for any degraded conditions were scheduled with the TSO with the appropriate priority.

In addition, the inspectors verified problems associated with the availability and reliability of the offsite and alternate AC power systems were entered into the licensee's corrective action program with the appropriate characterization and significance. Selected condition assessment resolution documents (CARDs) were reviewed to verify corrective actions were appropriate and implemented as scheduled.

This inspection constituted one offsite and alternate AC power systems readiness inspection sample as defined in Inspection Procedure (IP) 71111.01.

b. Findings

No findings were identified.

.2 Readiness for Impending Hot Summer Weather Conditions

a. Inspection Scope

The inspectors evaluated the licensee's preparations for hot summer weather conditions, focusing on the supplemental cooling water, residual heat removal service water, emergency equipment service water, and diesel generator service water systems. During the week June 5 through June 9, the inspectors performed a detailed review of severe weather and plant de-winterization procedures and performed general area plant walkdowns. The inspectors focused on plant specific design features and implementation of procedures for responding to or mitigating the effects of hot summer weather conditions on the operation of the plant. The inspectors reviewed system health reports and system engineering summer readiness review documents for the above systems.

In addition, the inspectors verified adverse weather related problems were entered into the licensee's corrective action program with the appropriate characterization and significance. Selected CARDs were reviewed to verify corrective actions were appropriate and implemented as scheduled.

This inspection constituted one seasonal extreme weather readiness inspection sample as defined in IP 71111.01.

b. Findings

No findings were identified.

1R04 Equipment Alignment (71111.04)

.1 Quarterly Partial System Walkdowns (71111.04Q)

a. Inspection Scope

The inspectors performed partial system walkdowns of the following risk-significant systems:

- Division 1 emergency equipment cooling water after maintenance;
- Division 1 mechanical draft cooling towers (MDCTs) and ultimate heat sink (UHS) during planned maintenance on Division 2 MDCTs and UHS; and
- HPCI (single train risk significant system).

The inspectors selected these systems based on their risk significance relative to the Reactor Safety Cornerstones. The inspectors reviewed operating procedures, system diagrams, TS requirements, and the impact of ongoing work activities on redundant trains of equipment in order to identify conditions that could have rendered the systems incapable of performing their intended functions. The inspectors also walked down accessible portions of the systems to verify system components and support equipment were aligned correctly and were available. The inspectors observed operating parameters and examined the material condition of the equipment to verify there were no obvious deficiencies.

In addition, the inspectors verified problems associated with plant equipment alignment were entered into the licensee's corrective action program with the appropriate characterization and significance. Selected CARDS were reviewed to verify corrective actions were appropriate and implemented as scheduled.

This inspection constituted three partial system walkdown inspection samples as defined in IP 71111.04.

b. Findings

No findings were identified.

1R05 Fire Protection (71111.05)

.1 Routine Resident Inspector Tours (71111.05Q)

a. Inspection Scope

The inspectors conducted fire protection walkdowns focusing on the availability, accessibility, and condition of firefighting equipment in the following risk-significant plant areas:

- Reactor Building Drywell First & Second Floors;
- Turbine Building Basement—Condensate Pump Bay;

- Reactor Building—Torus Room;
- Reactor Building First & Second Floors—Division 2 Residual Heat Removal Heat Exchanger Room; and
- Turbine Building Third Floor—North & South Ends.

The inspectors reviewed these fire areas to assess if the licensee had implemented a fire protection program that adequately controlled combustibles and ignition sources within the plant; effectively maintained fire detection and suppression capability; maintained passive fire protection features in good material condition; and implemented adequate compensatory measures for out-of-service, degraded, or inoperable fire protection equipment, systems, or features in accordance with the licensee's Fire Protection Plan. The inspectors selected fire areas based on their overall contribution to internal fire risk as documented in the plant's Individual Plant Examination of External Events Report with later additional insights, their potential to impact equipment that could initiate or mitigate a plant transient, or their impact on the plant's ability to respond to a security event. The inspectors verified fire hoses and extinguishers were in their designated locations and available for immediate use; fire detectors and sprinklers were unobstructed; transient material loading was within the analyzed limits; and fire doors, dampers, and penetration seals appeared to be in satisfactory condition.

In addition, the inspectors verified problems associated with plant fire protection were entered into the licensee's corrective action program with the appropriate characterization and significance. Selected CARDS were reviewed to verify corrective actions were appropriate and implemented as scheduled.

This inspection constituted five quarterly fire protection inspection samples as defined in IP 71111.05AQ.

b. Findings

No findings were identified.

.2 Annual Fire Protection Drill Observation (71111.05A)

a. Inspection Scope

On May 24, the inspectors observed fire brigade activation for a fire drill in the Division 2 Switchgear Room. Based on these observations, the inspectors evaluated the readiness of the plant fire brigade to fight fires. The inspectors verified the licensee identified deficiencies, openly discussed them in a self-critical manner at the drill debrief, and took appropriate corrective actions. Specific attributes evaluated were:

- proper wearing of turnout gear and self-contained breathing apparatus;
- proper use and layout of fire hoses;
- employment of appropriate firefighting techniques;
- sufficient firefighting equipment brought to the scene;
- effectiveness of fire brigade leader communications, command, and control;
- search for victims and propagation of the fire into other plant areas;
- smoke removal operations;
- utilization of pre-planned strategies;

- adherence to the pre-planned drill scenario; and
- drill objectives.

This inspection constituted one annual fire protection drill inspection sample as defined in IP 71111.05AQ.

b. Findings

No findings were identified.

1R06 Flooding (71111.06)

.1 Internal Flooding

a. Inspection Scope

The inspectors reviewed selected plant design features and licensee procedures intended to protect the plant and its safety-related equipment from internal flooding events. The inspectors reviewed flooding analyses and design documents, including the UFSAR (Updated Final Safety Analysis Report), engineering calculations, and plant response procedures, to identify licensee commitments. In addition, the inspectors reviewed licensee drawings to identify areas and equipment that may be affected by internal flooding caused by the failure or misalignment of nearby sources of water, such as the fire suppression or the service water systems.

The inspectors performed a walkdown of accessible portions of the following plant areas to assess the adequacy of watertight doors and verify drains and sumps were clear of debris and were functional, and the licensee complied with its commitments:

- Reactor Building Sub-Basement, Southeast & Southwest Quadrants.

In addition, the inspectors verified internal flooding related problems were entered into the licensee's corrective action program with the appropriate characterization and significance. Selected CARDS were reviewed to verify corrective actions were appropriate and implemented as scheduled.

This inspection constituted one internal flooding inspection sample as defined in IP 71111.06.

b. Findings

No findings were identified.

1R08 Inservice Inspection Activities (71111.08G)

From March 20 through April 7, the inspectors conducted a review of the implementation of the licensee's Inservice Inspection (ISI) Program for monitoring degradation of the reactor coolant system, risk-significant piping and components, and containment systems.

The inspections described in Sections 1R08.1 and 1R08.5 below constituted one inspection sample as defined in IP 71111.08.

.1 Piping Systems Inservice Inspection

a. Inspection Scope

The inspectors either observed or reviewed the following non-destructive examinations mandated by the American Society of Mechanical Engineers (ASME) Section XI Code to evaluate compliance with the ASME Code Section XI and Section V requirements, and if any indications and defects were detected, to determine if these were dispositioned in accordance with the ASME Code or an NRC-approved alternative requirement:

- Ultrasonic Examination of Reactor Pressure Vessel Closure Head Studs 1 to 68;
- Magnetic Particle Examination of an Core Spray Piping Weld Attachment, FW-E21-3053-0W1;
- Visual Examination (VT-3) of Component Support (Main Steam Spring Can Support), B21-2587-G06; and
- Visual Examination (VT-3) of Primary Containment.

The inspectors reviewed the following examination completed during the previous outage with relevant/recordable conditions/indications accepted for continued service to determine whether acceptance was in accordance with the ASME Code Section XI or an NRC-approved alternative:

- Reactor Pressure Vessel Upper Shell Course Longitudinal Seam Weld 1-308B.

The inspectors reviewed records for the following pressure boundary weld repairs completed for risk-significant systems during the last outage to determine if the licensee applied the pre-service non-destructive examinations and acceptance criteria required by the Construction Code, and/or the NRC-approved Code relief request. Additionally, the inspectors reviewed the welding procedure specifications and supporting weld procedure qualification records to determine whether the weld procedures were qualified in accordance with the requirements of the Construction Code and the ASME Code, Section IX.

- Division 1 Emergency Equipment Service Water piping MK-P45-3360-7 and MK-P45-3360-8.

b. Findings

No findings were identified.

.2 Reactor Pressure Vessel Upper Head Penetration Inspection Activities (Not Applicable)

.3 Boric Acid Corrosion Control (Not Applicable)

.4 Steam Generator Tube Inspection Activities (Not Applicable)

.5 Identification and Resolution of Problems

a. Inspection Scope

The inspectors performed a review of ISI related problems entered into the licensee's corrective action program, and conducted interviews with licensee staff to determine if:

- the licensee had established an appropriate threshold for identifying ISI related problems;
- the licensee had performed a root cause (if applicable) and taken appropriate corrective actions; and
- the licensee had evaluated operating experience and industry generic issues related to ISI and pressure boundary integrity.

The inspectors performed these reviews to evaluate compliance with 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," requirements.

b. Findings

No findings were identified.

1R11 Licensed Operator Regualification Program (71111.11)

.1 Resident Inspector Quarterly Review of Licensed Operator Regualification (71111.11Q)

a. Inspection Scope

The inspectors observed licensed operators during simulator training on May 11, conducted partially in response to licensee-identified corrective actions intended to improve overall operating crew performance. The inspectors assessed the operators' performance of simulated tasks focusing on alarm response, command and control of crew activities, communication practices, and procedural adherence. The inspectors also observed the operations training staff's post-evaluation critique to assess the ability of the licensee's evaluators to identify performance deficiencies. The crew's performance in these areas was compared to pre-established operator action expectations and successful critical task completion requirements.

This inspection constituted one quarterly licensed operator regualification program simulator inspection sample as defined in IP 71111.11.

b. Findings

No findings were identified.

.2 Resident Inspector Quarterly Observations During Periods of Heightened Activity or Risk (71111.11Q)

a. Inspection Scope

On May 20, the inspectors observed licensed operators in the control room perform a power reduction to about 30 percent to repair a steam leak on main steam line maintenance isolation valve N1100-F0610 and other planned maintenance. Then on May 21, the inspectors observed licensed operators in the control room perform power

ascension following the planned maintenance activities. These activities required heightened awareness, additional detailed planning, and involved increased operational risk. The inspectors evaluated the following areas:

- licensed operator performance;
- crew's clarity and formality of communications;
- ability to take timely actions in the conservative direction;
- prioritization, interpretation, and verification of annunciator alarms;
- correct use and implementation of procedures;
- control board (or equipment) manipulations;
- oversight and direction from supervisors; and
- ability to identify and implement appropriate TS actions.

The performance in these areas was compared to pre-established operator action expectations, procedural compliance, and task completion requirements.

In addition, the inspectors verified problems related to licensed operator performance were entered into the licensee's corrective action program with the appropriate characterization and significance. Selected CARDS were reviewed to verify corrective actions were appropriate and implemented as scheduled.

This inspection constituted one quarterly licensed operator heightened activity/risk inspection sample as defined in IP 71111.11.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12)

a. Inspection Scope

The inspectors evaluated the licensee's handling of selected degraded performance issues involving the following risk-significant structures, systems, and components (SSCs):

- CARD 17-20141; Failed Test of Shutdown Relay from Overspeed Simulation (EDG 14); and
- CARD 17-21981; Reactor Water Cleanup System Isolation.

The inspectors assessed performance issues with respect to the reliability, availability, and condition monitoring of the SSCs. Specifically, the inspectors independently verified the licensee's handling of SSC performance or condition problems in terms of:

- appropriate work practices;
- identifying and addressing common cause failures;
- scoping of SSCs in accordance with 10 CFR 50.65(b);
- characterizing SSC reliability issues;
- tracking SSC unavailability;
- trending key parameters (condition monitoring);
- 10 CFR 50.65(a)(1) or (a)(2) classification and reclassification; and

- appropriateness of performance criteria for SSC functions classified (a)(2) and/or appropriateness and adequacy of goals and corrective actions for SSC functions classified (a)(1).

In addition, the inspectors verified problems associated with the effectiveness of plant maintenance for risk-significant SSCs were entered into the licensee's corrective action program with the appropriate characterization and significance. Selected CARDS were reviewed to verify corrective actions were appropriate and implemented as scheduled.

This inspection constituted two quarterly maintenance effectiveness inspection samples as defined in IP 71111.12.

b. Findings

(1) Inadequate Work Instructions for Maintenance on Emergency Diesel Generator 14

Introduction: A finding of very low safety significance with an associated Non-Cited Violation of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," was self-revealed when plant operators were not able to shut down EDG 14 using the manual emergency stop button during surveillance testing. Consequently, operators shut down the engine and removed it from service. The licensee failed to have work instructions for maintenance on the safety-related EDG appropriate to ensure the EOS oil seal was properly installed to prevent oil intrusion into the switch housing.

Discussion: On January 5, 2017, during the performance of surveillance testing on EDG 14, plant operators were not able to shut down the engine using the manual emergency stop button. After three attempts with the manual emergency stop button, operators shut down the EDG using the normal shutdown controls and removed it from service. The EDG was inoperable for about 22 hours to investigate and correct the cause of the test failure.

The inspectors reviewed the licensee's equipment apparent cause evaluation in CARD 17-20141 for this problem and concurred with its conclusions. The direct cause was dirty switch contacts due to oil intrusion from the upper air start distributor into the EOS. This condition caused a high resistance between internal switch contacts that prevented completion of the overspeed trip circuit. The apparent cause was poor work quality that led to EOS oil seal and upper air start distributor gasket leaks. The EOS housing has an oil seal on the cover to prevent oil intrusion. Infield disassembly confirmed oil present within the EOS and a degraded oil seal. The oil seal was found not properly seated, which allowed minor seepage of oil to enter the switch housing. The source of the oil was a small seep from the upper air start distributor gasket that occurred while the engine was in standby. The licensee had replaced both the EOS and upper air start distributor within the past two years. The licensee determined the maintenance procedure and work order instructions did not provide sufficient guidance for maintenance craftsmen to ensure the oil seal and gasket were properly installed to prevent leakage.

The licensee also sent the EOS to a vendor for a failure analysis. Testing with the vendor supported the direct cause. In addition to high resistance between the internal switch contacts, the vendor found the amount of oil contained within the switch also contributed to the plunger assembly hanging up due to a hydraulic vacuum or lock

around the plunger so when the engine trip mechanism moved away from the micro switch the plunger did not move back with it so the contacts could close.

The licensee completed two corrective actions to address the direct cause. The first corrective action was to replace the EOS. The second corrective action was to replace the upper air start distributor gasket. There was one corrective action to address the apparent cause. The action was to revise the maintenance procedure and work order guidance for proper oil seal installation on the EOS and proper gasket installation on the upper air start distributor.

Analysis: The inspectors determined the licensee's failure to have work instructions for maintenance on safety-related EDG 14 appropriate to ensure the EOS oil seal was properly installed to prevent oil intrusion into the switch housing, was contrary to the requirements of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," and was therefore a licensee performance deficiency warranting a significance evaluation. Consistent with the guidance in IMC 0612, "Power Reactor Inspection Reports," Appendix B, "Issue Screening," dated September 7, 2012, the inspectors determined this performance deficiency was of more than minor safety significance, and thus a finding, because it was related to the Equipment Reliability attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the EOS failure during surveillance testing due to oil intrusion resulted in unplanned inoperability and unavailability of an onsite emergency power source. The inspectors also reviewed the examples of minor issues in IMC 0612, "Power Reactor Inspection Reports," Appendix E, "Examples of Minor Issues," dated August 11, 2009, and found no similar examples.

In accordance with IMC 0609, "Significance Determination Process," Attachment 0609.04, "Initial Characterization of Findings," Table 3, "SDP [Significance Determination Process] Appendix Router," dated June 19, 2012, the inspectors determined this finding affected the Mitigating Systems Cornerstone, specifically the Mitigating Systems contributor, and would require review using IMC 0609, Appendix A, "SDP for Findings At-Power," dated June 19, 2012, since the reactor was operating at power when this issue was discovered. The inspectors performed a Phase 1 SDP review of this finding using the guidance provided in IMC 0609, Appendix A, Exhibit 2, "Mitigating Systems Screening Questions," and determined it was a licensee performance deficiency of very low safety significance (Green) because it: (1) was not a deficiency affecting the design or qualification of a mitigating SSC, (2) did not represent a loss of system and/or function, (3) did not represent an actual loss of function of at least a single train for greater than its TS allowed outage time OR two separate safety systems out-of-service for greater than its TS allowed outage time, and (4) did not represent an actual loss of function of one or more non-TS trains or equipment designated as high safety significant in accordance with the licensee's Maintenance Rule Program for greater than 24 hours.

The inspectors concluded this finding affected the cross-cutting area of human performance and the cross-cutting aspect of documentation. Plant activities are governed by comprehensive, high-quality, programs, processes and procedures. In this case, the licensee determined it's maintenance procedure and work order guidance were not adequate to ensure the EOS oil seal and upper air start distributor gasket were

properly installed to prevent oil leakage from the air start distributor from getting into the EOS housing. (IMC 0310, H.7)

Enforcement: Title 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," requires, in part, that activities affecting quality be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and be accomplished in accordance with these instructions, procedures, or drawings.

Contrary to the above, on about May 1, 2015, the licensee failed to have instructions for performing maintenance on safety-related EDG 14 that was appropriate to the circumstances to ensure the EOS oil seal was properly installed to prevent oil intrusion into the switch housing. Because this violation was not repetitive or willful, was of very low safety significance, and was entered into the licensee's corrective action program, it is being treated as a Non-Cited Violation, consistent with Section 2.3.2.a of the NRC Enforcement Policy. (**NCV 05000341/2017002-01, Inadequate Work Instructions for Maintenance on EDG 14**)

The licensee entered this violation into its corrective action program for evaluation and identification of appropriate corrective actions (CARD 17-20141). Corrective actions for this issue included revising the maintenance procedure and work order guidance for proper oil seal installation on the EOS and proper gasket installation on the upper air start distributor.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13)

a. Inspection Scope

The inspectors reviewed the licensee's evaluation and management of plant risk for maintenance and emergent work activities affecting risk-significant and/or safety-related equipment listed below to verify the appropriate risk assessments and risk management actions were performed prior to removing equipment for work:

- Planned maintenance during the week of May 1-5 including Division 2 MDCTs and UHS, center reactor building closed cooling water pump, and #3 general service water pump;
- Planned maintenance during the week of May 15-19 including the East and West standby feedwater pumps, West stator water cooling pump, and East instrument air dryer;
- Emergent maintenance during the week of May 22-26 on the Division 2 Residual Heat Removal Service Water return flow control valve; and
- Planned maintenance during the week of June 19-23 including the Division 1 control complex heating, ventilation, and air conditioning chiller, and the Division 2 UHS and emergency equipment cooling water subsystem.

These activities were selected based on their potential risk significance relative to the Reactor Safety Cornerstones. As applicable for each of the above activities, the inspectors reviewed the scope of maintenance work in the plant's daily schedule, reviewed control room logs, verified plant risk assessments were completed as required by 10 CFR 50.65(a)(4) prior to commencing maintenance activities, discussed the results of the assessment with the licensee's probabilistic risk analyst and/or shift technical advisor, and verified plant conditions were consistent with the risk assessment assumptions. The inspectors also reviewed TS requirements and walked down portions

of redundant safety systems, when applicable, to verify risk analysis assumptions were valid, redundant safety-related plant equipment necessary to minimize risk was available for use, and applicable requirements were met.

In addition, the inspectors verified maintenance risk related problems were entered into the licensee's corrective action program with the appropriate characterization and significance. Selected CARDS were reviewed to verify corrective actions were appropriate and implemented as scheduled.

This inspection constituted four maintenance risk assessment and emergent work control inspection samples as defined in IP 71111.13.

b. Findings

No findings were identified.

1R15 Operability Determinations and Functionality Assessments (71111.15)

.1 Operability Determinations and Functionality Assessments

a. Inspection Scope

The inspectors reviewed the following issues:

- CARD 17–22088; Visual Inspection of 'B' MDCT Spray Nozzles; and
- CARD 17–24279; Core Thermal Power Indication May Be Suspect.

The inspectors selected these potential operability/functionality issues based on the safety significance of the associated components and systems. The inspectors verified the conditions did not render the associated equipment inoperable/non-functional or result in an unrecognized increase in plant risk. When applicable, the inspectors verified the licensee appropriately applied TS limitations, appropriately returned the affected equipment to an operable or functional status, and reviewed the licensee's evaluation of the issue with respect to the regulatory reporting requirements. Where compensatory measures were required to maintain operability, the inspectors determined whether the measures in place would function as intended and were properly controlled. When applicable, the inspectors also verified the licensee appropriately assessed the functionality of SSCs that perform specified functions described in the UFSAR, Technical Requirements Manual, Emergency Plan, Fire Protection Plan, regulatory commitments, or other elements of the current licensing basis when degraded and/or nonconforming conditions were identified.

In addition, the inspectors verified problems associated with the operability or functionality of safety-related and risk-significant plant equipment were entered into the licensee's corrective action program with the appropriate characterization and significance. Selected CARDS were reviewed to verify corrective actions were appropriate and implemented as scheduled.

This inspection constituted two operability determination and functionality assessment inspection samples as defined in IP 71111.15.

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.18)

.1 Temporary Modifications

a. Inspection Scope

The inspectors reviewed the following plant temporary modification:

- TM 17-0010; Remove Non-Safety Related Testable Check Function from E1100-F050B.

The inspectors reviewed the temporary modification and the associated 10 CFR 50.59 screening/evaluation against applicable system design basis documents, including the UFSAR and the TS, to verify whether applicable design basis requirements were satisfied. The inspectors reviewed the control room logs and interviewed engineering and operations department personnel to understand the impact that implementation of the temporary modification had on operability and availability of the affected system.

In addition, the inspectors verified problems associated with the installation of temporary modifications were entered into the licensee's corrective action program with the appropriate characterization and significance. Selected CARDS were reviewed to verify corrective actions were appropriate and implemented as scheduled.

This inspection constituted one temporary modification inspection samples as defined in IP 71111.18.

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19)

a. Inspection Scope

The inspectors reviewed the following post-maintenance testing activities to verify procedures and test activities were adequate to ensure system operability and functional capability:

- WO 43071564(6); ERE-31998 Replace ABB 27D (211) Relays 4160 [Volt] Engineered Safety Feature Bus 65F(E) with ABB 27D (411) Relays;
- WO 44305686; Final 43.401.516 Residual Heat Removal Pressure Isolation Valve Leakage (Test-2:E1100F050B);
- WO 38575583; Perform Reactor Core Isolation Cooling Overspeed Trip Test and Uncouple/Recouple Turbine as Required;
- WO 44152010; Perform 24.139.03 Section 5.3, 5.4 Standby Liquid Control Loop A Pump Flow, Manual Initiate and Squib Firing;
- WO 47323481; Contingency Rework Main Steam Isolation Valve B2103F022D;

- WO 43908231; B2100F076B Disassemble, Inspect, Rework Valve, Replace Disc Soft Seat; and
- WO 45880928; Diesel Fire Pump Angle Drive Inspect and Repair.

The inspectors reviewed the scope of the work performed and evaluated the adequacy of the specified post-maintenance testing. The inspectors verified the post-maintenance testing was performed in accordance with approved procedures, the procedures contained clear acceptance criteria that demonstrated operational readiness and the acceptance criteria were met, appropriate test instrumentation was used, the equipment was returned to its operational status following testing, and the test documentation was properly evaluated.

In addition, the inspectors verified problems associated with post-maintenance testing activities were entered into the licensee's corrective action program with the appropriate characterization and significance. Selected CARDS were reviewed to verify corrective actions were appropriate and implemented as scheduled.

This inspection constituted seven post-maintenance testing inspection samples as defined in IP 71111.19.

b. Findings

No findings were identified.

1R20 Refueling and Other Outage Activities (71111.20)

.1 Unit 2 Cycle 18 Refueling Outage (F2RF18)

a. Inspection Scope

The inspectors evaluated the licensee's conduct of F2RF18 refueling outage activities to assess the licensee's control of plant configuration and management of shutdown risk. The inspectors reviewed configuration management to verify the licensee maintained defense-in-depth commensurate with the shutdown risk plan; reviewed major outage work activities to ensure correct system lineups were maintained for key mitigating systems; and observed refueling activities to verify fuel handling operations were performed in accordance with the TS and approved procedures. Other major outage activities evaluated included the licensee's control of the following:

- containment penetrations in accordance with the TS;
- SSCs that could cause unexpected reactivity changes;
- flow paths, configurations, and alternate means for reactor coolant system inventory addition;
- SSCs (e.g., control rod drive mechanism replacements) that could cause a loss of inventory;
- reactor coolant system level instrumentation;
- radiological work practices;
- fatigue management, as required by 10 CFR 26, Subpart I;
- spent fuel pool cooling during and after core offload;
- switchyard activities and the configuration of electrical power systems in accordance with the TS and shutdown risk plan; and

- SSCs required for decay heat removal and for establishing alternate means for decay heat removal, including instrumentation.

The inspectors verified the licensee appropriately established plant conditions and satisfied TS requirements prior to and while performing Operations with the Potential to Drain the Reactor Vessel (OPDRV) activities.

The inspectors observed portions of the plant cooldown, including the transition to shutdown cooling, to verify the licensee controlled the plant cooldown in accordance with the TS. The inspectors also observed portions of the restart activities including reactor startup and plant heat up to verify TS requirements and administrative procedure requirements were met prior to changing operational modes or plant configurations. Major restart inspection activities performed included:

- verification that reactor coolant system boundary leakage requirements were met prior to entry into Mode 3 and subsequent operational mode changes;
- emergency core cooling system (ECCS) filling and venting to ensure no large air voids remained that could affect ECCS pump performance during loss-of-coolant accident conditions;
- verification that primary and secondary containment integrity was established prior to entry into Mode 3;
- inspection of the torus to assess material condition and search for loose debris, which, if present, could block ECCS pump suction screens; and
- inspection of the drywell to assess material condition and search for loose debris, which, if present, could block floor drains or be transported to the containment suppression pool.

The inspectors interviewed operations, engineering, work control, radiological protection, and maintenance department personnel and reviewed selected procedures and documents.

In addition, the inspectors verified problems associated with refueling outage activities were entered into the licensee's corrective action program with the appropriate characterization and significance. Selected CARDS were reviewed to verify corrective actions were appropriate and implemented as scheduled.

This inspection constituted one refueling outage inspection sample as defined in IP 71111.20.

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22)

a. Inspection Scope

The inspectors reviewed surveillance testing results for the following activities to determine whether risk-significant systems and equipment were capable of performing their intended safety functions and to verify testing was conducted in accordance with applicable procedural and TS requirements:

- 43.401.500; Local Leakage Rate Testing for Penetration X-7A, X-7B, X-7C, and X-7D;
- 43.000.003; Visual Examination of Snubbers;
- 24.137.21; Reactor Pressure Vessel System Leakage Test; and
- 24.307.04; EDG 14 – Loss of Offsite Power and ECCS Start With Loss of Offsite Power Test;
- 24.202.08; HPCI Time Response and Pump Operability Test at 1025 PSI [Pounds per Square Inch]; and
- 44.020.029, NSSS [Nuclear Steam Supply System] – Main Steam Line Pressure, Trip System A, Channel C Calibration / Functional;

The inspectors observed selected portions of the test activities to verify the testing was accomplished in accordance with plant procedures. The inspectors reviewed the test methodology and documentation to verify equipment performance was consistent with safety analysis and design basis assumptions, test equipment was used within the required range and accuracy, applicable prerequisites described in the test procedures were satisfied, test frequencies met TS requirements to demonstrate operability and reliability, and appropriate testing acceptance criteria were satisfied. When applicable, the inspectors also verified test results not meeting acceptance criteria were addressed with an adequate operability evaluation or the system or component was declared inoperable.

In addition, the inspectors verified problems associated with surveillance testing activities were entered into the licensee’s corrective action program with the appropriate characterization and significance. Selected CARDS were reviewed to verify corrective actions were appropriate and implemented as scheduled.

This inspection constituted two in-service tests, one primary containment isolation valve test, and three routine surveillance tests, for a total of six surveillance testing inspection samples as defined in IP 71111.22.

b. Findings

(1) Unacceptable Preconditioning of High Pressure Coolant Injection System Air-Operated Valve Prior to Stroke Time Test Measurement

Introduction: The inspectors identified a finding of very low safety significance with an associated Non-Cited Violation of 10 CFR 50, Appendix B, Criterion V, “Instructions, Procedures, and Drawings.” The licensee failed to establish an adequate procedure to perform required stroke time testing for HPCI turbine barometric condenser condensate drain line inboard isolation valve E4100-F026. Specifically, the surveillance test procedure resulted in unacceptable preconditioning of the valve prior to the stroke time test measurement.

Description: On May 25, 2017, the inspectors observed portions of surveillance test procedure 24.202.08, “HPCI Time Response and Pump Operability Test at 1025 PSI,” and subsequently reviewed the test results. This surveillance test procedure was

performed, in part, to satisfy the Inservice Testing Program requirements in TS 5.5.6 and 10 CFR 50.55a, Paragraph f, "Inservice testing requirements."

The inspectors noted the redundant high pressure coolant injection (HPCI) barometric condenser condensate drain line isolation valves (E4100-F025 and E4100-F026) automatically close when the HPCI turbine is started. These two air-operated valves are required by design to close upon HPCI turbine start to isolate seismically qualified portions of the piping system from non-seismically qualified portions to mitigate the consequences of an accident since the HPCI system is considered to be a closed system in connection with the reactor coolant system outside of the containment. The inspectors noted the outboard isolation valve (E4100-F025) was appropriately stroke tested and its closure time measured early during the surveillance test prior to the start of the HPCI turbine; however, the inboard isolation valve (E4100-F026) was not similarly tested. The inspectors found E4100-F026 was cycled several times during the surveillance test prior to measuring its stroke time. This normally closed valve was opened at step 5.2.44 just prior to the start of the HPCI turbine, and then verified closed at step 5.2.50 after the turbine started. After the HPCI turbine was shut down, E4100-F026 was cycled open at step 5.2.112 and closed an additional time at step 5.2.115. The valve was then opened at step 5.2.162 for a third time. Finally, at step 5.2.163, E4100-F026 was closed and its stroke time measured.

The inspectors questioned whether the test sequence inappropriately preconditioned E4100-F026 prior to its stroke time measurement. Cycling this air-operated valve prior to measuring its stroke time masked the as-found condition and did not appear necessary to place the system in the configuration for testing. It also appeared to the inspectors that a stroke time measurement could have been performed prior to running the HPCI turbine as was done for the redundant isolation valve E4100-F025.

The inspectors noted Inspection Manual Technical Guidance Part 9900 defines unacceptable preconditioning, in part, as: "[t]he alteration, variation, manipulation, or adjustment of the physical condition of an SSC before or during TS surveillance or ASME Code testing that will alter one or more of an SSC's operational parameters, which results in acceptable test results. Such changes could mask the actual as-found condition of the SSC and possibly result in an inability to verify the operability of the SSC. In addition, unacceptable preconditioning could make it difficult to determine whether the SSC would perform its intended function during an event in which the SSC might be needed." The Part 9900 Technical Guidance further states that influencing a test outcome by performing valve stroking does not meet the intent of the as-found testing expectations described in NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants," (April 1995), and may be unacceptable. The NUREG-1482 guidance has not changed in this respect with the latest revision in October 2013.

The inspectors also noted that cycling an air-operated valve prior to performing an as-found stroke time test measurement would not be in accordance with the licensee's procedural guidance. MOP03, "Operations Conduct Manual," Enclosure A, "Position Paper Defining the Fermi 2 Policy on Preconditioning," Revision 40, states, in part, "air-operated valves shall be stroke timed on the first stroke of a functional surveillance test ...Basis: Timing a stroke other than the first one constitutes preconditioning because the first stroke of an air operated valve after an extended period is typically longer than the following strokes."

The Part 9900 Technical Guidance states that some types of preconditioning may be considered acceptable, but “this preconditioning should have been evaluated and documented in advance of the surveillance.” Since the licensee had not performed an evaluation to justify that preconditioning of the valve was acceptable prior to completing the testing, the inspectors questioned whether the licensee’s surveillance testing sequence that cycled the valve prior to obtaining stroke time data constituted unacceptable preconditioning of the valve.

In response to the inspectors’ questions, the licensee wrote CARD 17–24906, “NRC Resident Identified E4100–F026 Is Preconditioned during 24.202.08,” to evaluate the preconditioning concern. The licensee completed an engineering evaluation and concluded E4100–F026 was unacceptably preconditioned by the test procedure since it was not tested in the as-found condition. The inspectors reviewed the licensee’s evaluation and concurred with this conclusion. Based on the performance of functional testing that verified E4100–F026 properly closed and opened during the surveillance test, the inspectors concluded that a reasonable basis existed to support continued operability of the valve.

Analysis: The inspectors determined the licensee’s failure to establish an adequate surveillance test procedure to perform required stroke time testing for HPCI turbine barometric condenser condensate drain line inboard isolation valve E4100–F026 under suitable environmental conditions was contrary to the requirements of 10 CFR 50, Appendix B, Criterion V, “Instructions, Procedures, and Drawings,” and was therefore a licensee performance deficiency warranting a significance evaluation. Consistent with the guidance in IMC 0612, “Power Reactor Inspection Reports,” Appendix B, “Issue Screening,” dated September 7, 2012, the inspectors determined this performance deficiency was of more than minor safety significance, and thus a finding, because it was associated with the Procedure Quality attribute of the Barrier Integrity Cornerstone and adversely affected the cornerstone objective to provide reasonable assurance that physical design barriers protect the public from radionuclide releases caused by accidents or events. Specifically, cycling the air-operated valve prior to performing the stroke time measurement masked the actual as-found condition of the valve, invalidating the test results. Because the preconditioning altered the as-found condition of the valve, the data collected through the performance of the surveillance test was not fully indicative of the true valve performance trend. Therefore, this performance deficiency had a direct effect on the licensee’s ability to trend as-found data for the purpose of assessing the reliability of the valve. The inspectors also reviewed the examples of minor issues in IMC 0612, “Power Reactor Inspection Reports,” Appendix E, “Examples of Minor Issues,” dated August 11, 2009, and found no similar examples.

In accordance with IMC 0609, “Significance Determination Process,” Attachment 0609.04, “Initial Characterization of Findings,” Table 3, “SDP Appendix Router,” dated June 19, 2012, the inspectors determined this finding affected the Barrier Integrity Cornerstone and would require review using IMC 0609, Appendix A, “SDP for Findings At-Power,” dated June 19, 2012, since the reactor was operating at power when this issue was discovered. The inspectors performed a Phase 1 SDP review of this finding using the guidance provided in IMC 0609, Appendix A, Exhibit 3, “Barrier Integrity Screening Questions,” and determined it was a licensee performance deficiency of very low safety significance (Green) because it represented only a degradation of the radiological barrier function provided for the auxiliary building and was not an actual loss

of the barrier function provided by the HPCI system pressure boundary as a closed system outside containment.

Although the valve testing sequence that unacceptably preconditioned E4100–F026 had existed in the surveillance test procedure for greater than three years, the inspectors determined this issue was reflective of current licensee performance based on a previous inspector-identified preconditioning issue found also during HPCI system surveillance testing. The inspectors concluded this finding affected the cross-cutting area of problem identification and resolution, in particular the cross-cutting aspect of resolution. The organization takes effective corrective actions to address issues in a timely manner, commensurate with their safety significance. Corrective actions resolve and correct the identified issues, including causes and extent of condition. In this case, corrective actions for the previous inspector-identified preconditioning issue did not address the extent of condition involving potential preconditioning of other HPCI system air-operated valves in other surveillance testing procedures. (IMC 0310, P.3)

Enforcement: Title 10 CFR 50, Appendix B, Criterion V, “Instructions, Procedures, and Drawings,” requires, in part, that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings.

Title 10 CFR 50, Appendix B, Criterion XI, “Test Control,” requires, in part, that a test program shall be established to assure all testing required to demonstrate that structures, systems, and components will perform satisfactorily in service is identified and performed in accordance with written test procedures which incorporate the requirements and acceptance limits contained in applicable design documents. Test procedures shall include provisions for assuring all prerequisites for the given test have been met and the test is performed under suitable environmental conditions.

Contrary to the above, surveillance test procedure 24.202.08, “HPCI Time Response and Pump Operability Test at 1025 PSI,” Revision 12, was not appropriate to the circumstances because it did not ensure stroke time testing of HPCI turbine barometric condenser condensate drain line inboard isolation valve E4100–F026 on May 25, 2017, was performed under suitable environmental conditions. Specifically, the test procedure directed cycling the safety-related air-operated valve open and closed several times prior to actually measuring its stroke time in the closed position. This preconditioned E4100–F026 prior to conducting the stroke time measurement. Because this violation was not repetitive or willful, was of very low safety significance, and was entered into the licensee’s corrective action program, it is being treated as a Non-Cited Violation, consistent with Section 2.3.2.a of the NRC Enforcement Policy
(NCV 05000341/2017002–02: Unacceptable Preconditioning of High Pressure Coolant Injection System Air Operated Valve Prior to Stroke Time Test Measurement)

The licensee entered this violation into its corrective action program for evaluation and identification of appropriate corrective actions (CARD 17–24906). Corrective actions for this issue include revising the surveillance test procedure to perform the stroke time measurement of E4100–F026 prior to starting the HPCI turbine.

1EP6 Drill Evaluation (71114.06)

.1 Emergency Preparedness Drill Observation

a. Inspection Scope

The inspectors evaluated the conduct of a scheduled licensee emergency drill on June 6 to identify any weaknesses and deficiencies in classification, notification, and protective action recommendation development activities. The drill was planned to be evaluated and was included in the performance indicator data regarding drill and exercise performance. The inspectors observed emergency response operations in the control room simulator and technical support center to determine whether the event classifications, notifications, and protective action recommendations were performed in accordance with procedures. The inspectors also reviewed the licensee's drill critique to compare any inspector-observed weaknesses with those identified by the licensee's staff in order to evaluate the critique and to verify whether the licensee's staff was properly identifying weaknesses and entering them into the corrective action program. As part of the inspection, the inspectors reviewed the drill package and other documents.

This inspection constituted one emergency preparedness drill inspection sample as defined in IP 71114.06.

b. Findings

No findings were identified.

2. RADIATION SAFETY

2RS1 Radiological Hazard Assessment and Exposure Controls (71124.01)

.1 Radiological Hazard Assessment (02.02)

a. Inspection Scope

The inspectors assessed the licensee's current and historic isotopic mix, including alpha emitters and other hard-to-detect radionuclides. The inspectors evaluated whether survey protocols were reasonable to identify the magnitude and extent of the radiological hazards.

The inspectors determined if there have been changes to plant operations since the last inspection that may have resulted in a significant new radiological hazard for onsite individuals. The inspectors evaluated whether the licensee assessed the potential impact of these changes and implemented periodic monitoring, as appropriate, to detect and quantify the radiological hazard. The inspectors reviewed the last two radiological surveys from selected plant areas and evaluated whether the thoroughness and frequency of the surveys were appropriate for the given radiological hazard.

The inspectors conducted walkdowns of the facility, including radioactive waste processing, storage, and handling areas to evaluate material conditions and performed independent radiation measurements as needed to verify conditions were consistent with documented radiation surveys.

The inspectors assessed the adequacy of pre-work surveys for select radiologically risk-significant work activities.

The inspectors evaluated the radiological survey program to determine if hazards were properly identified. The inspectors discussed procedures, equipment, and performance of surveys with radiation protection staff and assessed whether technicians were knowledgeable about when and how to survey areas for various types of radiological hazards.

The inspectors reviewed work in potential airborne areas to assess whether air samples were being taken appropriately for their intended purpose and reviewed various survey records to assess whether the samples were collected and analyzed appropriately. The inspectors also reviewed the licensee's program for monitoring contamination, which has the potential to become airborne.

These inspection activities constituted one complete sample as defined in IP 71124.01.

b. Findings

No findings were identified.

.2 Instructions to Workers (02.03)

a. Inspection Scope

The inspectors reviewed select radiation work permits used to access high radiation areas and evaluated the specified work control instructions or control barriers. The inspectors also assessed whether workers were made aware of the work instructions and area dose rates.

The inspectors reviewed electronic alarming dosimeter dose and dose rate alarm setpoint methodology. For selected electronic alarming dosimeter occurrences, the inspectors assessed the worker's response to the alarm, the licensee's evaluation of the alarm, and any follow-up investigations.

The inspectors reviewed the licensee's methods for informing workers of changes in plant operations or radiological conditions that could significantly impact their occupational dose.

The inspectors reviewed the labeling of select containers of licensed radioactive material that could cause unplanned or inadvertent exposure to workers.

These inspection activities constituted one complete sample as defined in IP 71124.01.

b. Findings

No findings were identified.

.3 Contamination and Radioactive Material Control (02.04)

a. Inspection Scope

The inspectors observed locations where the licensee monitors material leaving the radiologically controlled area and assessed the methods used for control, survey, and release of material from these areas. As available, the inspectors observed health physics personnel surveying and releasing material for unrestricted use.

The inspectors observed workers leaving the radiologically controlled area and assessed their use of tool and personal contamination monitors and reviewed the licensee's criteria for use of the monitors.

The inspectors assessed whether instrumentation was used at its typical sensitivity levels based on appropriate counting parameters or whether the licensee had established a de facto release limit.

The inspectors selected several sealed sources from the licensee's inventory records and assessed whether the sources were accounted for and verified to be intact. The inspectors also evaluated whether any transactions, since the last inspection, involving nationally tracked sources were reported in accordance with 10 CFR 20.2207.

These inspection activities constituted one complete sample as defined in IP 71124.01.

b. Findings

No findings were identified.

.4 Radiological Hazards Control and Work Coverage (02.05)

a. Inspection Scope

The inspectors evaluated ambient radiological conditions during tours of the facility. The inspectors assessed whether the conditions were consistent with applicable posted surveys, radiation work permits, and worker briefings.

The inspectors evaluated the adequacy of radiological controls, such as required surveys, radiation protection job coverage, and contamination controls. The inspectors evaluated the licensee's use of electronic alarming dosimeters in high noise areas as high radiation area monitoring devices.

The inspectors assessed whether radiation monitoring devices were placed on the individual's body consistent with licensee procedures. The inspectors assessed whether the dosimeter was placed in the location of highest expected dose or the licensee properly employed an NRC-approved method of determining effective dose equivalent.

The inspectors reviewed the application of dosimetry to effectively monitor exposure to personnel in work areas with significant dose rate gradients.

For select airborne area radiation work permits, the inspectors reviewed airborne radioactivity controls and monitoring, the potential for significant airborne levels, containment barrier integrity, and temporary filtered ventilation system operation.

The inspectors examined the licensee's physical and programmatic controls for highly activated or contaminated materials stored within pools and assessed whether appropriate controls were in place to preclude inadvertent removal of these materials from the pool.

These inspection activities constituted one complete sample as defined in IP 71124.01.

b. Findings

No findings were identified.

.5 High Radiation Area and Very High Radiation Area Controls (02.06)

a. Inspection Scope

The inspectors observed posting and physical controls for high radiation areas and very high radiation areas to assess adequacy.

The inspectors conducted a selective inspection of posting and physical controls for high radiation areas and very high radiation areas to assess conformance with performance indicators.

The inspectors reviewed procedural changes to assess the adequacy of access controls for high and very high radiation areas to determine whether procedural changes substantially reduced the effectiveness and level of worker protection.

The inspectors assessed the controls the high radiation areas greater than 1 rem/hour and areas with the potential to become high radiation areas greater than 1 rem/hour for compliance with TSs and procedures.

The inspectors assessed the controls for very high radiation areas and areas with the potential to become very high radiation areas. The inspectors also assessed whether individuals were unable to gain unauthorized access to these areas.

These inspection activities constituted one complete sample as defined in IP 71124.01.

b. Findings

No findings were identified.

.6 Radiation Worker Performance and Radiation Protection Technician Proficiency (02.07)

a. Inspection Scope

The inspectors observed radiation worker performance and assessed their performance with respect to radiation protection work requirements, the level of radiological hazards present, and radiation work permit controls.

The inspectors assessed worker awareness of electronic alarming dosimeter set points, stay times, or permissible dose for radiologically significant work as well as expected response to alarms.

The inspectors observed radiation protection technician performance and assessed whether the technicians were aware of the radiological conditions and radiation work permit controls and whether their performance was consistent with training and qualifications for the given radiological hazards.

The inspectors observed radiation protection technician performance of radiation surveys and assessed the appropriateness of the instruments being used, including calibration and source checks.

These inspection activities constituted one complete sample as defined in IP 71124.01.

b. Findings

No findings were identified.

.7 Problem Identification and Resolution (02.08)

a. Inspection Scope

The inspectors assessed whether problems associated with radiological hazard assessment and exposure controls were being identified at an appropriate threshold and were properly addressed for resolution. For select problems, the inspectors assessed the appropriateness of the corrective actions. The inspectors also assessed the licensee's program for reviewing and incorporating operating experience.

The inspectors reviewed select problems related to human performance errors and assessed whether there was a similar cause and whether corrective actions taken resolve the problems.

The inspectors reviewed select problems related to radiation protection technician error and assessed whether there was a similar cause and whether corrective actions taken resolve the problems.

These inspection activities constituted one complete sample as defined in IP 71124.01.

b. Findings

No findings were identified.

2RS2 Occupational As-Low-As-Is-Reasonably-Achievable Planning and Controls (71124.02)

.1 Implementation of As-Low-As-Is-Reasonably-Achievable and Radiological Work Controls (02.04)

a. Inspection Scope

The inspectors reviewed the radiological administrative, operational, and engineering controls planned for selected radiologically significant work activities and evaluated the integration of these controls and As-Low-As-Is-Reasonably-Achievable (ALARA) requirements into work packages, work procedures and/or radiation work permits.

The inspectors conducted observations of in-plant work activities and assessed whether the licensee had effectively integrated the planned administrative, operational, and

engineering controls into the actual field work to maintain occupational exposure ALARA. The inspectors observed pre-job briefings, and determined if the planned controls were discussed with workers. The inspectors evaluated the placement and use of shielding, contamination controls, airborne controls, radiation work permit controls, and other engineering work controls against the ALARA plans.

The inspectors assessed licensee activities associated with work in progress to ensure the licensee was tracking doses, performed timely in-progress reviews, and, when jobs did not trend as expected, appropriately communicated additional methods to be used to reduce dose. The inspectors evaluated whether health physics and ALARA staff were involved with the management of radiological work control when in-field activities deviated from the planned controls. The inspectors assessed whether the outage control center and station management provided sufficient support for ALARA re-planning.

The inspectors assessed the involvement of ALARA staff with emergent work activities during maintenance and when possible, attended in-progress review discussions, outage status meetings, and/or ALARA committee meetings.

The inspectors compared the radiological results achieved with the intended radiological outcomes and verified the licensee captured lessons learned for use in the next outage.

These inspection activities constituted one complete sample as defined in IP 71124.02.

b. Findings

No findings were identified.

.2 Radiation Worker Performance (02.05)

a. Inspection Scope

The inspectors observed radiation worker and radiation protection technician performance during work activities being performed in radiation areas, airborne radioactivity areas, or high radiation areas to assess whether workers demonstrated the ALARA philosophy in practice and followed procedures. The inspectors observed radiation worker performance to evaluate whether the training and skill level was sufficient with respect to the radiological hazards and the work involved.

The inspectors interviewed individuals from selected work groups to assess their knowledge and awareness of planned and/or implemented radiological and ALARA work controls.

These inspection activities constituted one complete sample as defined in IP 71124.02.

b. Findings

No findings were identified.

2RS3 In-Plant Airborne Radioactivity Control and Mitigation (71124.03)

.1 Engineering Controls (02.02)

a. Inspection Scope

The inspectors reviewed procedural guidance for use of ventilation systems and assessed whether the systems were used, to the extent practicable, during high-risk activities to control airborne radioactivity and minimize the use of respiratory protection. The inspectors assessed whether installed ventilation airflow capacity, flow path, and filter/charcoal unit efficiencies for selected systems were consistent with maintaining concentrations of airborne radioactivity in work areas below the concentrations of an airborne area to the extent practicable. The inspectors also evaluated whether selected temporary ventilation systems used to support work in contaminated areas were consistent with licensee procedural guidance and ALARA.

The inspectors reviewed select airborne monitoring protocols to assess whether alarms and set points were sufficient to prompt worker action. The inspectors assessed whether the licensee established trigger points for evaluating levels of airborne beta-emitting and alpha-emitting radionuclides.

These inspection activities constituted one complete sample as defined in IP 71124.03.

b. Findings

No findings were identified.

.2 Use of Respiratory Protection Devices (02.03)

a. Inspection Scope

The inspectors assessed whether the licensee provided respiratory protection devices for those situations where it was impractical to employ engineering controls such that occupational doses were ALARA. For select instances where respiratory protection devices were used, the inspectors assessed whether the licensee concluded that further engineering controls were not practical. The inspectors also assessed whether the licensee had established means to verify the level of protection provided by the respiratory protection devices was at least as good as that assumed in the work controls and dose assessment.

The inspectors assessed whether the respiratory protection devices used to limit the intake of radioactive materials were certified by the National Institute for Occupational Safety and Health/Mine Safety and Health Administration or have been approved by the NRC. The inspectors evaluated whether the devices were used consistent with their Occupational Safety and Health/Mine Safety and Health Administration certification or any conditions of their NRC approval.

The inspectors reviewed records of air testing for supplied-air devices and self-contained breathing apparatus (SCBA) bottles to assess whether the air used met or exceeded Grade D quality. The inspectors evaluated whether plant breathing air supply systems satisfied the minimum pressure and airflow requirements for the devices.

The inspectors evaluated whether selected individuals qualified to use respiratory protection devices had been deemed fit to use the devices by a physician.

The inspectors observed selected individuals donning, doffing, and functionally checking respiratory protection devices as appropriate and assessed whether these individuals knew how to safely use the device and how to properly respond to any device malfunction or unusual occurrence.

The inspectors observed the physical condition of respiratory protection devices ready for issuance and reviewed records of routine inspection for selected devices. The inspectors reviewed records of maintenance on the vital components for selected devices and assessed whether onsite personnel assigned to repair vital components received vendor-provided training.

These inspection activities constituted one complete sample as defined in IP 71124.03.

b. Findings

No findings were identified.

.3 Self-Contained Breathing Apparatus for Emergency Use (02.04)

a. Inspection Scope

The inspectors reviewed the status and surveillance records for select SCBAs. The inspectors evaluated the licensee's capability for refilling and transporting SCBA air bottles to and from the control room and operations support center during emergency conditions.

The inspectors assessed whether appropriate mask sizes and types were available for use. The inspectors evaluated whether on-shift operators had no facial hair that would interfere with the sealing of the mask and that appropriate vision correction was available.

The inspectors reviewed the past 2 years of maintenance records for selected in-service SCBA units used to support operator activities during accident conditions. The inspectors assessed whether maintenance or repairs on an SCBA unit's vital components were performed by an individual certified by the manufacturer of the device to perform the work. The inspectors evaluated the onsite maintenance procedures governing vital component work to determine whether there was any inconsistencies with the SCBA manufacturer's recommended practices. The inspectors evaluated whether SCBA cylinders satisfied the hydrostatic testing required by the U.S. Department of Transportation.

These inspection activities constituted a partial sample as defined in IP 71124.03.

b. Findings

No findings were identified.

.4 Problem Identification and Resolution (02.05)

a. Inspection Scope

The inspectors assessed whether problems associated with the control and mitigation of in-plant airborne radioactivity were being identified by the licensee at an appropriate threshold and were properly addressed for resolution. Additionally, the inspectors evaluated the appropriateness of the corrective actions for selected problems involving airborne radioactivity documented by the licensee.

These inspection activities constituted one complete sample as defined in IP 71124.03.

b. Findings

No findings were identified.

2RS4 Occupational Dose Assessment (71124.04)

.1 Source Term Characterization (02.02)

a. Inspection Scope

The inspectors evaluated whether the licensee had characterized the radiation types and energies being monitored and that the characterization included gamma, beta, hard-to-detects, and neutron radiation.

The inspectors assessed whether the licensee had developed scaling factors for including hard-to-detect nuclide activity in internal dose assessments.

These inspection activities constituted one complete sample as defined in IP 71124.04.

b. Findings

No findings were identified.

.2 External Dosimetry (02.03)

a. Inspection Scope

The inspectors evaluated whether the licensee's dosimetry vendor was National Voluntary Laboratory Accreditation Program accredited and if the approved irradiation test categories for each type of personnel dosimeter used were consistent with the types and energies of the radiation present and the way the dosimeter was being used.

The inspectors evaluated the onsite storage of dosimeters before their issuance, during use, and before processing/reading. For personal dosimeters stored onsite during the monitoring period, the inspectors evaluated whether they were stored in low dose areas with control dosimeters. For personal dosimeters that are taken offsite during the monitoring period, the inspectors evaluated the guidance provided to individuals with respect to care and storage of the dosimeter.

The inspectors evaluated the calibration of active dosimeters. The inspectors assessed the bias of the active dosimeters compared to passive dosimeters and the correction

factor used. The inspectors also assessed the licensee's program for comparing active and passive dosimeter results, investigations for substantial differences, and recording of dose. The inspectors assessed whether there were adverse trends for active dosimeters.

These inspection activities constituted one complete sample as defined in IP 71124.04.

b. Findings

No findings were identified.

.3 Internal Dosimetry (02.04)

a. Inspection Scope

The inspectors reviewed procedures used to assess internal dose using whole body counting equipment to evaluate whether the procedures addressed methods for differentiating between internal and external contamination, the release of contaminated individuals, the route of intake and the assignment of dose. The inspectors assessed whether the frequency of measurements was consistent with the biological half-life of the nuclides available for intake. The inspectors reviewed the licensee's evaluation for use of portal radiation monitors as a passive monitoring system to determine if instrument minimum detectable activities were adequate to detect internally deposited radionuclides sufficient to prompt additional investigation. The inspectors reviewed whole body counts and evaluated the equipment sensitivity, nuclide library, review of results, and incorporation of hard-to-detect radionuclides.

The inspectors reviewed procedures used to determine internal dose using in vitro analysis to assess the adequacy of sample collection, determination of entry route and assignment of dose.

The inspectors reviewed the licensee's program for dose assessment based on air sampling, as applicable, and calculations of derived air concentration. The inspectors determined whether flow rates and collection times for air sampling equipment were adequate to allow lower limits of detection to be obtained. The inspectors also reviewed the adequacy of procedural guidance to assess internal dose if respiratory protection was used.

The inspectors reviewed select internal dose assessments and evaluated the monitoring protocols, equipment, and data analysis.

These inspection activities constituted one complete sample as defined in IP 71124.04.

b. Findings

No findings were identified.

.4 Special Dosimetric Situations (02.05)

a. Inspection Scope

The inspectors assessed whether the licensee informs workers of the risks of radiation exposure to the embryo/fetus, the regulatory aspects of declaring a pregnancy, and the

specific process to be used for declaring a pregnancy. The inspectors selected individuals who had declared pregnancy during the current assessment period and evaluated whether the monitoring program for declared pregnant workers was technically adequate to assess the dose to the embryo/fetus. The inspectors assessed results and/or monitoring controls for compliance with regulatory requirements.

The inspectors reviewed the licensee's methodology for monitoring external dose in non-uniform radiation fields or where large dose gradients exist. The inspectors evaluated the licensee's criteria for determining when alternate monitoring was to be implemented. The inspectors reviewed dose assessments performed using multi-badging to evaluate whether the assessment was performed consistently with licensee procedures and dosimetric standards.

The inspectors evaluated the licensee's methods for calculating shallow dose equivalent from distributed skin contamination or discrete radioactive particles.

The inspectors evaluated the licensee's program for neutron dosimetry, including dosimeter types and/or survey instrumentation. The inspectors reviewed select neutron exposure situations and assessed whether dosimetry and/or instrumentation was appropriate for the expected neutron spectra, there was sufficient sensitivity, and neutron dosimetry was properly calibrated. The inspectors also assessed whether interference by gamma radiation had been accounted for in the calibration and whether time and motion evaluations were representative of actual neutron exposure events.

For the special dosimetric situations reviewed in this section, the inspectors assessed how the licensee assigned dose of record. This included an assessment of external and internal monitoring results, supplementary information on individual exposures, and radiation surveys and/or air monitoring results when dosimetry was based on these techniques.

These inspection activities constituted one complete sample as defined in IP 71124.04.

b. Findings

No findings were identified.

.5 Problem Identification and Resolution (02.06)

a. Inspection Scope

The inspectors assessed whether problems associated with occupational dose assessment were being identified by the licensee at an appropriate threshold and were properly addressed for resolution. The inspectors assessed the appropriateness of the corrective actions for a selected sample of problems documented by the licensee involving occupational dose assessment.

These inspection activities constituted one complete sample as defined in IP 71124.04.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator Verification (71151)

.1 Mitigating Systems Performance Index—High Pressure Injection Systems

a. Inspection Scope

The inspectors reviewed a sample of plant records and data against the reported mitigating systems performance index (MSPI) - High Pressure Injection Systems Performance Indicator. To determine the accuracy of the performance indicator data reported, performance indicator definitions and guidance contained in Nuclear Energy Institute (NEI) 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, was used. The inspectors reviewed the MSPI derivation reports, control room logs, Maintenance Rule database, licensee event reports (LERs), and maintenance and test data from April 2016 through March 2017, to validate the accuracy of the performance indicator data reported. The inspectors reviewed the MSPI component risk coefficient to determine if it had changed by more than 25 percent in value since the previous inspection, and if so, that the change was in accordance with applicable NEI guidance. The inspectors also reviewed the licensee's corrective action program database to determine if any problems had been identified with the performance indicator data collected or transmitted for this performance indicator.

This inspection constituted one MSPI - High Pressure Injection Systems Performance Indicator verification inspection sample as defined in IP 71151.

b. Findings

No findings were identified.

.2 Mitigating Systems Performance Index—Emergency AC Power System

a. Inspection Scope

The inspectors reviewed a sample of plant records and data against the reported MSPI - Emergency AC Power System Performance Indicator. To determine the accuracy of the performance indicator data reported, performance indicator definitions and guidance contained in NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, was used. The inspectors reviewed the MSPI derivation reports, control room logs, Maintenance Rule database, LERs, and maintenance and test data from April 2016 through March 2017, to validate the accuracy of the performance indicator data reported. The inspectors reviewed the MSPI component risk coefficient to determine if it had changed by more than 25 percent in value since the previous inspection, and if so, that the change was in accordance with applicable NEI guidance. The inspectors also reviewed the licensee's corrective action program database to determine if any problems had been identified with the performance indicator data collected or transmitted for this performance indicator.

This inspection constituted one MSPI—Emergency AC Power System Performance Indicator verification inspection sample as defined in IP 71151.

b. Findings

No findings were identified.

.3 Reactor Coolant System Leakage

a. Inspection Scope

The inspectors verified the Reactor Coolant System Leakage Performance Indicator. The inspectors reviewed the licensee's reactor coolant system leakage tracking surveillance test data from April 2016 through March 2017, to validate the accuracy of the licensee's submittals. To determine the accuracy of the performance indicator data reported during this period, performance indicator definitions and guidance contained in NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, was used. The inspectors also reviewed the licensee's corrective action program database to determine if any problems had been identified with the performance indicator data collected or transmitted for this performance indicator.

This inspection constituted one Reactor Coolant System Leakage Performance Indicator verification inspection sample as defined in IP 71151.

b. Findings

No findings were identified.

4OA2 Identification and Resolution of Problems (71152)

.1 Routine Review of Identification and Resolution of Problems

a. Inspection Scope

As discussed in previous sections of this report, the inspectors routinely reviewed issues during baseline inspection activities and plant status reviews to verify they were being entered into the licensee's corrective action program at an appropriate threshold, adequate attention was being given to timely corrective actions, and adverse trends were identified and addressed. Some minor issues were entered into the licensee's corrective action program as a result of the inspectors' observations; however, they are not discussed in this report.

This inspection was not considered to be an inspection sample as defined in IP 71152.

b. Findings

No findings were identified.

4OA3 Follow-Up of Events and Notices of Enforcement Discretion (71153)

.1 Retraction of Event Notification

On May 15, 2017, the licensee retracted Event Notification 52651 that had previously reported an incident when the TS limiting pressure for the secondary containment pressure boundary was momentarily not met during F2RF18 while OPDRV activities were in progress. TS 3.6.4.1, "Secondary Containment," requires the secondary

containment to be operable in Modes 1 through 3, during movement of recently irradiated fuel assemblies, and during OPDRVs. The licensee had made the notification under 10 CFR 50.72(b)(3)(v)(C) as an event or condition that at the time of discovery could have prevented the fulfillment of the safety function of structures or systems that are needed to control the release of radioactive material. At the time of the incident and the notification, Fermi 2 was shut down in Refueling Mode (Mode 5) with no fuel handling activities in progress.

The licensee re-reviewed the conditions associated with the Event Notification and determined the incident did not meet the reporting requirement based on the guidance in NUREG 1022, "Event Report Guidelines, 10 CFR 50.72 and 50.73," Revision 3. The inspectors reviewed the licensee's past operability/reportability evaluation and identified no issues of concern with it. Although the secondary containment was required to be operable at the time with OPDRV activities in progress per TS 3.6.4.1, it was not required to mitigate the consequences of an accident as described in the UFSAR while Fermi 2 was in Mode 5 with no fuel handling activities in progress. This did not result in a condition prohibited by the plant's TSs since the licensee satisfied the required actions within the associated completion times.

The licensee determined the direct cause for the momentary loss of secondary containment pressure control was likely the inadvertent opening of a large door or panel in the secondary containment boundary by workers during the refueling outage. The inspectors concluded the licensee's direct cause evaluation was reasonable and no performance deficiency was identified.

This inspection constituted one event follow-up inspection sample as defined in IP 71153.

.2 (Closed) Licensee Event Report 05000341/2017-001-00: "Loss of Reactor Protection System Scram Function During Main Steam Isolation Valve and Turbine Stop Valve Channel Functional Tests due to Use of a Test Box"

On January 6, 2017, an operations shift engineer determined that use of the reactor protection system (RPS) test box described in station procedures would result in the loss of two RPS reactor scram functions. TS 3.3.1.1 required RPS instrumentation for main steam isolation valves and turbine stop valves remain operable. An inadequate 10 CFR 50.59 evaluation was performed to revise operations procedures to incorporate the use of the test box in August of 2016. Implementation of the test box was intended to reduce unnecessary RPS actuations by eliminating the half scram created during testing. Between September 22 and 23, 2016, the main steam isolation valve and turbine stop valve instrumentation surveillance test procedures were each performed one time using the test box. The performance of these tests caused the loss of the RPS scram functions by bypassing more than the TS minimum allowed inputs per channel to maintain functionality. The failure to recognize the impact of the procedure revisions when performing the 10 CFR 50.59 evaluation was considered a human performance error by engineering and operations personnel and was determined to be a violation of 10 CFR 50.59, "Changes, Tests, and Experiments."

The licensee submitted licensee event report (LER) 05000341/2017-001-00 to report this event in accordance with 10 CFR 50.73(a)(2)(v)(A) and 50.73(a)(2)(v)(D) as an event or condition that could have prevented the fulfillment of a safety function needed to

shut down the reactor and maintain it in a safe shutdown condition and to mitigate the consequences of an accident, respectively.

The inspectors documented a licensee-identified Non-Cited Violation in Section 4OA7 of this report for the licensee's failure to perform an adequate 10 CFR 50.59 evaluation for the use of the RPS test box for main steam isolation valve and turbine stop valve testing that resulted in the loss of safety functions and non-compliance with TS 3.3.1.1.

This inspection constituted one event follow-up inspection sample as defined in IP 71153.

LER 05000341/2017-001-00 is closed.

4OA6 Management Meetings

.1 Resident Inspectors' Exit Meeting

The inspectors presented the inspection results to Mr. K. Polson and other members of the licensee's staff on July 10, 2017. The licensee acknowledged the findings presented. Proprietary information was examined during this inspection, but is not specifically discussed in this report.

.2 Interim Exit Meeting

Interim exit meetings were conducted for:

- The results of the Inservice Inspection Program inspection were presented to Mr. R. Breymaier and other members of the licensee's staff on April 7, 2017. The licensee acknowledged the information presented. Proprietary information was examined during this inspection, but is not specifically discussed in this report.
- The results of the Radiation Safety Program inspection were presented to Mr. M. Caragher and other members of the licensee's staff on April 13, 2017. The licensee acknowledged the information presented. The inspectors confirmed that none of the potential report input discussed was considered proprietary.
- The results of the Radiation Safety Program inspection were presented to Mr. R. Laburn and other members of the licensee's staff on June 8, 2017. The licensee acknowledged the information presented. The inspectors confirmed that none of the potential report input discussed was considered proprietary.

4OA7 Licensee-Identified Violations

The following violation of very low safety significance (Green) was identified by the licensee and is a violation of NRC requirements that meets the criteria of the NRC Enforcement Policy for being dispositioned as a Severity Level IV Non-Cited Violation.

- Title 10 CFR 50.59(d)(1) requires, in part, that the licensee maintain records of changes to the facility, of changes in procedures, and of tests and experiments made pursuant 10 CFR 50.59(c). These records must include a written evaluation which provides the bases for the determination that the change, test, or experiment does

not require a license amendment pursuant to Paragraph (c)(2) of this section. 10 CFR 50.59(c)(2)(ii) requires that a licensee shall obtain a license amendment pursuant to 10 CFR 50.90 prior to implementing a proposed change, test, or experiment if the change, test, or experiment would result in more than a minimal increase in the likelihood of occurrence of a malfunction of a structure, system, or component important to safety previously evaluated in the FSAR (as updated).

Technical Specification (TS) 3.3.1.1, "Reactor Protection System Instrumentation," states the RPS instrumentation for each function in Table 3.3.1.1-1 shall be operable. As specified in Table 3.3.1.1-1, Function 5, Main Steam Isolation Valve - Closure (8 channels) and Function 9, Turbine Stop Valve - Closure (4 channels) are required to be operable in Mode 1. TS 3.3.1.1, Required Action C.1 states with one or more functions with RPS trip capability not maintained to restore RPS trip capability in 1 hour. Condition C was applicable to both the main steam isolation valve and turbine stop valve RPS logic functional testing.

Contrary to the above, on or about August 19, 2016, the licensee failed to perform and maintain a written evaluation as required by 10 CFR 50.59(d)(1) to demonstrate a change to its facility did not require a license amendment. Specifically, the licensee incorrectly concluded no license amendment was required in its 10 CFR 50.59 evaluation prior to implementing surveillance test procedures 24.110.05, "RPS Turbine Control and Stop Valve Functional Test," Revision 44 and 24.137.01, "Main Steam Line Isolation Channel Functional Test," Revision 40. The revised procedures incorporated a change that resulted in more than a minimal increase in the likelihood of occurrence of a malfunction of a structure, system, or component important to safety previously evaluated in the FSAR (as updated) as specified by Section (c)(2)(ii). Specifically, the use of the test box resulted in the loss of two RPS trip functions by bypassing more than the TS minimum allowed inputs per channel to maintain functionality, violating the requirements of TS 3.3.1.1 during testing on September 22 and 23, 2016.

In accordance with IMC 0609, "Significance Determination Process," Attachment 0609.04, "Initial Characterization of Findings," Table 3, "SDP Appendix Router," the inspectors determined this finding affected the Mitigation Systems Cornerstone, specifically the Reactivity Controls Systems contributor, and would require review using IMC 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," June 19, 2012. The inspectors performed a Phase 1 SDP review of this finding using the guidance provided in IMC 0609, Appendix A, Exhibit 2, "Mitigating Systems Screening Questions," and determined this finding was a licensee performance deficiency of very low safety significance (Green) because it did not affect a single RPS trip signal to initiate a reactor scram AND the function of other redundant trips or diverse methods of reactor shutdown.

Violations of 10 CFR 50.59 are dispositioned using the traditional enforcement process because they are considered to be violations that potentially impede or impact the regulatory process. This violation was also associated with a finding that has been evaluated by the SDP and communicated with a SDP color reflective of the safety impact of the deficient licensee performance. The SDP, however, does not specifically consider regulatory process impact. Thus, although related to a common regulatory concern, it is necessary to address the violation and finding using different processes to correctly reflect both the regulatory importance of the violation and the

safety significance of the associated finding. In accordance with Section 6.1.d.2 of the NRC Enforcement Policy, this violation was categorized as Severity Level IV.

This violation was entered into the licensee's corrective action program as CARD 17-20163.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

J. Auler, Plant Performance Engineering
N. Avrakotos, Manager, Radiological Emergency Response Preparedness
L. Bennett, Director, Nuclear Operations
R. Breymaier, Manager, Performance Engineering and Fuels
M. Brooks, Principal Technical Expert
M. Caragher, Executive Director, Nuclear Production
K. Hullum-Lawson, Manager, Plant Support Engineering
J. Haas, Supervisor, Licensing
D. Hemmele, Superintendent, Nuclear Operations
E. Kokosky, Director, Organization Effectiveness
R. Laburn, Manager, Radiation Protection
K. Locke, General Supervisor - Electrical, Plant Systems Engineering
S. Maglio, Manager, Licensing
K. Mann, Supervisor, Regulatory Compliance
R. Matuszak, Manager, Plant Systems Engineering
D. Noetzel, Director, Nuclear Engineering
K. Polson, Site Vice President
W. Raymer, Director, Nuclear Maintenance
B. Rumans, General Supervisor, Radiation Protection Technical Services
P. Southwell, General Supervisor, Radiation Protection ALARA

U.S. Nuclear Regulatory Commission

B. Dickson, Chief, Reactor Projects Branch 2

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

05000341/2017002-01	NCV	Inadequate Work Instructions for Maintenance on EDG 14 (Section 1R12.b.1)
05000341/201700-02	NCV	Unacceptable Preconditioning of High Pressure Coolant Injection System Air Operated Valve Prior to Stroke Time Test Measurement (Section IR22.b.1)

Closed

05000341/2017002-01	NCV	Inadequate Work Instructions for Maintenance on EDG 14 (Section 1R12.b.1)
05000341/2017002-02	NCV	Unacceptable Preconditioning of High Pressure Coolant Injection System Air Operated Valve Prior to Stroke Time Test Measurement (Section IR22.b.1)
05000341/2017-001-00	LER	Loss of Reactor Protection System Scram Function During Main Steam Isolation Valve and Turbine Stop Valve Channel Functional Tests due to Use of a Test Box (Section 4OA3.2)

LIST OF DOCUMENTS REVIEWED

The following is a partial list of documents reviewed during the inspection. Inclusion on this list does not imply the NRC inspectors reviewed the documents in their entirety, but rather, selected sections of portions of the documents were evaluated as part of the overall inspection effort. Inclusion of a document on this list does not imply NRC acceptance of the document or any part of it, unless this is stated in the body of the inspection report.

1R01 Adverse Weather

- CARD 16-24566; Supplemental Cooling Chill Water Chiller Trip Due to SCS-1 Shutdown
- CARD 16-25909; Revise ODE-20
- CARD 16-27389; Loss of Supplemental Cooling System due to South Supplemental Cooling Chill Water Chiller Trip
- CARD 16-28621; Evaluate Layup Methods for Supplemental Cooling System
- CARD 16-28837; S1100/R1200 (Main Unit/System Service Transformer) Single Point Vulnerability Report
- CARD 17-00705; Broken Coordinated Manual Control Switch on Supplemental Cooling Chill Water Control Panel (P46-P009)
- CARD 17-24187; General Service Water Valve P46F004A for North Supplemental Cooling Chill Water Chiller P4600B001A Was Excessively Hunting for Position
- CARD 17-24586; NQA – Seasonal Readiness Program Issues
- CARD 17-24589; NQA – Delays in the Evaluation of Offsite Electrical Grid Degraded Voltage Values
- CARD 17-25034; South Supplemental Cooling Chill Water Chiller Lost Oil Pressure Resulting in Shutdown
- CARD 17-25107; Partial Completion due to Failed Transformer (WO 43792597)
- DTE Letter TMPE-15-0191; To J. Andree; 2015 Fermi 2 Input Parameters for 2016 Study Grid Adequacy Study Fermi PST Event AG80; October 9, 2015
- DTE Memo NPOP-17-0033; To E.L. Bennett III, Director, Nuclear Operations, From D. Bruce Moss, Shift Manager, Nuclear Operations; Warm Weather Readiness for 2017; May 31, 2017
- Fermi 2 Archived Operator Log; From May 1, 2016 through May 31, 2017
- Fermi 2 Operator Log; March 1, 2017 through May 10, 2017
- Fermi 2 Operator Reports; Turbine Building; June 7, - June 8, 2017
- Fermi 2 UFSAR; 1.2-32; Revision 19
- Fermi 2 UFSAR; 1.2-9; Revision 19
- Fermi 2 UFSAR; 7.6-50; Revision 18
- Fermi 2 UFSAR; 7.6-51; Revision 18
- Fermi 2 UFSAR; 8.2-1; Revision 20
- Fermi 2 UFSAR; 9.2-10; Revision 19
- Fermi 2 UFSAR; 9.2-4; Revision 19
- Final Report; 2015 Fermi 2 Nuclear Power Plant Grid Reliability Analysis for Year 2016 System; December 9, 2015
- MOP 04-100-001; Shiftly Communications with MISO/SOC; Revision 0
- NQA Surveillance Report 17-1002; Seasonal Readiness Assessment; May 6 – May 17, 2017
- Operations Department Expectation ODE-12; Limited Conditions for Operation; Revision 40
- Procedure 20.300.Bases; Loss of Offsite and Onsite Power Bases; Revision 8
- Procedure 20.300.GRID; Grid Disturbance; Revision 7
- Procedure 20.300.Offsite Bases; Loss of Offsite Power Bases; Revision 2
- Procedure 20.300.Offsite; Loss of Offsite Power; Revision 12
- Procedure 20.300.PHASE; Loss of Phase; Revision 0

- Procedure 20.300.SBO; Loss of Offsite and Onsite Power; Revision 25
- Procedure 23.127.01; Reactor Building Closed Cooling Water Supplemental Cooling System; Revision 32
- Procedure 23.127; Reactor Building Closed Cooling Water/Emergency Equipment Cooling Water System; Revision 142
- Procedure 23.307; Emergency Diesel Generator System; Revision 122
- Procedure 23.420; Residual Heat Removal Complex Heating and Ventilation; Revision 35
- Procedure 27.000.06; Hot Weather Operations; Revision 5
- WO 43792597; Perform Seasonal Startup PM per Vendor Requirements

1R04 Equipment Alignment

- Diagram 6M721-2035; HPCI System Reactor Building; Revision BN
- Diagram 6M721-2043; HPCI System Barometric Condenser Reactor Building; Revision AJ
- Drawing 6M721N-2052; P & ID Residual Heat Removal Service Water System Division 1 Residual Heat Removal Complex; Revision AE
- Procedure 23.127; Reactor Building Closed Cooling Water/Emergency Equipment Cooling Water System; Revision 142
- Procedure 23.202; High Pressure Coolant Injection System; Revision 110
- Procedure 23.208; Residual Heat Removal Complex Service Water Systems; Revision 112

1R05 Fire Protection

- Fire Protection Pre Plan FP-RB-1-7b; Reactor Building South Control Rod Drive and Railroad Bay Area, Zone 7; Revision 4
- Fire Protection Pre Plan FP-RB-1-7c; Reactor Building Neutron Monitoring System Room, Zone 7; Revision 4
- Fire Protection Pre Plan FP-RB-Drywell; Drywell; Revision 2
- Fire Protection Pre Plan FP-RB-SB-1; Torus Room, Zone 1, Elevation 540'0"; Revision 3
- Fire Protection Pre Plan FP-TB; Turbine Building; Revision 9
- Procedure 28.505.62; Fire Detection Device Visual Inspection; Revision 25

1R06 Flood Protection

- Drawing 6M721-2223; Equipment Drains - All Floors Auxiliary and Reactor Buildings; Revision X
- Drawing 6M721-2224; Floor Drains - All Floors Auxiliary and Reactor Buildings; Revision Y
- Drawing 6M721-5710-2; Sump Pumps System Functional Operating Sketch, Revision AR
- Drawing 6M721-5710-3, Waste Collector Diagram Radwaste System, Revision K
- Fermi 2 UFSAR; 3.4-4; Revision 18
- Fermi 2 UFSAR; Revision 20
- Flood Protection System Study; Report 8433.001-S-M-001; July 18, 1994
- Information Notice 83-44; Potential Damage to Redundant Safety Equipment as a Result of Backflow Through the Equipment and Floor Drain System, July 1, 1983
- NUREG-0800, 3.6.1 "Plant Design for Protection Against Postulated Piping Failures in Fluid Systems Outside Containment," Revision 3
- WO 35274854, Blockage Experienced in Floor Drains D076-87
- WO 44114124, Inspect/Determine if Cleaning is Required for Plant Sumps
- WO 44304023, Floor Drain D076-60 is Blocked and Will Not Accept Water

1R08 Inservice Inspection

- Calculation No. 1400385.303; FERMI Emergency Equipment Service Water Division 1 Piping Wall Thinning Evaluation; Revision 0
- CARD 15-27747; Existing Indication Located Near Steam Dryer TR-A-7/8 Capture Plate; October 14, 2015
- CARD 15-27971; UT Measurements Below Minimum Wall Thickness for Division 1 Emergency Equipment Service Water Return Piping
- CARD 15-28308; Reactor Pressure Vessel Longitudinal Seam 1-308B Contains Reporting Welding Flaws
- CARD 15-29625; RF17 Delay Caused by Added Scope to Replace Residual Heat Removal Service Water Piping
- CARD 16-20862; Electric Power Research Institute Nondestructive Examination Level III Basic Written Exam Compliance Issues
- CARD 17-21584; UT Exam Results for PM 1546 (Work Order)
- Fermi Inservice Inspection Nondestructive Examination Program Plan for Piping, Components and Attachments; Revision 10
- GEH-PDI-UT-1; PDI Generic Procedure for the UT of Ferritic Piping Welds; Revision 10
- GEH-PDI-UT-2; PDI Generic Procedure for the UT of Austenitic Piping Welds; Revision 9
- GEH-PDI-UT-5; PDI Generic Procedure for Straight Beam Ultrasonic Examination of Bolts and Studs; Revision 8
- Procedure 39.NDE.002; Magnetic Particle Examination by the AC/DC Yoke Method; Revision 25
- Procedure 43.000.004; Visual Examination of Component Supports; Revision 33
- Procedure 43.000.019; Primary Containment Inspection; Revision 8
- Report No. 003N1497; Fermi Unit 2 Nut Capture Plate TR-A-7/8 Functionality Assessment; Revision 1
- Report No. 1600328.402; Fermi 2 Residual Heat Removal Service Water and Emergency Equipment Service Water Inspection-Replacement Prioritization; Revision 0
- WO 44478287; Perform NDE Exams for RF18
- WO 44478663; Perform NDE Exams for RF18 (Closure Head Studs)
- WO 44478952; Perform NDE Exams for RF18 (RPV Head)
- WO 44480729; Perform NDE Exams for RF18 (FW-E21-3053-0W1)

1R11 Licensed Operator Requalification Program

- 50.59 Screen 17-0092; Steam Leak Repair of N1100F610, Main Steam Line B Isolation Valve; Revision 0
- Operational Decision making Issue ODMI-17-006; Steam Leak on Third Main Steam Isolation Valve N1100F610; Revision 0
- Procedure 22.000.03; Power Operation 25% to 100% to 25%; Revision 101
- TM-17-0016; On-Line Leak Repair of N1100F610; Revision 0

1R12 Maintenance Effectiveness

- Apparent Cause Evaluation CARD 17-21981; Reactor Water Clean Up Differential Flow Isolations During Varying Conditions; Revision 0
- CARD 15-20371; Reactor Water Clean Up Demineralizer A Went to Lockout When Adjusting G3352F044
- CARD 15-20828; Failure of Multiplex Units A, B, and C
- CARD 15-21446; C9600 Classified as (a)(1) per Maintenance Rule

- CARD 15-23113; Evaluate Adding E21 Maintenance Rule Function to Maintenance Rule Conduct Manual App E Based on Emergency Operating Procedure Mitigating Function
- CARD 15-25171; Maintenance Rule Mission Time Discrepancy for E41 and E51
- CARD 15-28194; Service Water Challenges to the Fermi Organization
- CARD 15-30322; 10CFR50.65(a)(3) Assessment Deficiency: System Engineering Program and Procedure Review Notice Reviews for Maintenance Rule Impacts
- CARD 16-00178; West Stator Water Cooling Pump Discharge Pressure Switch Instrument Line Leaking
- CARD 16-20084; Clarify Maintenance Rule Counting of Containment Isolation Valve Failures
- CARD 16-23663; North Reactor Water Cleanup Recirculation Pump A Seal Leak
- CARD 16-24746; Failure of Site to Maintain HVAC Equipment
- CARD 16-24952; Degraded Margin to Undesirable State: Reactor Water Clean Up Isolation on High Differential Flow
- CARD 16-26323; Nuclear Quality Assurance Audit recommendation – Validate Adequacy of Timeline for Radiation Monitor (D1100 System) Replacement Project
- CARD 16-26959; South Reactor Water Clean Up Pump Seal Failure
- CARD 16-28802; Reactor Water Clean Up System Isolation
- CARD 16-28902; Inadequate Guidance for Maintenance Rule Unplanned Capability Loss Factor Process
- CARD 17-20141; Surveillance Performance Form Failed Test of Shut Down Relay from Overspeed Simulation per WO 43631018 PM1291
- CARD 17-20207; Update Maintenance Rule Functional Failure for Closed CARD 16-27583
- CARD 17-20367; Operations Shift 2 CLO – Lessons Learned from Response to EDG-14 Overspeed Trip Failure
- CARD 17-20839; Rising Trend Reactor Water Clean Up Differential Flow
- CARD 17-21981; Reactor Water Clean Up System Isolation
- CARD 17-21983; North Reactor Water Cleanup Recirculation Pump A Seal Leak Following Reactor Water Clean Up Isolation
- CARD 17-21990; Reactor Water Clean Up System Isolation Due to High Differential Flow During System Shutdown
- CARD 17-22025; G22N036 Would Not Respond as Expected
- CARD 17-22149; Reactor Water Clean Up “A” Pump Trip Emergent Issue Team Additional Recommendations
- Equipment Apparent Cause Evaluation CARD 17-20141; EDG-14 Emergency Overspeed Trip Circuit Failure; Revision 0
- Equipment Apparent Cause Evaluation CARD 17-21983; Reactor Water Clean Up North Pump Seal Leak; Revision 0
- Fairbanks Morse Engine Engineering Report; Detroit Edison Failure Analysis; Failure Analysis of Over Speed trip Micro Switch; March 28, 2017
- Fermi 2 Control Room Log; January 5, 2017
- Fermi 2 Operator Log; January 5, 2017 to January 7, 2017
- Maintenance Rule Conduct Manual ARP 2D115; Reactor Water Clean Up Differential Flow High; Revision 16
- Maintenance Rule Conduct Manual MMR APP F; Appendix F – Maintenance Rule Performance Criteria; Revision 19
- Technical Evaluation TE-R30-17-014; Review of Emergency Overspeed Switch Failure on EDG-14; Revision 0
- WO 37662340; Implement Mounting Configuration Change for EDG-14 Emergency Overspeed Switch
- WO 42996058; EDG-14 Lower Air Start Distributor Housing is not Tight to Mounting Plate

1R13 Maintenance Risk Assessment and Emergent Work Control

- CARD 17-24655; E1150F068B Division 2 Residual Heat Removal Heat Exchanger Service Water Outlet Flow Control Valve Failed to Open

1R15 Operability Determinations and Functionality Assessments

- CARD 16-21421; 23.428 Attachment 4 is Incorrect and Evaluate 24.428 for Enhancement
- CARD 16-25753; During Performance of 24.307.35 EDG 12 Diesel Generator Service Water, Diesel Fuel Oil Transfer, Air Surveillance EDG 12 FO Transfer Pump A Discharge Check Valve Did Not Close
- CARD 17-21215; Question on Secondary Containment Verification for FLEX Connections
- CARD 17-21682; Past Operability Evaluation per 24.208.03
- CARD 17-21715; EDG 12 Generator Inboard and Outboard Bearing Oil Viscosities Low Out of Specification
- CARD 17-22088; Visual Inspection of "B" MDCT Spray Nozzles
- CARD 17-22095; Visual Inspection of "B" MDCT Spray Nozzle Header
- CARD 17-24279; Core Thermal Power Indication May Be Suspect
- Engineering Functional Analysis EFA-C96-17-007; Post FR18 Heat Balance Integrity; Revision 0
- Fermi 2 Control Room Log; May 8, 2017
- Fermi 2 Control Room Log; May 9, 2017
- Procedure 27.000.09; Time Critical Actions Validation and Verification; Revision 1
- Procedure 57.000.02; Core Thermal Power Evaluation; Revision 35
- Technical Evaluation TE-E11-17-019; Potential Degraded Division 1 MDCT Extent of Condition Evaluation; Revision A
- Technical Evaluation TE-E11-17-024; Past Operability Review for Degraded Division 2 MDCT Nozzles; Revision 0

1R18 Plant Modifications

- 50.59 Evaluation 17-0071; Elimination of Line Flushing and Warmup, Through Residual Heat Removal Division 2 Inboard Isolation Testable Check Valve E1100F050B, Prior to its Use for Shutdown Cooling Mode; Revision 0
- TM-17-0010; Remove Non-Safety-Related Testable Check Function from E1100F050B; Revision A
- WO 47381211; E1100F050B Failed to Close – Rework Valve

1R19 Post-Maintenance Testing

- CARD 17-22209; B2103F022D Failed Local Leakage Rate Testing – Work Order for Repair Required
- CARD 17-22599; Feedwater Line B Exceeded its Acceptance Criteria
- CARD 17-22948; Indications in Poppet Seat
- CARD 17-23175; NRC Question
- CARD 17-23233; NQA- Evaluate if Fittings Used on B2103F022D Hydraulic Manifold are Required to be ASME Code Materials as Identified in 35.CON.017
- Diagram 61721-2578-11; Relaying and Metering Diagram 4160V ESS Bus 65F and 65T; Revision N
- Diagram 61721-2572-29; Schematic Diagram 416V Essential Buses 65E and 65F Load Shedding Strings; Revision N

- Diagram 6SD721-2500-01; One Line Diagram Plant 416V and 480V System Service; Revision BK
- Diagram 6SD721-2500-04; One Line Diagram 4160V System Service Buses 65E, 65F, 65G – Reactor Building Unit 2; Revision T
- Diagram 6SD721-2501-49; Wiring Diagram 416V Bus 65F Pos. F7 Pot. And Metering; Revision M
- Diagram 6SD721-2530-11; One Line Diagram 260/130V Essential Dual Battery 2PB Distribution – Division 11; Revision AQ
- Procedure 24.000.05; Monthly Continuity Light and Channel Check; Revision 49
- Procedure 24.203.02; Division 1 Core Spray System Pump and Valve Operability, and Automatic Actuation; Revision 53
- Procedure 28.504.07; Diesel Fire Pump Engine Monthly Operability Test; Revision 19
- Procedure 35.318.008; ITE Voltage Relay Testing; Revision 35
- Procedure 37.206.001; Reactor Core Isolation Cooling Turbine Mechanical Overspeed Trip Adjustment; Revision 28
- Procedure 37.206.002; Reactor Core Isolation Cooling Turbine Overspeed Test With Motor Unit; Revision 10
- Procedure 42.302.09; Calibration and Functional Test of Division 2 4160 Volt Bus 65E Undervoltage Relays; Revision 35
- Procedure 43.302.10; Calibration and Functional Test of Division 2 4160 Volt Bus 65F Undervoltage Relays; Revision 36
- Procedure 43.401.304; Local Leakage Rate Testing for Penetration X-9B; Revision 43
- WO 38575583; Perform Reactor Core Isolation Cooling Overspeed Trip Test and Uncouple/Recouple Reactor Core Isolation Cooling Turbine as Required
- WO 43071564; ERE-31998 Replace ABB 27D (211) Relays (4 total) 4160V Engineered Safety Feature Bus 65E with ABB 27D (411) Relays
- WO 43071566; ERE-31998 Replace ABB 27D (211) Relays (4 total) 4160V Engineered Safety Feature Bus 65F with ABB 27D (411) Relays
- WO 43908231; Disassemble Inspect and Rework Valve. Replace Disc Soft Seat
- WO 44120108; Preliminary 43.401.304 Local Leakage Rate Testing X-9B (Test-2: B2100F076B, E5150F013, G3352F220)
- WO 44151354; Final 43.401.34 Local Leakage Rate Testing for X-9B (Test-2: B2100F076B, E5150F013, G3352F220)
- WO 44151683; Final 43.401.500 Local Leakage Rate Testing for X-7D B2103F022D and F028D (Test 4)
- WO 44152010; Perform 24.139.03 Sec-5.3, 5.4 Standby Liquid Control Loop A Pump Flow, Manual Initiate and Squib Firing
- WO 44305686; Final 43.401.516 Residual Heat Removal Pressure ISO Valve Leakage (Test 2 E1100F050B)
- WO 44452881; Perform 28.504.02 Diesel Fire Pump Weekly Operability
- WO 45880928; Diesel Fire Pump Angle Drive Inspect and Repair
- WO 46485023; Replace Standby Liquid Control Squib Circuit Continuity Meter Relay Unit
- WO 47323481; Contingency Rework Main Steam Isolation Valve B2103F022D

1R20 Refueling Outage

- CARD 17-23337; Loss of Reactor Protector System B Due to Under-voltage of EPA Breaker C7100S003B
- CARD 17-22304; Degraded Bolting on Residual Heat Removal Service Water Pump A
- CARD 17-22316; Flange Corrosion on EDG 12 Service Water Pump Column

- CARD 17-22862; Motor Operated Valve E2150F004a As-found Thrust Does Not Meet Minimum Required Thrust criteria
- CARD 17-22874; Four Drop Per Minute Leak From P4400F608
- CARD 17-22884; G5100F607 Above Repair Guideline
- CARD 17-22919; Control Rod 30-23 Will Not Move
- CARD 17-22922; Leakage Rate for Penetration X-205B Above Established Repair Guideline
- CARD 17-23081; G1154F600 and G1100F003 Exceeded Maximum Allowable Leakage Rate
- CARD 17-23104; Penetration X-25 Exceeds its Leakage Limit
- CARD 17-23107; Local Leak Rate Testing 43.401.510 Failed Test 5 (T4600F400/T4600F401/T4600F412/T4800F410)
- CARD 17-23173; Switchgear Cabinet Requires Major Rebuild
- CARD 17-23197; E41F403 Division 2 Torus Level Instrument Isolation Valve Will Not Stay Closed
- CARD 17-23226; RF18 Reactor Pressure Vessel Foreign Material Status
- CARD 17-23235; Foreign Material Event on Reactor Building Fifth Floor, Retaining Pin/Clip Missing on Reactor Cavity Work Platform
- CARD 17-23237; Retrieve Currently Unrecoverable Foreign Material Identified Near Jet Pump 4 Adaptor
- CARD 17-23238; N3016F606 Failed to Open
- CARD 17-23248; Leak Identified on E1100F001B During Post Modification Testing VT-2 Inspection
- CARD 17-23259; Foreign Material Exclusion Event – Missing Bolt on Shroud Head Bolt Wrench
- CARD 17-23441; Leakage Identified During Reactor Pressure Vessel Pressure Test B3100F029
- CARD 17-23450; Unsatisfactory Local Leakage Rate for Airlock T2301-A001D
- IPTE Evaluation 17-001; RF18 Reactor Cavity Flood Up Evolution Using 35.710.025 and 23.708
- IPTE Evaluation 17-03; RF18 Reactor Cavity Drain Down Evolution per 35.710.026 and 23.708
- Procedure 22.000.02; Plant Startup to 25 Percent Power; Revision 98
- Procedure 22.000.03; Power Operation 25 Percent to 100 Percent to 25 Percent; Revision 101
- Procedure 22.000.04; Plant Shutdown from 25 Percent Power; Revision 82
- Procedure 22.000.05; Pressure/Temperature Monitoring During Heatup and Cooldown; Revision 49
- Procedure 23.205; Residual Heat Removal System; Revision 132
- Procedure 23.708; Draining Reactor Well and Dryer Separator Storage Pit to Hotwell; Revision 81
- Procedure 23.800.07; Reactor Coolant Natural Circulation and Decay Heat Removal; Revision 11
- Procedure 24.137.21; Reactor Pressure Vessel System Leakage Test; Revision 34
- Procedure 24.428; Secondary Containment Operability Verification; Revision 41
- Technical Evaluation TE-B11-17-037; Unrecoverable Foreign Material Identified Near Jet Pump 4 Adaptor; Revision 0
- Work Control Conduct Manual MWC 13; Outage Nuclear Safety; Revision 16

1R22 Surveillance Testing

- CARD 17-10601; RF18 Snubber As-Found Visual Examination Discrepancies
- CARD 17-22207; Penetration X7-C as Found Local Leak Rate Testing Results Exceed Repair Guidelines

- CARD 17-22209; B2103F022D Failed Local Leak Rate Testing – Work Order for Repair Required
- CARD 17-22643; Potentially Locked up Snubber B21-2590-G04
- CARD 17-22645; Corrective Maintenance Required on Snubber E11-3157-G08 to Repair Spherical Bearing
- CARD 17-22864; Snubber at E4156G021 Was Found to be Disconnected from the Component
- CARD 17-22952; Broken Snubber Found After Maintenance Was Performed
- CARD 17-23035; PSA 35 Snubber Found Not Torqued to Extension Tube
- CARD 17-23175; NRC Question
- CARD 17-23435; Leakage Identified During Reactor Pressure Vessel Pressure Test E1100F040B
- CARD 17-24849; E4100F029 Stroke Time Does Not Meet Acceptance Criteria
- CARD 17-24854; HPCI Condenser to Reactor Water Isolation Valve (E4100F025) Did Not have Procedural Steps to Support Lineup Verification in 24.202.08
- CARD 17-24906; NRC Resident Identified E4100F026 is Preconditioned During 24.202.08
- Code for Operation and Maintenance of Nuclear Power Plants; Subsection ISTD, Preservice and Inservice Examination and Testing of Dynamic Restraints (Snubbers) in Light-Water Reactor Nuclear Power Plants; ASME OM Code-2004
- Diagram 6M721-2035; High Pressure Coolant Injection System Reactor Building; Revision BN
- Diagram 6M721-2043; High Pressure Coolant Injection System Barometric Condenser Reactor Building; Revision AJ
- Fermi 2 Inservice Testing Program for Pumps and Valves; Part 5; IST Valve Scope Table; Revision 1
- Fermi 2 UFSAR; 6.2-14; Primary Containment Penetration Pipe Lines Connecting Closed- Loop Quality Group B Systems to Quality Group D Systems; Revision 20
- Inservice Inspection-Nondestructive Examination (ISI-NDE) Program (Plan) for Fermi 2 Power Plant Document No. ISI-NDE Program; Revision 10
- Procedure 24.137.21; Reactor Pressure Vessel System Leakage Test; Revision 34
- Procedure 24.202.08; High Pressure Coolant Injection Response and Pump Operability Test at 1025 PSI; Revision 12
- Procedure 24.307.04; EDG 14 – Loss of Offsite Power and ECCS Start With Loss of Offsite Power Test; Revision 44
- Procedure 43.401.500; Local Leakage Rate Testing for Penetration X-7A, X-7B, X-7C, and X- 7D; Revision 38
- Procedure 44.020.027; NSSS – Main Steam Line Pressure, Trip System A, Channel A Calibration / Functional; Revision 35
- Procedure 44.020.029; NSSS – Main Steam Line Pressure, Trip System A, Channel C Calibration / Functional; Revision 38
- Surveillance Procedure 43.000.003; Visual Examination of Snubbers; Revision 48
- Technical Evaluation TE-E41-17-032; Snubber W-E41-5256-G21 Visual Failure Evaluation; Revision 0
- WO 44305177; Preliminary 43.401.500 Local Leak Rate Testing for X-7A, B2103F022A, and F028A (Test 1)
- WO 44305186; Preliminary 43.401.500 Local Leak Rate Testing for X-7B, B2103F022B, and F028B (Test 2)
- WO 44305193; Preliminary 43.401.500 Local Leak Rate Testing for X-7C, B2103F022C, and B2103F028 (Test 3)
- WO 44305204; Preliminary 43.401.500 Local Leak Rate Testing for X-7D, B2103F022D, and B2103F028D (Test 4)

- WO 44529910; Perform 44.020.027 NS4 Main Steam Line Pressure, Trip Sys A, Channel A, Calibration/Functional
- WO 44529912; Perform 44.020.029 NS4 Main Steam Line Pressure, Trip Sys A, Channel C, Calibration/Functional

2RS1 – Radiological Hazard Assessment and Exposure Controls

- Air Sample Form; Various Dates
- CARD 16-29774; Lack of Questioning Attitude
- CARD 16-30179; NQA – Weaknesses in Initial Radiation Protection Response to HRA/LHRA Events
- CARD 16-30183; NQA – Gap in LHRA/VHRA Access Control
- CARD 17-22654; RF18 Emerging Trend in Radiological Safety Behaviors
- CARD 17-22913; RF18 Personnel Contamination Events
- CARD 17-23333; GE Individual Receives Dose Alarm RB-5 While Removing Cattle Chute Dry
- MRP06; Accessing High Radiation, Locked High Radiation, and Very High Radiation Areas at Fermi 2; Revision 16
- Procedure 64.713.050; Source Leak Testing; Revision 9
- Procedure 67.000.100; Radiological Posting and Markings; Revision 27
- Procedure 67.000.101; Performing Surveys and Monitoring Work; Revision 45
- Procedure 67.000.506; Radiological Air Sampling Program; Revision 02
- Procedure 67.000.507; Alpha Monitoring and Controls; Revision 01
- Radiological Survey; Various Dates
- RWP 172021; E11 (Residual Heat Removal) and E21 (Core Spray) System Maintenance and Inspection; Revision 00
- RWP 173016; Main Steam Isolation Valves – Drywell and Reactor Building Steam Tunnel – Maintenance and Inspection; Revision 03
- RWP 173018; Intermediate Range Monitor, Source Range Monitor, Local Power Range Monitor, Position Indicating Probe, and Traverse In-Core Probe Maintenance and Inspection; Revision 01
- RWP 174004; RB5 – Reactor Reassembly and Support Activities; Revision 02
- Source Leak Tests; December 19, 2016

2RS2 – Occupational ALARA Planning and Controls

- Procedure 63.000.100; Radiation Work Permits; Revision 49
- Procedure 63.000.200; ALARA Reviews; Revision 40A
- RWP 172021 and ALARA Plan; E11 (Residual Heat Removal) and E21 (Core Spray) System Maintenance and Inspection; Revision 00
- RWP 173016 and ALARA Plan; Main Steam Isolation Valves – Drywell and Reactor Building Steam Tunnel – Maintenance and Inspection; Revision 03
- RWP 173018; and ALARA Plan; Intermediate Range Monitor, Source Range Monitor, Local Power Range Monitor, Position Indicating Probe, and Traverse In-Core Probe Maintenance and Inspection; Revision 01
- RWP 174004 and ALARA Plan; Reactor Building 5 – Reactor Reassembly and Support Activities; Revision 02

2RS3 – In-Plant Airborne Radioactivity Control and Mitigation

- CARD 15-2779; Outage Improvement Recommendation – Respiratory Training; October 15, 2015

- CARD 16-26249; NQA Audit Deficiency: Corrective Action to Issue Instructions with Disposable Dust Masks is Not Being Implemented; August 8, 2016
- CARD 17-22213; AMS-4 Alarm during Vessel Head Stud Nut Removal; March 19, 2017
- CARD 17-23453; Air Sample >0.3 DAC Prompts Whole Body Counting for Refuel Floor Personnel; April 13, 2017
- Compressed Air/Gas Quality Testing Results; Various Dates
- MRP09; Respiratory Protection; Revision 13
- MSA FireHawk M-7 SCBA Inspection Record; Various Dates
- Posi3 USB Test Results; Various Dates
- Procedure 65.000.737; Set up, Operation, Shutdown, and Disassembly of a Breathing Air System; Revision 14
- Procedure 65.000.768; Inspection of MSA FireHawk M-7 Self-Contained Breathing Apparatus; Revision 4
- Respirator Qualification Report

2RS4 Occupational Dose Assessment

- CARD 15-29019; Personal Contamination Event; November 15, 2015
- CARD 16-26802; Training Request for Radiation Protection for EDEX Dose Determinations; August 26, 2016
- DLR/Secondary Dosimetry Comparison Graphs/Forms; Various Dates
- MRP010; Fetal Protection Program; Revision 8
- NPRP-15-0104; Prospective Evaluation of Fermi 2 Internal Dose, December 4, 2015
- NPRP-15-0119; Radioiodine Air Sampling in RF17; October 19, 2015
- NPRP-15-0125; Assigning Effective Dose Equivalent for External Radiation Exposure (EDEX); November 6, 2015
- NPRP-16-0100; Analysis of the Current Fermi 2 Radionuclide Mix; October 24, 2016
- NPRP-17-0093; RF18 Divers' Tritium Bioassay Results and Analysis; May 16, 2017
- Procedure 65.000.211; Bioassay Sample Collection and Processing; Revision 11
- Procedure 65.000.267; Whole Body Count Protocol and Evaluation of Bioassay Results; Revision 8
- Procedure 65.000.269; Determination of Dose from Multiple Whole Body Dosimeters; Revision 0A
- Procedure 67.000.402; Dosimetry Analysis; Revision 20
- RF18 Internal Dose Evaluations; Various Dates

4OA1 – Performance Indicator Verification

- CARD 16-28485; Revise Previously Submitted NRC Performance Indicator
- CARD 17-21715; EDG-12 Generator Inboard and Outboard Bearing Oil Viscosities Low Out of Specification
- CARD 17-25167; NRC Identified EDG Unavailability Documented Incorrectly for October 2016
- CARD 16-28674; EDG-14 Shutdown During 24.307.17 due to Thick Smoke
- NEI 99 02; Regulatory Assessment Performance Indicator Guideline; Revision 7
- Fermi 2 Archived Equipment Log; April 1, 2016 through March 31, 2017
- MSPI Basis Document; June 21, 2013; Revision 4

4OA3 Follow-Up of Events and Notices of Enforcement Discretion

- Apparent Cause Evaluation CARD 17-22857; Reactor Building Pressure Failed to Meet TS 3.6.4.1 Criteria During Operations with Potential to Drain the Reactor Vessel (OPDRVs); Revision 0

- CARD 17-22857; Degraded Reactor Building Pressure During OPDRV
- Event Notification 52651 (updated); Retraction of Event Notification 52651; May 15, 2017
- Fermi 2 Control Room Log; March 30, 2017

LIST OF ACRONYMS USED

AC	Alternating Current
ADAMS	Agencywide Document Access and Management System
ALARA	As-Low-As-Is-Reasonably-Achievable
ASME	American Society of Mechanical Engineers
CARD	Condition Assessment Resolution Document
CFR	<i>Code of Federal Regulations</i>
ECSS	Emergency Core Cooling System
EDG	Emergency Diesel Generator
EOS	Emergency Overspeed Switch
F2RF18	Fermi 2 Cycle 18 Refueling Outage
FSAR	Final Safety Analysis Report
HPCI	High Pressure Coolant Injection
IMC	Inspection Manual Chapter
IP	Inspection Procedure
ISI	Inservice Inspection
LER	Licensee Event Report
MDCT	Mechanical Draft Cooling Tower
MSPI	Mitigating Systems Performance Index
NCV	Non-Cited Violation
NEI	Nuclear Energy Institute
NRC	U.S. Nuclear Regulatory Commission
OPDRV	Operations with the Potential to Drain the Reactor Vessel
PARS	Publicly Available Records System
PSI	Pounds per Square Inch
RPS	Reactor Protection System
SCBA	Self-Contained Breathing Apparatus
SDP	Significance Determination Process
SSC	Structure, System, and/or Component
TS	Technical Specification
TSO	Transmission System Operator
UFSAR	Updated Final Safety Analysis Report
UHS	Ultimate Heat Sink
WO	Work Order