



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

REGION III
2443 WARRENVILLE RD. SUITE 210
LISLE, IL 60532-4352

January 5, 2016

Mr. Kevin Davison
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, UNITS 1 AND 2 - NRC ANNUAL FOLLOW-UP OF SELECTED PROBLEM IDENTIFICATION AND RESOLUTION ISSUES; INSPECTION REPORT 05000282/2015008; 05000306/2015008 AND NOTICE OF VIOLATION

Dear Mr. Davison:

On November 24, 2015, the U.S. Nuclear Regulatory Commission (NRC) completed an annual problem identification and resolution follow-up sample at your Prairie Island Nuclear Generating Plant, Units 1 and 2. The enclosed report documents the results of this inspection, which were discussed on November 24, 2015, with Mr. S. Northam, Vice President of Fleet Operations, and other members of your staff.

Based on the results of this inspection, the NRC has identified an issue that was evaluated under the risk significance determination process as having very low safety significance (Green). The NRC has also determined that a violation is associated with this issue. This violation was evaluated in accordance with the NRC Enforcement Policy. The current Enforcement Policy is included on the NRC's web site at (<http://www.nrc.gov/about-nrc/regulatory/enforcement/enforce-pol.html>).

This violation is cited in the enclosed Notice of Violation (Notice), and the circumstances surrounding it are described in detail in the subject inspection report. The violation is being cited in the Notice, consistent with the NRC Enforcement Policy, Section 2.3.2.a.2, because Prairie Island Nuclear Generating Plant, Unit 2, failed to restore compliance and failed to have objective plans to restore compliance in a reasonable time period following the NRC identification of an associated Non-Cited Violation (NCV) on June 30, 2011. The associated NCV was documented in Inspection Report (IR) 05000282/2011003; 05000306/2011003.

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. If you have additional information that you believe the NRC should consider, you may provide it in your response to the Notice. The NRC review of your response to the Notice will also determine whether further enforcement action is necessary to ensure compliance with regulatory requirements.

Based on the results of this inspection, the NRC has also identified four issues that were evaluated under the risk significance determination process as having very low safety significance (Green). The NRC has also determined that violations are associated with these issues. These violations are being treated as NCVs, consistent with Section 2.3.2 of the Enforcement Policy. These NCVs are described in the subject inspection report. Additionally, a licensee-identified violation is listed in Section 4OA7 of this report.

K. Davison

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If you contest the subject or severity of any 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 the Prairie Island Nuclear Generating Plant.

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

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/

Christine A. Lipa, Chief
Engineering Branch 2
Division of Reactor Safety

Docket Nos. 50-282, 50-306
License Nos. DPR-42, DPR-60

Enclosure:

1. Notice of Violation
2. IR 05000282/2015008; 05000306/2015008

cc: Distribution via LISTSERV®

NOTICE OF VIOLATION

Northern States Power Company
Prairie Island Nuclear Generating Plant, Unit 2

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

During an U.S. Nuclear Regulatory Commission (NRC) inspection conducted from October 5 through November 24, 2015, a violation of NRC requirements was identified. In accordance with the NRC Enforcement Policy, the violation is listed below:

Title 10, *Code of Federal Regulations* (CFR), Part 50, Appendix B, Criterion XVI, "Corrective Action," states, in part, that measures shall be established to assure that conditions adverse to quality (CAQs), such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and non-conformances, are promptly identified and corrected.

Contrary to the above, from April 11, 2011, to at least October 22, 2015, the licensee failed to correct a CAQ. Specifically, on April 11, 2011, the NRC identified that the licensee was not monitoring five safety-related gas susceptible locations within the emergency core cooling system considered to be inaccessible and the licensee captured this CAQ in their Corrective Action Program. However, on October 22, 2015, the inspectors identified that the licensee had not corrected this CAQ for two of these locations and did not have objective plans to restore compliance.

This violation is associated with a Green Significance Determination Process finding.

Pursuant to the provisions of 10 CFR 2.201, Northern States Power Company, is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001 with a copy to the Regional Administrator, Region III, and a copy to the NRC Resident Inspector at the Prairie Island Nuclear Generating Plant, Units 1 and 2, within 30 days of the date of the letter transmitting this Notice. This reply should be clearly marked as a "Reply to a Notice of Violation; VIO 05000306/2015008-01," and should include: (1) the reason for the violation, or, if contested, the basis for disputing the violation or severity level, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken, and (4) the date when full compliance will be achieved. Your response may reference or include previous docketed correspondence, if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an Order or a Demand for Information may be issued as to why the license should not be modified, suspended, or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

If you contest this enforcement action, you should also provide a copy of your response, with the basis for your denial, to the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001.

Because your response will be made available electronically for public inspection in the NRC Public Document Room or from ADAMS, accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>, to the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies

Notice of Violation

the information that should be protected and a redacted copy of your response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21.

In accordance with 10 CFR 19.11, you may be required to post this Notice within two working days of receipt.

Dated this 5th day of January, 2016.

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Nos: 50-282; 50-306
License Nos: DPR-42; DPR-60

Report No: 05000282/2015008; 05000306/2015008

Licensee: Northern States Power Company, Minnesota

Facility: Prairie Island Nuclear Generating Plant, Units 1 and 2

Location: Welch, MN

Dates: October 5 - November 24, 2015

Inspector: N. Féliz Adorno, Senior Reactor Inspector

Approved by: Christine A. Lipa, Chief
Engineering Branch 2
Division of Reactor Safety

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SUMMARY

Inspection Report 05000282/2015008, 05000306/2015008; 10/05/2015 – 11/24/2015; Prairie Island Nuclear Generating Plant, Units 1 and 2; Annual Problem Identification and Resolution Inspection.

This report covers an 8-week period of inspection by primarily one regional inspector focused on gas accumulation management in piping. Four Green findings were identified by the inspector and one Green finding was self-revealed. Four of these findings involved Non-Cited Violations (NCVs) of U.S. Nuclear Regulatory Commission (NRC) requirements while one of these findings involved a Notice of Violation of NRC requirements. 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.

NRC-Identified and Self-Revealing Findings

Cornerstone: Mitigating Systems

- **Green.** The inspectors identified a finding of very low safety significance (Green), and an associated cited violation of Title 10, *Code of Federal Regulations* (CFR), Part 50, Appendix B, Criterion XVI, "Corrective Actions," for the failure to correct a condition adverse to quality (CAQ). Specifically, on August 1, 2011, the NRC issued an NCV for the failure to monitor five safety-related gas susceptible locations considered to be inaccessible, which is a CAQ. As of November 24, 2015, the licensee had not corrected this CAQ for two of those locations and did not have plans to restore compliance. The licensee captured this issue into their Corrective Action Program (CAP) with a proposed corrective action to develop an alternative monitoring method for these locations when the unit is operating.

The performance deficiency was determined to be more than minor because it was associated with the Mitigating Systems cornerstone attribute of equipment performance, and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The finding screened as of very low safety significance (Green) because it did not result in the loss of operability or functionality of mitigating systems. Specifically, the licensee was able to access and inspect these locations during the refueling outage that was ongoing when this issue was identified and confirmed that they were full of water during the previous operating cycle. In addition, a historical review did not find information that challenged operability due to gas accumulation at these locations. The inspectors determined that this finding had a cross-cutting aspect in the area of problem identification and resolution because the licensee did not thoroughly evaluate their discovery that the CAQ was not been corrected on July 29, 2013. Specifically, on 2013, the licensee initiated a condition evaluation (CE) to determine if the action plan at the time addressed the NCV associated with the CAQ. However, the CE was closed by crediting actions that were similar to those that resulted in the NCV and other documented observations associated with the inappropriate resolution of the issue. [P.2] (Section 40A2.1.c(1))

- Green. The inspectors identified a finding of very low safety significance (Green), and an associated NCV of 10 CFR Part 50, Appendix B, Criterion V, “Instructions, Procedures, and Drawings,” for the licensee’s failure to manage gas accumulation at the residual heat removal (RHR) train credited for emergency core cooling in MODE 4, “Hot Shutdown.” Specifically, the RHR train credited for emergency core cooling in MODE 4 was not verified to be full of water before its operability was required in MODE 4 following system draining during refueling outage 1R29. The licensee captured this issue into their CAP with a proposed corrective action to revise procedures to explicitly require these inspections prior to transitioning into MODE 4 during startup activities.

The performance deficiency was determined to be more than minor because it was associated with the Mitigating Systems cornerstone attribute of equipment performance, and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The finding screened as of very low safety significance (Green) because it did not result in the loss of operability or functionality of mitigating systems. Specifically, the licensee reviewed records associated with gas accumulation management activities during 1R29 and discovered that a non-conforming void was vented 12 – 18 hours after the transition to MODE 4. However, an operability review reasonably determined that this non-conforming condition did not result in loss of operability. The inspectors did not identify a cross-cutting aspect associated with this finding because it was not confirmed to reflect current performance.
(Section 40A2.1.c(2))

- Green. A finding of very low safety significance (Green), and an associated NCV of 10 CFR Part 50, Appendix B, Criterion V, “Instructions, Procedures, and Drawings,” was self-revealed for the licensee’s failure to establish procedures to verify RHR is operable with respect to gas accumulation following maintenance outages. Specifically, procedures were not established to verify the system is sufficiently full of water when RHR is secured in its standby emergency core cooling system mode of operation during startup activities following maintenance outages. The licensee captured this issue into their CAP. As a long term corrective action, the licensee revised procedures to require gas accumulation inspections of the affected gas susceptible locations as part of the unit startup activities following a maintenance outage.

The performance deficiency was determined to be more than minor because it was associated with the Mitigating Systems cornerstone attribute of equipment performance, and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The finding screened as of very low safety significance (Green) because it did not result in the loss of operability or functionality of mitigating systems. Specifically, the licensee performed a past operability review of the limiting void found at the RHR piping after maintenance outages and reasonably concluded that the system remained operable. The inspectors did not identify a cross-cutting aspect associated with this finding because it was not confirmed to reflect current performance.
(Section 40A2.1.c(3))

- Green. The inspectors identified a finding of very low safety significance (Green), and an associated NCV of 10 CFR Part 50, Appendix B, Criterion III, “Design Control,” for the licensee’s failure to manage potential gas accumulation due to safety injection

isolation check valve leakage following maintenance outages. Specifically, the licensee did not evaluate the potential to accumulate nitrogen at multiple RHR and safety injection gas susceptible locations due to safety injection check valve unseating caused by maintenance outages. As a result, the station did not manage this gas intrusion mechanism. The licensee captured this issue into their CAP with a proposed corrective action to revise procedures to verify that the safety injection check valves are seated as part of the unit startup activities following a maintenance outage.

The performance deficiency was determined to be more than minor because it was associated with the Mitigating Systems cornerstone attribute of equipment performance, and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The finding screened as of very low safety significance (Green) because it did not result in the loss of operability or functionality of mitigating systems. Specifically, the licensee performed a past operability review of the limiting void found at one of the affected piping locations and reasonably concluded that the associated system remained operable. The inspectors did not identify a cross-cutting aspect associated with this finding because it was not confirmed to reflect current performance. (Section 4OA2.1.c(4))

- Green. The inspectors identified a finding of very low safety significance (Green) and associated NCV of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," for the licensee's failure to identify a continuous gas intrusion into one train of RHR, which was a CAQ, resulting in a continuous undetected void growth that exceeded the applicable operability limits. The licensee did not consider applicable active gas intrusion mechanisms when evaluating the discovery of a void at the RHR piping. The licensee captured this issue into their CAP and stopped the continuous gas intrusion into the affected piping location.

The performance deficiency was determined to be more than minor because it was associated with the Mitigating Systems cornerstone attribute of equipment performance, and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The finding screened as of very low safety significance (Green) because it did not result in the loss of operability or functionality of mitigating systems. Specifically, the licensee performed a past operability review of the void and reasonably concluded that the system remained operable. The inspectors determined that this finding had a cross cutting aspect in the area of human performance because the licensee did not recognize and plan for the possibility of mistakes when evaluating the gas surveillance results of February 10, 2015. Specifically, the licensee did not plan for the possibility that the unacceptable results were indicative of a different problem than originally determined or a combination of problems. As a result, the licensee failed to identify the continuous gas intrusion incident. [H.12] (Section 4OA2.1.c(5))

Licensee-Identified Violations

A violation of very low safety significance (Green) that was identified by the licensee has been reviewed by the NRC. Corrective actions taken or planned by the licensee have been entered into the licensee's CAP. This violation and CAP tracking numbers are listed in Section 4OA7.

REPORT DETAILS

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

4OA2 Identification and Resolution of Problems (71152)

.1 Annual Follow-up of Selected Issues: Management of Gas Accumulation in Piping

a. Inspection Scope

During a review of items entered in the licensee's Corrective Action Program (CAP), the inspectors noted multiple corrective action documents associated with gas accumulation issues at the residual heat removal (RHR) piping. These issues included the discovery of unexpected complex gas accumulation issues, unplanned Limiting Condition for Operation (LCO) entries due to gas accumulation, and gas removal challenges.

The inspectors reviewed selected gas accumulation management issues in light of the number and complexity of the issues described above against selected performance attributes contained in Inspection Procedure (IP) 71152-03.06. Specifically, the inspectors reviewed corrective action documents of selected identified gas accumulation management problems to assess completeness, accuracy, timeliness, classification, and prioritization of the problem resolution commensurate with the associated safety significance. In addition, the inspectors reviewed the associated operability and causal evaluations, when applicable, to assess the licensee evaluation of non-conforming conditions and their impact to safe plant operation. The inspectors also reviewed the licensee consideration of extent of condition and previous occurrences of the associated problems. In addition, the inspectors reviewed the corrective actions of selected issues to assess problem resolution activities, including timeliness. This assessment also included a review of associated drawings, procedures, and design reviews, and interviews of licensee personnel. The documents reviewed are listed in the Attachment to this report.

This review constituted one in-depth problem identification and resolution sample as defined in IP 71152-05.

b. Observations

The inspectors noted the following examples of licensee CAP weaknesses when addressing gas accumulation management issues:

- The licensee had not corrected a condition adverse to quality (CAQ), which was previously identified, and did not have plans to restore compliance. Specifically, on August 1, 2011, the U.S. Nuclear Regulatory Commission (NRC) issued a Non-Cited Violation (NCV) for the failure to monitor five safety-related gas susceptible locations considered to be inaccessible. As of November 24, 2015, the licensee had not corrected this CAQ for two of those locations and did not have plans to restore compliance. The details and enforcement action associated with this issue are discussed in Section 4OA2.1.c(1) of this Inspection Report (IR).

- A corrective action associated with a minor violation documented in IR 05000282/2011003; IR 05000306/2011003, dated August 1, 2011, was inconsistently implemented. Specifically, on 2011, the inspectors identified a minor violation of Title 10, *Code of Federal Regulations* (CFR), Part 50, Appendix B, Criterion V, "Instruction, Procedures, and Drawings," for the failure to trend the sizes of voids discovered during periodic gas monitoring activities, which was contrary to procedure H64, "Gas Accumulation Management Program (GAMP)." The licensee captured this issue in their CAP as Action Request (AR) 1271024, and implemented corrective actions to trend void sizes. However, during this inspection period, the inspectors noted that the licensee inconsistently trended void sizes. Specifically, void sizes were not clearly documented to differentiate between the as-found and as-left measurements. In addition, after the original corrective action was implemented, the licensee implemented a new trending tool but the data had not been completely uploaded. This inconsistent implementation of the GAMP trending requirements was determined to be minor during this inspection period because the data was retrievable and the inspectors did not find an adverse unrecognized trend. The licensee capture this concern in their CAP as AR 01496191.
- The licensee did not document the discovery of a problem in their CAP. Specifically, during the reactor unit startup activities associated with refueling outage 1R29, the licensee discovered a void at the RHR system that exceeded its operability limits when this system was required to be operable. However, the licensee did not document this CAQ in their CAP. The details and enforcement action of the associated issue are discussed in Section 4OA2.1.c(2) of this IR.
- The licensee did not identify a CAQ. Specifically, when evaluating the discovery of voids at the RHR piping during a surveillance, the licensee did not consider that the affected locations were vulnerable to active gas intrusion mechanisms (i.e., those that result in a continuous gas intrusion). As a result, the licensee failed to identify an ongoing continuous gas intrusion into the RHR system, which was a CAQ, and the corrective actions taken were limited to address the portion of the problem that was not associated with the active gas intrusion incident. The details and enforcement action of this issue are discussed in Section 4OA2.1.c(5) of this IR, while Sections 4OA2.1.c(3) and 4OA2.1.c(4) discuss the details and enforcement actions of other closely related issues.

c. Findings

(1) Failure to Correct a Non-Cited Violation Associated with Inadequate Gas Monitoring of Inaccessible Residual Heat Removal Gas Susceptible Locations

Introduction: A finding of very low safety significance (Green), and an associated cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions," was identified by the inspectors for the licensee's failure to correct a CAQ. Specifically, on August 1, 2011, the NRC issued an NCV for the failure to monitor five safety-related gas susceptible locations considered to be inaccessible, which is a CAQ. As of November 24, 2015, the licensee had not corrected this CAQ for two of those locations and did not have plans to restore compliance.

Description: On January 11, 2008, the NRC requested each Generic Letter (GL) 2008-01, "Managing Gas Accumulation in Emergency Core Cooling (ECCS), Decay Heat Removal (DHR), and Containment Spray (CS) Systems," addressee to evaluate

the ECCS, DHR, and CS systems licensing basis, design, testing, and corrective actions to ensure that gas accumulation was maintained less than the amount that would challenge the operability of these systems. One of the licensee's original actions to address these requests was to establish procedure H64 to programmatically control gas accumulation at the Generic Letter (GL) 2008-01 subject systems. Section 4.5.4.B of procedure H64, Revision 2, stated that, "Monitoring may not be practical for locations that are inaccessible due to radiological, environmental conditions, the plant configuration or personnel safety." It further stated that "For these locations alternative methods should be developed to monitor the potential void locations." Revision 16 of procedure FP-G-DOC-05, "Procedure Writers Guide," Section 4.12, states that, "When used in NSPM documents, use of the term 'should' denotes an expected action." It also stated that, "Deviations from these expectations require prior management approval."

On April 11, 2011, the NRC identified that the licensee had not developed alternative methods to monitor the potential for gas accumulation at five inaccessible susceptible locations that require periodic monitoring (i.e., gas susceptible locations 2RH-13, 2RH-15, 2SI-45, 1SI-41, and 1RH-21). This procedure H64 deviation did not receive prior management approval as required by procedure FP-G-DOC-05. This issue was originally captured by the licensee in their CAP as AR 01271826, and was documented by the inspectors as NCV 05000282/2011003-09; 05000306/2011003-09, "Alternative Methods Were Not Developed for Monitoring Inaccessible Susceptible Locations," in IR 05000282/2011003; IR 05000306/2011003, dated August 1, 2011. This IR also documented that the inspectors noted that AR 01271826 was not appropriate for the issue and were concerned that this vulnerability could result in the cancelation of the corrective action assignment related to this issue. As a result, the IR stated that the licensee issued a different corrective action document (i.e., AR 01281682) to capture this issue.

On July 29, 2013, the licensee discovered that the resolution of AR 01281682 was effectively a repeat of the inappropriate action associated with AR 01271826 that had been documented in the IR. Specifically, AR 01281682 was closed to no action by crediting resolution of a third corrective action document (i.e., AR 01281652). To resolve the inspectors' concerns, the apparent cause evaluation (ACE) conducted under AR 01281652 credited existing corrective action assignments tracked by AR 01271826, which was the original corrective action document determined to be inappropriate to address this concern. The licensee captured this discovery in their CAP as AR 01391787, and initiated a CE to determine if the action plan at the time addressed the NCV.

During this inspection period, the inspectors noted that, for Unit 2 RHR gas susceptible locations 2RH-13 and 2RH-15, the CE was closed by crediting some actions that were similar to the NRC observations documented in the previous IR associated with AR 01271826, and with the licensee observations captured in AR 01391787. Specifically, the CE determined that the closure of AR 01281682 to AR 01281652 was appropriate because both ARs had the same severity level. However, the CE failed to recognize that AR 01281652 credited AR 01271826, which had a lower severity level and was the subject of previous documented concerns. In addition, the inspectors noted that the CE was closed by crediting other actions that were similar to the actions that resulted in the NCV. Specifically, the CE determined that the NCV was resolved by noting that gas susceptible locations 2RH-13 and 2RH-15 were added to the quarterly gas accumulation surveillance procedures and have been tested by recent surveillances.

However, the CE failed to recognize that these locations were always identified by these procedures but, since these high points were inaccessible, some of the surveillances were completed at the highest accessible locations and these were not adequate monitoring locations because they would not allow the detection of voids before they exceeded the applicable design limits. This was the observation that led to the NRC identification of the NCV in 2011.

The inspectors were concerned because, as of October 22, 2015, the licensee had not restored compliance and did not have objective plans to restore compliance in a reasonable time period following the NRC identification of the NCV on April 11, 2011. The licensee captured the inspectors' concerns in the CAP as AR 01498169. The proposed corrective action to restore compliance at the time of this inspection was to develop an alternative monitoring method for these locations when the unit is operating. In addition, since these locations are accessible during outages and the affected unit was in an outage when this issue was identified, the licensee confirmed that the affected locations were full of water during the previous operating cycle.

Analysis: The inspectors determined that the failure to correct the lack of periodic gas accumulation monitoring of inaccessible RHR gas susceptible locations, which is a CAQ, was contrary to 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," and was a performance deficiency. The performance deficiency was determined to be more than minor because it was associated with the Mitigating Systems cornerstone attribute of equipment performance, and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure to periodically monitor gas susceptible locations 2RH-13 and 2RH-15 does not ensure the availability and reliability of the RHR system to perform its accident mitigating function because a potential adverse void would not be detected and managed to ensure operability.

The inspectors determined the finding could be evaluated using the Significance Determination Process (SDP) in accordance with Inspection Manual Chapter (IMC) 0609, "SDP," Attachment 0609.04, "Initial Characterization of Findings," issued on June 19, 2012. Because the finding impacted the Mitigating Systems cornerstone, the inspectors screened the finding through IMC 0609, Appendix A, "The SDP for Findings At-Power," issued on June 19, 2012, using Exhibit 2, "Mitigating Systems Screening Questions." The finding screened as of very low safety significance (Green) because it did not result in the loss of operability or functionality of mitigating systems. Specifically, the licensee was able to inspect these locations during the refueling outage that was ongoing when this issue was identified and confirmed that they were full of water during the previous operating cycle. In addition, a historical review did not find information that challenged operability due to gas accumulation at these locations.

The inspectors determined that this finding had a cross cutting aspect in the area of problem identification and resolution because the licensee did not thoroughly evaluate their discovery that the CAQ was not been corrected on July 29, 2013. Specifically, the licensee initiated a CE to determine if the action plan at the time addressed the NCV associated with the CAQ. However, the CE was closed by crediting actions that were similar to those that resulted in the NCV and other documented observations associated with the inappropriate resolution of the issue. [P.2]

Enforcement: Title 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," states, in part, that measures shall be established to assure that CAQs, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and non-conformances, are promptly identified and corrected.

Contrary to the above, from April 11, 2011, to at least October 22, 2015, the licensee failed to correct a CAQ. Specifically, on April 11, 2011, the NRC identified that the licensee was not monitoring five safety-related gas susceptible locations within the ECCS considered to be inaccessible and the licensee captured this CAQ in their CAP. However, on October 22, 2015, the inspectors identified that the licensee had not corrected this CAQ for two of these locations and did not have objective plans to restore compliance.

The licensee is still evaluating its planned corrective actions. However, the inspectors determined that the continued non-compliance does not present an immediate safety concern because the affected unit was in an outage and the licensee established procedures to mitigate the applicable gas intrusion mechanisms during startup activities.

This violation is being cited as described in the Notice, which is enclosed with this IR. This is consistent with the NRC Enforcement Policy, Section 2.3.2.a.2, which states, in part, that the licensee must restore compliance within a reasonable period of time (i.e., in a timeframe commensurate with the significance of the violation) after a violation is identified. The NRC identified the original issue on April 11, 2011, and dispositioned it as NCV 05000282/2011003-09; 05000306/2011003-09 in IR 05000282/2011003; IR 05000306/2011003, dated August 1, 2011. On October 22, 2015, the inspectors determined that the licensee failed to restore compliance within a reasonable time for two of the five affected gas susceptible locations following the identification of this CAQ and failed to have objective plans to restore compliance. (VIO 05000306/2015008-01, Failure to Correct an NCV Associated with Inadequate Gas Monitoring of Inaccessible RHR Gas Susceptible Locations)

(2) Failure to Manage Gas Accumulation at the Residual Heat Removal Train Credited for Emergency Core Cooling in MODE 4

Introduction: The inspectors identified a finding of very low safety significance (Green), and an associated NCV of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," for the licensee's failure to manage gas accumulation at the RHR train credited for emergency core cooling in MODE 4, "Hot Shutdown." Specifically, the RHR train credited for emergency core cooling in MODE 4 was not verified to be full of water before its operability was required in MODE 4 following system draining during refueling outage 1R29.

Description: During refueling outage 1R29, which occurred during the fall of 2014, the licensee partially drained both RHR trains for maintenance work under clearance orders 56788 and 59050. Subsequently, the drained piping sections were filled and vented. In addition, the licensee performed dynamic venting in an attempt to flush any remaining void while in MODE 6, "Refueling." While in MODE 5, "Cold Shutdown," some of the gas susceptible locations were inspected to verify that they were full of water prior to entry into MODE 4 to support the emergency core cooling RHR mode of operation. Specifically, LCO 3.5.3, "ECCS – Shutdown," of the licensee's Technical Specifications (TS) required one ECCS train to be operable in MODE 4 when both

reactor coolant system (RCS) cold leg temperatures are greater than the safety injection pump disable temperature specified in the Pressure and Temperature Limits Report (PTLR).

During this inspection period, the inspectors noted that the licensee did not inspect all of the gas susceptible locations that were potentially impacted by the draining activity prior to crediting the Unit 1 "B" RHR train for emergency core cooling in MODE 4. Specifically, the licensee completed these inspections following entry into MODE 4. In addition, inspection of the Unit 1 "B" RHR train minimum flow line discovered a 29.1 cubic inch void that exceeded the 18 cubic inch operability limit established in procedure TP 1468, "Unit 1 GL-08-01 Inspections." The licensee estimated that this discovery occurred 12 – 18 hours after transitioning to MODE 4. The Unit 1 "A" RHR train was inoperable during this timeframe due to other planned activities.

In addition, the licensee did not capture the discovery of the 29.1 cubic inch void in their CAP during 1R29. The likely reasons for the failure to initiate a corrective action document were that the performers of TP 1468 did not recognize that operability of the affected RHR train was required in MODE 4 and that the as-left condition was within acceptable limits. As a result, the inspectors reviewed the upcoming refueling outage schedule and noted that it specified completion of the gas accumulation inspections prior to transitioning to MODE 4. In addition, the licensee was planning to revise procedure H64 to explicitly require these inspections prior to MODE 4. However, the inspectors noted that this revision was not tracked as a corrective action. As a result, the licensee initiated AR 01496254 to track this procedure revision.

The licensee captured the failure to manage gas accumulation at the RHR train credited for emergency core cooling in MODE 4 during 1R29 in the CAP as AR 01500190. The immediate corrective action was to evaluate RHR operability. Specifically, the licensee determined that the RHR was full of water based on the most recent TP 1468 results. In addition, the licensee determined that the 29.1 cubic inch void was bounded by recent operability evaluations of larger voids at the affected location. The proposed plan to restore compliance at the time of this inspection credited the AR 01496254 assignment to revise procedure H64.

Analysis: The inspectors determined that the failure to manage gas accumulation for the RHR train credited for emergency core cooling in MODE 4 was contrary to procedure H64 and was a performance deficiency. The performance deficiency was determined to be more than minor because it was associated with the Mitigating Systems cornerstone attribute of equipment performance and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure to manage gas accumulation for the RHR train credited for emergency core cooling in MODE 4 does not ensure the availability and reliability of the RHR system to perform its accident mitigating function. In addition, this failure resulted in crediting an RHR train for emergency core cooling in MODE 4 that was not verified to be full of water and that was later determined to have a void that exceeded the associated design limits.

The inspectors determined the finding could be evaluated using the SDP in accordance with IMC 0609, "SDP," Attachment 0609.04, "Initial Characterization of Findings," issued on June 19, 2012. Because the finding occurred during shutdown operations, the inspectors screened the finding through IMC 0609 Appendix G, "Shutdown Operations

SDP,” issued on May 9, 2014, which referred to Attachment 1 of IMC 0609, Appendix G, “Phase 1 Initial Screening and Characterization of Findings,” issued on May 9, 2014. Because the finding impacted the Mitigating Systems cornerstone, the inspectors screened the finding through using Exhibit 3, “Mitigating Systems Screening Questions,” of this attachment. The finding screened as of very low safety significance (Green) because it did not result in the loss of operability or functionality of mitigating systems. Specifically, the licensee reviewed records associated with gas accumulation management activities during 1R29 and discovered that a non-conforming void was vented 12 – 18 hours after the transition to MODE 4. However, an operability review reasonably determined that this non-conforming condition did not result in loss of operability.

The inspectors did not identify a cross-cutting aspect associated with this finding because it was not confirmed to reflect current performance. Specifically, although this finding occurred within the last 3 years, the inspectors reviewed the schedule for the upcoming refueling outage and noted that it specified completion of the gas accumulation inspections prior to transitioning to MODE 4. In addition, the licensee was planning to revise procedure H64 to explicitly require these inspections prior to MODE 4.

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

The licensee established Revision 2 of procedure H64 as the implementing procedure for managing gas accumulation in ECCS. Section 4.8 of procedure H64 states that, “Any system maintenance activity that will result in a reduction in fluid inventory of a fluid system in the scope of the gas accumulation management program should be evaluated to determine the required fill, vent and verification inspection.” It also stated that, “The work processes should include provision for engineering review and evaluation of such evolutions.” Subsection 4.8.3, stated that, “Engineering should either specify as part of their review or confirm the procedure that the selected verification locations will demonstrate that the system is sufficiently full to perform its functions.” It further stated that, “This includes the specification of appropriate verification locations and methods.”

The licensee established Revision 16 of procedure FP-G-DOC-05, “Procedure Writers Guide,” as the implementing procedure for writing procedures to ensure that management expectations regarding responsibilities and methods for accomplishing these responsibilities are provided to personnel. Procedure FP-G-DOC-05, Section 4.12, states that, “When used in NSPM documents, use of the term ‘should’ denotes an expected action.” It also stated that, “Deviations from these expectations require prior management approval.”

Contrary to the above, on November 16, 2014, the licensee failed to follow Section 4.8 of procedure H64. Specifically, the licensee did not specify or confirm that selected verification locations for RHR demonstrated that the system was sufficiently full of water to perform its emergency core cooling function in MODE 4 following a system maintenance activity that resulted in a fluid inventory reduction. In addition, this deviation did not receive prior management approval, as required by Section 4.12 of procedure FP-G-DOC-05.

The licensee is still evaluating its planned corrective actions. However, the inspectors determined that the continued non-compliance does not present an immediate safety concern because the licensee created an action to ensure that the upcoming outage schedule is updated to address this issue.

Because this violation was of very low safety significance and was entered into the licensee's CAP as AR 01500190 and AR 01496254, this violation is being treated as a NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy. (NCV 05000282/2015008-02; 05000306/2015008-02, Failure to Manage Gas Accumulation at the RHR Train Credited for Emergency Core Cooling in MODE 4)

(3) Failure to Establish Procedures to Verify Residual Heat Removal is Full of Water Following Maintenance Outages

Introduction: A finding of very low safety significance (Green), and an associated NCV of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," was self-revealed for the licensee's failure to establish procedures to verify RHR is operable with respect to gas accumulation following maintenance outages. Specifically, procedures were not established to verify the system is full of water when RHR is secured in its standby ECCS mode of operation during startup activities following maintenance outages.

Description: On December 10, 2014, the licensee began a Unit 1 maintenance outage associated with a reactor coolant pump (RCP) seal replacement. During this maintenance outage, the licensee operated RHR in its shutdown cooling mode of operation, which circulates RCS water through the RHR system. This water had dissolved nitrogen. On December 24, 2014, the licensee secured shutdown cooling and aligned both RHR trains for the ECCS mode of operation. This maintenance outage concluded on December 26, 2014. The licensee did not perform gas accumulation inspections of the RHR piping to verify it was full of water before declaring it operable for its ECCS mode of operation. TS LCO 3.5.3 required one ECCS train to be operable in MODE 4 when both RCS cold leg temperatures are greater than the safety injection pump disable temperature specified in the PTLR. In addition, TS LCO 3.5.2, "ECCS – Operating," requires two ECCS trains to be operable in MODEs 1, 2, and 3.

On January 26, 2015, the licensee began a second Unit 1 maintenance outage associated with another RCP seal replacement. Again, the Unit 1 "B" RHR train was operated in its shutdown cooling mode circulating nitrogen-rich water throughout its piping system. On February 9, 2015, the licensee secured shutdown cooling, aligned the Unit 1 "B" RHR train for the ECCS mode of operation, and transitioned to MODE 4 and 3. Again, the licensee did not perform gas accumulation inspections of the RHR piping to verify it was full of water before declaring it operable for its ECCS mode of operation.

On February 9, 2015, the licensee also began quarterly gas accumulation inspections using procedure TP 1468. This periodic inspection began after transitioning to MODE 3 and was not part of the unit startup readiness activities following the maintenance outage. On February 10, 2015, the licensee discovered voids at RHR gas susceptible locations 1RH-12 and 1RH-11. The 1RH-12 void size was 350 cubic inches, which exceeded the TP 1468 operability limit of 22.85 cubic inches. The 1RH-11 void size was 62.21 cubic inches, which exceeded the TP 1468 operability limit of 11.62 cubic inches. The licensee declared both RHR trains inoperable while in MODE 1. The licensee

reduced the void sizes below the operability limits by venting these locations later that day. Location 1RH-12 is downstream of ECCS injection valve MV-32065 at the Unit 1 "B" RHR train. Location 1RH-11 is a similar location at the Unit 1 "A" RHR train downstream of ECCS injection valve MV-32064. These locations are isolated from the shutdown cooling configuration by these valves, which are open during the ECCS alignment.

The licensee captured the discovery of these voids in their CAP as AR 01465572 and performed an ACE. One of the apparent causes was changes in nitrogen solubility. Specifically, the RHR system introduced water with dissolved nitrogen during shutdown cooling operations during the maintenance outages and a portion of this nitrogen came out of solution due to system depressurization when secured for ECCS mode of operation. The affected locations were system high points and were not verified to be full of water before exiting the maintenance outages because the procedures established to perform this verification were not applicable following maintenance outages. The other apparent cause associated with this problem is discussed further in Section 4OA2.1.c(5) of this IR. Because the time that the void exceeded the applicable operability limit remained undetermined during this inspection period, the inspectors were unable to verify if the licensee appropriately changed MODE during reactor unit startup activities.

Procedure H64, Section 4.9, "Gas Monitoring," stated that, "The monitoring plan must be developed to ensure the system meets the design limit and must ensure the system is capable of performing its design function throughout the next monitoring interval." It further stated that, "The monitoring frequency for each location requiring periodic monitoring should be documented in station procedures." It also stated that this frequency should consider "Probability of gas intrusion due to normal plant maneuvers and equipment manipulation." However, the monitoring frequency for the affected locations did not consider the system configuration and operational changes experienced during maintenance outages that can lead to gas accumulation beyond the system design and operability limits.

The licensee's long term corrective actions included a revision of procedures 1/2C1.2-M4, "Unit 1/2 Startup to MODE 4," to require gas accumulation inspections of the affected gas susceptible locations as part of the unit startup activities following a maintenance outage. In addition, the licensee performed a past operability evaluation and reasonably determined that the RHR trains remained operable.

Analysis: The inspectors determined that failure to establish procedures to verify RHR is operable with respect to gas accumulation following maintenance outages was contrary to 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," and was a performance deficiency. The performance deficiency was determined to be more than minor because it was associated with the Mitigating Systems cornerstone attribute of equipment performance and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure to have procedures to verify RHR is full of water following maintenance outages creates the potential for an unacceptable void to go undetected affecting the availability and capability of this system to perform the mitigating function.

The inspectors determined the finding could be evaluated using the SDP in accordance with IMC 0609, "SDP," Attachment 0609.04, "Initial Characterization of Findings." Because the finding impacted the Mitigating Systems cornerstone, the inspectors screened the finding through IMC 0609, Appendix A, "The SDP for Findings At-Power," using Exhibit 2, "Mitigating Systems Screening Questions." The finding screened as of very low safety significance (Green) because it did not result in the loss of operability or functionality of mitigating systems. Specifically, the licensee performed a past operability review of the void found at 1RH-12 and reasonably concluded that the system remained operable. The consequence of this void bounded all of the RHR voids known during this inspection period for the last year.

The inspectors did not identify a cross-cutting aspect associated with this finding because it was not confirmed to reflect current performance due to the age of the performance deficiency. Specifically, the procedures associated with gas accumulation management were developed as part of the GL 2008-01 effort which was completed more than 3 years ago.

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

Contrary to the above, as of August 4, 2015, the licensee failed to have procedures for verifying that RHR was operable as part of the unit startup activities following a maintenance outage. Specifically, this system experience configuration and operational changes during maintenance outages that can lead to gas accumulation beyond the system design and operability limits. However, the procedures failed to verify that the RHR was sufficiently full of water after RHR was aligned in its standby ECCS mode of operation during startup activities following maintenance outages.

The licensee is still evaluating its planned corrective actions. However, the inspectors determined that the continued non-compliance does not present an immediate safety concern because the licensee vented the nitrogen that accumulated at locations 1RH-11 and 1RH-12.

Because this violation was of very low safety significance and was entered into the licensee's CAP as AR 014465572, this violation is being treated as a NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy. (NCV 05000282/2015008-03; 05000306/2015008-03, Failure to Establish Procedures to Verify RHR is Full of Water Following Maintenance Outages)

(4) Failure to Manage Potential Gas Accumulation Due to Safety Injection Isolation Check Valve Leakage Following Maintenance Outages

Introduction: The inspectors identified a finding of very low safety significance (Green), and an associated NCV of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," for the licensee's failure to manage potential gas accumulation due to safety injection isolation check valve leakage following maintenance outages. Specifically, the GL 2008-01 design reviews did not evaluate the potential to accumulate nitrogen at multiple RHR and safety injection gas susceptible locations due to safety injection check valve unseating caused by maintenance outages. As a result, the station did not manage this gas intrusion mechanism.

Description: On January 11, 2008, the NRC requested each GL 2008-01 addressee to evaluate the ECCS, DHR, and CS systems licensing basis, design, testing, and corrective actions to ensure that gas accumulation was maintained less than the amount that would challenge the operability of these systems. One of the licensee's original actions to address these requests was to perform design reviews to identify gas susceptible locations and their applicable gas intrusion mechanisms to manage gas accumulation at these locations.

On February 24, 2011, the licensee identified that these design reviews were not documented. Specifically, the licensee did not have quality records documenting the evaluation of gas susceptible locations that determined which locations required periodic monitoring. The licensee captured this issue in their CAP as AR 01272406. This issue was documented as a licensee-identified NCV of 10 CFR Part 50, Appendix B, Criterion XVII, "Quality Assurance Records," in NRC IR 05000282/2011003; IR 05000306/2011003, dated August 1, 2011. The licensee credited AR 01281652 to resolve the concern captured in AR 01272406 and, ultimately, AR 01281652 credited a corrective action assignment under AR 01271580 to resolve this concern. As a result, on June 9, 2011, the licensee completed their evaluation and documentation of, in part, specific gas intrusion mechanisms for each identified gas susceptible location.

One of the gas intrusion mechanisms evaluated by the licensee was the introduction of nitrogen-rich water to the ECCS due to RCS leakage past the safety injection isolation check valves and subsequent out-gassing due to the reduction of temperature and pressure at the ECCS piping. This evaluation was consistent with the requirements of GAMP procedure H64, Section 4.5.4. Specifically, it stated that, "The station should develop a process to evaluate all identified local high points, system high points and other potential void locations to determine if gas accumulation could occur." It further stated that, "The potential sources of gas intrusion developed as a result of Section 4.1 of this document should be evaluated for applicability to identified high point locations." Section 4.1 identified a number of gas intrusion mechanisms that included "Leakage from the RCS," "Out-gassing of dissolved gas when gas saturated liquid passes from piping at high pressure into piping at lower pressure," and "Leakage through valves, including leakage through a series of nominally closed valves." Because Section 4.1 of procedure H64 also stated that "Potential void locations require further evaluation to determine what level of monitoring is required," the licensee determined that the safety injection isolation check valves required verification to ensure their disc were properly seated following refueling outages to mitigate the possibility for leakage that could introduce gas into the ECCS piping. As a result, the licensee only verified that these check valves were seated following refueling outages.

However, during this inspection period, the inspectors noted that this evaluation failed to consider the possibility of safety injection isolation check valve leakage due to disc unseating following maintenance outages. As a result, the licensee was not managing the potential to unseat these valves following maintenance outages which had the potential to adversely affect gas susceptible locations 1RH-10, 1RH-11, 1RH-12, 1RH-29, 2RH-14, 2RH-17, 1SI-48, 1SI-49, 2SI-40, and 2SI-41 of the RHR and safety injection systems. In addition, the failure to manage gas accumulation due to potential safety injection isolation check valve leakage following maintenance outages contributed to the introduction of a nitrogen void in location 1RH-12 of the Unit 1 "B" RHR train that exceeded the applicable operability limits. Specifically, this void, which was discovered on February 10, 2015, was the result of two gas intrusion mechanisms and leakage through

the safety injection isolation check valves was one of the associated causes. The details of this active gas intrusion incident and another licensee deficient performance associated with this incident are discussed in Section 4OA2.1.c(5) of this IR. The other cause and associated licensee deficient performance associated with the void discovered on February 10, 2015, are discussed in Section 4OA2.1.c(3) of this IR.

The licensee captured the inspectors' concerns in their CAP as AR01465572. As an immediate corrective action, the licensee vented the nitrogen that accumulated at location 1-RH-12. Additionally, the licensee seated the associated check valves, performed an extent of condition, completed an ACE, and evaluated 1-RH-12 for past operability. The licensee was in the process of implementing long term corrective actions that included revising procedures H64 and 1/2C1.2-M4 to verify that the safety injection check valves are seated as part of the unit startup activities following maintenance outages.

Analysis: The inspectors determined that the failure to manage potential gas accumulation due to safety injection check valve leakage following maintenance outages was contrary to procedure H64 and was a performance deficiency. The performance deficiency was determined to be more than minor because it was associated with the Mitigating Systems cornerstone attribute of equipment performance, and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure to manage active gas intrusion mechanisms at RHR and safety injection susceptible locations does not ensure the availability of these systems to perform their mitigating functions. In addition, this failure resulted in the accumulation of gas at the Unit 1 'B' train of RHR challenging its operability.

The inspectors determined the finding could be evaluated using the SDP in accordance with IMC 0609, "SDP," Attachment 0609.04, "Initial Characterization of Findings." Because the finding impacted the Mitigating Systems cornerstone, the inspectors screened the finding through IMC 0609 Appendix A, "The SDP for Findings At-Power," using Exhibit 2, "Mitigating Systems Screening Questions." The finding screened as of very low safety significance (Green) because it did not result in the loss of operability or functionality of mitigating systems. Specifically, the licensee performed a past operability review of the void found at 1RH-12 and reasonably concluded that the system remained operable. The consequence of this void bounded all of the voids known at the affected locations during this inspection period for the last year.

The inspectors did not identify a cross-cutting aspect associated with this finding because it was not confirmed to reflect current performance due to the age of the performance deficiency. Specifically, the GL 2008-01 design reviews were completed more than 3 years ago.

Enforcement: Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that the licensee provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program.

Contrary to the above, on June 9, 2011, the licensee failed to verify the adequacy of the RHR and safety injection design. Specifically, the design reviews failed to evaluate the potential to accumulate nitrogen at multiple RHR and safety injection gas susceptible

locations (i.e., 1RH-10, 1RH-11, 1RH-12, 1RH-29, 2RH-14, 2RH-17, 1SI-48, 1SI-49, 2SI-40, and 2SI-41) due to safety injection check valve unseating caused by maintenance outages.

The licensee is still evaluating its planned corrective actions. However, the inspectors determined that the continued non-compliance does not present an immediate safety concern because the licensee vented the nitrogen that accumulated at location 1-RH-12 and seated the associated check valves.

Because this violation was of very low safety significance and was entered into the licensee's CAP as AR 014465572, this violation is being treated as a NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy. (NCV 05000282/2015008-04; 05000306/2015008-04, Failure to Manage Potential Gas Accumulation Due to Safety Injection Isolation Check Valve Leakage Following Maintenance Outages)

(5) Failure to Identify a Continuous Gas Intrusion into Residual Heat Removal

Introduction: The inspectors identified a finding of very low safety significance (Green), and an associated NCV of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," for the licensee's failure to identify a continuous gas intrusion into RHR gas susceptible location 1-RH-12, which was a CAQ, resulting in a continuous undetected void growth that exceeded the applicable operability limits. Specifically, the licensee did not consider applicable active gas intrusion mechanisms when evaluating the discovery of a void at the RHR piping.

Description: On December 10, 2014, the licensee began a Unit 1 maintenance outage associated with an RCP seal replacement. As part of the startup activities, the licensee transitioned to MODE 4 and 3 on December 24 and 25, 2014, respectively. The TS LCO 3.5.3 required one ECCS train to be operable in MODE 4 when both RCS cold leg temperatures are greater than the safety injection pump disable temperature specified in the PTLR. In addition, TS LCO 3.5.2 requires two ECCS trains to be operable in MODES 1, 2, and 3. The licensee did not verify that the safety injection isolation check valves were seated as part of the startup activities.

On January 26, 2015, the licensee began a second Unit 1 maintenance outage associated with another RCP seal replacement. On February 9, 2015, the licensee transitioned to MODEs 4 and 3. Again, the licensee did not verify that the safety injection isolation check valves were seated as part of the startup activities.

On February 9, 2015, the licensee also began quarterly gas accumulation inspections using procedure TP 1468 after transitioning to MODE 3 and were not part of the unit startup readiness activities following the maintenance outage. On February 10, 2015, the licensee discovered voids at RHR gas susceptible locations 1RH-12 and 1RH-11. The 1RH-12 void size was 350 cubic inches, which exceeded the TP 1468 operability limit of 22.85 cubic inches. The 1RH-11 void size was 62.21 cubic inches, which exceeded the TP 1468 operability limit of 11.62 cubic inches. The licensee captured the discovery of these voids in their CAP as AR 01465572 and declared both RHR trains inoperable while in MODE 1. The licensee declared the system operable later that day because the void sizes were reduced below their operability limits via venting.

However, the inspectors noted that these actions did not consider the known locations susceptibility to active gas intrusion mechanisms. Specifically, Section 4.9.2 of GAMP procedure H64 stated that, "When an actual gas intrusion event has occurred or there exists an increased possibility that gas intrusion may occur in a given location or system the condition should be documented in the corrective action program." It also stated that, "The corrective actions should include additional monitoring." It explained that "Additional monitoring or increased monitoring frequencies should be established when potential problems are observed, until the root cause of gas accumulation can be identified and corrected." In addition, it stated that, "A monitoring plan with specific locations, techniques, and frequency should be employed to verify that any gas accumulation resulting from the active gas intrusion mechanisms remains less than the volume that challenges the ability of the system to perform its design function(s)." The inspectors were concerned because the affected gas susceptible locations were vulnerable to active gas intrusion mechanisms and the licensee did not established an increased monitoring frequency until the root cause of the gas accumulation was found to verify the sytem remained capable of performing its safety function. Specifically, the inspectors noted that location 1RH-12 is at the Unit 1 "B" RHR train downstream of ECCS injection valve MV-32065 and upstream of the safety injection isolation check valves SI-9-5 and SI-9-3. Location 1RH-11 is at a similar location at the Unit 1 "A" train between MV-32064 and check valves SI-9-6 and SI-9-4. These check valves are in series and isolate the ECCS from the RCS. In MODE 1, the RCS operates at a significantly greater pressure and temperature than the ECCS. Thus, leakage of RCS nitrogen rich water to ECCS may lead to nitrogen out-gassing or steam formation in the ECCS piping. In addition, the inspectors considered other system interfaces as potential gas sources.

As a result of the inspectors' concerns, the licensee performed an additional inspection on February 18, 2015. The associated 1RH-11 inspection results did not show evidence of an active gas intrusion mechanism. However, the inspection discovered a void of 113.8 cubic inches at the 1RH-12 location confirming the existence of a continuous gas intrusion incident due to an active gas intrusion mechanism. Consequently, the licensee implemented venting at a periodicity that was based on growth rates. In addition, the licensee declared the Unit 1 "B" train inoperable and decided to not declare it operable until the continuous gas intrusion incident was under control. Following further prompting from the inspectors, the licensee took chemistry samples of the vented gas and measured pipe temperatures. The gas was 94 percent nitrogen. In addition, the 1RH-12 piping temperature was warmer than the similar location at the opposite RHR train and had a temperature profile that was warmer in the vicinity of the check valves. Thus, the licensee concluded that the check valves were leaking RCS water into location 1RH-12 causing nitrogen to come out of solution due to the lower system pressure. On February 21, 2015, the licensee vented the piping porting in between the check valves to properly seat their discs. On February 22, 2015, the licensee declared the Unit 1 "B" RHR train operable after confirming that the 1RH-12 void size was below operability limits and stable.

While the licensee corrected the discovery of a non-conforming void at 1RH-12, which is a CAQ, on February 10, 2015, the licensee failed to identify the continuous gas intrusion into this location, which was a second CAQ. The licensee captured the additional concerns associated with the failed identification of the continuous gas intrusion into 1RH-12 in their CAP as AR01465572 along with the other concerns related with the voids discovered on February 10, 2015. These other concerns are

discussed in detailed in Sections 40A2.1.c(3) and 40A2.1.c(4) of this IR. In addition, the licensee performed a past operability evaluation and reasonably determined that the RHR trains remained operable.

Analysis: The inspectors determined that the failure to identify a continuous gas intrusion into 1-RH-12, a CAQ, was contrary to 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," and was a performance deficiency. The performance deficiency was determined to be more than minor because it was associated with the Mitigating Systems cornerstone attribute of equipment performance and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure to identify a continuous gas intrusion at the Unit 1 "B" RHR piping resulted in a void reintroduction of a size that exceeded the applicable operability limits.

The inspectors determined the finding could be evaluated using the SDP in accordance with IMC 0609, "SDP," Attachment 0609.04, "Initial Characterization of Findings." Because the finding impacted the Mitigating Systems cornerstone, the inspectors screened the finding through IMC 0609 Appendix A, "The SDP for Findings At-Power," using Exhibit 2, "Mitigating Systems Screening Questions." The finding screened as of very low safety significance (Green) because it did not result in the loss of operability or functionality of mitigating systems. Specifically, the licensee performed a past operability review of the void found at 1RH-12 and reasonably concluded that the system remained operable.

The inspectors determined that this finding had a cross-cutting aspect in the area of human performance because the licensee did not recognize and plan for the possibility of mistakes when evaluating the gas surveillance results of February 10, 2015. Specifically, the licensee did not plan for the possibility that the unacceptable results were indicative of a different problem than originally determined or a combination of problems. As a result, the licensee failed to identify the continuous gas intrusion incident. [H.12]

Enforcement: Title 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requires, in part, that CAQs, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and non-conformances are promptly identified.

Contrary to the above, from February 10, 2015, to February 21, 2015, the licensee failed to identify a CAQ. Specifically, the licensee failed to identify a continuous gas intrusion incident, a CAQ, at RHR gas susceptible location 1RH-12 resulting in a continuous undetected void growth that exceeded the applicable design limits. The licensee had sufficient information to identify this CAQ because the GAMP procedure contained sufficient guidance to determine the source of this void.

The licensee is still evaluating its planned corrective actions. However, the inspectors determined that the continued non-compliance does not present an immediate safety concern because the licensee vented the nitrogen that accumulated at location 1RH-12 and seated the associated check valves.

Because this violation was of very low safety significance and was entered into the licensee's CAP as AR 014465572, this violation is being treated as a NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy. (NCV 05000282/2015008-05; 05000306/2015008-05, Failure to Identify a Continuous Gas Intrusion into RHR)

4OA6 Meetings

.1 Exit Meeting Summary

On November 24, 2015, the inspectors presented the inspection results to Mr. S. Northam, and other members of the licensee staff. The licensee acknowledged the issues presented. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. Several documents reviewed by the inspectors were considered proprietary information and were either returned to the licensee or handled in accordance with NRC policy on proprietary information.

4OA7 Licensee-Identified Violations

The following violation of very low significance (Green) was identified by the licensee and is a violation of NRC requirements, which meet the criteria of the NRC Enforcement Policy for being dispositioned as an NCV.

- Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that the licensee provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program. Contrary to the above, as of November 24, 2015, the licensee failed to verify the adequacy of the ECCS vent designs. Specifically, the licensee did not verify that the ECCS vent designs were adequate. As a result, some vents were inadequate to remove gas that accumulated in excess of the applicable design limits. The licensee captured their concern in their CAP as AR 01482500 and AR 01465114, and initiated actions to add and/or modify the vents.

The inspectors determined the finding could be evaluated using the SDP in accordance with IMC 0609, "SDP," Attachment 0609.04, "Initial Characterization of Findings." Because the finding impacted the Mitigating Systems cornerstone, the inspectors screened the finding through IMC 0609 Appendix A, "The SDP for Findings At-Power," using Exhibit 2, "Mitigating Systems Screening Questions." The finding screened as of very low safety significance (Green) because it did not result in the loss of operability or functionality of mitigating systems. Specifically, the licensee evaluated the voids that could not be vented and reasonably determined they did not result in loss of operability.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

S. Northam, Vice President of Fleet Operations
K. Davison, Site Vice President
E. Blondin, Engineering Director
S. Martin, Performance Assessment Manager
M. Pearson, Regulatory Affairs Manager
J. Connors, Engineering Supervisor

U.S. Nuclear Regulatory Commission

K. Riemer, Chief, Reactor Projects Branch 2
C. Lipa, Chief, Engineering Branch 2
N. Félix Adorno, Senior Reactor Inspector, Engineering Branch 2
T. Beltz, Project Manager, Office of Nuclear Reactor Regulation

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened and Closed

05000306/2015008-01	VIO	Failure to Correct an NCV Associated with Inadequate Gas Monitoring of Inaccessible RHR Gas Susceptible Locations (Section 4OA2.1.c(1))
05000282/2015008-02; 05000306/2015008-02	NCV	Failure to Manage Gas Accumulation at the RHR Train Credited for Emergency Core Cooling in MODE 4 (Section 4OA2.1.c(2))
05000282/2015008-03; 05000306/2015008-03	NCV	Failure to Establish Procedures to Verify RHR is Full of Water Following Maintenance Outages (Section 4OA2.1.c(3))
05000282/2015008-04; 05000306/2015008-04	NCV	Failure to Manage Potential Gas Accumulation Due to SI Isolation Check Valve Leakage Following Maintenance Outages (Section 4OA2.1.c(4))
05000282/2015008-05 05000306/2015008-05	NCV	Failure to Identify a Continuous Gas Intrusion into RHR (Section 4OA2.1.c(5))

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 inspector 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 inspection report.

- H64; Gas Accumulation Management Program; Rev. 2B
- H64; Gas Accumulation Management Program; Rev. 2
- TP 1468; Unit 1 GL-08-01 Inspections; Rev. 6
- 1M-RH-TRN A; ECCS Train A: Isolate, Drain, Fill and Vent; Rev. 7
- 1C1.2-M4; Unit 1 Startup to MODE 4; Rev. 2
- 1C1.2-M4; Unit 1 Startup to MODE 4; Rev. 1
- SP 1466; Dynamic Flush of RHR System (GL 2008-01); Rev. 2
- Calc. 32-9236122; Operability Evaluation for Void Found at Location 1RH-11 in the PINGP Unit 1 RHR System; Rev. 0
- Calc. 32-9237388; U1 RHR System Operability Evaluation for Void 1RH-11; Rev. 0
- Calc. 32-9241892; Operability Evaluation for Void Found at Location 1RH-12 in the PINGP Unit 1 RHR System; Rev. 0
- NOS Observation Report 2013-03-006; Engineering Programs and Inservice Testing; dated 09/25/13
- AR01291233; GL 08-01: Void Identified at Susceptible Location 1RH-21; dated 06/20/11
- AR01391787; Misuse of CAP Hinders Fix of GL 08-01 NRC Finding 2011003-09; dated 07/29/13
- AR01391784; Misuse of CAPAs within the CAP Hinders GL 08-01 Fix; dated 07/29/13
- AR01464866; Void Identified During GL 08-01 Examination; dated 02/04/15
- AR01465572; Voids Identified in RH Piping; dated 02/10/15
- AR01465659; NRC Question: RHR Pump Availability Given Void Inoperability; dated 02/20/15
- AR01466757; Voids Identified in RH Piping at Location 1RH-12; dated 02/18/15
- AR01466999; Void Identified in RH Piping at Location 1RH-12; dated 02/19/15
- AR01467032; Elevated Temperature was Noted on Line 6-SI-25D; dated 02/20/15
- AR01482226; GAMP: Void Identified at Location 2RH-26 and 2RH-09; dated 06/08/15
- AR01482500; GAMP: Void Identified at Location 1RH-04 and 1RH-27; dated 06/10/15
- AR01484195; GAMP: Answer NRC Void Question for 2RH-09 and 2RH-26; dated 06/25/15
- AR01484157; GAMP: Void Identified at Location 2RH-09 and 2RH-26; dated 06/25/15
- AR01488704; GAMP: Acceptable Void Identified During TP 2468 Performance; dated 08/05/15
- AR01466967; Operations Needs to Evaluate Alternate RHR Venting Method; dated 02/19/15
- AR01281658; TI-177 GL08-01 Reviews Did Not Identify Susceptible Locations; dated 04/20/11
- AR01281682; TI-177 – Need Methods to Evaluate Inaccessible Locations; dated 04/20/11
- AR01271826; GL-08-01 TI-177 NRC Inspection Prep - H64 Gap Analysis; dated 02/21/11
- AR01281652; TI177 Results of Susceptible Location Reviews Not Documented; dated 04/20/11
- AR01271024; GL-08-01 TI-177 NRC Inspection Prep - H64 Gap Analysis; dated 02/15/11
- AR01456527; GL-08-01 Inspection Identified Void in Piping; dated 11/18/14
- AR01493599; GAMP: Acceptable Void Identified at 1RH-20; dated 09/17/15
- WO00514236; TP 2468 Unit 2 GL-08-01 Inspections; date 08/27/15
- WO00524641; Perform UT Inspection for GL 08-01 TP 2468; dated 07/09/15
- WO00513378; TP 1468 – Unit 1 GL-08-01 Inspections; dated 02/10/15

Corrective Action Documents Generated as a Result of the Inspection

- AR01497409; ECCS Fill and Vent Completed Procedures Not Retained; dated 10/19/15
- AR01498131; Record Pressure/Gas Property for Large Voids Founds; dated 10/22/15
- AR01496469; ACE 01281652 Corrective Actions Were Completed in C Level CAPs; dated 10/12/15
- AR01497119; Analysis 32-9242120 Missed an Item for Additional Review; dated 10/16/15
- AR01496254; GAMP: H64 Wording Not Clear for Void Checks during Startup; dated 10/09/15
- AR01496191; GAMP: Corrective Action Implementation Was Inconsistent; dated 10/09/15
- AR01495447; GAMP: Vendor Product (EC22242) Does Not List All Susceptible; dated 10/2/15
- AR01495724; GAMP: Typing Error Found in TP 1468; dated 10/05/15
- AR01495444; GAMP: Alternate Testing Method Used but Not Well Documented; dated 10/02/15
- AR01498169; GAMP: Legacy – Ineffective Corrective Action from 2011 CAP 01271826; dated 10/22/15

LIST OF ACRONYMS USED

ACE	Apparent Cause Evaluation
ADAMS	Agencywide Document Access Management System
AR	Action Request
CAP	Corrective Action Program
CAQ	Condition of Adverse Quality
CE	Condition Evaluation
CFR	<i>Code of Federal Regulations</i>
CS	Containment Spray
DHR	Decay Heat Removal
DRP	Division of Reactor Projects
ECCS	Emergency Core Cooling System
GAMP	Gas Accumulation Management Program
GL	Generic Letter
IMC	Inspection Manual Chapter
IP	Inspection Procedure
IR	Inspection Report
LCO	Limiting Condition for Operation
NCV	Non-Cited Violation
NRC	U.S. Nuclear Regulatory Commission
PARS	Publicly Available Records System
PTLR	Pressure and Temperature Limits Report
RCP	Reactor Coolant Pump
RCS	Reactor Coolant System
RHR	Residual Heat Removal
SDP	Significance Determination Process
TS	Technical Specification

K. Davision

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If you contest the subject or severity of any 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 the Prairie Island Nuclear Generating Plant.

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

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/

Christine A. Lipa, Chief
Engineering Branch 2
Division of Reactor Safety

Docket Nos. 50-282, 50-306
License Nos. DPR-42, DPR-60

Enclosure:
IR 05000282/2015008; 05000306/2015008

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