UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
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November 5, 2015

Mr. Paul Fessler
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 05000341/2015003

Dear Mr. Fessler:

On September 30, 2015, the U.S. Nuclear Regulatory Commission (NRC) completed an integrated inspection at your Fermi Power Plant, Unit 2 (Fermi 2). On October 8, 2015, the NRC inspectors discussed the results of this inspection with Mr. V. Kaminskas and other members of your staff. The inspectors documented the results of this inspection in the enclosed inspection report.

The NRC inspectors documented five findings of very low safety significance (Green) in this report. Four of these findings involved violations of NRC requirements. The NRC is treating these violations as Non-Cited Violations (NCVs) consistent with Section 2.3.2.a of the NRC Enforcement Policy.

If you contest the violations or significance of these NCVs, 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 the Regional Administrator, Region III; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at Fermi 2.

If you disagree with a cross-cutting aspect assignment or a finding not associated with a regulatory requirement 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 Fermi 2.

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 2.390, "Public Inspections, Exemptions, Requests for Withholding," of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC's Public Document Room or from the Publicly Available Records (PARS) component of the NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Michael A. Kunowski, Chief
Branch 5
Division of Reactor Projects

Docket No. 50–341
License No. NPF–43

Enclosure:
IR 05000341/2015003 w/Attachment:
Supplemental Information

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No:	50–341
License No:	NPF–43
Report No:	05000341/2015003
Licensee:	DTE Energy Company
Facility:	Fermi Power Plant, Unit 2
Location:	Newport, MI
Dates:	July 1 through September 30, 2015
Inspectors:	B. Kemker, Senior Resident Inspector T. Briley, Acting Senior Resident Inspector P. Smagacz, Resident Inspector S. Bell, Health Physicist G. Hansen, Senior Emergency Preparedness Specialist A. Shaikh, Senior Reactor Inspector R. Walton, Senior Operations Engineer J. Wojewoda, Reactor Engineer
Approved by:	M. Kunowski, Chief Branch 5 Division of Reactor Projects

Enclosure

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SUMMARY

Inspection Report 05000341/2015003; 07/01/2015–09/30/2015; Fermi Power Plant, Unit 2; Maintenance Effectiveness, Identification and Resolution of Problems, and Follow-Up of Events and Notices of Enforcement Discretion.

This report covers a 3-month period of inspection by resident inspectors and announced baseline inspections by regional inspectors. Five Green findings, four 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 April 29, 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 February 4, 2015. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG–1649, "Reactor Oversight Process," dated February 2014.

Cornerstone: Initiating Events

Green. A finding of very low safety significance with an associated Non-Cited Violation of Title 10 of the *Code of Federal Regulations* (10 CFR) 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," was self-revealed on March 19, 2015, when the reactor recirculation pump 'A' seal cooling water flow switch failed, resulting in a leak of Reactor Building closed cooling water and emergency equipment cooling water into the drywell and a subsequent reactor recirculation pump trip. The reactor recirculation pump seal cooling water flow switch was incorrectly classified in the licensee's preventive maintenance program and did not have appropriate preventive maintenance tasks assigned to prevent its failure. The licensee replaced the failed flow switch prior to plant start up from the forced outage. Corrective actions to prevent recurrence for this event include replacing the recirculation pump seal cooling water flow switches with a more robust design that do not have glass tubes, thus eliminating the failure mechanism.

The finding was of more than minor safety significance because it was associated with the Equipment Performance attribute of the Initiating Events Cornerstone and adversely affected the cornerstone objective of limiting the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, the reactor recirculation pump seal cooling water flow switch failure caused a loss of cooling water flow to a reactor recirculation pump that subsequently resulted in loss of the pump and single loop operation. In addition, the finding was sufficiently similar to Inspection Manual Chapter 0612, "Power Reactor Inspection Reports," Appendix E, "Examples of Minor Issues," Example 7(d), in that this violation of 10 CFR 50.65(a)(2) had a consequence such that "[a]n actual failure had occurred with the non-scoped component causing a transient/scram." The finding was determined to be a licensee performance deficiency of very low safety significance during a quantitative Significance Determination Process review since the delta core damage frequency was determined to be less than 1.0E-6/year. The inspectors concluded this finding affected the cross-cutting area of problem identification and resolution and the cross-cutting aspect of identification (IMC 0310, P.1). Specifically, licensee personnel had opportunities through execution and analysis of its preventive

maintenance program to ascertain the effect the recirculation pump seal flow switch failure would have on the closed cooling water systems that connect to the component. (Section 1R12.b.(2))

Cornerstone: Mitigating Systems

Green. A finding of very low safety significance with an associated Non-Cited Violation of 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," was self-revealed on May 24, 2015, when the failure of a reactor protection system (RPS) timing relay caused an invalid half-scram due to loss of power and the resultant closure of multiple containment isolation valves. The timing relay failure occurred, in part, due to the licensee's failure to perform preventive maintenance on the component. The licensee replaced the failed timing relay and initiated corrective actions to create preventive maintenance activities for replacing the RPS timing relays.

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 (i.e., core damage). Specifically, the RPS timing relay failure resulted in the loss of RPS Train B power and caused multiple containment isolation valves to spuriously close. In addition, the finding was sufficiently similar to Inspection Manual Chapter 0612, "Power Reactor Inspection Reports," Appendix E, "Examples of Minor Issues," Example 7(c), in that this violation of 10 CFR 50.65(a)(3) had a consequence "…such as equipment problems attributable to failure to take industry operating experience into account when practicable." The finding was determined to be a licensee performance deficiency of very low safety significance. Although the issue affected the design or qualification of a mitigating system or component, failure of the timing relay and loss of RPS B power did not result in the loss of safety function of any safety-related structure, system, or component. Actuation of the RPS relies on a loss of power, which was not affected by the relay failure. The inspectors concluded this finding affected the cross-cutting area of human performance and the cross-cutting aspect of design margins (IMC 0310, H.6). Specifically, the licensee did not place special attention to appropriately operate and maintain RPS timing relays subject to age-related degradation within design margins with respect to an appropriate service life. Relevant external operating experience was not evaluated by the licensee and factored into an appropriate evaluation of component service life because the relay was not entered into its central component database. (Section 1R12.b.(1))

Green. A finding of very low safety significance with an associated Non-Cited Violation of Technical Specification 5.4, "Procedures," was self-revealed on May 16, 2015, when the failure of an auxiliary trip unit relay for the Division 2 spent fuel pool ventilation exhaust radiation monitor caused an invalid actuation of primary and secondary containment isolation valve logic for numerous valves in the drywell and suppression pool ventilation and nitrogen inerting systems, and an invalid engineered safety features system actuation of the standby gas treatment system and control center heating, ventilation, and air conditioning system. The licensee failed to perform any replacement preventive maintenance for the component throughout the history of plant operation. The licensee subsequently replaced the failed relay and returned the Division 2 spent fuel pool ventilation exhaust radiation monitor to service. In addition, the licensee initiated a corrective action to create preventive maintenance activities to replace all potentially age-degraded auxiliary trip unit relays and to create new preventive maintenance strategies for relays not currently within the scope of its preventive maintenance template.

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 (i.e., core damage). Specifically, the age-related auxiliary trip unit relay failure unnecessarily challenged actuation of engineered safety features and resulted in inoperable safety-related equipment until maintenance was completed to replace the failed relay. The finding was determined to be a licensee performance deficiency of very low safety significance. Although the issue affected the design or qualification of a mitigating system or component, failure of the auxiliary trip unit relay did not result in the loss of safety function of any safety-related structure, system, or component but instead resulted in invalid actuation of safety features. The inspectors concluded this finding affected the cross-cutting area of problem identification and resolution and the cross-cutting aspect of operating experience (IMC 0310, P.5). Specifically, the licensee did not appropriately evaluate and implement relevant internal and external operating experience to appropriately adjust its preventive maintenance program to replace auxiliary trip unit relays. (Section 4OA2.2)

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 on March 19, 2015, when the reactor automatically scrammed due to an automatic reactor scram signal generated from the oscillation power range monitor (OPRM) logic of the reactor protection system. The licensee failed to maintain response procedures appropriate to the circumstances to direct licensed reactor operators to take timely mitigating actions when the reactor was operating in a condition more susceptible to core thermal-hydraulic instability (i.e., high power and low flow conditions) following the loss of a reactor recirculation pump and transition to single loop operation. Corrective actions include procedure revisions to add steps for timely mitigation actions when the reactor is operating in a condition more susceptible to core thermal-hydraulic instability and training of licensed operators.

The finding was of more than minor safety significance because it was associated with the Procedure Quality 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 (i.e., core damage). Specifically, the failure to have procedures appropriate to the circumstances in response to a thermal-hydraulic instability event resulted in untimely operator action that led to an automatic reactor scram. The finding was determined to be a licensee performance deficiency of very low safety significance. The inspectors concluded that because the changes to the abnormal operating procedure were performed in the year 2000 after the OPRM system was installed at the plant and no opportunity reasonably existed since that time to identify and correct it, this issue was not reflective of current licensee performance and no cross-cutting aspect was identified. (Section 4OA3.1)

Cornerstone: Barrier Integrity

Green. A finding of very low safety significance was self-revealed on July 7, 2015, during post-maintenance testing of the Reactor Building heating, ventilation, and air conditioning (RBHVAC) system when reverse rotation of the center exhaust fan pressurized secondary containment due to reversed electrical leads. Personnel responsible for oversight and execution of the post-maintenance test of the RBHVAC center exhaust fan did not appropriately consider the possibility and adverse effects of prolonged reverse rotation after performing a revision to the work order. As a result, a normal post-installation test activity (i.e., "bump-check" for rotation) was deviated from and produced unintended consequences, (i.e., a momentary degradation of secondary containment). No violation of regulatory requirements was identified because the RBHVAC system fans were not safety-related equipment. This issue was determined to be a finding. The licensee's corrective actions for this event include revising the maintenance procedure to clarify work instructions when visible verification of rotation cannot be completed and an operational check is required for flow characteristics, and providing required reading to all operations shift personnel, electrical planners, and maintenance personnel to clarify the difference between a rotational check and an operational check and any potential impact.

The finding was of more than minor safety significance because it was associated with the Human Performance attribute of the Barrier Integrity Cornerstone and adversely affected the cornerstone objective of providing reasonable assurance that physical design barriers protect the public from radionuclide releases caused by accidents or events. Specifically, the failure to assess the plant impact from potential prolonged reverse rotation of the center RBHVAC exhaust fan during a post-maintenance test had a direct effect on the licensee's ability to maintain the safety function of secondary containment. The finding was determined to be a licensee performance deficiency of very low safety significance because it represented only a degradation of the radiological barrier function provided by the reactor building. The inspectors concluded this finding affected the cross-cutting area of human performance and the cross-cutting aspect of consistent process (IMC 0310, H.13), the licensee did not utilize a consistent, systematic approach when the request was made to change the post-maintenance test from a rotational check to an operational check. (Section 4OA3.2)

REPORT DETAILS

Summary of Plant Status

Fermi Power Plant, Unit 2, was operated at or near 100 percent power during the inspection period with the following exceptions:

- On July 22, the licensee reduced power to about 72 percent, fully inserted two control rods, and removed them from service for maintenance to replace hydraulic control units. The unit was returned to full power the following day.

- On July 25, the licensee reduced power to about 85 percent to perform control rod sequence exchanges and scram time testing of two control rods following maintenance on hydraulic control units. The unit was returned to full power the following day.

- On August 1, the licensee reduced power to about 88 percent to remove a heater drain pump from service for maintenance. The unit was returned to full power the following day.

- On August 22, the licensee reduced power to about 79 percent to perform control rod sequence exchanges. The unit was returned to full power the following day.

- On September 5, the licensee reduced power to about 77 percent to perform control rod sequence exchanges. The unit was returned to full power the following day.

- On September 13, Control Room operators manually scrammed the unit in response to a loss of cooling water supply to nonsafety-related systems in the Turbine Building, including the main turbine oil and station air systems. The unit remained shut down for a 13-day forced outage through September 27, at which time the licensee commenced the Cycle 17 refueling outage (RF–17). The unit was shut down for RF–17 at the end of the inspection period.

1. REACTOR SAFETY

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

1R01 Adverse Weather Protection (71111.01)

.1 Readiness For Impending Adverse Weather Condition – Severe Thunderstorm

a. Inspection Scope

A severe thunderstorm was forecasted in the vicinity of the plant on August 19 with lightning, high winds, and heavy rains. The inspectors reviewed the licensee's overall preparations for the expected conditions, including Abnormal Operating Procedure (AOP) 20.000.01, "Acts of Nature," Revision 48, and severe weather guidelines in Operations Department Expectation (ODE)-3, "Communications," Revision 53, to assess the adequacy of the licensee's response to the expected conditions. The inspectors toured the plant grounds in the vicinity of the 120-kilovolt and 345-kilovolt switchyards and the main power transformers to look for loose materials and debris, which, if present, could become missiles during high wind conditions. During the inspection, the inspectors focused on plant-specific design features and the licensee's preparations for the impending adverse weather conditions.

This inspection constituted one readiness for impending adverse weather condition inspection sample as defined in Inspection Procedure (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 2 Emergency Diesel Generators (EDG) During EDG 12 Maintenance;
- Division 2 Standby Gas Treatment System (SGTS) During Division 1 SGTS Maintenance; and
- Division 1 Emergency Equipment Cooling Water (EECW) During Division 2 EECW Maintenance.

The inspectors selected these systems based on their risk significance relative to the Reactor Safety Cornerstones. The inspectors reviewed operating procedures, system diagrams, Technical Specification (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 equipment alignment-related problems 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. Documents reviewed are listed in the Attachment to this report.

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

b. Findings

No findings were identified.

.2 Semi-Annual Complete System Walkdown (71111.04S)

a. Inspection Scope

From July 8 through August 26, the inspectors performed a complete system alignment inspection of the residual heat removal service water (RHRSW) system to verify the functional capability of the system. This system was selected because it was considered both safety significant and risk significant in the licensee's probabilistic risk assessment. The inspectors walked down the system to review mechanical and electrical equipment lineups; electrical power availability; system pressure and temperature indications, as appropriate; component labeling; component lubrication; component and equipment cooling; hangers and supports; and operability of support systems; and to ensure ancillary equipment or debris did not interfere with equipment operation. A review of a sample of past and outstanding work orders (WOs) was performed to determine whether any deficiencies significantly affected the system function. In addition, the inspectors reviewed the corrective action program database to ensure system equipment alignment problems were being identified and appropriately resolved. Documents reviewed are listed in the Attachment to this report.

This inspection constituted one complete system walkdown inspection sample 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:

- Auxiliary Building Fifth Floor, Ventilation Areas;
- Reactor Building First Floor, North and South Hydraulic Control Unit Areas;
- Radioactive Waste Building Second Floor, Balance of Plant Switchgear and Batteries;
- Auxiliary Building Fourth Floor, Reactor Building Heating, Ventilation, and Air Conditioning (RBHVAC) Ventilation and Testability Panel Area; and
- Auxiliary Building Third Floor, Control Room.

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 fire protection 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. Documents reviewed are listed in the Attachment to this report.

This inspection constituted five quarterly fire protection inspection samples 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 Updated Final Safety Analysis Report (UFSAR), engineering calculations, and AOPs, 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:

- Auxiliary Building Basement and First Floor.

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. Documents reviewed are listed in the Attachment to this report.

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

b. Findings

No findings were identified.

1R11 Licensed Operator Requalification Program (71111.11)

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

a. Inspection Scope

The inspectors observed licensed operators during evaluated simulator training on August 11. The inspectors assessed the operators' response to the simulated events focusing on alarm response, command and control of crew activities, communication practices, procedural adherence, and implementation of Emergency Plan requirements. The inspectors also observed the post-training critique to assess the ability of the licensee's evaluators and the operating crew to self-identify performance deficiencies. The crew's performance in these areas was compared to pre-established operator action expectations and successful critical task completion requirements. Documents reviewed are listed in the Attachment to this report.

This inspection constituted one quarterly licensed operator requalification 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 September 5 and 6, the inspectors observed licensed operators in the Control Room perform a down-power for control rod sequence exchange. This activity required heightened awareness and 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 licensed operator performance 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. Documents reviewed are listed in the Attachment to this report.

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

b. Findings

No findings were identified.

.3 Simulator Fidelity Regarding the Ability to Model Core Thermal-hydraulic Instabilities

a. Inspection Scope

The inspectors reviewed selected training records and interviewed licensed operators and operations training staff to evaluate the effectiveness of simulator training following an event in which licensed operators failed to stabilize the plant while operating in a region of core thermal-hydraulic instability.

This inspection does not constitute an inspection sample as defined in IP 71111.11.

b. Findings

Introduction: The inspectors opened an Unresolved Item (URI) to further evaluate the capability of the Fermi 2 simulator to model core thermal-hydraulic instabilities, to evaluate the adequacy of licensed operator training using the plant simulator for response to the condition, and to determine whether a noncompliance with the regulatory requirements exists.

Description: On March 19, 2015, Fermi 2 received an automatic reactor scram signal generated from the oscillation power range monitor (OPRM) logic of the reactor protection system. As discussed in Section 4OA3.1 of this inspection report, following the transition of the unit to single loop operation due to the loss of a reactor recirculation pump, licensed operators failed to stabilize the plant while operating in a region of core thermal-hydraulic instability on the Power-to-Flow Map due to inadequate procedures. The result was a reactor scram. During review of this event, the inspectors questioned whether licensed operator training and the licensee's simulator were adequate to prepare the operators to respond to the condition. Currently, the Fermi 2 plant simulator does not model core thermal-hydraulic instability under the high power and low flow conditions experienced on March 19; however, the training staff is able to artificially introduce the instability in the simulator in certain scenarios. The inspectors questioned whether the modeling of thermal-hydraulic instability falls under the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) 55.46(c)(1), which requires the simulator to demonstrate expected plant response to operator input and to normal, transient, and accident conditions.

This issue of concern is considered a URI pending additional review by the NRC's operator licensing inspectors **(URI 05000341/2015003–01, Inadequate Simulator Fidelity Regarding the Ability to Model Core Thermal-hydraulic Instabilities)**.

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 15–23626, Loss of RPS B; and
- CARD 15–22029, Reactor Building Closed Cooling Water (RBCCW)/EECW Drywell Leak Causes Single Loop Operation and Reactor Scram.

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. Documents reviewed are listed in the Attachment to this report.

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

b. Findings

(1) Failure to Incorporate Operating Experience into Preventive Maintenance Activities Associated with RPS Timing Relays

Introduction: A finding of very low safety significance (Green) with an associated Non-Cited Violation of 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," was self-revealed on May 24, 2015, when the failure of an reactor protection system (RPS) timing relay caused an invalid half-scram due to loss of power and the resultant closure of multiple containment isolation valves. The timing relay failure occurred, in part, due to the licensee's failure to perform preventive maintenance on the component.

Discussion: On May 24, with Fermi 2 operating at full power, an unexpected RPS Train B half-scram occurred causing multiple containment isolation valves to close. The licensee's investigation identified that RPS Train B timing relay 1TD had failed causing the motor generator set to lose power. The motor generator set is designed to ride through a loss of (or degraded) supply voltage for up to two seconds. The motor generator set performs this function through timing relay 1TD with the time delay drop-out set for two seconds. Failure of the timing relay caused the motor to stop. The loss of RPS Train B power resulted in the closure of reactor water cleanup system outboard containment isolation valves, primary containment radiation monitoring system inboard and outboard containment isolation valves, reactor recirculation pump seal purge flow outboard containment isolation valves, torus water management system outboard containment isolation valves, Division 2 drywell pneumatics inboard and outboard containment isolation valves, and the drywell floor and equipment drain sumps inboard containment isolation valves. The inspectors noted that on June 5, the licensee made the appropriate 60-day telephone notification of the event (Event Notification 51128) to the NRC Operations Center pursuant to 10 CFR 50.73(a)(2)(iv)(A) due to the invalid automatic actuation (i.e., closure) of containment isolation valves in more than one system.

The inspectors reviewed the licensee's cause evaluation for the event and concurred with its conclusions. The direct cause was a failure of RPS Train B timing relay 1TD due to age-related degradation. The timing relay installed at the time of failure was a General Electric model CR2820B. The vendor manual had no qualified service life documented or recommended replacement schedule. Industry operating experience reviewed by the inspectors indicated multiple failures attributed to normal wear/end-of-life. The licensee replaced the failed relay, which is obsolete, with an Eaton Cutler Hammer Pneumatic time delay relay. The replacement relay vendor manual specifies a replacement schedule every 25,000 operations or 10 years from the date of manufacture, whichever comes first. The relay that failed had been installed for about 12 years. It had been replaced in 2003 during corrective maintenance for a previous relay failure. Although the vendor did not specify a service life, it appeared the relay had reached the end of its service life since it would be unlikely for an older vintage relay to have had a longer expected service life than the newer relay. A critical element in the selection of safety-related component is the determination of how long an installed component can be relied upon to perform its specified safety function. In the absence of a vendor specified service life, the licensee should have established one, as specified in its NRC-approved Quality Assurance (QA) Program implemented under 10 CFR 50, Appendix B, but had not.

In its evaluation, the licensee identified no preventive maintenance activities were created for the RPS timing relays in accordance with its preventive maintenance template. Based on the guidance provided in procedure MES 51, "Preventive Maintenance Program," Revision 15, the licensee determined it should have classified the relay as Critical 2, High Duty Cycle, and Mild Service Condition. The licensee's preventive maintenance template for Critical 2, Low Duty Cycle, and Mild Service Condition components recommended replacement of the relay at a "6R" or 9-year interval, and functional testing every "2R" or 3 years. However, the licensee did not have the 1TD relay entered into its central component database and therefore preventive maintenance activities (e.g., replacement schedules) were never developed for it. In addition, because the component was not listed in the database, no links to relevant industry operating experience were captured and evaluated by the licensee. The licensee concluded in its evaluation the lack of a preventive maintenance strategy to replace the relay on the recommended frequency resulted in its failure while in service and subsequently caused the of RPS Train B half-scram event. The licensee did not perform a review of relevant industry operating experience during its cause evaluation.

The inspectors found numerous examples during their review of external operating experience of similar age-related failures of General Electric CR2820B timing relays, including an event that occurred at Fermi 2 in September 2008. This operating experience was issued through the industry operating experience network. The failure of a General Electric CR2820B timing relay identified during a logic system functional test resulted in an inoperable low pressure core spray pump. The licensee's apparent cause evaluation, at the time, concluded the normally de-energized relay had failed due to age-related degradation. The installed relay was nearly 24 years old when it failed. The inspectors also noted a very similar event occurred at another licensee's facility in June 1993 and it was reported in Licensee Event Report (LER) 05000263/1993–007–00, "Engineered Safety Features Actuation Caused by Loss of Reactor Protection System." This failure of a General Electric CR2820B timing relay caused a loss of power to an RPS bus, which resulted in a half-scram, RBHVAC isolation, SGTS initiation, and closure of 8 primary containment isolation valves.

The inspectors noted that the capability of providing high quality power to the RPS trip systems was appropriately scoped within the licensee's Maintenance Rule Program. The Maintenance Rule (10 CFR 50.65) requires that licensees monitor the performance of SSCs sufficient to provide reasonable assurance that these SSCs are capable of fulfilling their intended functions. The licensee's evaluation of the RPS timing relay failure correctly classified it as a maintenance preventable functional failure because a preventive maintenance task had not been created and performed to replace the relay in in accordance with its preventive maintenance template.

The inspectors reviewed the guidance provided in NUMARC 93–01, "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," Revision 4A. Section 12.1 of this guidance states that adjustment in preventive maintenance activities shall be made under required 10 CFR 50.65(a)(3) reviews where necessary to ensure that the objective of preventing failures of SSCs through maintenance is appropriately balanced with minimizing unavailability. In addition, Section 12.2.2 of this guidance states the 10 CFR 50.65(a)(3) periodic assessment should include a review of the performance against the established criteria, and where appropriate, industry-wide operating experience should be reviewed to identify potential problems that are applicable to the plant. Applicable industry problems should be evaluated and compared with the existing maintenance and monitoring activities, and where appropriate, adjustments should be made to the existing programs.

<u>Analysis</u>: The inspectors determined the licensee's failure to evaluate and take into account, where practical, industry operating experience associated with preventive maintenance on General Electric model CR2820B timing relays in the RPS motor generator sets was contrary to the requirements of 10 CFR 50.65(a)(3), and was therefore a performance deficiency warranting a significance evaluation. The inspectors concluded this performance deficiency was of more than minor safety significance, and thus a finding, 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 (i.e., core damage). Specifically, the RPS timing relay failure resulted in the loss of RPS Train B power and caused multiple

containment isolation valves to spuriously close. In addition, the inspectors 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 this issue sufficiently similar to guidance provided in Example 7(c) to decide the issue was not of minor safety significance because this violation of 10 CFR 50.65(a)(3) had a consequence "…such as equipment problems attributable to failure to take industry operating experience into account when practicable." Although abundant industry operating experience with similar age-related failures of General Electric CR2820B timing relays existed, including an event that occurred at Fermi 2 in September 2008, appropriate adjustment to the licensee's preventive maintenance program to replace the RPS timing relays in response to this operating experience was not performed.

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 Mitigating Systems Cornerstone, specifically the Mitigating SSCs and Functionality contributor, and would require review using IMC 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated 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). Although the issue affected the design or qualification of a mitigating SSC, failure of the timing relay and loss of RPS B power did not result in the loss of safety function of any safety-related SSC. Actuation of the RPS relies on a loss of power, which was not affected by the relay failure.

The inspectors concluded this finding affected the cross-cutting area of human performance and the cross-cutting aspect of design margins (IMC 0310, H.6). Specifically, the licensee did not place special attention to appropriately operate and maintain RPS timing relays subject to age-related degradation within design margins with respect to an appropriate service life. Relevant external operating experience was not evaluated by the licensee and factored into an appropriate evaluation of component service life because the relay was not entered into its central component database.

Enforcement: 10 CFR 50.65(a)(3) states, in part, that performance and condition monitoring activities and associated goals and preventive maintenance activities shall be evaluated at least every refueling cycle provided the interval between evaluations does not exceed 24 months. The evaluations shall take into account, where practical, industry-wide operating experience. Adjustments shall be made, where necessary, to ensure that the objective of preventing failures of SSCs through maintenance is appropriately balanced against the objective of minimizing unavailability of SSCs due to monitoring or preventive maintenance.

Contrary to the above, prior to May 24, 2015, the licensee failed to incorporate operating experience involving age-related failures of General Electric model CR2820B timing relays when it was practical to do so and to adjust its preventive maintenance with the objective of preventing failures. Consequently, on May 24, 2015, RPS Train B timing relay 1TD failed due to age-related degradation, causing the motor generator set to lose power and a subsequent invalid half-scram with closure of multiple containment isolation valves. Because of the very low safety significance, this violation is being treated as a Non-Cited Violation consistent with Section 2.3.2.a of the NRC Enforcement Policy

(NCV 05000341/2015003–02, Failure to Incorporate Operating Experience into Preventive Maintenance Activities Associated with RPS Timing Relays). The licensee entered this violation into its corrective action program as CARD 15–23626.

As an immediate corrective action, the licensee replaced the failed RPS Train B timing relay to restore normal power to RPS Train B. The licensee also initiated corrective actions to have the 1TD relays entered into its central component database and to create preventive maintenance activities for replacing the RPS timing relays. In addition, the licensee created actions to review RPS motor generator set schematics to identify additional components for entry into its central component database, to classify these additional components per its preventive maintenance program, and to develop preventive maintenance activities for replacing them consistent with its preventive maintenance template. Replacement of the RPS Train A 1TD timing relay is currently planned for the Cycle 17 refueling outage in the fall of 2015.

(2) Failure to Establish Correct Classification and Preventive Maintenance for Reactor Recirculation Pump Flow Switches

Introduction: A finding of very low safety significance (Green) with an associated Non-Cited Violation of 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," was self-revealed on March 19, 2015, when the reactor recirculation pump 'A' seal cooling water flow switch failed resulting in a leak of RBCCW and EECW into the drywell and a subsequent reactor recirculation pump trip. The reactor recirculation pump seal cooling water flow switch was incorrectly classified in the licensee's preventive maintenance program and did not have appropriate preventive maintenance tasks assigned to prevent its failure.

Description: On March 19, with Fermi 2 operating at full power, annunciators were received in the Control Room indicating RBCCW leakage in the drywell. Control Room operators entered AOP 20.127.01, "Loss of RBCCW." The procedure did not provide guidance on the situation; therefore, the Control Room Supervisor (CRS) directed manual initiation of both divisions of EECW in an attempt to isolate the leak and maintain as much of the cooling system in service as possible.

After several minutes, Division 1 EECW system pressure lowered and indication of pump cavitation was observed. Rising drywell pressure was also noted by Control Room operators. The CRS directed venting the drywell, tripping reactor recirculation pump 'A' due to loss of cooling, and tripping the Division 1 EECW pump due to cavitation. Control Room operators entered AOP 20.138.01, "Recirculation Pump Trip," due to the manual shutdown of the pump and AOP 20.413.01, "Control Center HVAC System Failure," due to the loss of EECW. An automatic reactor scram subsequently occurred due to actuation of the OPRM logic of the RPS.

The licensee submitted LER 05000341/2015–003–00, "Oscillation Power Range Monitor Upscale Reactor Scram During Single Loop Operation," to report this event in accordance with 10 CFR 50.73(a)(2)(iv)(A) as an event or condition that resulted in automatic actuation of the RPS. Refer to Section 4OA3.1 of this inspection report for the inspectors' review of the LER.

Upon entering the drywell after shutdown, the licensee identified the reactor recirculation pump 'A' seal cooling water flow switch was broken and water was leaking from it. This flow switch is one of six identical flow switches for the two reactor recirculation pumps.

Each flow switch is composed of a steel metal float within a glass tube that is subsequently contained within a metal box that has a Plexiglas face in order to allow visual determination of the level of the float. The float's level within the glass tube provides indication of cooling water flow to the reactor recirculation pump seals.

The inspectors reviewed the licensee's cause evaluation for the event and concurred with its conclusions. The failure mechanism was determined to be flow-induced vibration of the metal float against the glass tube that was also influenced by water hammer/pressure transients and radiation embrittlement. As the water flowed around the float, the float vibrated in the process stream impacting the inner diameter surfaces. Over the many years of operation (the float switch was installed before Fermi 2 initially went critical in 1988), with a consistent flow rate through the meter, the damage accumulated in a localized area until a critical crack size was reached, resulting in rupture of the glass.

The only preventive maintenance activity for the flow switches was a calibration during refueling outages. The flow switches were listed as "run-to-failure" in the licensee's preventive maintenance program because the components were classified based only on their loss of alarm function. A rupture of the glass tube was not considered, and therefore the flow switches were not classified appropriately as critical items whose failure would result in a plant transient and shutdown for repair.

<u>Analysis</u>: The inspectors determined the licensee's failure to demonstrate the performance of the reactor recirculation pump seal cooling water flow switches was effectively controlled through appropriate preventive maintenance in accordance with 10 CFR 50.65(a)(2) or monitored as specified in 10 CFR 50.65(a)(1), such that the reactor recirculation system remained capable of performing its intended function was a performance deficiency warranting a significance evaluation. Specifically, reactor recirculation pump seal cooling water flow switches installed in the EECW system were inappropriately treated as "run-to-failure" components in the licensee's preventive maintenance program because their failure and the effect on the reactor recirculation pumps, RBCCW system, and EECW system was not understood. This resulted in inadequate and untimely maintenance being performed on these components, which led to failure of a flow switch. The inspectors concluded this performance deficiency was of more than minor safety significance, and thus a finding, because it was associated with the Equipment Performance attribute of the Initiating Events Cornerstone and adversely affected the cornerstone objective of limiting the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, the reactor recirculation pump seal cooling water flow switch failure caused a loss of cooling water flow to a reactor recirculation pump that subsequently resulted in loss of the pump and single loop operation. In addition, the inspectors reviewed the examples of minor issues in IMC 0612, "Power Reactor Inspection Reports," Appendix E, "Examples of Minor Issues," and found this issue sufficiently similar to guidance provided in Example 7(d) to decide the issue was not of minor safety significance in that "[a]n actual failure had occurred with the non-scoped component causing a transient/scram."

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 Initiating Events Cornerstone, specifically the Support System Initiators contributor, and would require review using IMC 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At Power," dated June 19, 2012. The inspectors performed a Phase 1 SDP review of this finding using the guidance provided in IMC 0609, Appendix A, Exhibit 1, "Initiating Events Screening Questions," and determined this finding would require a detailed risk evaluation because the finding involved the complete or partial loss of a support system that contributes to the likelihood of, or causes, an initiating event AND affected mitigation equipment. The reactor recirculation pump seal cooling water flow switch failure resulted in a transient due to loss of the reactor recirculation pump, which resulted in an increased likelihood for a reactor scram and adversely affected the RBCCW and Division 1 EECW systems.

To evaluate the risk significance of the finding, the senior reactor analyst used the Fermi 2 Standardized Plant Analysis Risk (SPAR) model version 8.20 and the Systems Analysis Programs for Hands-on Integrated Reliability Evaluations version 8.1.2 software to evaluate a conditional core damage probability (CCDP) for the forced reactor shutdown in order to repair the flow switch for reactor recirculation pump ‘A’. A "transient" initiating event was used to model the forced reactor shutdown for equipment repair. In addition, to model the failure of the reactor recirculation pump flow switch due to leakage, a Change Set was inserted into the SPAR model to: (1) set the RBCCW pumps’ fail-to-run basic event due to common cause to "True," and (2) set the EECW pump for Division 1 fail-to-run basic event to "True." The result was a CCDP of 1.62E-06. The dominant sequence was a transient initiating event, failure of the power conversion system and its recovery, failure of residual heat removal (RHR), failure of containment venting, and failure of late injection. The increased risk due to the approximate 15 days the plant was shut down with the failure of the reactor recirculation pump ‘A’ flow switch was small (approximately 1.9E-8/year) and will be treated as negligible.

An estimate of the plant-specific initiating event frequency (IEF) for the failure of a reactor recirculation pump flow switch due to leakage was obtained by the following method:

- The number of CARDs associated with failed reactor recirculation pump flow switches due to leakage (before the present failure) was three (CARD 89–1245, CARD 03–10430, and CARD 06–22396). Thus, including the present failure results in a total of four recirculation pump flow switch failures due to leakage.
- The number of reactor-years of Fermi 2 operation was obtained. Fermi 2 has been in commercial operation since 1988 (27 years).
- Using a Bayesian update with a Jeffreys non-informative prior, the observed four reactor recirculation pump switch failures due to leakage over the number of reactor-years of Fermi 2 operation (27 years) was used to obtain a mean IEF of 1.67E-1/year.

An estimate of the delta core damage frequency (ΔCDF) due to the performance deficiency for internal events was then obtained by multiplying the IEF of the event (1.67E-1/year) times the CCDP if the initiating event were to occur (1.62E-6). The result is an estimated ΔCDF of 2.71E-7/year.

Since the total estimated ΔCDF was greater than 1.0E-7/year, an evaluation was performed for external event delta risk contributions. Using the Fermi 2 SPAR model, the following results were obtained for an exposure time of 15 days (with the same Change Set that was used for the internal events risk evaluation).

External Event	ΔCDF (1/year)
Fire	1.54E-7
Flood	7.89E-12
Seismic	4.56E-9
Total =	**1.59E-7**

Adding the external event contribution to the internal events contribution gives the following:

ΔCDF = 2.71E-7/year + 1.59E-7/year = 4.30E-7/year

Since the total estimated ΔCDF was greater than 1.0E-7/year, IMC 0609, Appendix H, "Containment Integrity Significance Determination Process," dated May 6, 2004, was used to determine the potential risk contribution due to large early release frequency (LERF). The LERF contribution was determined to be negligible due to failure of late injection being the dominant sequence for internal events.

Based on the detailed risk evaluation, the inspectors determined the finding was of very low safety significance (Green).

The inspectors concluded this finding affected the cross-cutting area of problem identification and resolution and the cross-cutting aspect of identification (IMC 0310, P.1). Specifically, licensee personnel had opportunities through execution and analysis of its preventive maintenance program to ascertain the effect the recirculation pump seal flow switch failure would have on the closed cooling water systems that connect to the component.

Enforcement: 10 CFR 50.65(a)(1) requires, in part, that each holder of an operating license monitor the performance or condition of SSCs within the scope of the monitoring program as defined by 10 CFR 50.65(b), against licensee-established goals in a manner sufficient to provide reasonable assurance that such SSCs are capable of fulfilling their intended functions.

10 CFR 50.65(a)(2) states, in part, that monitoring as specified in paragraph (a)(1) is not required where it has been demonstrated that the performance or condition of an SSC is being effectively controlled through the performance of appropriate preventive maintenance, such that the SSC remains capable of performing its intended function.

Contrary to the above, as of March 19, 2015, the licensee failed to demonstrate the performance or condition of the reactor recirculation pump seal cooling water flow switches had been effectively controlled through the performance of appropriate preventive maintenance. Specifically, the reactor recirculation pump seal cooling water flow switches were inappropriately treated as a run-to-failure components in the licensee’s preventive maintenance program, resulting in inadequate and untimely maintenance being performed on these components, which led to a flow switch failure and loss of cooling water flow to a reactor recirculation pump that subsequently resulted in loss of the pump and single loop operation. This demonstrates the performance or condition of the system was not being effectively controlled through the performance of appropriate preventive maintenance and, as a result, that goal setting and monitoring was required. Because this violation was not repetitive or willful 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 05000341/2015003-03, Failure to Establish Correct Classification and Preventive Maintenance for Reactor Recirculation Pump Flow Switches)**. The licensee entered this violation into its corrective action program as CARD 15–22029.

The licensee replaced the failed flow switch prior to plant start up from the forced outage. Corrective actions to prevent recurrence for this event include replacing the recirculation pump seal cooling water flow switches in the next refueling outage with a more robust design that do not have glass tubes, thus eliminating the failure mechanism.

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 were performed prior to removing equipment for work:

- Planned maintenance during the week of July 13 through 17 on EDG 12; and
- Planned maintenance during the week of August 10 through 14 including Division 1 EECW/EESW/Ultimate Heat Sink and Division 1 Non-Interruptible Air Supply (NIAS) systems.

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. Documents reviewed are listed in the Attachment to this report.

This inspection constituted two 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 15–24260, EECW and NIAS Cooler Calculation DC–6356 Does Not Address Actual Installed Configuration;
- CARD 15–24441, General Electric – Hitachi (GEH) Part 21 Communication: SC 14–03; Acoustic Load Pressure Difference on Access Hole Cover; and
- CARD 15–26058, E4100F025, High Pressure Coolant Injection (HPCI) Condition to Dirty Radwaste Outboard Isolation Valve Failed to Stroke Within the Owner Specified Limit in Accordance with 24.202.08.

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 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. Documents reviewed are listed in the Attachment to this report.

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

b. Findings

No findings were identified.

.2 Annual Review of Operator Workarounds

a. Inspection Scope

The inspectors performed an in-depth review of operator workarounds and assessed the cumulative effect of existing workarounds and other operator burdens. The inspectors reviewed operator workarounds, Control Room deficiencies, temporary modifications, and lit annunciators. The inspectors verified operator workarounds were being identified at an appropriate threshold, the workarounds did not adversely impact operators' ability to implement abnormal and emergency operating procedures, and the cumulative effect of operator burdens did not adversely impact mitigating system functions.

In addition, the inspectors verified problems creating operator workaround and other operator burdens 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 annual operator workaround review inspection sample as defined in IP 71111.15.

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.18)

.1 Permanent Modifications

a. Inspection Scope

The inspectors reviewed the engineering analyses, modification documents, and design change information associated with the following permanent plant modification:

- Engineering Design Package 37271, HPCI/GSW [General Service Water] Cross-Tie.

During this inspection, the inspectors evaluated the implementation of the design modification and verified, as appropriate:

- The compatibility, functional properties, environmental qualification, seismic qualification, and classification of materials and replacement components were acceptable;
- The structural integrity of the SSCs would be acceptable for accident/event conditions;
- The implementation of the modification did not impair key safety functions;
- No unintended system interactions occurred;
- The affected significant plant procedures, such as normal, abnormal, and emergency operating procedures, testing and surveillance procedures, and training were identified and necessary changes were completed;
- The design and licensing documents were either updated or were in the process of being updated to reflect the modifications;

- The changes to the facility and procedures as described in the UFSAR were appropriately reviewed and documented in accordance with 10 CFR 50.59, "Changes, Tests, and Experiments";
- The system performance characteristics, including energy needs affected by the modifications, continued to meet the design basis;
- The modification test acceptance criteria were met; and
- The modification design assumptions were appropriate.

Completed activities associated with the implementation of the modification, including testing, were also inspected and the inspectors discussed the modification with the responsible engineering and/or operations staff.

In addition, the inspectors verified problems related to the installation of permanent plant 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 permanent plant modification inspection sample 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 37086838, Perform 24-Month Preventative Maintenance Tasks per 34.307.001 on EDG 12;
- WO 38037479, Perform 24.307.46 EDG 12 Fast Start Followed by Load Reject;
- WO 43417837, Post-Maintenance Test – Operability Check (Surveillance Run With Sequence of Events) [RHRSW Pump C];
- WO 43022864, Post-Maintenance Test – Operability Check (Surveillance Run With Sequence of Events) [RHRSW Pump C];
- WO 36139692, Replace P45F401 with Tested Spare;
- WO 43674621, Load Test RB-5 Crane T3100E002;
- WO 43902604, Leak at Weld at Weldolet for Drain Valve; and
- WO 38105028, Post-Maintenance Test – Final 43.401.510 Local Leak Rate Testing Purge and Vent Test T4803F602.

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. Documents reviewed are listed in the Attachment to this report.

This inspection constituted eight 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 Forced Outage (FO 15–02)

a. Inspection Scope

On September 13, Control Room operators manually scrammed the reactor in response to a loss of cooling water supply to non-safety-related systems in the Turbine Building, including the main turbine oil and station air systems. The unit remained shut down for a 13-day forced outage through September 27, at which time the licensee commenced the Cycle 17 refueling outage (RF–17).

The inspectors evaluated the licensee's conduct of FO 15–02 activities to assess the 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, and reviewed outage work activities to ensure correct system lineups were maintained for key mitigating systems. Other major outage activities evaluated included the licensee's control of the following:

- containment penetrations in accordance with the TSs;
- SSCs that could cause unexpected reactivity changes;
- flow paths, configurations, and alternate means for reactor coolant system inventory addition;
- reactor coolant system level instrumentation;
- radiological work practices;
- fatigue management, as required by 10 CFR 26, Subpart I;
- switchyard activities and the configuration of electrical power systems in accordance with the TSs and shutdown risk plan; and
- SSCs required for decay heat removal and for establishing alternate means for decay heat removal, including instrumentation.

The inspectors observed portions of the plant cool down to verify the licensee controlled the plant cool down in accordance with the TSs.

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 the conduct of 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 other outage inspection sample as defined in IP 71111.20.

b. Findings

No findings were identified.

.2 Unit 2 Refueling Outage (RF-17)

a. Inspection Scope

The licensee commenced the Cycle 17 refueling outage on September 27. The inspectors began their inspection of the refueling outage activities, which are expected to conclude in the next inspection period.

This inspection does not constitute an 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 function and to verify testing was conducted in accordance with applicable procedural and TS requirements:

- 24.206.01, Reactor Core Isolation Cooling (RCIC) System Pump and Valve Operability Test; and
- 82.000.21, Receipt, Inspection, and Handling of Pre-Channeled Unirradiated Fuel.

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. Documents reviewed are listed in the Attachment to this report.

This inspection constituted one in-service test and one routine surveillance inspection, for a total of two surveillance testing inspection samples as defined in IP 71111.22.

b. Findings

No findings were identified.

1EP4 Emergency Action Level and Emergency Plan Changes (71114.04)

a. Inspection Scope

The regional inspectors performed an in-office review of the latest revisions to the Emergency Plan, Emergency Action Levels (EALs).

The licensee transmitted the Emergency Plan and EAL revisions to the NRC pursuant to the requirements of 10 CFR Part 50, Appendix E, Section V, "Implementing Procedures." The NRC review was not documented in a safety evaluation report and did not constitute approval of licensee-generated changes; therefore, this revision is subject to future inspection.

This EAL and Emergency Plan Changes inspection constituted one sample as defined in IP 71114.04.

b. Findings

No findings were identified.

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 July 21 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, Technical Support Center, and Emergency Operations Facility to determine whether the event classifications, notifications, and protective action recommendations were performed in accordance with procedures. The inspectors also attended 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. Documents reviewed are listed in the Attachment to this report.

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

b. Findings

No findings were identified.

2. RADIATION SAFETY

2RS8 Radioactive Solid Waste Processing and Radioactive Material Handling, Storage, and Transportation (71124.08)

This inspection constituted one complete inspection sample as defined in IP 71124.08.

.1 Inspection Planning (02.01)

a. Inspection Scope

The inspectors reviewed the solid radioactive waste system description in the UFSAR, the Process Control Program, and the recent Radiological Effluent Release Report for information on the types, amounts, and processing of radioactive waste disposed.

The inspectors reviewed the scope of quality assurance audits in this area since the last inspection to gain insights into the licensee’s performance and inform the "smart sampling" inspection planning.

b. Findings

No findings were identified.

.2 Radioactive Material Storage (02.02)

a. Inspection Scope

The inspectors selected areas where containers of radioactive waste were stored, and evaluated whether the containers were labeled in accordance with 10 CFR 20.1904, "Labeling Containers," or controlled in accordance with 10 CFR 20.1905, "Exemptions to Labeling Requirements."

The inspectors assessed whether the radioactive material storage areas were controlled and posted in accordance with the requirements of 10 CFR Part 20, "Standards for Protection Against Radiation." For materials stored or used in the controlled or unrestricted areas, the inspectors evaluated whether they were secured against unauthorized removal and controlled in accordance with 10 CFR 20.1801, "Security of Stored Material," and 10 CFR 20.1802, "Control of Material Not in Storage."

The inspectors evaluated whether the licensee established a process for monitoring the impact of long-term storage (e.g., buildup of any gases produced by waste decomposition, chemical reactions, container deformation, loss of container integrity, or re-release of free-flowing water) that was sufficient to identify potential unmonitored, unplanned releases or nonconformance with waste disposal requirements.

The inspectors selected containers of stored radioactive material and assessed for signs of swelling, leakage, and deformation.

b. Findings

No findings were identified.

.3 Radioactive Waste System Walkdown (02.03)

a. Inspection Scope

The inspectors walked down accessible portions of select radioactive waste processing systems to assess whether the current system configuration and operation agreed with the descriptions in the UFSAR, Offsite Dose Calculation Manual, and the Process Control Program.

The inspectors reviewed administrative and/or physical controls (i.e., drainage and isolation of the system from other systems) to assess whether the equipment, which was not in service or abandoned in place would not contribute to an unmonitored release path and/or affect operating systems or be a source of unnecessary personnel exposure. The inspectors assessed whether the licensee reviewed the safety significance of systems and equipment abandoned in place in accordance with 10 CFR 50.59, "Changes, Tests, and Experiments."

The inspectors reviewed the adequacy of changes made to the radioactive waste processing systems since the last inspection. The inspectors evaluated whether changes from what was described in the UFSAR were reviewed and documented in accordance with 10 CFR 50.59, as appropriate, and to assess the impact on radiation doses to members of the public.

The inspectors selected processes for transferring radioactive waste resin and/or sludge discharges into shipping/disposal containers and assessed whether the waste stream mixing, sampling procedures, and methodology for waste concentration averaging were consistent with the Process Control Program, and provided representative samples of the waste product for the purposes of waste classification as described in 10 CFR 61.55, "Waste Classification."

For those systems that provide tank recirculation, the inspectors evaluated whether the tank recirculation procedures provided sufficient mixing.

The inspectors assessed whether the licensee’s Process Control Program correctly described the current methods and procedures for dewatering and waste stabilization (e.g., removal of freestanding liquid).

b. Findings

No findings were identified.

.4 Waste Characterization and Classification (02.04)

a. Inspection Scope

The inspectors selected the following radioactive waste streams for review:

- 10 CFR 61 Analysis, Condensate Resin;
- 10 CFR 61 Analysis, Bead Resin/Charcoal; and
- 10 CFR 61 Analysis, Dry Active Waste Smear.

For the waste streams listed above, the inspectors assessed whether the licensee's radiochemical sample analysis results (i.e., "10 CFR Part 61" analysis) were sufficient to support radioactive waste characterization as required by 10 CFR Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste." The inspectors evaluated whether the licensee's use of scaling factors and calculations to account for difficult-to-measure radionuclides was technically sound and based on current 10 CFR Part 61 analysis for the selected radioactive waste streams.

The inspectors evaluated whether changes to plant operational parameters were taken into account to: (1) maintain the validity of the waste stream composition data between the annual or biennial sample analysis update; and (2) assure that waste shipments continued to meet the requirements of 10 CFR Part 61 for the waste streams selected above.

The inspectors evaluated whether the licensee had established and maintained an adequate QA Program to ensure compliance with the waste classification and characterization requirements of 10 CFR 61.55 and 10 CFR 61.56, "Waste Characteristics."

b. Findings

No findings were identified.

.5 Shipment Preparation (02.05)

a. Inspection Scope

The inspectors observed shipment packaging, surveying, labeling, marking, placarding, vehicle checks, emergency instructions, disposal manifest, shipping papers provided to the driver, and licensee verification of shipment readiness. The inspectors assessed whether the requirements of the applicable transport cask certificate of compliance had been met. The inspectors evaluated whether the receiving licensee was authorized to receive the shipment packages. The inspectors evaluated whether the licensee's procedures for cask loading and closure procedures were consistent with the vendor's current approved procedures.

The inspectors observed radiation workers during the conduct of radioactive waste processing and radioactive material shipment preparation and receipt activities. The inspectors assessed whether the shippers were knowledgeable of the shipping regulations and whether shipping personnel demonstrated adequate skills to accomplish the package preparation requirements for public transport with respect to:

- As appropriate, the licensee's response to NRC Bulletin 79–19, "Packaging of Low-Level Radioactive Waste for Transport and Burial," dated August 10, 1979; and
- Title 49 CFR Part 172, "Hazardous Materials Table, Special Provisions, Hazardous Materials Communication, Emergency Response Information, Training Requirements, and Security Plans," Subpart H, "Training."

Due to limited opportunities for direct observation, the inspectors reviewed the technical instructions presented to workers during routine training. The inspectors assessed whether the licensee's training program provided training to personnel responsible for the conduct of radioactive waste processing and radioactive material shipment preparation activities.

b. Findings

No findings were identified.

.6 Shipping Records (02.06)

a. Inspection Scope

The inspectors evaluated whether the shipping documents indicated the proper shipper name; emergency response information and a 24-hour contact telephone number; accurate curie content and volume of material; and appropriate waste classification, transport index, and UN number for the following radioactive shipments:

- Radioactive Waste Shipment EF2–13–053; Dewatered Resins; June 14, 2013
- Radioactive Waste Shipment EF2–13–078; Dry Active Waste; August 27, 2013
- Radioactive Material Shipment EF2–14–020; Control Rod Drive Mechanisms; March 1, 2014
- Radioactive Waste Shipment EF2–14–061; Dewatered Resins; December 2, 2014

Additionally, the inspectors assessed whether the shipment placarding was consistent with the information in the shipping documentation.

b. Findings

No findings were identified.

.7 Identification and Resolution of Problems (02.07)

a. Inspection Scope

The inspectors assessed whether problems associated with radioactive waste processing, handling, storage, and transportation were being identified by the licensee at an appropriate threshold, were properly characterized, and were properly addressed for resolution in the licensee corrective action program. Additionally, the inspectors evaluated whether the corrective actions were appropriate for a selected sample of problems documented by the licensee that involve radioactive waste processing, handling, storage, and transportation.

The inspectors reviewed results of selected audits performed since the last inspection of this program and evaluated the adequacy of the licensee's corrective actions for issues identified during those audits.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator Verification (71151)

.1 Mitigating Systems Performance Index (MSPI)—RHR Systems

a. Inspection Scope

The inspectors reviewed a sample of plant records and data against the reported MSPI - RHR 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, were used. The inspectors reviewed the MSPI derivation reports, Control Room logs, Maintenance Rule database, LERs, and maintenance and test data from July 2014 through June 2015 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 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. Documents reviewed are listed in the Attachment to this report.

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

b. Findings

No findings were identified.

.2 MSPI—Cooling Water Systems

a. Inspection Scope

The inspectors reviewed a sample of plant records and data against the reported MSPI - Cooling Water Systems 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, were used. The inspectors reviewed the MSPI derivation reports, Control Room logs, Maintenance Rule database, LERs, and maintenance and test data from July 2014 through June 2015 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 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. Documents reviewed are listed in the Attachment to this report.

This inspection constituted one MSPI - Cooling Water Systems Performance Indicator verification inspection sample as defined in IP 71151.

b. Findings

No findings were identified.

.3 MSPI—Heat Removal System

a. Inspection Scope

The inspectors reviewed a sample of plant records and data against the reported MSPI - Heat Removal 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, were used. The inspectors reviewed the MSPI derivation reports, Control Room logs, Maintenance Rule database, LERs, and maintenance and test data from July 2014 through June 2015 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 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. Documents reviewed are listed in the Attachment to this report.

This inspection constituted one MSPI - Heat Removal System 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.

.2 Annual In-depth Review Samples

a. Inspection Scope

The inspectors selected the following issue for in-depth review:

- CARD 15–23465, Trip of RBHVAC, Auto Start Division 1 SGTS and Control Center Heating, Ventilation, and Air Conditioning (CCHVAC) Auto Swap to Recirculation.

As appropriate, the inspectors verified the following attributes during their review of the licensee's corrective actions for the above CARD and other related CARDs:

- complete and accurate identification of the problem in a timely manner commensurate with its safety significance and ease of discovery;
- consideration of the extent of condition, generic implications, common cause, and previous occurrences;
- evaluation and disposition of operability/functionality/reportability issues;
- classification and prioritization of the resolution of the problem commensurate with safety significance;
- identification of the root and contributing causes of the problem; and
- identification of corrective actions, which were appropriately focused to correct the problem.

The inspectors discussed the corrective actions and associated evaluations with licensee personnel. Documents reviewed are listed in the Attachment to this report.

This inspection constituted one annual in-depth review inspection samples as defined in IP 71152.

b. Findings and Observations

(1) Failure to Perform Preventive Maintenance on Safety-Related Auxiliary Trip Unit Relays for the Spent Fuel Pool Ventilation Exhaust Radiation Monitors

Introduction: A finding of very low safety significance (Green) with an associated Non-Cited Violation of TS 5.4, "Procedures," was self-revealed on May 16, 2015, when the failure of an auxiliary trip unit relay for the Division 2 spent fuel pool ventilation exhaust radiation monitor caused an invalid actuation of primary and secondary containment isolation valve logic for numerous valves in the drywell and suppression pool ventilation and nitrogen inerting systems, and an invalid engineered safety features system actuation of the SGTS and CCHVAC system. The licensee failed to perform any replacement preventive maintenance for the relay throughout the history of plant operation.

Discussion: On May 16, with Fermi 2 operating at full power, the nonsafety-related RBHVAC system tripped during operation, the safety-related SGTS auto started, and the safety-related CCHVAC system shifted to the recirculation mode of operation. In addition, the Division 2 Reactor Building isolation signal tripped, which resulted in an invalid actuation of primary and secondary containment isolation valve logic for numerous valves in the drywell and suppression pool ventilation and nitrogen inerting systems. The licensee's investigation identified a relay had failed in the Division 2 spent fuel pool ventilation exhaust radiation monitor auxiliary trip unit. At the time of the event, all of the affected containment isolation valves were closed so none of the valves changed position.

The inspectors reviewed the licensee's cause evaluation for the event and concurred with its conclusions. The direct cause was a failure of relay K82 in auxiliary trip unit C51A-Z2D (C51K604D) due to age-related degradation. The relay installed at the time of failure was a General Electric model 129B2694P007. The licensee's review of internal operating experience and plant WOs for the auxiliary trip units had identified failed relays in 1999, 2001, 2009, and this most recent failure in 2015. The licensee concluded these failures constituted a trend of relay failures that should have prompted a change in maintenance strategy for the component. This was considered to be a contributing cause in the licensee's evaluation. The installed auxiliary trip unit relay was original plant equipment and was therefore greater than 30 years old. No replacement history was found for the failed relay and maintenance craftsmen who replaced it stated it appeared to be the originally installed relay. The system engineer noted the vendor manual had provided no qualified service life or recommended replacement schedule. The original manufacturer of the relay (Potter-Brumfield) documented an expected lifetime of the relay based on the number of operations/cycles (i.e., 10 million operations, mechanical; 100,000 operations minimum at rated loads). However, this was before these relays had had any substantial service time and subsequent industry operating experience identified numerous age-related failures had occurred well before this presumed service. A critical element in the selection of safety-related component is the determination of how long an installed component can be relied upon to perform its specified safety function. In the absence of an appropriate vendor-specified service life, the licensee did not establish one and document it in accordance with its NRC-approved QA Program implemented under 10 CFR 50, Appendix B. As a result, the licensee did not schedule preventive maintenance to replace the relay prior to its failure.

Based on the guidance provided in procedure MES 51, "Preventive Maintenance Program," Revision 15, the licensee classified the relay as Critical 2, Low Duty Cycle, and Mild Service Condition. The licensee's preventive maintenance template for Critical 2, Low Duty Cycle, and Mild Service Condition components recommended replacement of the relay at a "6R" or 9-year interval, and functional testing every "2R" or 3 years. However, the only preventive maintenance activity performed was a logic system functional test every 91 days. The licensee concluded in its evaluation the auxiliary trip unit relay failures could have been prevented if they were being replaced at a 6R interval in accordance with its preventive maintenance template.

The inspectors reviewed external industry operating experience for the General Electric 129B2694P007 (or Potter-Brumfield KH-4690) relay. Industry operating experience indicated multiple failures of these relays attributed to normal wear/end-of-life or aging. The licensee did not document a review of relevant industry operating experience during its evaluation.

Analysis: The inspectors determined the licensee's failure to establish an appropriate service life and perform preventive maintenance on Division 2 spent fuel pool ventilation exhaust radiation monitor relay K82 in auxiliary trip unit C51A-Z2D (C51K604D) consistent with its preventive maintenance template was contrary to the requirements of TS 5.4.1.a, and was therefore a performance deficiency warranting a significance evaluation. The inspectors concluded this performance deficiency was of more than minor safety significance, and thus a finding, 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 (i.e., core damage). Specifically, the age-related auxiliary trip unit relay failure unnecessarily challenged actuation of engineered safety features and resulted in inoperable safety-related equipment until maintenance was completed to replace the failed relay. The inspectors 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 Mitigating Systems Cornerstone, specifically the Mitigating SSCs and Functionality contributor, and would require review using IMC 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated 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). Although the issue affected the design or qualification of a mitigating system or component, failure of the auxiliary trip unit relay did not result in the loss of safety function of any safety-related SSC but instead resulted in invalid actuation of safety features.

The inspectors concluded this finding affected the cross-cutting area of problem identification and resolution and the cross-cutting aspect of operating experience (IMC 0310, P.5). Specifically, the licensee did not appropriately evaluate and implement relevant internal and external operating experience to appropriately adjust its preventive maintenance program to replace auxiliary trip unit relays. Although internal operating experience from 1999, 2001, and 2009 identifying age-related failures of the auxiliary trip unit relays was entered into the licensee’s corrective action program, appropriate adjustment to the licensee’s preventive maintenance program to replace these relays in response to this operating experience was not performed. In addition, relevant external operating experience was not considered during the licensee’s evaluation of the past relay failures to make adjustment to its preventive maintenance program to replace these relays.

<u>Enforcement</u>: TS 5.4.1.a requires, in part, that written procedures be established, implemented, and maintained covering the applicable procedures recommended in Regulatory Guide 1.33, Revision 2, Appendix A, dated February 1978. Regulatory Guide 1.33, Revision 2, Appendix A, Section 9.b, recommends procedures for performing maintenance, including preventive maintenance schedules for safety-related SSCs to specify inspection or replacement of parts that have a specific lifetime. Licensee procedure MES 51, "Preventive Maintenance Program," Revision 15, implements the requirements of Regulatory Guide 1.33, Revision 2, Appendix A, Section 9.b and contains guidance for performing preventive maintenance on

safety-related SSCs. Specifically, Step 5.2 of this procedure provides direction for the licensee to implement its preventive maintenance technical requirements and frequency (i.e., its preventive maintenance template). The licensee's preventive maintenance template specified that Critical 2, Low Duty Cycle, and Mild Service Condition components such as auxiliary trip unit relay K82 be replaced on a "6R" or 9-year frequency during their service life.

Contrary to the above, prior to May 16, 2015, the licensee failed to establish an appropriate service life and replace safety-related auxiliary trip unit relays for spent fuel pool radiation monitors consistent with its preventive maintenance template. Consequently, Division 2 spent fuel pool ventilation exhaust radiation monitor relay K82 in auxiliary trip unit C51A-Z2D (C51K604D) failed as a result of age-related degradation causing an invalid actuation of primary and secondary containment isolation valve logic for numerous valves in the drywell and suppression pool ventilation and nitrogen inerting systems, and an invalid engineered safety features system actuation of the SGTS and CCHVAC system. Because this violation was not repetitive or willful, 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 05000341/2015003–04, Failure to Perform Preventive Maintenance on Safety-Related Auxiliary Trip Unit Relays for the Spent Fuel Pool Ventilation Exhaust Radiation Monitors)**. The licensee entered this violation into its corrective action program as CARD 15–23465.

As an immediate corrective action, the licensee replaced the failed K82 relay and returned the Division 2 spent fuel pool ventilation exhaust radiation monitor to service. In addition, the licensee initiated a corrective action to create preventive maintenance activities to replace all possibly age-degraded auxiliary trip unit relays and to create new preventive maintenance strategies for relays not currently within the scope of its preventive maintenance template.

.3 Semi-Annual Trend Review

a. Inspection Scope

The inspectors reviewed repetitive or closely related issues documented in the licensee's corrective action program to look for trends not previously identified. This included a review of the licensee's quarterly trend coding and analysis reports to assess the effectiveness of the licensee's trending process. The inspectors also reviewed selected CARDs regarding licensee-identified potential trends to verify that corrective actions were effective in addressing the trends and implemented in a timely manner commensurate with the significance. Documents reviewed are listed in the Attachment to this report.

This inspection constituted one semi-annual trend review inspection sample as defined in IP 71152.

b. Assessment and Observations

No findings were identified.

(1) Overall Effectiveness of Trending Program

The inspectors determined the licensee's trending program was marginally effective at identifying, evaluating, monitoring, and correcting adverse performance trends. The inspectors noted some performance issues have not been adequately addressed by the licensee through its corrective action and preventive maintenance processes. Examples documented in this report were age-related safety-related relay failures, for which the licensee had not established effective preventive maintenance activities to replace the components prior to their failure in accordance with its preventive maintenance procedure. The inspectors also noted the licensee did not complete a quarterly trend coding and analysis report for the first quarter of 2015, but rather combined the first and second quarters together into a single report. This affected the timely review of trending data for the first quarter of the year and the implementation of appropriate corrective actions. The inspectors noted the licensee had similarly previously combined the second and third quarters of 2014 together into a single report.

The inspectors reviewed several common cause evaluations performed by the licensee to evaluate potential adverse performance and equipment trends. In general, these evaluations were performed well and identified appropriate corrective actions to address adverse trends that were identified. However, the inspectors noted the common cause evaluation tool appeared to be underutilized by the licensee to evaluate potential emerging trends at low levels in order to prevent larger problems from manifesting. The inspectors noted for the 13-month period of June 2014 through July 2015, the licensee initiated only 12 CARDs to perform common cause evaluations. The inspectors also noted the licensee was not always timely in completing these common cause evaluations. For example, CARD 14–26505, "Bubble Chart Analysis Identified Trend Related to Troubleshooting, Cause Analysis, and Corrective Action," was written on June 14, 2014, to perform a common cause evaluation. The common cause evaluation had not yet been documented in the CARD as completed and the CARD remained open a year later. In response to the inspectors' questions, the licensee documented completion of the evaluation and closed the CARD on August 28, 2015.

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

.1 (Closed) LER 05000341/2015–003–00, Oscillation Power Range Monitor Upscale Reactor Scram During Single Loop Operation

a. Inspection Scope

On March 19, 2015, Fermi 2 automatically scrammed from about 74 percent power due to an automatic reactor scram signal generated from the OPRM logic of the RPS. The unit had just transitioned to single loop operation after operators secured a reactor recirculation pump due to the loss of its normal and emergency cooling water supply. After the pump was secured, reactor power lowered from 100 percent to about 62 percent power as designed. At this power level, the heater drains pumping system stopped pumping forward, resulting in a loss of about one third of feedwater heating. Because of the increased sub-cooling due to the loss of the heater drains pumps, power began rising. At about 74 percent power, the OPRM Upscale logic actuated.

The licensee completed a 4-hour notification call (Event Notification 50903) on March 19 to report the inoperable secondary containment as required by 10 CFR 50.72(b)(2)(iv)(B) as an event or condition that resulted in actuation of the RPS when the reactor is critical.

The licensee submitted LER 05000341/2015–003–00 to report this event in accordance with 10 CFR 50.73(a)(2)(iv)(A) as an event or condition that resulted in automatic actuation of the RPS.

The inspectors reviewed the licensee's root cause evaluation for the event and interviewed licensee personnel. Documents reviewed as part of this inspection are listed in the Attachment to this report.

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

b. Findings

(1) Failure to Maintain Adequate Procedures to Respond to Thermal-hydraulic Instabilities

Introduction: A finding of very low safety significance (Green) with an associated Non-Cited Violation of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures and Drawings," was self-revealed on March 19, 2015, when the reactor automatically scrammed due to an automatic reactor scram signal generated from the OPRM logic of the RPS. Licensee procedures did not direct licensed reactor operators to take timely mitigating actions when the reactor was operating in a condition more susceptible to core thermal-hydraulic instability (i.e., high power and low flow conditions) following the loss of a reactor recirculation pump and transition to single loop operation.

Description: On March 19, with Fermi 2 operating at full power, annunciators were received in the Control Room indicating RBCCW leakage in the drywell. Control Room operators entered AOP 20.127.01, "Loss of RBCCW." The procedure, however, did not provide guidance on this particular situation, so the CRS directed manual initiation of both divisions of EECW in an attempt to isolate the leak and maintain as much of the cooling system in service as possible.

After several minutes, Division 1 EECW system pressure lowered and indication of pump cavitation was observed. Rising drywell pressure was also noted by Control Room operators. The CRS directed venting the drywell, tripping reactor recirculation pump 'A' due to loss of cooling, and tripping the Division 1 EECW pump due to cavitation. Control Room operators entered AOP 20.138.01, "Recirculation Pump Trip," due to manual shutdown of the pump and AOP 20.413.01, "Control Center HVAC System Failure," due to loss of EECW.

Reactor power rapidly decreased to about 62 percent and was accompanied by the (expected) loss of the heater drain pumps during the transition to single loop operation. In interviews, the operating crew did not recall addressing the reduction of feedwater heating directly. Decreasing feedwater temperature from the loss of the heater drain pumps resulted in reactor power increasing to 74 percent over the next 10 minutes. While power was increasing, OPRM upscale alarms were received and acknowledged by the CRS. Control Room operators reported the plant was operating in the "Exit Region" of the Power-to-Flow Map and OPRM counts were increasing. The CRS directed operators to perform Subsequent Action Step 'C' of AOP 20.138.01. This action contained eight steps. Step 5 stated: "Verify reactor power less than 66.1 percent or insert the CRAM array to lower reactor power to less than 66.1 percent."

At this time, an alarm for the main steam line radiation monitors was received. Control Room operators temporarily halted preparations to insert the CRAM array to evaluate the alarm. The alarm was determined to be the result of a crud burst due to the rapid downpower concurrent with on-line noble chemistry injections that had been in progress for over a week. Post-scram chemistry analyses confirmed no fuel damage had occurred. Evaluating the alarm further delayed operators from inserting the CRAM array and stabilizing reactor power. While making final preparations to insert the CRAM array, three OPRM upscale alarms were received and the reactor automatically scrammed.

The inspectors reviewed the licensee's root cause evaluation for the event and concurred with its conclusions. When the OPRMs were first made operable at Fermi 2 in May 2000, three AOPs were revised. These AOPs were "Loss of Feedwater Heating," "Recirculation Pump Trip," and "Jet Pump Failure." Important Control Room operator actions were removed from the procedures. In all cases, the requirement to monitor for thermal-hydraulic instability through the selection of control rods was removed as well as the statement to place the Reactor Mode Switch in "Shutdown" if thermal-hydraulic instability was observed. The bases for the procedure changes reflected the licensee's belief of the superior capability of the newly installed electronic system to detect and suppress neutron flux instability or thermal-hydraulic instability as compared to a human operator. The licensee further noted in its evaluation the procedure changes during implementation of OPRMs negatively impacted licensed operator training, which in turn affected their proficiency to maneuver the plant when confronted with plant conditions susceptible to thermal-hydraulic instability.

Analysis: The inspectors determined the licensee's failure to maintain procedures appropriate to the circumstances as required by 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures and Drawings," to direct licensed reactor operators to take timely mitigating actions when the reactor was operating in a condition more susceptible to core thermal-hydraulic instability was a performance deficiency warranting a significance evaluation. Consistent with the guidance in IMC 0612, Appendix B, "Issue Screening," dated September 7, 2012, the inspectors determined the performance deficiency was of more than minor safety significance, and thus a finding, because it affected the Procedure Quality attribute of the Mitigating Systems cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, the failure to have procedures appropriate to the circumstances in response to a thermal-hydraulic instability event resulted in untimely operator action that resulted in an automatic reactor scram. 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 Mitigating Systems Cornerstone, specifically the Reactivity Control Systems contributor, and would require review using IMC 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated 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 would require evaluation using IMC 0609, Appendix M, "Significance Determination Process Using Qualitative Criteria," dated April 4, 2012, because the finding was the result of a mismanagement of reactivity by licensed reactor operators (e.g., reactor power exceeding the licensed power limit, inability to anticipate and control changes in reactivity during operations).

To evaluate the risk significance of the finding, the senior reactor analyst used the Fermi 2 SPAR model version 8.20 and the Systems Analysis Programs for Hands-on Integrated Reliability Evaluations version 8.1.2 software to evaluate a CCDP for a reactor scram following a trip of reactor recirculation pump 'A'. A "Transient" initiating event was used to model the reactor scram. The result was a CCDP of 1.61E-06. The dominant sequence was a transient initiating event, failure of the power conversion system and its recovery, failure of RHR, failure of containment venting, and failure of late injection.

An estimate of the plant-specific IEF for the trip of a reactor recirculation pump and the resultant reactor scram due to OPRM logic was obtained by the following method:

- In NUREG/CR–3862, "Development of Transient Initiating Event Frequencies for Use with Probabilistic Risk Assessments," Table 9, a value of 0.06 reactor recirculation pump trips/year is given. Since Fermi 2 has two reactor recirculation pumps, the frequency of a trip of a single reactor recirculation pump is 0.12/year (1.2E-1/year).

- Due to the performance deficiency, assume that every reactor recirculation pump trip results in a reactor scram.

An estimate of the ∆CDF due to the performance deficiency is then obtained by multiplying the IEF of the event (1.2E-1/year) times the CCDP if the initiating event were to occur (1.61E-6). The result is an estimated ΔCDF of 1.93E-7/year.

Since the ΔCDF is associated with an internal events initiating event only, an evaluation for external event delta risk contributions was not required.

Since the total estimated ΔCDF was greater than 1.0E-7/year, IMC 0609 Appendix H, "Containment Integrity Significance Determination Process," dated May 6, 2004, was used to determine the potential risk contribution due to LERF. The LERF contribution was determined to be negligible due to failure of late injection being the dominant sequence for internal events.

Based on the detailed risk evaluation, the inspectors determined the finding was of very low safety significance (Green).

The inspectors concluded that because changes to the licensee's response procedures were performed in 2000 when the OPRM system was installed and no opportunity reasonably existed since that time to identify and correct the problem, this issue would not be reflective of current licensee performance and no cross-cutting aspect was identified.

Enforcement: 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 March 19, 2015, the licensee did not prescribe documented procedures appropriate to the circumstances to direct licensed reactor operators to take timely mitigating actions when the reactor was operating in a condition more susceptible to core thermal-hydraulic instability (i.e., high power and low flow conditions) following the loss of a reactor recirculation pump and transition to single loop operation. Specifically, AOP 20.138.01, "Recirculation Pump Trip," Revision 46, did not contain prompt actions to insert the CRAM array while operating in the "Exit Region" of the Power-to-Flow Map. This resulted in an automatic reactor scram. Because this violation was not repetitive or willful, 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 05000341/2015003–05, Failure to Maintain Adequate Procedures to Respond to Thermal-Hydraulic Instabilities).** The licensee entered this violation into its corrective action program as CARD 15–22090.

Corrective actions include revising response procedure to add steps for an immediate action to place the Reactor Mode Switch in "Shutdown" if the unit is operating in the "Scram Region" of the Power-to-Flow Map, an immediate action to insert the CRAM array if the unit is operating in the "Exit Region" of the Power-to-Flow Map, and a new override action to immediately place the Reactor Mode Switch in "Shutdown" if neutron flux instability is observed. Corrective actions also include training for licensed operators on the procedure revisions.

LER 05000341/2015–003–00 is closed.

.2 (Closed) LER 05000341/2015–004–00, Secondary Containment Declared Inoperable Due to Reverse Rotation of Normal Exhaust Fan During Post-Maintenance Testing

a. Inspection Scope

On July 7, 2015, during post-maintenance testing of the RBHVAC system with the SGTS in operation, secondary containment pressure exceeded the TS limit. The cause of the event was reverse rotation of the RBHVAC center exhaust fan due to reversed electrical leads.

The licensee completed an 8-hour notification call (Event Notification 51202) on July 7 to report the inoperable secondary containment as required by 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 a safety function needed to control the release of radioactive material.

The licensee submitted LER 05000341/2015–004–00 to report this event in accordance with 10 CFR 50.73(a)(2)(v)(C) as an event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to control the release of radioactive material.

The inspectors reviewed the licensee's apparent cause evaluation for the event and interviewed licensee personnel. Documents reviewed as part of this inspection are listed in the Attachment to this report.

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

b. Findings

(1) Failure to Adequately Assess Plant Impact for Post-Maintenance Testing on RBHVAC

Introduction: A finding of very low safety significance (Green) was self-revealed during post-maintenance testing of the RBHVAC system when reverse rotation of the center exhaust fan pressurized secondary containment due to reversed electrical leads. Personnel responsible for oversight and execution of the post-maintenance test of the RBHVAC center exhaust fan did not appropriately consider the possibility and adverse effects of prolonged reverse rotation after performing a revision to the WO. As a result, a normal post-installation test activity was deviated from and produced unintended consequences.

Description: On July 7, post-maintenance testing was being performed on the nonsafety-related RBHVAC center exhaust fan motor after replacement. A portion of the test consisted of briefly cycling power to the fan to check for proper exhaust fan rotation. The test plan used the RBHVAC system operating procedure to start the center RBHVAC supply and exhaust fans with a contingency to have the safety-related SGTS running. Operators planned to manually trip the center RBHVAC fans if an abnormal secondary containment pressure response was observed.

The intent of the step in the WO to perform a rotational check was for operators to momentarily close the breaker to the center RBHVAC exhaust fan motor and determine proper motor/fan rotation. This task could not be performed as written because the electricians could not see the fan rotate since the fan was located inside ventilation ductwork. A meeting was held between maintenance, operations, planning, and system engineering personnel to complete the rotational check with maintenance personnel having a view from the input plenum. The discussion was limited to the exhaust fan only and did not encompass the full impact of RBHVAC system operation.

This setup was attempted, however maintenance personnel still could not clearly observe the rotation of the fan and requested a longer run of the center RBHVAC fan by operations in order to see air movement, thus changing the rotational check to an operational check. An operational check is a method used to determine motor rotation using system parameters such as pressure or flow.

In preparation for the test, the SGTS was started and the east and west RBHVAC supply and exhaust fans were secured. After the center supply and exhaust fans were started, however, secondary containment differential pressure exceeded the TS surveillance requirement limit of -0.125 inches water column. Operators then stopped the RBHVAC fans, with the maximum pressure reaching 0.28 inches water column. Pressure was returned below -0.125 inches water column by the SGTS. The TS pressure limit was exceeded for approximately 41 seconds.

The inspectors reviewed the apparent cause evaluation for the event and concurred with its conclusions. The direct cause was that during the decision-making for the in-field change of plan request from rotational check to operational check, the responsible senior reactor operator did not appropriately consider the worst case end state and identify contingencies, nor did the senior reactor operator require the maintenance organization to stop work and rewrite the WO so the requested plan could be fully reviewed for impact through the work control process since it was not going to be worked as originally written. The WO did not contain adequate work instructions for performing the operational check as required by procedure MWC02, "Work Management Process," nor was the risk adequately addressed per procedure MWC15, "Elevated Risk Management," since operations did not hold maintenance to the standards in procedure MWC10, "Work Package Preparation," for a written work plan that could be evaluated for risk during the process.

Analysis: The inspectors determined the licensee's failure to follow applicable procedure standards for conducting maintenance to adequately assess plant impact for post-maintenance testing on the RBHVAC system was a performance deficiency warranting a significance evaluation. Specifically, personnel responsible for oversight and execution of the post-maintenance test of the RBHVAC center exhaust fan did not appropriately consider the possibility and adverse effects of prolonged reverse rotation after performing a major revision to the WO. As a result, a normal post-installation test activity (i.e., "bump-check" for rotation) was deviated from and produced unintended consequences (i.e., momentary degradation of secondary containment). Consistent with the guidance in IMC 0612, Appendix B, "Issue Screening," dated September 7, 2012, the inspectors determined the performance deficiency was of more than minor safety significance, and thus a finding, because it was associated with the Human Performance attribute of the Barrier Integrity Cornerstone and adversely affected the cornerstone objective of providing reasonable assurance that physical design barriers protect the public from radionuclide releases caused by accidents or events. Specifically, the failure to assess the plant impact from potential prolonged reverse rotation of the center RBHVAC exhaust fan during a post-maintenance test had a direct effect on the licensee's ability to maintain the safety function of secondary containment. 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, specifically the Reactor Building Degraded contributor, and would require review using IMC 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated June 19, 2012. 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." The inspectors determined this finding was a licensee performance deficiency of very low safety significance (Green) because it represented only a degradation of the radiological barrier function provided by the Reactor Building.

The inspectors concluded this finding affected the cross-cutting area of human performance and cross-cutting aspect of consistent process (IMC 0310, H.13). Specifically, the licensee did not utilize a consistent, systematic approach when the request was made to change the post-maintenance test from a rotational check to an operational check.

Enforcement: No violation of regulatory requirements was identified because the RBHVAC system fans were not safety-related equipment and the applicable maintenance procedures were administrative procedures not covered under 10 CFR Part 50, Appendix B. This issue was determined to be a finding **(FIN 05000341/2015003-06, Failure to Adequately Assess Plant Impact for Post-Maintenance Testing on RBHVAC)**. The licensee entered this finding into its corrective action program as CARD 15-24660.

The licensee's corrective actions for this event included revising procedure MWC10 to clarify work instructions when visible verification of rotation cannot be completed and an operational check is required for flow characteristics, and providing required reading to all operations shift personnel, electrical planners, and maintenance personnel to clarify the difference between a rotational check and an operational check and any potential impact.

LER 05000341/2015–004–00 is closed.

.3 Reactor Scram Response

a. Inspection Scope

On September 13, Control Room operators manually scrammed the reactor and tripped the main turbine generator due to a loss of cooling water supply to non-safety-related systems in the Turbine Building, including the main turbine oil and station air systems. Previously, Control Room operators had briefed and dispatched non-licensed operators to swap the Turbine Building closed cooling water (TBCCW) heat exchangers from the east train to the west train. During the transfer, Control Room operators received alarms indicating the existence of a leak in one of the heat exchangers from the GSW system into the TBCCW system. This condition resulted in overfilling the TBCCW expansion tank, lifting the expansion tank relief valve, and eventually the loss of both operating TBCCW pumps. Since TBCCW provides cooling to various Turbine Building components, including the station air compressors and reactor feedwater pump lubricating oil coolers, this condition resulted in a loss of station air system pressure and also required operators to stop the reactor feedwater pumps. Standby feedwater pumps were then used to control reactor pressure vessel level. Forty minutes later, operators closed the main steam isolation valves due to low air system pressure, necessitating the use of safety relief valves to control reactor pressure. Several hours later, a through-wall leak developed on standby feedwater system drain piping that caused operators to shift reactor pressure vessel level control to the RCIC system.

The inspectors observed operator actions post-scram, interviewed plant personnel, performed plant tours, and reviewed operator logs to evaluate operator actions during the event.

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

b. Findings

No findings were identified.

4OA5 Other Activities

.1 (Closed) URI 05000341/2015008–03, Inadequate 10 CFR 50.59 Evaluation for the On-Line NobleChem™ Process

During review of Engineering Design Package 36240, "On-Line Noble Chemistry Injection Skid Implementation Related Plant Changes," Revision A, and 10 CFR 50.59 Evaluation 10–0286, "Evaluation of Noble Metal Solution Injection into Feedwater System," Revision A, the inspectors identified a URI associated with the licensee's evaluation of the calculated hydrogen accumulation in balance of plant piping sections and the consequences of a potential hydrogen detonation in these piping sections on the accident frequency described in the UFSAR. Specifically, the inspectors questioned the effects that a potential hydrogen detonation in these piping segments would have on the frequency of occurrence of accidents previously evaluated in the UFSAR and whether there was a reasonable likelihood that this change would have required a license amendment.

Based on discussions amongst the NRC staff, the inspectors determined the issue was of minor significance because the inspectors did not reach a consensus that there was a reasonable possibility that a license amendment would be required. Subsequently, the licensee performed a 10 CFR 50.59 evaluation that provided sufficient basis to conclude that a license amendment was not required.

URI 05000341/2015008–03 is closed.

.2 Review of Institute of Nuclear Power Operations Assessment Report

The inspectors reviewed the Institute of Nuclear Plant Operations Evaluation Report for the assessment of Fermi 2 conducted in June 2015. During this review, the inspectors did not identify any new safety significant issues.

4OA6 Management Meetings

.1 Resident Inspectors' Exit Meeting

The inspectors presented the inspection results to Mr. V. Kaminskas, and other members of the licensee's staff on October 8, 2015. The licensee acknowledged the findings presented. Proprietary information was examined during this inspection, but is not specifically discussed in this report.

.2 Interim Exit Meetings

Interim exit meetings were conducted for:

- The inspection results for the Radioactive Solid Waste Processing and Radioactive Material Handling, Storage, and Transportation inspection with Mr. M. Philippon via teleconference, on August 4, 2015.

- The Annual Review of EAL and Emergency Plan Changes with the Licensee's Radiological Emergency Response Preparedness Manager, Mr. N. Avrakotos, on October 5, 2015.

The inspectors confirmed none of the potential report input discussed was considered proprietary.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

N. Avrakotos, Manager, Radiological Emergency Response Preparedness
S. Berry, Manager, Outage and Work Management
S. Bollinger, Manager, Nuclear Performance Improvement
R. Breymaier, Manager, Performance Engineering and Fuels
W. Colonnello, Director, Nuclear Work Management
K. Hlavaty, Director, Recovery Team and Major Enterprise Projects
E. Kokosky, Director, Nuclear Organizational Effectiveness
S. Hassoun, Supervisor, Licensing
D. Hemmele, Superintendent, Operations
V. Kaminskas, Site Vice President
J. Louwers, Manager, Nuclear Quality Assurance
R. LaBurn, Manager, Radiation Protection
J. Pendergast, Principal Engineer, Licensing
L. Peterson, Director, Nuclear Engineering
M. Philippon, Director, Nuclear Production
G. Piccard, Manager, Nuclear Engineering (Systems)
C. Robinson, Manager, Licensing
G. Strobel, Manager, Nuclear Operations
J. Thorson, Manager, Recovery Team
S. Ward, Senior Engineer, Licensing
B. Weber, Principal Technical Specialist, Radiation Protection
H. Yeldell, Manager, Nuclear Maintenance

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

05000341/2015003–01	URI	Inadequate Simulator Fidelity Regarding the Ability to Model Thermal-Hydraulic Instabilities (Section 1R11.3)
05000341/2015003–02	NCV	Failure to Incorporate Operating Experience Into Preventive Maintenance Activities Associated With RPS Timing Relays (Section 1R12.b.(1))
05000341/2015003–03	NCV	Failure to Establish Correct Classification and Preventive Maintenance for Reactor Recirculation Pump Flow Switches (Section 1R12.b.(2))
05000341/2015003–04	NCV	Failure to Perform Preventive Maintenance on Safety-Related Auxiliary Trip Unit Relays for the Spent Fuel Pool Ventilation Exhaust Radiation Monitors (Section 4OA2.2)
05000341/2015003–05	NCV	Failure to Maintain Adequate Procedures to Respond to Thermal-Hydraulic Instabilities (Section 4OA3.1)
05000341/2015003–06	FIN	Failure to Adequately Assess Plant Impact for Post-Maintenance Testing on RBHVAC (Section 4OA3.2)

Closed

05000341/2015003–02	NCV	Failure to Incorporate Operating Experience Into Preventive Maintenance Activities Associated With RPS Timing Relays (Section 1R12.b.(1))
05000341/2015003–03	NCV	Failure to Establish Correct Classification and Preventive Maintenance for Reactor Recirculation Pump Flow Switches (Section 1R12.b.(2))
05000341/2015003–04	NCV	Failure to Perform Preventive Maintenance on Safety-Related Auxiliary Trip Unit Relays for the Spent Fuel Pool Ventilation Exhaust Radiation Monitors (Section 4OA2.2)
05000341/2015–003–00	LER	Oscillation Power Range Monitor Upscale Reactor Scram During Single Loop Operation (Section 4OA3.1)
05000341/2015003–05	NCV	Failure to Maintain Adequate Procedures to Respond to Thermal-Hydraulic Instabilities (Section 4OA3.1)
05000341/2015–004–00	LER	Secondary Containment Declared Inoperable Due to Reverse Rotation of Normal Exhaust Fan During Post-Maintenance Testing (Section 4OA3.2)
05000341/2015003–06	FIN	Failure to Adequately Assess Plant Impact for Post-Maintenance Testing on RBHVAC (Section 4OA3.2)
05000341/2015008–03	URI	Inadequate 10 CFR 50.59 Evaluation for the On-Line NobleChem™ Process (Section 4OA5.1)

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.

1R04 Equipment Alignment

- AdHoc Trend Display; February 20, 2014 and May 7, 2015
- Attachment 71111.04; Equipment Alignment; Issue Date: September 24, 2014; Effective Date: January 1, 2015
- CARD 13–24483; Inservice Testing (IST) Pump Performance Trend for E1151C001C
- CARD 14–29392; Pump E1151C001C (RHRSW Pump C) Exceeded IST Alert Criteria
- CARD 15–21412; Vendor Recommended Upgrade in Pump Coupling Material
- CARD 15–23277; RHRSW Return From RHR Heat Exchanger High Temperature Alarm Setpoints Above Piping Design Temperature
- CARD 15–23490; Incorrect Inservice Inspection Boundary Classification (M–5813–3)
- DC–0622; RHRSW System – Direct Water Injection to Reactor Pressure Vessel – Hydraulic Analysis; Volume I; Revision C
- Drawing 6I721–2649–1; SGTS Diagram; Document Serial Number I–2649–01
- Drawing 6M721–5444; EECW Division 1; Revision BV
- Drawing 6M721–5729–1; EECW (Division 1) Functional Operating Sketch; Revision BG
- Drawing 6M721N–2047; Piping and Instrumentation Diagram Diesel Generator System - Division 2 - RHR Complex; Revision AK
- Drawing 6M721N–2049; Piping and Instrumentation Diesel Fuel and Lube Oil Systems - Division 2 - RHR Complex; Revision AV
- Drawing 6M721N–2052; Piping and Instrumentation Diagram RHR Service Water System Division 1 RHR Complex; Revision AE
- Drawing 6M721N–2053; Piping and Instrumentation Diagram RHR Service Water System Division 2 RHR Complex; Revision AH
- E1151; RHR Service Water; System Engineer Marcus Rivard; Reporting Period Fourth Quarter 2014
- E1151; RHR Service Water; System Engineer Marcus Rivard; Reporting Period First Quarter 2015
- EDG 13 and 14 Standby Lineup Verification 23.307
- Email To: J. Auler, DTE; From: E. Cavey, T North Consulting; Subject: Variability in Dp Measurements for Service Water Pumps; February 15, 2015
- Fire Protection Pre Plan FP–AB–4–16C; Auxiliary Building Ventilation Equipment Room, Zone 16, Elevation 659’6"; Revision 3
- Procedure 23.127; RBCCW/EECW System; Revision 136
- Procedure 23.208; RHR Complex Service Water Systems; Revision 107
- Procedure 23.307; EDG System; Revision 120
- Procedure 23.404; SGTS; Revision 53

1R05 Fire Protection

- CARD 15–20857; Deterioration of Battery Casing and Excessive Corrosion
- CARD 15–26245; NRC-Identified: UFSAR Section Incorrectly References TS Sections For Fire Protection

- Fire Protection Pre Plan FP–AB–3–12; Control Center Complex, Zone 12 and 12A, Elevation 643’6"; Revision 5
- Fire Protection Pre Plan FP–RB–1–7a; Reactor Building North Control Rod Drive Area, Zone 7, Elevation 583’6"; Revision 4
- Fire Protection Pre Plan FP–RB–1–7b; Reactor Building South Control Rod Drive and Railroad Bay Area, Zone 7; Revision 4
- Procedure FP–AB–5–16f; Auxiliary Building, Fifth Floor Ventilation Equipment Room, Zone 16, Elevation 677'0"
- Procedure FP–RDWST; Radwaste Building Zones 22, 23, 24, and 25; Revision 5

1R06 Flood Protection

- Batching Sheet VSSERC SE–89–0137; Safety Evaluation; Revision 0
- CARD 14–26608; NRC Concern - Analysis of Holes Cut Out in Floor Drain Covers
- CARD 14–29648; Torn Seal on Water Tight Door
- CARD 15–24583; NRC Identified Issue: Watertight Door, Turbine Building to RBCCW T1–32, Seal Damaged/Missing
- DC–4948; Internal Flooding Study of the Turbine Building; Volume 1; Revision B
- 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
- Engineering Design Package 10624; Capping of Floor Drain Hubs D075–30 and 31; Revision 0

1R11 Licensed Operator Requalification Program

- CARD 15–26301; Problems Encountered Inserting Control Rod 30-31 During Rod Pattern Adjustment
- CARD 15–26311; Procedure Enhancement for 3D118 Local Power Range Monitor Downscale
- Control Rod Move Sheet; September 6, 2015
- MOP19; Reactivity Management; Revision 21
- Procedure 23.000.03; Power Operation 25 Percent to 100 Percent to 25 Percent; Revision 97
- Procedure 23.623; Reactor Manual Control System; Revision 65
- Reactivity Maneuvering Plan; September 2015; Revision 0

1R12 Maintenance Effectiveness

- ACE 15–22029; B31N004A Failure Results in Unexpected Entry Into Single Loop Operations; Revision 0
- CARD 14–22547; Blown Fuse Causes Loss of RPS B
- CARD 14–28567; NRC Cross-Cutting Aspect Review Operating Experience (RPS Blown Fuse Finding 3Q2014)
- CARD 15–22028; 3D100 Recirculation System Coolants Temperature High Received For Point 3 North Recirculation Pump
- CARD 15–22029; RBCCW/EECW Drywell Leak Causes Single Loop Operation and Reactor Scram
- CARD 15–22030; Division 1 EECW Pump Cavitation During RBCCW Leak in the Drywell
- CARD 15–23626; Loss of RPS B
- CARD 15–23646; RPS West Motor Generator Set "B" 1TD Relay Failed As Found Apt
- CARD 15–24536; GE SIL 508 Affects RPS Motor Generator Set Motor Starters
- Equipment Apparent Cause Evaluation Guide Template; RBCCW/EECW Drywell Leak Causes Single Loop Operation and Reactor Scram; Template Revision; Date April 22, 2015

- Equivalent Replacement Evaluation 46402; Replacement of RPS Motor Generator Sets Pneumatic Control Relay; Revision 0
- Fermi Control Room Log; May 25, 2015
- LER 93–007–00; Engineered Safety Feature Actuation Caused By Loss of RPS Power Supply; Docket Number 05000263

1R13 Maintenance Risk Assessments and Emergent Work Control

- CARD 15–25531; Enhancement to ODE
- CARD 15–25586; Incorrect Risk Profile For Ultimate Heat Sink Mechanical Draft Cooling Tower A Fan Breakers Out-Of-Service - GREEN vice YELLOW
- CARD 15–25590; Emergency Core Cooling System Levels 1, 2, and 8 (Division 1) Surveillances Not Performed Due to Impact on High Pressure Cooling Injection
- ODE–16; Risk Assessment and Operation of Equipment Out-of-Service; Revision 2
- ODE–20; Protected Equipment; Revision 16
- Procedure 42.321.14; Dedicated Shutdown Panel H21–P623 Transfer Switch Control Center Isolation Test; Revision 25

1R15 Operability Determinations and Functionality Assessments

- 10 CFR Part 21, Communication; To: Plants Listed on Attachments 1 and 2; From: D. Porter, GEH Nuclear Energy; Subject: Acoustic Load Pressure Difference on Access Hole Cover; May 18, 2015
- 50.59 Screen 10–0177; Weld Flaw Evaluation for the Zero Degree (Top Hat Design) Access Hole Cover in the Reactor Vessel; Revision 0
- Active Operations Challenges Index; May 18, 2015
- American Society of Mechanical Engineers OM Code–2004; ISTC–5133; Stroke Test Corrective Action
- CARD 13–24224; GEH 10 CFR Part 21 Communication Error I Method of Characteristics Boundary Conditions Affecting Acoustic Loads Analyses
- CARD 15–24260; EECW and NIAS Cooler Calculation DC–6356 Does Not Address Actual Installed Configuration
- CARD 15–24441; GEH Part 21 Communication: SC 14–03: Acoustic Load Pressure Difference on Access Hole Cover
- CARD 15–24789; Division 1 SGTS Cardox Pressure Low Due to Compressor Failing to Stop
- CARD 15–24793; B Standby Liquid Control Pump Gear Reducer Sightglass Leaking Oil
- CARD 15–24881; Inadvertent Inoperability of Division 1 SGTS CO2 System
- CARD 15–26058; E4100F025, HPCI Condition to Dirty Radioactive Waste Outboard Isolation Valve , Failed to Stroke Within the Owner Specified Limit IAW 24.202.08 Step 5.2.172
- CRIS Dots; July 16, 2015
- Drawing 6I721–2642–05; SGTS Division 1 CO2 Discharge System; Revision L
- Drawing 6I721–2642–07; SGTS Motor Feeds and Control Power Division 1; Revision M
- Letter From: Rita Arndt, GEH Nuclear Energy – To: C. Becker, DTE – Subject: Response to MEPF–12–0020; January 31, 2013
- ODE-006; Open Operator Challenges; May 2015
- ODE–6; Operator Challenges; Revision 14
- Procedure ARP 1D92; EECW Makeup Tank A Level High/Low; Revision 17
- Procedure ARP 4D4; Turbine Trip Protection Fault; Revision 22
- Procedure ARP 4D46; Main Turbine Tripped; Revision 24
- Procedure 23.103; Condensate Filter Demineralizer System; Revision 81
- Procedure 23.107; Reactor Feedwater and Condensate Systems; Revision 134

- Procedure 23.127; RBCCW/EECW System; Revision 136
- Procedure 23.712; Off-Gas System; Revision 66
- Procedure 24.202.08; HPCI Time Response and Pump Operability Test At 1025 PSI; Revision 8
- Procedure 27.000.01; Locked Valve Lineup Verification; Revision 84
- Troubleshooting Datasheet For CARD 15–26058; E4100F025 (HPCI Barometric Condenser Condensate Outlet Outboard Isolation Valve) Received Three Baseline Strokes to be Used to Develop IST Acceptance Criteria. The New Acceptance Criteria Was Placed in 24.202.08 on August 3, 2015. When the Surveillance Was Run For The First Time With The New Acceptance Criteria; The Valve Failed to Stroke Within The IST/OSL Limits
- Unit Condition Assessment; January 2015
- Unit Condition Assessment; April 2015

1R18 Plant Modifications

- 50.59 Screen No.14–0198; FLEX Bleed Water Path HPCI Test Line to GSW; Revision C
- ECR–37271–1; FLEX Bleed Water Path – HPCI Test Line to GSW; Revision 0
- ECR–37271–2; FLEX Bleed Water Path – HPCI Test Line to GSW; Revision 0
- ECR–37271–3; FLEX Bleed Water Path – HPCI Test Line to GSW; Revision 0
- Engineering Design Package–3721; FLEX Bleed Water Path – HPCI Test Line to GSW; Revision 0
- Drawing 6M721–2010–1; GSW System; Revision A
- Drawing 6M721–2035; HPCI Reactor Building; Revision BN
- Drawing 6M721–3228–2; Hanger Isometric Condensate Return to Storage Tanks From Reactor and Radwaste Building Condensate Systems; Revision N
- Drawing 6M721–4970–1; Piping Isometric Flex Bleed Water Path-HPCI/RCIC Test Line to GSW Cross Connect; Revision 0
- Drawing 6M721–5708–1; HPCI System Functional Operating Sketch; Revision AQ
- Drawing 6M721–5726–1; GSW System Functional Operating Sketch; Revision A
- Drawing 6M721–5754–1; Piping Isometric GSW Return From Chillers; Revision A

1R19 Post-Maintenance Testing

- CARD 15–24860; EDG 12 #2 and #10 Piston/Liners Have Indications of Water
- CARD 15–24862; EDG 12 Engine Bay
- CARD 15–24891; Wear Marks Observed on EDG 12 #3 and #7 OCS Camshaft Lobes
- CARD 15–24892; Lube Oil Leakage Identified During One-Time Pre-Lube Test of EDG 12
- CARD 15–24964; Fuel Leak on Opposite Control Side #6 Injector
- CARD 15–24978; EDG 12 Control Side #8 Cylinder Fuel Injector Leak
- CARD 15–24983; Two Exhaust Leaks Noted During System Operating Procedure Run, Opposite Control Side
- CARD 15–25079; Nuclear QA – Work Order for the RHRSW Pump "C" Was Not Planned According to MWC 10
- CARD 15–25087; RB Crane South Main Hook Drum Bearing Degraded
- CARD 15–25538; EESW South Pump Failed Performance Indicator Acceptance Criteria Per 35.329.007
- CARD 15–26001; NQA – Crane Bore Does Not Meet Acceptance Criteria for Visual Inspection
- CARD 15–26068; Foreign Material Identified Inside RB Crane Drum
- CARD 15–26127; Reactor Building Crane Main Hoist Brake Will Not Disengage
- CARD 15–26176; Load Rating of Crane on Reactor Building 5th Floor
- CARD 15–26308; Tornado Locks on the Reactor Building 5th Floor Crane Failed to Release

- CARD 15–26346; Reactor Building Crane East Side Bridge Brakes Locked Up
- CARD 15–26469; Leak at Weld at Weldolet for Drain Valve N2103F326
- CARD 15–26439; Evaluation of Rigging Configuration for 125% Load Testing of the Reactor Building Main Crane per MMA07 Section 3.6
- CARD 15–26465; RB Crane Brakes Locked Up
- CARD 15–26904; RB Craen Abnormal Main Hook Speed Experienced During Lift
- CARD 15–26933; RB Crane Foot Brake Stopped Working
- Correspondence, DTE Memo NP–15–0021; From: M. Philippon; To: Distribution; Subject: Senior Line Manager Designation For IPTE 15–07; August 27, 2015
- Procedure 24.205.05; Division 1 RHRSW Pump and Valve Operability Test; Revision 52
- Procedure 24.208.02; Division 1 EESW and EECW Makeup Pump and Valve Operability Test; Revision 69
- Procedure 24.307.46; EDG 12 - Fast Start Followed by Load Reject; Revision 14
- Procedure 32.717.01; Reactor Building Crane Operation; Revision 6
- SOE 15–04; IST Program, Baseline Pump Performance Test for E1151–C001C; Revision 0
- TE-T31-15-040; RB-1 Floor Loading Evaluation for RB5 Crane Load Test; Revisions 0 and A [Proprietary]
- WO 36139692; Replace P45F401 With Tested Spare and Perform Ultrasonic Test on Upstream Horizontal Piping
- WO 37009022; Perform 24.208.02 Section 5.2 Only
- WO 37086838; Perform 24-Month Preventative Maintenance Tasks Per 34.307.002 on EDG 12
- WO 37899620; Neil Required – Reactor Building Overhead Crane Preventative Maintenance Inspections
- WO 38037479; Perform 24.307.46 EDG 12 Fast Start Followed by Load Reject
- WO 43417837; Post Maintenance Test 34.307.001 Section 16 Firing Pressures
- WO 43674621; Load Test RB-5 Crane T3100E002
- WR 43659672; Revise WO to Clarify Work Group to Perform Steps 50.3 and 50.3.1 From Inservice Inspection to QA; August 26, 2015; Revision 1
- WR 43674621; Revise WO to Allow for Installation and Adjustment of Lower Limit Switch. Reactor Building Crane T3100E002 Will be De-energized and Tagged Upon Request During This Evolution; September 3, 2015; Revision 2
- WR 43902604; Leak at Weld at Weldolet for Drain Valve; September 17, 2015; Revision 1

1R20 Refueling and Other Outage Activities

- CARD 15–26632; New Control Blade M2737 Inspection Unsatisfactory
- CARD 15–26676; While Scram Was Inserted to Support 27.106.08, Scram Discharge Volume Flush, Rod Drift Lights Were Not Received for Three Control Rods
- CARD 15–26764; Half Scram Occurred During Intermediate Range Monitor D Retract From Core
- CARD 15–26802; Leak

1R22 Surveillance Testing

- Procedure 24.206.01; RCIC System Pump and Valve Operability Test; Revision 77
- Procedure 82.000.21; Receipt, Inspection, and Handling of Pre-Channeled Unirradiated Fuel; Revision 1
- WO 38137131; Perform 24.206.01 RCIC System Pump Operability and Valve Test at 1000 PSIG

1EP4 Emergency Action Level and Emergency Plan Changes

- Fermi 2 Radiological Emergency Response Preparedness Plan; Revisions 43, 44, and 45
- EP 101; Classification of Emergencies; Revision 39
- EP 290; Emergency Notifications; Revisions 58 and 59
- EP 540; Drills and Exercises; Revisions 36 and 37
- EP 545; Protective Action Recommendations; Revisions 24 and 25
- EP 590; 10CFR50.54(q) Screens and Evaluations; Revision 0
- EP 601; Public Education and Information; Revision 10 and 11
- 10CFR50.54(q) Evaluation Number 2014–12E; November 25,
- 10CFR50.54(q) Evaluation Number 2014–13E; December 2, 2014
- 10CFR50.54(q) Evaluation Number 2014–14E; December 10, 2014
- 10CFR50.54(q) Evaluation Number 2014–15E; December 9, 2014
- 10CFR50.54(q) Evaluation Number 2014–16E; December 10, 2014
- 10CFR50.54(q) Evaluation Number 2014–17E; December 18, 2014
- 10CFR50.54(q) Evaluation Number 2014–18E; December 19, 2014
- 10CFR50.54(q) Screen Number 2014–103S; December 10, 2014
- 10CFR50.54(q) Screen Number 2014–104S; November 25, 2014
- 10CFR50.54(q) Screen Number 2014–112S; December 10, 2014
- 10CFR50.54(q) Screen Number 2014–118S; December 19, 2014
- 10CFR50.54(q) Evaluation Number 2015–01E; January 5, 2015
- 10CFR50.54(q) Evaluation Number 2015–04E; January 27, 2015
- 10CFR50.54(q) Evaluation Number 2015–05E; January 28, 2015
- 10CFR50.54(q) Evaluation Number 2015–06E; January 28, 2015
- 10CFR50.54(q) Evaluation Number 2015–07E; March 10, 2015
- 10CFR50.54(q) Evaluation Number 2015–08E; March 10, 2015
- 10CFR50.54(q) Evaluation Number 2015–09E; June 5, 2015
- 10CFR50.54(q) Screen Number 2015–06S; January 23, 2015
- 10CFR50.54(q) Screen Number 2015–09S; January 28, 2015
- 10CFR50.54(q) Screen Number 2015–20S; March 10, 2015
- 10CFR50.54(q) Screen Number 2015–21S; March 10, 2015
- 10CFR50.54(q) Screen Number 2015–53S; June 4, 2015
- NRC Letter; Subject: Fermi 2 Issuance of Amendment to Revise the Emergency Action Level Scheme for the Fermi 2 Emergency Plan (TAC No. MF5048); September 29, 2015
- CARD 14–20260; NQA Audit Deficiency - Annual Review of the RERP Plan Did Not Update Changes to Letters of Agreement; January 14, 2014
- CARD 14–20329; RERP Plan Changes Were Not Accurately Updated; January 16, 2014
- CARD 14–24324; Self-Assessment Deficiency - RERP Plan Letters of Agreement; May 21, 2014

2RS8 Radioactive Solid Waste Processing and Radioactive Material Handling, Storage, and Transportation

- UFSAR Chapter 11; Various Revisions
- UFSAR Change Package LCR-96-175-UFS; Dated September 3, 1996
- 65.000.506; Shipping Low Specific Activity Radioactive Material; Revision 21
- 65.000.509; Shipping Greater Than A_1, A_2 Quantities of Radioactive Material; Revision 20
- 65.000.515; Receipt, Storage, Inventory, Inspection, and Package of Radioactive Material Shipping Packages; Revision 19
- 65.000.523; Radwaste Shipments; Revision 13
- 65.000.610; Shipping Cask USA/9168/B(U); Revision 18

- 65.704.001; Setup and Operating Procedure for the RDS–1000 Unit; Revision 11
- MRP16; Use of On-Site Storage Facility; Revision 7
- MRP24; Fermi 2 10CFR61 Compliance Manual; Revision 6
- MRP26; Process Control Program; Revision 3
- Radioactive Material Transportation Training Records; Various Records
- Log; Control of Radiative Material Outside Plant RRA; Undated
- Inventory of Radwaste Storage Bays; Undated
- NRC QA Program Approval; Approval Number 0526; November 18, 2009
- Use of the CNS 8-120A Cask as a USA DOT 7A Type A Package; June 11, 2013
- NQA Audit Report 14-011; Quality Assurance Audit of the Radiological Effluents Program and the Radiological Material Transfer & Disposal Program; August 4, 2014
- Quick Hit Self-Assessment Report RP Solid Waste Processing; May 29, 2015
- CARD 13–26962; Leak Test of Vent Port on USA/9168/B(U)-96 Shipping Cask Number 8-120B-2 Failed Twice; Dated September 30, 2013
- CARD 14–26190: NQA Audit Deficiency-Lack of Engineering Justification for the Radwaste Dewatering Unit; August 1, 2014
- CARD 14–28434; Potential Asbestos Material Identified by Vendor in Shipment; October 28, 2014
- CARD 15–23931; Trefoil Marking on 8-120B-6 Shipping Cask; June 4, 2015
- CARD 15–24183; Damaged Radioactive Material Package Received from Vendor; June 12, 2015
- CARD 15–24631; Radioactive Material Package Received with Radiation Limits Above Shipment Limit for Category; July 6, 2015
- CARD 15–24694; Radwaste HAZMAT Employee Inappropriately Certified in 2010; July 8, 2015
- GEL Waste Stream Sample Results Report; January 7, 2015
- Historical Perspective on Unused Liquid and Solid Radwaste System Equipment; May 27, 2008
- Radioactive Waste Shipment EF2–13–053; Dewatered Resins; June 14, 2013
- Radioactive Waste Shipment EF2–13–078; Dry Active Waste; August 27, 2013
- Radioactive Material Shipment EF2–14–020; CRDMs; March 1, 2014
- Radioactive Waste Shipment EF2–14–061; Dewatered Resins; December 2, 2014

4OA1 Performance Indicator Verification

- CARD 14–26967; Motor Operated Valve E1150F007B Did Not Stroke Open As Expected During 24.204.06
- CARD 14–27610; Evaluation of RHR Minimum Flow Valves for Inclusion in MSPI
- MS08; MSPI Heat Removal System; July 2014 through June 2015
- MS09; RHR Heat Removal System and MS10; Cooling Water System; July 2014 through June 2015
- MSPI Basis Document; June 21, 2013; Revision 4

4OA2 Problem Identification and Resolution

- IQ15 – 2Q15 – Station Trend Report (Draft); Preparer: C. Tomkinson; Approver: S. Bollinger
- Apparent Cause Evaluation for CARD 14–20510; Nuclear Quality Assurance (NQA) Audit Finding: Station Trending Process in Not Being Effectively Implemented to Identify Adverse Trends
- CARD 14–20510; NQA Audit Finding: Station Trending Process in Not Being Effectively Implemented to Identify Adverse Trends

- CARD 14–25623; 2014 USA Mid Cycle Performance Gap – Effective Trending
- CARD 14–26504; Bubble Chart Analyses Identified Trend Related to Parts Quality
- CARD 14–26505; Bubble Chart Analysis Identified Trend Related to Troubleshooting, Cause Analysis and Correct Action
- CARD 14–29054; NQA Audit Deficiency – Adverse Trend On-Site Organizations Non-Compliance With Temporary Storage of QA Records as Defined in MGA07
- CARD 15–20925; CARD 15–20419 RCE Identified a Potential Piping and Instrumentation Theme
- CARD 15–21295; T4100C013 Center Reactor Recirculation Motor Generator Set Cooler Failed to Start
- CARD 15–21567; Discrepancy Between Central Component Data Base and the Actual Installed Equipment
- CARD 15–21589; Potential Trend in Vendor Support Impacting Scheduled Work
- CARD 15–21902; Emerging Trend in CARD Initiation
- CARD 15–22345; 4Q14 Station Trend Report – Area to be Monitored – Document Quality
- CARD 15–22346; 4Q14 Station Trend Report – Area to be Monitored – Work Preparation
- CARD 15–23182; The "B" Fuel Pool Ventilation Exhaust Radmonitor Failed Downscale
- CARD 15–23465; Trip of RBHVAC, Autostart Division 1 SGTS and CCHVAC Auto Swap to Recirculation
- CARD 15–23527; Replace Relays Causing Spurious Alarms on Fuel Pool Ventilation Exhaust Radiation Monitors D11K609B/D
- CARD 15–23678; Potential Emerging Trend Identified as a Result of First Quarter 2015 Maintenance Rework Program Trend Analysis
- CARD 15–23909; Perform Common Cause Analysis on 2015 Consequential Failure Events
- CARD 15–23945; Trend in Individuals Completing Their Respiratory Proficiency Demonstration Without Completion of the Prerequisites
- CARD 15–24213; NQA – Adverse Trend Identified in Maintenance Work Order and Procedure Documentation
- Common Cause Analysis for CARD 14–26505; Bubble Chart Analysis Identified Trend Related to Troubleshooting, Cause Analysis and Correction Actions
- Common Cause Analysis for CARD 14–29054; NQA Audit Deficiency – Adverse Trend On Site Organizations Non-Compliance With Temporary Storage of Records as Defined in MGA07
- Common Cause Analysis for CARD 15–23909; Perform Common Cause Analysis on 2015 Consequential Failure Events
- Common Cause Analysis for CARD 15–23945; Trend in Individuals Completing Their Respiratory Proficiency Demonstration Without Completion of the Prerequisites
- Correspondence, DTE Memo TMTE–14–0104; From: R. Matuszak; To: G. Piccard; Subject: Self-Assessment of System Engineering Trending/Monitoring Changes Effectiveness; December 15, 2014
- Correspondence, DTE Memo NAPI–14–0030; From: D. Sadowyj; To: S. Bollinger; Subject: Quick Hit Self-Assessment – Trending Program CARD 14–20510; December 19, 2014

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

- ACE 15–24660; Secondary Containment Pressure Boundary Vacuum Not Maintained within Specification; Revision 0
- ARP 3D106; OPRM Upscale; Revision 19
- CARD 15–22090; Evaluate Reactor Scram From OPRM Upscale During Single Loop Operation

- CARD 15–22127; SEN 254 Repeat Reactor Recirculation Pump Downshifts and Lack of Timely Operator Response
- CARD 15–23509; NRC Question – UFSAR Chapter 15 Description of Single Loop Operation
- CARD 15–23760; Change Integrated Process Computer System Power to Flow Map to Display Stability Awareness Region by Default
- CARD 15–24129; Incomplete Alignment Between Root Cause and Effectiveness Review Measures for 15–22090 Root Cause Evaluation
- CARD 15–24563; New Backup Stability Protection Graphs for Cycle 18
- CARD 15–24660; Loss of Secondary Containment During Post Maintenance Test. Evaluate for Event Free Day Reset IAW MGA 23
- CARD 15–26521; Level 3 Actuation While Maintaining Reactor Pressure Vessel Level/Pressure with RCIC and Safety Relief Valves
- CARD 15–26623; Lost Indication for the E51F505 RCIC STM Flow to Turbine Excess Flow Check Valve
- CARD 15–26643; South Reactor Feed Pump Turbine Oil Reservoir Water Containment
- CARD 15–26653; Forced Outage 15–02 RCIC Assessment
- Change Analysis; September 15, 2009, OPRM Scram Event Versus Scram Event Versus March 19, 2015, OPRM Scram Event; June 20, 2013
- Control Room Log; September 14, 2015
- Correspondence, DTE Letter NRC–15–0055; From: V. Kaminskas; To: NRC; Subject: Licensee Event Report No. 2015–003; May 5, 2015
- ENS Notification 51391
- Event Notification No. 51391; Manual Scram Due to Loss of Turbine Building Closed Cooling Water; September 13, 2015
- MMA11; Post Maintenance Testing Guidelines; Revision 23
- MWC02; Work Management Process; Revision 34
- MWC10; Work Package Preparation; Revision 28
- MWC15; Elevated Risk Management; Revision 14
- NRC Regulatory Guide 1.33; February 1978; Revision 2
- Operator Statements Post-Event
- Post-Scram Data and Evaluation for CARD 15–22029; August 29, 2013
- Procedure 20.107.02; Loss of Feedwater Heating; Revision 25
- Procedure 20.128.01; Loss of Turbine Building Closed Cooling Water System; Revision 15
- Procedure 20.129.01; Loss of Station Air Procedure; Revision 31
- Procedure 20.138.01; Recirculation Pump Trip; Revision 47
- Procedure 20.138.02; Jet Pump Failure; Revision 27
- Procedure 20.138.03; Uncontrolled Recirculation Flow Change; Revision 16
- Procedure 23.131; General Service Water System; Revision 110
- Procedure 29.100.01; Sheet 1 – Reactor Pressure Vessel Control; Revision 14
- Report; Plant Process Computer System Post Trip Report; March 19, 2015
- Report; Root Cause Evaluation Report for CARD 15–22090; June 17, 2014
- UFSAR; October 2014; Revision 19

LIST OF ACRONYMS USED

∆CDF	Delta Core Damage Frequency
10 CFR	Title 10 of the *Code of Federal Regulations*
ADAMS	Agencywide Documents Access and Management System
AOP	Abnormal Operating Procedure
CARD	Condition Assessment Resolution Document
CCDP	Conditional Core Damage Probability
CCHVAC	Control Center Heating, Ventilation, and Air Conditioning
CRS	Control Room Supervisor
EAL	Emergency Action Level
EDG	Emergency Diesel Generator
EECW	Emergency Equipment Cooling Water
EESW	Emergency Equipment Service Water
FO	Forced Outage
GEH	General Electric – Hitachi
GSW	General Service Water
HPCI	High Pressure Coolant Injection
IEF	Initiating Event Frequency
IMC	Inspection Manual Chapter
IP	Inspection Procedure
IST	Inservice Testing
LER	Licensee Event Report
LERF	Large Early Release Frequency
MSPI	Mitigating Systems Performance Index
NCV	Non-Cited Violation
NEI	Nuclear Energy Institute
NIAS	Non-Interruptible Air Supply
NQA	Nuclear Quality Assurance
NRC	U.S. Nuclear Regulatory Commission
ODE	Operations Department Expectation
OPRM	Oscillation Power Range Monitor
PARS	Publicly Available Records System
QA	Quality Assurance
RBCCW	Reactor Building Closed Cooling Water
RBHVAC	Reactor Building Heating, Ventilation, and Air Conditioning
RCIC	Reactor Core Isolation Cooling
RHR	Residual Heat Removal
RHRSW	Residual Heat Removal Service Water
RPS	Reactor Protection System
SDP	Significance Determination Process
SGTS	Standby Gas Treatment System
SPAR	Standardized Plant Analysis Risk
SSC	Structure, System, and Component
TBCCW	Turbine Building Closed Cooling Water
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
URI	Unresolved Item
WO	Work Order

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Sincerely,

/RA/

Michael A. Kunowski, Chief
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