



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**

REGION III  
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LISLE, IL 60532-4352

October 25, 2016

Mr. Scott Northard  
Site Vice President  
Prairie Island Nuclear Generating Plant  
Northern States Power Company, Minnesota  
1717 Wakonade Drive East  
Welch, MN 55089

**SUBJECT: PRAIRIE ISLAND NUCLEAR GENERATING PLANT, UNIT 2—NRC 95001  
SUPPLEMENTAL INSPECTION REPORT 05000306/2016009 AND  
ASSESSMENT FOLLOW-UP LETTER**

Dear Mr. Northard:

On September 16, 2016, the U.S. Nuclear Regulatory Commission (NRC) completed a supplemental inspection at your Prairie Island Nuclear Generating Plant, Unit 2. The enclosed report documents the results of this inspection, which were discussed with you and members of your staff during an exit meeting and a regulatory performance meeting on September 16, 2016.

As required by the NRC Reactor Oversight Process (ROP) Action Matrix, this supplemental inspection was performed in accordance with Inspection Procedure 95001, "Inspection for One or Two White Inputs in a Strategic Performance Area." The purpose of the inspection was to examine the causes for, and actions taken related to, a White performance indicator (PI) in the Initiating Events Cornerstone at the Prairie Island Nuclear Generating Plant, Unit 2. Specifically, the PI for Unplanned Reactor Scrams per 7,000 Critical Hours exceeded the Green-to-White threshold as reported in your fourth quarter 2015 PI submittal.

By letter dated March 2, 2016, the NRC informed you that because of the change in your PI status, the performance at Prairie Island Nuclear Generating Station Plant, Unit 2, was in the Regulatory Response Column of the ROP Action Matrix as of the fourth quarter of 2015 (ADAMS Accession No. ML16060A325). The NRC was notified by your staff on May 23, 2016, of your readiness for this inspection. By letter dated August 9, 2016, we informed you of our intent to perform this supplemental inspection (ADAMS Accession No. ML16222A702).

This supplemental inspection was conducted to provide assurance that the root causes and contributing causes of the events resulting in the White PI were understood, that the extent of condition and extent of cause of any performance issues were identified, that the corrective actions taken to address and preclude repetition for any performance issues were prompt and effective, and that any corrective action plans directed prompt actions to effectively address and preclude repetition of significant performance issues.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations, and with the conditions of your license. The inspectors reviewed selected procedures and records and interviewed plant personnel.

The NRC determined that the root cause evaluations (RCEs) completed for three individual unplanned reactor scrams that resulted in the White PI, as well as the aggregate RCE completed in preparation for this inspection, were conducted to a level of detail commensurate with the significance of the problems and reached reasonable conclusions as to the root and contributing causes of the events. The NRC concluded that you identified reasonable and appropriate corrective actions for each root and contributing cause and that the corrective actions appeared to be prioritized commensurate with the safety significance of the issues. The NRC has determined that completed or planned corrective actions were sufficient to address the performance issue that led to the White PI. Therefore, the NRC concluded that your actions met the objectives of Inspection Procedure 95001, "Inspection for One or Two White Inputs in a Strategic Performance Area." Based on the results of this inspection, no findings were identified.

This letter informs you of the NRC's assessment of your facility. This letter supplements, but does not supersede, the Annual Assessment Letter issued on March 2, 2016, (ADAMS Accession No. ML16060A325).

The NRC's review of Prairie Island Nuclear Generating Plant, Unit 2, identified that Unplanned Scrams per 7,000 Critical Hours PI had returned to below the Green-to-White threshold in the second Quarter of 2016. In accordance with the guidance in Inspection Manual Chapter 0305, "Operating Reactor Assessment Program," the White PI will only be considered in assessing plant performance through the first quarter of 2016. Therefore, as a result of the successful completion of the supplemental inspection and a Green Unplanned Scrams per 7,000 Critical Hours PI, the NRC determined the performance at Prairie Island Nuclear Generating Plant, Unit 2, to be within the Licensee Response column of the ROP Action Matrix as of the date of this letter.

S. Northard

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In accordance with Title 10 of the *Code of Federal Regulations* 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 Public Document Room or from the Publicly Available Records System (PARS) component of NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

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K. Riemer, Chief  
Branch 2  
Division of Reactor Projects

Docket No. 50-306  
License No. DPR-60

Enclosure:  
Inspection Report 05000306/2016009

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No: 50-306  
License No: DPR-60

Report No: 05000306/2016009

Licensee: Northern States Power Company, Minnesota

Facility: Prairie Island Nuclear Generating Plant, Unit 2

Location: Welch, MN

Dates: September 12 through September 16, 2016

Inspectors: J. Boettcher, Resident Inspector - Palisades  
V. Petrella, Reactor Inspector (Observer)

Approved by: K. Riemer, Chief  
Branch 2  
Division of Reactor Projects

Enclosure

## SUMMARY OF FINDINGS

Inspection Report 05000306/2016009; 09/12/2016 – 09/16/2016; Prairie Island Nuclear Generating Plant, Unit 2; Supplemental Inspection 95001.

This report covers a one-week period of an announced supplemental inspection of a White performance indicator (PI) for unplanned scrams in the Initiating Events cornerstone. The inspection was conducted by a resident inspector. The U.S. Nuclear Regulatory Commission (NRC) inspectors did not identify any findings or violations of more than minor significance. 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," (ROP) dated July 2016.

This inspection was conducted in accordance with Inspection Procedure (IP) 95001, "Supplemental Inspection for One or Two White Inputs in a Strategic Performance Area," to assess the licensee's evaluation of one White PI in the Initiating Events Cornerstone. The PI for Unplanned Reactor Scrams per 7,000 Critical Hours exceeded the Green-to-White threshold, which was reported in the licensee's fourth quarter 2015 PI submittal. As discussed in the Annual Assessment Letter dated March 2, 2016, (ADAMS No. ML16060A325), this change in PI status caused Prairie Island Nuclear Generating Plant, Unit 2 to transition from the Licensee Response column to the Regulatory Response column of the ROP Action Matrix in the fourth quarter of 2015.

In preparation for the inspection, the licensee performed a root cause evaluation (RCE) to address the White PI. This aggregate RCE was reviewed during the inspection to address the objectives of the inspection procedure. In addition, the inspectors also reviewed the licensee's RCEs conducted for each of the three individual unplanned reactor scrams. The inspectors determined that the licensee's aggregate RCE was conducted to a level of detail commensurate with the significance of the problem and reached reasonable conclusions. The inspectors also concluded that the licensee identified reasonable and appropriate corrective actions and that the corrective actions appeared to be prioritized commensurate with the safety significance of the issue.

The aggregate RCE reviewed the three unplanned reactor scrams that contributed to the White PI. The evaluation discussed the conclusions that were drawn when those events were reviewed in aggregate. The conclusions from the licensee's root cause team included two contributing causes. The root, apparent, direct and contributing causes, and factors associated with the three scrams reviewed were sufficiently diverse such that no commonality was identified that met the licensee's definition of a root cause. As such, this aggregate evaluation did not reveal a root cause.

The Unplanned Scrams per 7,000 Critical Hours PI returned below the Green-to-White threshold in the second quarter 2016. Therefore, given the licensee's acceptable performance in addressing the White PI, in accordance with the guidance in IMC 0305, "Operating Reactor Assessment Program," the White PI will only be considered in assessing plant performance through the first quarter of 2016. As a result, the NRC determined the performance at Prairie Island Nuclear Generating Station, Unit 2 to be in the Licensee Response Column of the ROP Action Matrix as of the date of this inspection report and assessment follow-up letter.

**NRC-Identified and Self-Revealed Findings**

No findings were identified.

**Licensee-Identified Violations**

None

## REPORT DETAILS

### 4. OTHER ACTIVITIES

#### 4OA4 Supplemental Inspection (95001)

##### .1 Inspection Scope

This inspection was conducted in accordance with Inspection Procedure 95001, "Inspection for One or Two White Inputs in a Strategic Performance Area," to assess the licensee's evaluation of one White Unplanned Reactor Scrams per 7,000 Critical Hours performance indicator (PI) in the Initiating Events Cornerstone. The PI exceeded the Green-to-White threshold as reported in the licensee's fourth quarter 2015 PI submittal. The inspection objectives were to:

- assure that the root causes and contributing causes of individual and collective (multiple white inputs) significant performance issues are understood;
- independently assess and assure that the extent of condition and extent of cause of significant individual and collective (multiple white inputs) performance issues are identified;
- assure that corrective actions taken to address and preclude repetition of significant performance issues are prompt and effective; and
- assure that corrective plans direct prompt actions to effectively address and preclude repetition of significant performance issues.

The three unplanned reactor scrams that caused the PI to exceed the Green-to-White threshold are briefly described below:

- Reactor Scram Due to 21 Feedwater Pump Lock Out

On April 3, 2015, the operators manually scrambled the reactor in response to an unexpected annunciator indicating the 21 feedwater (FW) pump was locked out and lowering steam generator levels. The annunciator was received due to indicated low 21 FW pump suction pressure. The cause of the indicated low 21 FW pump suction pressure was determined to be due to a failure of the 21 FW pump suction pressure switch (PS-16012). The plant was in Mode 1 and at 100 percent reactor power at the time of the scram.

- Reactor Scram Due to a Turbine Trip

On June 7, 2015, Unit 2 experienced an automatic turbine trip and an automatic reactor trip due to low turbine bearing oil pressure. The cause was determined to be poor weld quality that resulted in a circumferential crack on the welded joint upstream of check valve 2TO-303, causing a decrease in the turbine bearing oil pressure to less than the turbine oil pressure trip setpoint of 6 psi. The plant was in Mode 1 and at 100 percent reactor power at the time of the scram.

- Reactor Scram Due to a Main Electrical Generator Trip

On December 17, 2015, Unit 2 experienced an automatic turbine trip and an automatic reactor trip due to the ground overvoltage protection relay (59/2G). Further troubleshooting determined ground fault condition on phase C due to a 10 MM socket and hex key left in the generator at the vendor fabrication facility. The plant was in Mode 1 and at 100 percent reactor power at the time of the scram.

On May 23, 2016, the licensee notified the U.S. Nuclear Regulatory Commission (NRC) that applicable corrective actions to address the White PI had either been completed or initiated, and that it was ready for the NRC to conduct its supplemental inspection to review the actions taken to address the PI. In preparation for the inspection, the licensee performed a root cause evaluation (RCE) 01506468, to address the White PI. This aggregate RCE was reviewed during the inspection to address the specific requirements of the IP.

In addition to the aggregate RCE for the White PI mentioned above, the inspectors also reviewed the licensee's RCEs conducted for each of the three individual unplanned reactor scrams. The following RCEs were also the subject of this inspection:

- RCE 01472846, Unplanned Manual Reactor Trip Occurred due to a Failure of the 21 Feedwater Pump Suction Pressure Switch;
- RCE 01482090, Unit 2 Experienced a Turbine Trip and Reactor Trip due to Low Turbine Bearing Oil Pressure; and
- RCE 01506285, Unit 2 Main Electrical Generator Tripped by Ground Overvoltage Protection Relay.

The inspectors reviewed corrective actions that were taken or planned to address the identified causes. The inspectors also held discussions with licensee personnel to ensure that the root and contributing causes, and the contribution of safety-culture components, were understood and that corrective actions taken or planned were appropriate to address the causes and preclude repetition.

The following inspection results are organized by the specific inspection objectives of IP 95001.

## .2 Evaluation of Inspection Requirements

### 02.01 Problem Identification

- a. *Determine that the evaluation documented who identified the issue (i.e., licensee-identified, self-revealed, or NRC-identified), and under what conditions the issue was identified.*

The inspectors determined that the licensee's RCE adequately identified when the Unplanned Reactor Scrams per 7,000 Critical Hours PI crossed the Green-to-White threshold after the third reactor scram occurred. The unplanned reactor scram on December 17, 2015, was the third unplanned reactor scram in 2015 and resulted in exceeding the White PI threshold. Each of the unplanned scrams described above that contributed to the PI was the result of self-revealed events.

The inspectors determined that the RCE for the reactor scram due to the main electrical generator trip documented who identified the issue. The inspectors observed that the RCEs for the reactor scrams due to the 21 FW pump pressure switch failure and low turbine oil bearing pressure did not document who identified the issue. However, previous equipment cause evaluations (ECE) for these issues documented who identified the issues. The licensee's procedure for RCEs does not discuss the documentation of who identified the issue. The inspectors determined that each of these RCEs documented under what conditions the issues were identified.

- b. *Determine that the evaluation documented how long the issue existed and prior opportunities for identification.*

The Unplanned Reactor Scrams per 7,000 Critical Hours PI exceeded the Green-to-White threshold as reported in the licensee's fourth quarter 2015 PI submittal. The licensee's evaluation correctly documented that this occurred with the third unplanned reactor scram on December 17, 2015. As discussed in the licensee's evaluation, each of the three reactor scrams was sufficiently unique, such that there was no commonality that could have been used to identify specific risks that would have prevented the PI exceeding the White threshold.

With regards to each individual RCE, the licensee determined there were similar applicable events in one of the three reactor scrams. This was related to the manual scram due to the 21 FW pump suction pressure switch failure, because a similar failure of the same pressure switch occurred in 2010 and was determined to be an age-related failure. The root cause for this issue was that the organization failed to ensure that the 2010 event was evaluated and corrected commensurate with its significance.

The inspectors determined that the RCEs adequately documented how long the issue existed and whether there were any prior opportunities for identification.

- c. *Determine that the evaluation documented significant plant-specific consequences, as applicable, and compliance concerns associated with the issue.*

The licensee performed an assessment of the White PI, taking into consideration the plant specific risk consequences in the areas of industrial safety, nuclear safety, radiological safety, environmental impact and regulatory impact. The licensee determined there were no actual or potential consequences associated with nuclear safety, industrial safety, radiological safety, or environmental impact. The inspectors determined that nuclear safety significance and risk was appropriately discussed in the licensee's evaluation for the White PI. The licensee's RCE also appropriately identified the regulatory impact of the White PI, recognizing that this resulted in exceeding the White threshold for a PI and moving from the Licensee Response column to the Regulatory Response Column of the Action Matrix, which necessitated additional inspection as well as a Regulatory Performance Meeting.

With regards to each individual RCE, the licensee concluded that for each of the scrams all safety systems responded as designed. The licensee documented that there were no radiological, industrial, or environmental impacts associated with each of the events. Two of the three reactor scrams were reportable to the NRC as an event or condition that resulted in the actuation of the reactor protection system when the reactor is critical. Additionally, all three events contributed to exceeding the White threshold for the PI.

During their review at the time of each event, the resident inspectors evaluated plant parameters, operator actions, risk-significance, and overall plant status including the availability of mitigating systems. For each of the scrams, the inspectors determined that all safety systems responded as designed, the scrams were not complicated by material condition deficiencies, and no human performance errors complicated the event response.

The inspectors concluded that the licensee appropriately documented the risk consequences and compliance concerns associated with the issue.

*d. Findings*

No findings were identified.

2.02 Root Cause, Extent of Condition, and Extent of Cause Evaluation

*a. Determine that the problem was evaluated using a systematic methodology to identify the root and contributing causes.*

In its aggregate root cause analysis, the licensee used the Event and Causal Factor Charting method to graphically identify the timelines associated with the unplanned scrams. Weak and failed barriers identified in the Event and Causal Factor charting were analyzed using the Barrier Analysis and Why Staircase methods. The licensee also used other methods when determining the individual RCEs such as the Failure Modes and Effects Analysis.

The inspectors determined that the aggregate RCE, as well as the individual RCEs, adequately applied systematic methodologies to identify the root and contributing causes.

*b. Determine that the root cause evaluation was conducted to a level of detail commensurate with the significance of the problem.*

The licensee's evaluation reviewed the three unplanned reactor scrams that contributed to the White PI. The evaluation discussed the conclusions that were drawn when those events were reviewed in aggregate. The root, direct, and contributing causes, and factors associated with the three scrams reviewed were considered by the licensee to be sufficiently diverse such that no commonality was identified that met its definition of a root cause. The evaluation did not reveal a common root cause, but did reveal two contributing causes associated with the three events. The individual causal analysis reports for the three scram events associated with the White PI were also reviewed by inspectors.

The inspectors determined that the RCEs were conducted to a level of detail commensurate with the significance of the problem.

*c. Determine that the root cause evaluation included a consideration of prior occurrences of the problem and knowledge of prior operating experience.*

The licensee's aggregate and individual RCEs included a review of prior occurrences and internal/external operating experience.

The aggregate RCE concluded that prior to the current unacceptable frequency of scrams, there were no similar occurrences and no new information was identified during its internal/external operating experience review that could have been used to predict/prevent the White PI. Therefore, no additional corrective actions were developed as a result of this review.

In each of the three individual events, the licensee concluded that similar missed opportunities and failed barriers occurred as discussed below:

- RCE 01472846, associated with the manual reactor trip due to the 21 FW pump suction pressure switch failure, determined that a pressure switch failure in 2010 was not evaluated and corrected commensurate with its significance. The aggregate RCE determined that the Corrective Action Program (CAP) process used in 2010 had failed barriers. However, the licensee did not identify additional operating experience that identified the same failure for the same cause. Additionally, RCE 01472846 documented that, although the causes are similar, the event did not meet the definition of a repeat event as defined by procedure FP-PA-EVAL-01, "Evaluation Methods."
- RCE 01482090, associated with the turbine trip and reactor trip due to low turbine bearing oil pressure, determined that there was operating experience (OE) for a similar event with no actions taken by the licensee. The evaluation documented that, procedure FP-PA-OE-01, "Operating Experience," has a more comprehensive screening process now than at the time the OE was disseminated. This resulted in a missed opportunity, but not additional actions were required because of the additional requirements already in place.
- RCE 01506285, associated with the main electrical generator trip, identified OE associated with damage to generators due to foreign material introduction. However, none of the OE was associated with factory originated foreign material issues. The aggregate RCE identified weak barriers and missed opportunities associated with changes in the manufacturing sequence and oversight of vendor activities.

The inspectors determined that the causal evaluations included consideration of prior occurrences of the problem and knowledge of prior operating experience.

- d. *Determine that the root cause evaluation addressed extent of condition and extent of cause of the problem.*

The aggregate RCE included an extent of condition, looking specifically at unplanned scrams per 7,000 critical hours and additional NRC PIs. The licensee determined that none of the other PIs exceeded 50 percent of the White threshold value. The aggregate RCE also included an extent of cause for each of the contributing causes identified. The licensee determined that actions to address potential vulnerabilities identified with this review already existed or have been created. Actions included: (1) a revision to the CAP Evaluation Downgrade Request form (QF0466), (2) a revision to the Integrated Risk Management procedure (FP-WM-IRM-02), and (3) coaching provided to individuals involved in the CAP screening process and PARB team.

Each of the three unplanned reactor scrams was individually evaluated by a RCE, and each of those evaluations addressed the extent of condition and extent of cause of the problem that resulted in the scrams. Corresponding corrective actions appeared to be appropriate to address the problems.

The specific root/contributing causes of each scram event (as determined by the licensee), as well as the scope of the extent of condition/cause review are listed below:

- RCE 01472846, associated with the manual reactor trip due to the 21 FW pump suction pressure switch failure, determined that the direct cause of the pressure switch failure was excessive, high-frequency movement that caused wear of internal components. The RCE identified that the organization failed to ensure that the 2010 event was evaluated and corrected commensurate with its significance, which was the root cause. After the 2010 event, the licensee determined that a RCE should be performed, but the CAP screening process approved a downgrade to an Apparent Cause Evaluation (ACE) based on the understanding that the cause of the pressure switch failure was simple and known. The extent of cause reviewed RCEs and ACEs performed since January 1, 2014 for failure to fully identify the cause or improper downgrading of the evaluations. The extent of condition reviewed 24 pressure switches of the same make and model for high-frequency hydraulic oscillations and mechanical vibrations.
- RCE 01482090, associated with the turbine trip and reactor trip due to low turbine bearing oil pressure, determined that insufficient weld quality in a weld from the original manufacturing, which resulted in the catastrophic failure of the weld and subsequent drop in system pressure. The extent of condition and extent of cause reviewed welded connections inside the turbine oil reservoir for each unit and weld quality issues for turbine lube oil piping, seal oil skids, and diesel lube oil skids for each unit.
- RCE 01506285, associated with the main electrical generator trip, determined that the direct cause of the event was that a worker left a socket and hex key in the generator during manufacturing at the vendor facility. The licensee determined the root cause was that the vendor used an alternate manufacturing sequence for the generator which resulted in degraded barriers to prevent a foreign material event. Additionally, the licensee's vendor oversight did not address the impact of alternate manufacturing sequences on foreign material program barriers, which was identified as a contributing cause.

The extent of condition reviewed the manufacturing sequences for potential changes that could have resulted in a defect, such as foreign material. The extent of cause reviewed the potential for additional failures due to poor workmanship in the manufacturing processes and programmatic barriers to quality workmanship related to oversight of vendors and supplemental workers.

Overall, the inspectors concluded that the licensee's analysis appropriately addressed extent of condition and extent of cause of the problems.

- e. *Determine that the root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture traits in NUREG–2165, “Safety Culture Common Language,” referenced in IMC 0310, “Aspects Within Cross-Cutting Areas.”*

The inspectors reviewed the RCEs and validated the licensee had systematically considered each of the safety culture components. Two safety culture components, Challenge the Unknown and Standards, were identified. The licensee did not identify any commonality as a result of the safety culture review. The licensee did consider the insights obtained during the individual RCEs when addressing the root and contributing causes. Associated corrective actions contained appropriate elements to improve overall human performance.

The inspectors determined that, the root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components.

- f. *Examine the common cause analyses for potential programmatic weaknesses in performance when a licensee has a second White input in the same cornerstone.*

The licensee did not have a second White input in the Reactor Safety cornerstone and, therefore, did not perform a common cause analysis.

- g. *Findings*

No findings were identified.

## 2.03 Corrective Actions Taken

- a. *Determine that appropriate corrective actions are specified for each root and contributing cause or that the licensee has an adequate evaluation for why no actions were necessary.*

The inspectors reviewed each of the three causal evaluations and their associated corrective actions. The specific causes identified by the licensee for each of the issues were discussed above in section 2.02.d. A summary of the main corrective actions for each of the events is listed below:

- RCE 01472846, associated with the manual reactor trip due to the 21 FW pump suction pressure switch failure, documented corrective actions to replace the failed pressure switch, implement a monitoring plan for all FW pump suction pressure switches and pressure indicators, and to change the procedure for the CAP process to require a RCE for any scrams.
- RCE 01482090, associated with the turbine trip and reactor trip due to low turbine bearing oil pressure, documented the performance of weld repairs on the unit 2 turbine oil reservoir piping and inspection of the piping connections in the unit 2 turbine oil reservoir.

During the review of this RCE, the inspectors noted that there were no corrective actions classified as a corrective action to prevent recurrence (CAPR). Per procedure FP–PA–RCE–01, “Root Cause Evaluation Manual,” all RCEs will include CAPRs for root causes unless specifically exempted by CAP screening. This issue was initially screened to perform an equipment cause evaluation. The

licensee determine that the issue required further evaluation and re-screened to perform a RCE. However, during the re-screen process, an exemption to have no CAPRs was not documented. This issue was documented in the CAP. The inspectors did not identify any concerns with the corrective actions documented in the RCE.

- RCE 01506285, associated with the main electrical generator trip, documented repairs to the unit 2 generator, completion of a contract change request for the installation of the unit 1 generator and changes made to the procedures associated with project management and vendor oversight to ensure any vendor process changes are evaluated for effects on foreign material and that logging of smallest separable components in foreign material exclusion zones is contractually included for future projects.

The inspectors concluded that the corrective actions were clearly described and were entered into the licensee's corrective action program tracking system. The inspectors further concluded that the corrective actions appropriately addressed the root and contributing causes of the events, and if properly implemented would address the problems identified within each of the evaluations. No concerns were identified.

- b. Determine that corrective actions have been prioritized with consideration of risk significance and regulatory compliance.*

The inspectors determined that the licensee adequately prioritized the corrective actions with consideration of the risk significance and regulatory compliance. The inspectors reviewed the prioritization of the corrective actions and verified that, within reason, actions of a generally higher priority were scheduled for completion ahead of those of a lower priority. While many of the corrective actions were completed, some have not yet been completed.

- c. Determine that corrective actions taken to address and preclude repetition of significant performance issues are prompt and effective.*

The inspectors determined that the licensee's corrective actions taken to address and preclude repetition were prompt. For each corrective action taken to address and preclude repetition, the licensee identified associated effectiveness reviews that are discussed below in section 2.04.c.

- d. Determine that each Notice of Violation related to the supplemental inspection is adequately addressed, either in corrective actions taken or planned.*

As this supplemental inspection is reviewing a PI that crossed the White threshold, there are no NOVs related to this supplemental inspection. The inspectors determined that the licensee adequately developed quantitative or qualitative measures of success for determining effectiveness of the corrective actions to prevent recurrence.

- e. Findings*

No findings were identified.

## 2.04 Corrective Action Plans

- a. *Determine that appropriate corrective action plans are specified for each root and contributing cause or that the licensee has an adequate evaluation for why no actions were necessary.*

The inspectors reviewed each of the three causal evaluations and their associated corrective actions. The specific causes identified by the licensee for each of the issues were discussed above in section 2.02.d. A summary of the open planned corrective actions for each of the events is listed below:

- RCE 01472846, associated with the manual reactor trip due to the 21 FW pump suction pressure switch failure, documented planned corrective actions to install pressure snubbers on all FW pump suction pressure switches.
- RCE 01482090, associated with the turbine trip and reactor trip due to low turbine bearing oil pressure, documented planned corrective actions to inspect the piping connections in the unit 1 turbine oil reservoir.
- RCE 01506285, associated with the main electrical generator trip, documented repairs to the unit 2 generator, documented planned corrective actions to complete an evaluation of any actions from this issue for the installation of the unit 1 generator.

The inspectors concluded that the corrective actions were clearly described and were entered into the licensee's corrective action program tracking system. The inspectors further concluded that the corrective actions appropriately addressed the root and contributing causes of the events, and if properly implemented would address the problems identified within each of the evaluations. No concerns were identified.

- b. *Determine that corrective action plans have been prioritized with consideration of risk significance and regulatory compliance.*

The inspectors determined that the licensee adequately prioritized the planned corrective action with consideration of the risk significance and regulatory compliance. The inspectors reviewed the prioritization of the corrective actions and verified that, within reason, actions of a generally higher priority were scheduled for completion ahead of those of a lower priority. The inspectors concluded the timeline for completion of corrective actions was appropriate.

- c. *Determine that appropriate quantitative or qualitative measures of success have been developed for determining the effectiveness of planned and completed corrective actions.*

The inspectors determined that the licensee adequately developed quantitative or qualitative measures of success for determining effectiveness of the corrective actions to prevent recurrence.

Under the aggregate RCE 01506468, the licensee identified an effectiveness review action to conduct a snapshot evaluation of the organizational internalization of the specific risk element of 'bias towards consequences.' This assessment was complete on August 29, 2016. Personnel were asked about the mitigation of high consequence issues regardless of the probability of an event occurring. The evaluation success criteria was measured by 80 percent positive response, with approximately 84 percent of personnel responding positively when questioned.

The licensee also identified effectiveness reviews associated with each of the root causes identified.

- RCE 01472846, associated with the manual reactor trip due to the 21 FW pump suction pressure switch failure, identified an effectiveness review action to perform a visual inspection of pressure switches with pressure snubbers installed for signs of wear. This review has a due date of December 8, 2016. Additionally, the RCE documented an effectiveness review assignment to perform a snap-shot assessment of all CAP downgrade requests for 6 months after the implementation of the procedure change to validate that none have been downgraded inappropriately. This review has a due date of February 24, 2017.
- RCE 01482090, associated with the turbine trip and reactor trip due to low turbine bearing oil pressure, documented an effectiveness review assignment to perform a review of all work and actions taken for addressing poor welds identified in the turbine oil system and a review of all ARs for the system. The licensee identified that success criteria will be no weld quality related equipment failures for the system. This review has a due date of January 15, 2017.
- RCE 01506285, associated with the main electrical generator trip, identified that its corrective actions to prevent recurrence will be considered effective by verifying no level 1 or 2 foreign material events occur during the vendor installation of the unit 1 generator. This review has a due date of January 18, 2019. Additionally, the licensee will review the online performance of generators for both units. These reviews have a due date of December 18, 2017, for the unit 2 generator and December 14, 2020, for the unit 1 generator.

The inspectors discussed the scope of the effectiveness reviews with the licensee. Specifically, the identified effectiveness reviews are scoped to assess the performance of generator projects. However, the generator projects were not completed using revisions to the project management and vendor oversight procedures identified in the corrective actions, resulting in a potential gap to review the effectiveness of these actions for intended impact, desired results, and unintended, adverse consequences on future projects. As a result of the discussion, the licensee entered this issue into the CAP and added an additional effectiveness review to review contracts for manufactured plant equipment initiated between September 2016 and February 2017 to ensure that any process sequence changes are evaluated. The action will be considered effective if all reviewed contracts contain appropriate language to address process sequence changes.

The inspectors concluded the effectiveness reviews, overall, appeared to be appropriate.

- d. *Determine that each Notice of Violation related to the supplemental inspection is adequately addressed, either in corrective actions taken or planned.*

As this supplemental inspection is reviewing a PI that crossed the White threshold, there are no NOVs related to this supplemental inspection.

- e. *Findings*

No findings were identified.

#### 4OA6 Management Meetings

##### .1 Exit Meeting Summary

The inspectors presented the inspection results to Mr. S. Northard, Site Vice-President, and other members of licensee management on September 16, 2016. The inspectors asked licensee management whether any materials examined during the inspection should be considered proprietary. All documents provided to the NRC that contained proprietary information have been returned.

##### .2 Regulatory Performance Meeting

On September 16, 2016, as part of the exit meeting for the 95001 supplemental inspection, NRC management met with the licensee to discuss regulatory performance, in accordance with Section 10.02.b.4 of IMC 0305. During this meeting, the NRC and licensee discussed the primary issues related to the White Unplanned Scrams per 7000 Critical Hours PI that resulted in Prairie Island Nuclear Generating Plant, Unit 2, being placed in the Regulatory Response column of the Action Matrix. This discussion included the causes, corrective actions, extent of condition, extent of cause, and other planned licensee actions.

ATTACHMENT: SUPPLEMENTAL INFORMATION

## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### Licensee

S. Northard, Site Vice President  
T. Conboy, Director Site Operations  
S. Sharp, Director Performance Improvement  
W. Paulhardt, Plant Manager  
D. Lapcinski, Assistant Operations Manager  
J. Bjorseth, Engineering Director  
H. Butterworth, Business Support Director  
J. Boesch, Maintenance Manager  
T. Borgen, Operations Manager  
B. Boyer, Radiation Protection Manager  
B. Carberry, Emergency Preparedness Manager  
S. Martin, Performance Assessment Manager  
J. Kivi, Regulatory Affairs Manager  
P. Wildenborg, Health Physicist

#### U.S. Nuclear Regulatory Commission

K. Riemer, Branch Chief  
J. Boettcher, Resident Inspector - Palisades, Team Lead

### **LIST OF ITEMS OPENED, CLOSED, DISCUSSED**

#### Opened

None

#### Closed

None

#### Discussed

None

## LIST OF DOCUMENTS REVIEWED

The following is a partial list of documents reviewed during the inspection. Inclusion on this list does not imply that the NRC inspectors reviewed the documents in their entirety, but rather that selected sections or 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 IR.

### 4OA4 Supplemental Inspection

- ACE 01506285, Unit 2 Main Electrical Generator Tripped by Ground Overvoltage Protection Relay, February 23, 2016
- AR 01448716, Shortfalls in ACE/ECE Quality, September 30, 2014
- AR 01449251, Performance Assessment Rated as "Below Expectations," October 3, 2014
- AR 01463006, Unplanned Power Changes Indicator at 50% of Green/White Threshold, 4Q14, January 21, 2015
- AR 01472846, 21 FW Pump Lockout/U2 Reactor Trip due to PS 16012 Failure, April 3, 2015
- AR 01482090, Unit 2 Turbine/Reactor Trip – Low Turbine Bearing Oil Pressure, June 7, 2015
- AR 01486394, Unit 1 SSFF Indicator at 50% of Green/White Threshold, 2Q15, July 16, 2015
- AR 01486397, U2 Unplanned Scrams Indicator at 50% of Green/White Threshold, 2Q15, July 16, 2015
- AR 01500599, Recent Sharp Decline in Performance at Prairie Island, November 6, 2015
- AR 01506285, Unit 2 Reactor Trip due to Turbine Trip, December 17, 2015
- AR 01506468, Potential White NRC KPI for Unplanned Scrams, December 20, 2015
- AR 01516549, RCE – U2 Scrams per 7000 Hours Received PARB Grade of 2, March 23, 2016
- AR 01516859, CAP: Organizational Failure in the Performance of 95001 RCE, March 25, 2016
- AR 01516492, Shortfalls with PARB Input on Root Cause, March 22, 2016
- AR 01521246, NOS ID: ACE 0124461 (FW Suction Pressure Switch Fail/U2 Trip) Corrective Action Untimely, May 6, 2016
- AR 01521512, (NOS ID) RCE and ECE Operating Experience Concerns Re: 95001 Inspection, May 10, 2016
- AR 01520390, Feedback Received from Industry Peer on 95001 RCE 01506468, April 28, 2016
- AR 01520761, 95001 Mock Inspection: LER 50-306/2015-002-00 Supplement Needed?, May 2, 2016
- AR 01521175, 95001 Mock Inspection: 4.0 Critiques Not Completed for Scrams, May 5, 2016
- AR 01534406, 95001 – No QF-0422 Form Attached to Completed EFR Assignment, September 12, 2016
- AR 01534454, 95001 Review of CAPR Action Reveals More Actions Necessary, September 13, 2016
- AR 01534667, 95001 – Question on EFR for Unit 2 Generator RCE 01506285, September 14, 2016
- AR 01534781, 95001 – No Documentation of Self Revealing Event in RCE Reports, September 15, 2016
- AR 01534785, 95001 – No Documentation of AR Screening Approval for No CAPR, September 15, 2016
- Contract Change Request 00013920, Scope of Work Change Statement for Contract 44971, July 8, 2016
- Drawing NF-39231-2, Lube, Lift, Seal Oil & Oil Purification Flow Diagram, Generator and Turbines – Unit 2, Revision 81

- Drawing XH-2-296-1, Lube Oil Reservoir Piping, Revision 76
- ECE 01472846, Pressure Switch PS-16012 Failed Low Resulting in the Tripping of the 21 Feedwater Pump and Subsequent Manual Reactor Trip, February 18, 2016
- ECE 01482090, Unit 2 Experienced a Turbine Trip due to Low Turbine Oil Pressure, February 18, 2016
- Focused Self-Assessment Plan and Report, 95001 Readiness Preparations (Unplanned Scrams), March 28, 2016 – April 1, 2016
- FP-MA-COM-02, Oversight and Control of Supplemental Personnel, Revision 4
- FP-MA-FME-01, Foreign Material Exclusion and Control, Revision 12
- FP-NO-SAS-08, Project Oversight, Revision 6
- FP-NP-PMM-01, Project Management Manual, Revision 12
- FP-NP-PMM-01, Project Management Manual, Revision 13
- FP-PA-ACE-01, Apparent Cause Evaluation Manual, Revision 3
- FP-PA-ARP-01, CAP Action Request Process, Revision 44
- FP-PA-ARP-01, CAP Action Request Process, Revision 45
- FP-PA-ARP-01, CAP Action Request Process, Revision 46
- FP-PA-EFR-01, Effectiveness Review Manual, Revision 1
- FP-PA-EVAL-01, Evaluation Methods, Revision 1
- FP-PA-HU-05, Decision Making, Revision 1
- FP-PA-OE-01, Operating Experience Program, Revision 24
- FP-PA-PAR-01, Performance Assessment Review Board and Performance Assessment Oversight, Revision 12
- FP-PA-PI-01, Performance Indicator Control, Revision 11
- FP-PA-RCE-01, Root Cause Evaluation Manual, Revision 2
- FP-PA-RCE-01, Root Cause Evaluation Manual, Revision 3
- Generator Replacement Project Customer Witness Point, Unit 2 Rotor Slotting Observation Trip Report, April 15, 2014 - April 16, 2014
- Key Performance Indicator Data for Unplanned Scrams Per 7,000 Critical Hours, July 2016
- Missed Opportunity Review Checklist for AR 01506285, March 3, 2016
- NOS Observation Report 2016-02-001, 95001 Readiness Assessment (Reactor Scram White KPI), June 3, 2016
- Nuclear Energy Institute (NEI) 99–02, Regulatory Assessment Performance Indicator Guideline, Revision 7
- Nuclear Leaders Handbook: An Overview of the Xcel Energy Nuclear Performance Model, Q2 2016 Update
- Nuclear Leaders' Handbook Nuclear Management Model, 2014
- OP-2013-002, Prairie Island Units 1 and 2 Main Generator Replacement, Contract No. 44971, Revision 3
- Picture of Excellence Nuclear Leaders Handbook, August 2016
- Prairie Island Unit 2 Main Generator Restoration Effort Executive Update, January 7, 2016
- Prairie Island Unit 2 Mock 95001 Inspection Exit Presentation, May 6, 2016
- QF0429, NSPM CAP Screen Team Meeting Template, Revision 19
- RCE 01472846, Unplanned Manual Reactor Trip Occurred due to a Failure of the 21 Feedwater Pump Suction Pressure Switch, May 9, 2016
- RCE 01482090, Unit 2 Experienced a Turbine Trip and Reactor Trip due to Low Turbine Bearing Oil Pressure, May 16, 2016
- RCE 01506285, Unit 2 Main Electrical Generator Tripped by Ground Overvoltage Protection Relay, Revision 0
- RCE 01506468, Prairie Island Unit 2 Exceeded the Threshold for White NRC PI for Unplanned Scrams per 7,000 Critical Hours, Revision 3
- RCE Review for AR 01506468, Revision 0

- Xcel Energy Source Surveillance Report 2014-0045, April 25, 2014
- Xcel Energy Source Surveillance Report 2014-0054, May 13, 2014
- Xcel Energy Source Surveillance Report 2014-0055, May 13, 2014
- Xcel Energy Source Surveillance Report 2014-0106, October 8, 2014
- Xcel Energy Source Surveillance Report 2014-0152, December 19, 2014
- Xcel Energy Source Surveillance Report 2014-0154, January 9, 2015
- Xcel Energy Source Surveillance Report 2015-0006, March 16, 2015
- Xcel Energy Source Surveillance Report 2015-0010, June 9, 2015
- Xcel Energy Source Surveillance Report 2015-0012, July 9, 2015
- Xcel Energy Supplier Assessment Report, Augmented Quality Assessment 2013-0148, November 18, 2013
- WO 00527709, Inspect Piping Connections in the Unit 2 Turbine Oil Reservoir

## LIST OF ACRONYMS USED

ACE	Apparent Cause Evaluation
ADAMS	Agencywide Documents Access and Management System
CAP	Corrective Action Program
CAPR	Corrective Action to Prevent Recurrence
ECE	Equipment Cause Evaluation
FW	Feedwater
IMC	Inspection Manual Chapter
NRC	U.S. Nuclear Regulatory Commission
OE	Operating Experience
PARS	Publicly Available Records System
PI	Performance Indicator
RCE	Root Cause Evaluation
ROP	Reactor Oversight Process

S. Northard

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Sincerely,

*/RA/*

Kenneth Riemer, Chief  
Branch 2  
Division of Reactor Projects

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