



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
REGION III
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September 23, 2016

Mr. Bryan C. Hanson
Senior VP, Exelon Generation Company, LLC
President and CNO, Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: BRAIDWOOD STATION, UNITS 1 AND 2 – NRC PROBLEM
IDENTIFICATION AND RESOLUTION INSPECTION REPORT
05000456/2016007; 05000457/2016007

Dear Mr. Hanson:

On August 11, 2016, the U.S. Nuclear Regulatory Commission (NRC) completed a Problem Identification and Resolution (PI&R) Biennial Inspection at your Braidwood Station, Units 1 and 2. The NRC inspection team discussed the results of this inspection with Ms. M. Marchionda and other members of your staff. The inspection team documented the results of this inspection in the enclosed inspection report.

Based on the inspection samples selected for review, the inspection team determined that the Braidwood staff's implementation of the corrective action program (CAP) supported nuclear safety. In reviewing the CAP, the team assessed how well the staff identified problems at a low threshold, how well the station's process for prioritizing and evaluating these problems was implemented, and the effectiveness of corrective actions taken by the staff to resolve these problems. In each of these areas, the team determined that the station's performance was adequate to support nuclear safety.

The team also evaluated other processes used to identify issues for resolution. These included the use of audits and self-assessments to identify latent problems and incorporation of lessons learned from industry operating experience into station programs, processes, and procedures. The team determined that the station's performance in each of these areas supported nuclear safety.

The team determined that the station's management maintained a safety conscious work environment adequate to support nuclear safety. Based on the team's interviews and observations, employees were willing to raise concerns related to nuclear safety through at least one of the several means available.

Based on the results of this inspection, the NRC identified one issue that was evaluated under the significance determination process as having very low safety significance (Green). The NRC also determined that the issue had an associated violation. Because this finding was of very low safety significance and was entered into the CAP to address the issue, this violation is being treated as a Non-Cited Violation (NCV), consistent with Section 2.3.2 of the Enforcement Policy. This NCV is described in the subject inspection report.

B. Hanson

- 2 -

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

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 System (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/

Eric R. Duncan, Chief
Branch 3
Division of Reactor Projects

Docket Nos. 50-456 and 50-457
License Nos. NPF-72 and NPF-77

Enclosure:
IR 05000456/2016007; 05000457/2016007

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Nos: 50-456; 50-457
License Nos: NPF-72; NPF-77

Report No: 05000456/2016007; 05000457/2016007

Licensee: Exelon Generation Company, LLC

Facility: Braidwood Station, Units 1 and 2

Location: Braceville, IL

Dates: July 11 through August 11, 2016

Inspectors: D. Betancourt, Resident Inspector, Team Leader
M. Holmberg, Senior Reactor Inspector
J. Bozga, Reactor Inspector
G. O'Dwyer, Reactor Inspector

Approved by: E. Duncan, Chief
Branch 3
Division of Reactor Projects

Enclosure

SUMMARY

Inspection Report (IR) 05000456/2016007; 05000457/2016007; 07/11/2016 – 08/11/2016; Braidwood Station, Units 1 and 2; Biennial Problem Identification and Resolution Inspection Report.

This team inspection was performed by three U.S. Nuclear Regulatory Commission (NRC) regional inspectors and the Braidwood resident inspector. One Green finding was identified by the team. This finding was considered a non-cited violation (NCV) of NRC regulations. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process." The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 6, dated July 2016.

Problem Identification and Resolution

On the basis of the samples selected for review, the team determined that implementation of the corrective action program (CAP) at Braidwood Station, Units 1 and 2, was generally good. The licensee demonstrated a low threshold for identifying problems and entering them into the CAP. Items entered into the CAP were screened and prioritized in a timely manner using established criteria; were properly evaluated commensurate with their safety significance; and corrective actions were generally implemented in a timely manner, commensurate with the safety significance of the issue. The use of operating experience was integrated into daily activities. Audits and self-assessments were performed at appropriate frequencies and at an appropriate level to identify issues. On the basis of the interviews conducted during the inspection, workers at the site expressed a willingness to raise safety concerns without the fear of retaliation. The team did not identify any impediment to the establishment of a safety conscious work environment at Braidwood Station. On the basis of the interviews conducted, workers at the site expressed a willingness to enter safety concerns directly into the CAP or make safety concerns known through their supervisors. Some non-supervisory personnel questioned the value of identifying concerns for what they perceived as low level issues.

Cornerstone: Mitigating Systems

- Green. A finding of very low safety significance and an associated NCV of Title 10 of the *Code of Federal Regulations* (CFR) Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," was self-revealed when the licensee failed to prescribe essential service water (SX) system operating and/or surveillance procedures appropriate to the circumstances. Specifically, the licensee failed to provide SX operating procedure guidance to limit the closure position of valves 1SX007, 2SX007 and 0SX007, such that cavitation-induced damage/failure of components did not occur or to establish a procedure to monitor and correct cavitation-induced damage prior to component failure associated with the operation of these valves. Consequently, a through-wall leak occurred downstream of valve 1SX007 that was caused by cavitation-induced wall loss at the neck of the pipe flange supporting this valve. The licensee replaced the damaged valve and piping and entered this issue into their CAP as Issue Report (IR) 02697962.

The team determined that the performance deficiency was more than minor because it was associated with the Equipment Performance attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, continued operation of the SX007 valves without monitoring or correcting

cavitation-induced damage could result in a more significant failure resulting in the loss of an SX train and/or an internal flooding event. The team determined that this finding was of very low safety significance because although it was determined to be a deficiency affecting the design or qualification of a mitigating structure, system, and component (SSC), the operability or functionality of the component was not affected. The team did not identify a cross-cutting aspect for this finding because the finding did not reflect current licensee performance. (Section 4OA2.1(3))

REPORT DETAILS

4. OTHER ACTIVITIES

Cornerstone: Mitigating Systems

4OA2 Problem Identification and Resolution (71152B)

The activities documented in Sections .1 through .4 constituted one biennial sample of problem identification and resolution as defined in Inspection Procedure (IP) 71152.

.1 Assessment of the Corrective Action Program Effectiveness

a. Inspection Scope

The team reviewed the licensee's corrective action implementing procedures and attended corrective action program (CAP) meetings to assess the implementation of the CAP by site personnel.

The team reviewed risk and safety significant issues in the licensee's CAP since the last NRC PI&R inspection, completed in August 2014. The issues selected were represented in all of the NRC's Reactor Oversight Process (ROP) cornerstones. The team reviewed a sample of issues identified through NRC generic communications, department self-assessments, licensee audits, operating experience reports, and NRC documented findings. Additionally, the team reviewed issue reports (IRs) generated as a result of daily plant activities. The team also reviewed a sample of work orders (WOs), performance indicator reports, system health reports, and completed causal evaluations from the licensee's various methods, which included root cause evaluations (RCEs) and apparent cause evaluations (ACEs).

A five year review related to leaks in the essential service water (SX) system was also performed to assess the licensee's efforts in monitoring for system degradation due to aging. The team also performed a partial system walkdown of the SX system, auxiliary feedwater system, and equipment contained in the lake greenhouse to determine whether the condition of the equipment was appropriately represented in plant health reports, WOs, and the CAP.

During these reviews, the team evaluated whether the licensee's actions were in compliance with the facility's CAP and Title 10 of the *Code of Federal Regulations* (CFR) Part 50, Appendix B requirements. Specifically, the team assessed whether licensee personnel were identifying station issues at the proper threshold, whether identified issues were being entered into the CAP in a timely manner with the appropriate significance characterization, and whether identified issues were appropriately prioritized for resolution. The team also assessed whether the licensee assigned the appropriate evaluation method to ensure the proper determination of root, apparent, and contributing causes. Finally, the team evaluated the timeliness and effectiveness of corrective actions (CAs) for selected IRs, completed causal evaluations, and previously identified NRC findings and NCVs.

Documents reviewed are listed in the Attachment.

b. Assessment

(1) Effectiveness of Problem Identification

Based on the results of the inspection, the team concluded that problem identification was generally effective. Based on the information reviewed, including initiation rates of IRs and information from interviews, the team determined that the licensee had an appropriate and low threshold for initiating IRs and that all station departments were active in generating IRs. The team also determined that the station was generally effective at trending low level issues to prevent larger issues from developing. The team assessed the effectiveness of problem identification as adequate to support nuclear safety.

Findings

No findings were identified.

(2) Effectiveness of Prioritization and Evaluation of Issues

Based on the results of the inspection, the team concluded that the prioritization and evaluation of issues was generally appropriate. The team determined that station ownership committee (SOC) and management review committee (MRC) meetings were generally thorough and meeting participants were actively engaged and well-prepared. The results of SOC and MRC meetings were also determined to accurately prioritize issues. Higher level evaluations, such as RCEs and ACEs, were generally technically accurate; of sufficient depth to effectively identify the cause(s); and generally considered extent of condition, generic implications, and previous occurrences in an adequate manner. However, the team found one example for which a contributing cause in a RCE did not include an assigned corrective action (CA). The licensee entered this issue in their CAP as IR 02696896, "No Corrective Action Tracking Item (ATI) for Root Cause Identified for Contributing Cause," and provided a justification as to why a CA was not needed to address the contributing cause. The team reviewed the IR and associated justification and determined the actions were appropriate.

Unresolved Item (URI): Identification of Significant Conditions Adverse to Quality in Accordance with the Quality Assurance Topical Report

Introduction: The team identified an Unresolved Item (URI) regarding the identification of significant conditions adverse to quality (SCAQs) in the CAP. Specifically, the team determined that the CAP, as implemented by PI-AA-125, "Corrective Action Program," and PI-AA-120, "Issue Identification and Resolution," appeared to not ensure that SCAQs were appropriately identified and corrected to prevent recurrence.

Description: Chapter 16 of the Braidwood Quality Assurance Topical Report (QATR) describes the licensee's program to identify and correct conditions adverse to quality. Procedure PI-AA-125 implemented the requirements established in the QATR. During this inspection, the team reviewed the CAP procedure to determine how it ensured that SCAQs were identified and resolved. As part of this review, the team requested a copy of identified SCAQs over the last two years and were subsequently informed that none had been identified.

Issue #1

The team reviewed the QATR and noted that the following requirements applied:

- Section 2.1 stated that measures are required to assure that the cause of any significant condition adverse to quality is determined and that corrective actions to prevent recurrence [CAPRs] are implemented.
- Section 2.2.1, "Significant Conditions Adverse to Quality," stated that in cases of significant conditions adverse to quality the cause of the condition must be determined and documented, the resolution determined and documented, and the corrective actions taken and documented to prevent recurrence.
- Step 2.116 of Appendix D of the QATR defined a significant condition adverse to quality as, "a condition, which if left uncorrected, could have a serious effect on safety or operability."

The team reviewed procedure PI-AA-125 and PI-AA-120, which delineated the process for the identification and screening of issues, and identified that these procedures did not include a provision to classify an identified issue as a SCAQ. The team also noted that the definition of a SCAQ was not being used to determine whether a RCE was needed; therefore, a CAPR did not appear to be directly associated with a SCAQ.

Based on the above, the team questioned whether CAP procedure PI-AA-125 prescribed a process through which SCAQs were identified and documented, and corrective actions taken and documented to prevent recurrence as required by the QATR. The team discussed this issue with the licensee. The licensee stated that since the terms SCAQ and condition adverse to quality (CAQ) were not explicitly defined in NRC regulations, that they had created a graded approach of significance level and likelihood (which included risk and uncertainty) to ensure that items were properly dispositioned and the level of resources and rigor applied appropriately followed the CAP governance. The licensee further stated that the graded approach, along with a well-trained management team that has nuclear safety and conservative decision-making as their primary focus, provided for an effective CAP. Finally, the licensee stated that even if a CAPR was not issued, that CAs would prevent recurrence of the events entered into the CAP.

The team questioned whether a CAPR and a CA would be equally effective as corrective actions to prevent the recurrence of issues dispositioned in the CAP. The licensee agreed that the two types of CAs were treated differently. For example, 1) the MRC was required to assess changes to the intent of a CAPR, which was not required for a CA, 2) an effectiveness review may not necessarily be assigned if an issue was corrected using only a CA, and 3) if there was a desire to suspend or modify a previously implemented CAPR, then a risk analysis and MRC concurrence was necessary; which was not the case for a CA.

At the end of the inspection it was not clear how procedures PI-AA-120 and PI-AA-125 ensured that SCAQs were identified and documented, and corrective actions taken and documented to prevent recurrence. Additionally, it was not clear if the licensee's process implemented the requirements in the QATR.

Resolution of this issue will be based on additional NRC review to determine if a violation of NRC requirements occurred.

Issue #2

The team identified an example of a potential SCAQ for which the licensee implemented CAs that failed to prevent the issue from recurring. Specifically, for a December 30, 2013 oil leak on the inboard bearing housing of the Unit 1 Train B (1B) SX pump, the licensee's CAs restored operability, but were not adequate to prevent recurrence and consequently an oil leak recurred on November 18, 2014. Both of these oil leaks resulted in the licensee declaring the 1B SX pump inoperable and required entry into Technical Specification (TS) Limited Condition for Operation (LCO) 3.7.8 (reference Non-Cited Violation (NCV) 05000456/2014005-02; Failure to Correct Undersized Essential Service Water Pump Bearing Casing Drain Line Resulted in System Inoperability).

The team questioned whether the oil leaks on the inboard pump bearing housing of the 1B SX pump should have been categorized as a SCAQ as defined in the licensee's QATR. Specifically, QATR Section 2.116, "Definitions," defined a SCAQ as, "A condition, which if left uncorrected, could have a serious effect on safety or operability." In this case, although the oil leakage at the inboard pump bearing housing first identified in 2013 was specifically addressed through repairs, the CAs were not adequate to prevent recurrence and a second oil leak occurred in 2014 that caused a serious effect on the operability of the 1B SX pump (i.e. rendered the 1B SX pump inoperable). Additionally, the team considered this issue to have a potentially "serious" effect on operability, because if left uncorrected the oil leakage would have depleted the oil supply reservoir resulting in a loss of lubrication to the pump shaft bearings that could damage the pump shaft and require substantial repairs to return the pump to operation.

The team discussed this issue with the licensee. The licensee's response was that because there was no potential for common cause failure, and there was no significant change to plant risk after removing the 1B SX pump from service, the events discussed above were appropriately screened as Significance Level 3 issues. The licensee also stated that a SCAQ would typically be assigned for a Significance Level 1 or 2 issue, but even if an issue was assigned this level of significance, it would not necessarily be categorized as a SCAQ.

At the end of the inspection it was not clear how the definition of SCAQ in the QATR was utilized in the CAP. Resolution of this issue will be based upon additional NRC review and a determination of whether the failure of the 1B SX pump constituted a SCAQ as defined in the QATR. **(URI 05000456/2016007-01; 05000457/2016007-01, Identification of SCAQs in Accordance with the QATR)**

(3) Effectiveness of Corrective Actions

Based on the results of the inspection, the team concluded that the CAs appeared generally appropriate for the identified issues. The CAs associated with selected NRC documented findings and violations, as well as licensee-identified violations, were generally appropriate to correct the problem and were implemented in a timely manner. Problems identified through RCEs or ACEs were generally resolved in accordance with CAP procedures.

Observations

Five Year Review of Essential Service Water System Issues That May be Age-Related (IP 71152 Section 03.05.m)

The team performed a walkdown of accessible portions of the Unit 1 and Unit 2 SX system in the lake greenhouse (including the chemical addition system) and the accessible SX system piping in the auxiliary building, focusing on areas that had been subject to through-wall leakage and/or repair activities, to identify issues related to potential aging of structures, systems, and components (SSCs).

The exterior of SX system piping was found to be generally clean and painted with no visual evidence of through-wall leakage. There was also no oil leakage observed at any of the SX pump bearings.

Additionally, the team reviewed photographs of a component cooling water (CC) system heat exchanger (HX) and an emergency diesel generator jacket water cooler with the end-bells removed to assess aging degradation mechanisms that affected the internal condition of the SX piping supply at these locations.

From those photographs, it was visually discernible that the interior surface of these HXs and the SX supply piping were covered with a relatively uniform corrosion layer intermixed with irregular formations (tubercles). The team considered this condition typical and acceptable for an SX system in commercial service for over 30 years.

The team performed a review of CAP records, focusing on SX system performance over the past five years, to evaluate the CAs following leakage events. Specifically, the team focused on aging issues related to leakage events to ensure CAs were complete, accurate, and timely; considering extent of condition; were appropriately classified and prioritized; correctly identified root and contributing causes; were appropriately focused on actions that resulted in the correction of the identified problem; identified negative trends; adequately evaluated operating experience for applicability; and communicated applicable lessons learned to appropriate organizations.

In general, the licensee implemented effective CAs for the issues reviewed. However, an issue of concern was identified that indicated opportunities existed to improve CAP effectiveness. This example was associated with cavitation-induced degradation and leakage that occurred downstream of the 1SX007 valve in May of 2015.

Findings

Operation of SX System Valves Results in Cavitation Damage and Pipe Leakage

Introduction: A self-revealed 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 identified for the licensee's failure to prescribe SX system operating and/or surveillance procedures appropriate to the circumstances. Specifically, the licensee failed to provide SX system operating procedure guidance to limit the position of valves 1SX007, 2SX007 and 0SX007 to preclude the cavitation-induced damage/failure of components or to establish a procedure to monitor and correct cavitation-induced damage prior to component failure associated with the operation of these valves.

Description: During cold weather conditions, the overall flow requirements for the SX system is very low and, as a consequence, the licensee reduces SX system flow through the CC HXs by throttling closed SX system valves 1SX007, 2SX007 and 0SX007 at the outlet of the CC HX. The throttling of these butterfly-type valves has resulted in cavitation-induced damaged (e.g. wall loss and through-wall leakage) at the 2SX007 valve body and 1SX007 downstream piping flange in the past. The team was concerned that continued operation of the SX007 valves in this manner could result in a more significant event; including the loss of an SX system train and/or internal flooding.

Cavitation is the sudden vaporization and condensation of a liquid downstream of a valve due to localized low pressure zones. When flow passes through a throttled valve, a localized low pressure zone forms immediately downstream of the valve. If the localized pressure falls below the vapor pressure of the fluid, the liquid vaporizes (boils) and forms a vapor pocket. As the vapor bubbles flow downstream, the pressure recovers, and the bubbles violently implode causing localized stresses in the piping walls and valve body that can result in severe pitting of the surrounding material. For example, valve vendor guidance document, "Flowserve Cavitation Control," stated, "Cavitation damage destroys both piping and control valves, often resulting in catastrophic failure. It causes valves to leak by eroding seat surfaces. It can drill holes through pressure vessel walls. Even low levels of cavitation will cause cumulative damage, steadily eroding parts until the part is either repaired, or it fails." The team noted that many valve vendors provide guidance to properly size and select flow control valves to avoid operation that results in cavitation.

On April 22, 2003, the licensee replaced valve 1SX007 due to seat leakage using WO 00452527. During this valve replacement, the licensee documented the identification of "major corrosion damage" on the east side flange (downstream side of valve) in the closure section of the WO.

On April 15, 2008, the licensee identified that the as-found seating torque for motor-operated butterfly valve 2SX007 exceeded the acceptance criteria. The licensee removed the valve and identified portions of the carbon steel valve body that had eroded away as a result of cavitation-induced erosion (IR 00763398). Specifically, the licensee concluded that the flow of water around the valve disc during the months when the valve was nearly closed during cold weather conditions created a low pressure region resulting in the formation and collapse of bubbles (cavitation) and resultant damage.

On May 17, 2015, the licensee identified a 0.125 gallon per minute (gpm) leak from a through-wall hole downstream of valve 1SX007 at the neck of the 24-inch diameter pipe flange supporting this valve. The licensee replaced the pipe and sent the removed pipe section to a vendor for examination. The vendor identified a patch of localized internal thinning that measured 18 inches in circumferential extent and 2 inches in axial extent. The vendor report stated, "The sponge-like jagged appearance is typical of cavitation damage." The vendor did not attempt to determine the extent of material lost in the through-wall direction, but took a photograph of a cross-section through the damaged area. Based upon this photograph, which included an overlay, the team observed that the loss of material reached 0.75 inches in the 1.25 inch thick pipe-wall for this cross-section of flange/pipe wall.

The damage to the piping and valves in these examples was the result of operation with the SX007 valves in a significantly throttled position, which created cavitation conditions.

During cold weather conditions with colder supply water, the licensee reduced SX flow through the CC HX by throttling closed on the outlet valves. Specifically, Steps F.1.i and F.2.d of procedure BwOP CC-1, "Component Cooling Water System Startup," directed operators to adjust the position of SX007 valves as required to maintain CC HX outlet temperature between 70-100 degrees Fahrenheit without restrictions. Although the licensee was aware of this problem, procedure BwOP CC-1 was not revised to limit closure (throttling) of these butterfly valves to prevent cavitation. The team was concerned that without additional guidance, procedure BwOP CC-1 was inadequate because continued operation of these valves in this manner would result in cavitation-induced damage to the valves and downstream piping. The licensee entered this issue into their CAP as AR 02697962.

The licensee stated that the cavitation-induced damage associated with the SX007 valves was a long-standing issue and various options to address this concern had been considered. Specifically, the licensee considered revising the operating procedure to allow lower temperature SX operation and avoid throttling these valves to the point that cavitation occurred; however, this option was not selected.

Additionally, the licensee considered implementation of a design change to install a bypass valve to avoid throttling SX007 valves into the cavitation range, but again this option was not selected.

Instead, the licensee stated that they relied on the Raw Water Program to monitor cavitation damage. Specifically, in IR 02701110, the licensee stated that WO 00452527 closure comments should have been entered into the CAP and because of this error a formal evaluation of the observed condition and potential extent of condition were not completed as required by the Generic Letter 89-13 Program and Raw Water Program. The licensee also identified 23 other SX system locations potentially susceptible to cavitation-induced damage and had actions planned to perform visual inspections or replacements of these components. However, as of August 9, 2016, the licensee had not updated the Raw Water Program to monitor these areas. Instead, the licensee was relying on engineering judgment to schedule visual inspections of the SX007 downstream piping and this inspection did not include the SX007 valve body areas subject to cavitation damage. Specifically, the licensee determined that it was not possible to perform ultrasonic examinations of the areas affected by cavitation on the SX007 valves or downstream flange/pipe and instead assigned an Action Tracking Item to perform internal visual inspections of the SX007 segments of pipe in February and September of 2017. Further, these visual inspections had been deferred from the original planned inspection interval of one year based upon engineering judgment. The team could not independently confirm that engineering judgment would support the increased inspection interval to ensure that additional SX component leakage or failures would not occur. The licensee entered this issue into their CAP as IR 02697529 and concluded that the SX piping segments subject to cavitation damage were operable because currently there was no leakage at these locations. The licensee also assigned a CA to develop an evaluation for the material condition of these piping segments.

Analysis: The team determined that the licensee's failure to prescribe SX system operating procedures appropriate to the circumstances and limit the position of valves 1SX007, 2SX007 and 0SX007 to avoid cavitation damage and/or implement a procedure to monitor and correct this damage prior to component failure was contrary to 10 CFR Part 50, Appendix B, Criterion V, and was a performance deficiency.

This finding was determined to be of more than minor because it was associated with Mitigating Systems cornerstone attribute of Equipment Performance and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, continued operation of the SX007 valves with an inadequate operating procedure could result in continued cavitation-induced damage resulting in a more significant failure such as the loss of an SX system train and/or an internal flooding event which would adversely affected the capability of the SX system to respond to initiating events to prevent undesirable consequences.

The team determined the finding could be evaluated using the Significance Determination Process in accordance with Inspection Manual Chapter (IMC) 0609, "Significance Determination Process," Attachment 0609.04, "Initial Characterization of Findings," dated June 19, 2012, and Appendix A, Exhibit 2 - Mitigating Events Screening Questions, dated June 19, 2012. The team answered "Yes" to Question A.1 of Exhibit 2 of Appendix A of IMC 609 because the finding was a deficiency affecting the design or qualification of a mitigating SSC, but the affected SSC maintained operability or functionality. Therefore, the team determined that this finding was of very low safety significance (Green). The team did not identify a cross-cutting aspect associated with this finding because the issue did not reflect current performance.

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

Contrary to the above, prior to May 17, 2015, the licensee failed to prescribe SX system operating and/or surveillance procedures appropriate to the circumstances for SX system operation, which was an activity affecting quality. Specifically, the licensee failed to provide SX system operating procedure guidance to limit the position of valves 1SX007, 2SX007 and 0SX007 such that cavitation-induced damage/failure of components did not occur and/or the licensee failed to establish a procedure to monitor and correct cavitation-induced damage prior to component failure associated with operation of these valves. Consequently, on May 17, 2015, a through-wall leak occurred downstream of valve 1SX007 that was caused by cavitation-induced wall loss at the neck of the pipe flange supporting this valve. Because this finding was of very low safety significance and was entered into the licensee's CAP as IR 02697962, the associated violation is being treated as a NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy. **(NCV 05000456/2016007-02; NCV 05000457/2016007-02; Operation of SX System Valves Results in Cavitation Damage and Pipe Leakage)**

.2 Assessment of the Use of Operating Experience

a. Inspection Scope

The team reviewed the licensee's implementation of their Operating Experience (OE) program. Specifically, the team reviewed OE program procedures; attended CAP meetings to observe the use of OE information, completed evaluations of OE-related issues and events; and selected monthly assessments of the OE composite performance indicators. The objective of this review was to determine whether the licensee was effectively integrating OE into the performance of daily activities, whether

evaluations of issues were appropriate and conducted by qualified personnel, whether the licensee's program was sufficient to prevent future occurrences of previous industry events, and whether the licensee effectively used the information in developing departmental assessments and facility audits. The team also assessed if corrective actions, as a result of OE, were identified and implemented in an effective and timely manner.

b. Assessment

In general, OE was appropriately utilized at Braidwood Station. Industry OE was disseminated across the various plant departments. No issues were identified during the team's review of licensee OE evaluations. The team also verified that the use of OE in formal CAP products, such as RCEs and ACEs, was appropriate and adequate. Generally, OE that was applicable to the station was thoroughly evaluated and actions were implemented in a timely manner to address any issues that resulted from the evaluations.

Findings

No findings were identified.

.3 Assessment of Self-Assessments and Audits

a. Inspection Scope

The team assessed the licensee's ability to identify and enter issues into the CAP, prioritize and evaluate those issues, and implement effective corrective actions, resulting from departmental self-assessments and audits.

b. Assessment

Based on the results of the inspection, the team did not identify any issues of concern regarding Braidwood Station's ability to conduct self-assessments and audits. Assessments were conducted in accordance with plant procedures, were generally thorough and intrusive, adequately covered the subject area, and were effective at identifying issues and enhancement opportunities at an appropriate threshold. Identified issues were entered into the CAP with the appropriate significance characterization and corrective actions were completed and/or scheduled to be completed in a timely manner commensurate with their safety significance.

Findings

No findings were identified.

.4 Assessment of Safety Conscious Work Environment

a. Inspection Scope

The team assessed the licensee's safety conscious work environment through a review of the facility's Employee Concerns Program (ECP) implementing procedures, discussions with coordinators of the ECP, interviews with personnel from various departments, and a review of IRs. Additionally, the site's most recent safety culture assessment was reviewed.

b. Assessment

Based on the results of the inspection, the team did not identify any issues that suggested conditions were not conducive to the establishment and existence of a safety conscious work environment at Braidwood Station. Information obtained during the interviews indicated that an environment was established where employees felt free to raise nuclear safety issues without fear of retaliation; were aware of and generally familiar with the CAP and other processes, including the ECP and the NRC, through which concerns could also be raised; and safety significant issues could be freely communicated to supervision.

Observations

All interviewees indicated that they could, and would, bring up safety issues with supervision, management, or through the CAP. None of the interviewed personnel stated that there was intimidation or retaliation, or a perception of such, when they raised issues. Those same interviewees predominantly stated that although they would utilize the ECP, they saw no need to use that program for issue reporting. Several of those interviewed questioned the value of identifying concerns for what they perceived as low level issues. For nearly all departments interviewed, there was a desire for better communication and feedback on issues entered into the CAP which were not addressed or were deferred.

Findings

No findings were identified.

4OA6 Management Meetings

.1 Exit Meeting Summary

On August 11, 2016, the team presented the inspection results to the Site Vice President, Ms. M. Marchionda, and other members of the licensee's staff. The licensee acknowledged the issues presented. The team confirmed that none of the potential report input discussed was considered proprietary and that all material considered proprietary by the licensee was returned.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

M. Marchionda, Site Vice President
A. Ferko, Plant Manager
J. Bashor, Engineering Director
P. Rausch, Operations Director
S. Reynolds, Regulatory Assurance Manager
H. Rosenboom, CAP Manager
R. Schliessmann, NRC Coordinator

U.S. Nuclear Regulatory Commission

E. Duncan, Chief, Reactor Projects Branch 3

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

05000456/2016007-01	URI	Identification of SCAQs in Accordance with the QATR (Section 4OA2.1(2))
05000456/2016007-02; 05000457/2016007-02;	NCV	Operation of SX System Valves Results in Cavitation Damage and Pipe Leakage (Section 4OA2.1(3))

Closed

05000456/2016007-02; 05000457/2016007-02;	NCV	Operation of SX System Valves Results in Cavitation Damage and Pipe Leakage (Section 4OA2.1(3))
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Discussed

05000456/2014005-02	NCV	Failure to Correct Undersized Essential Service Water Pump Bearing Casing Drain Line Resulted in System Inoperability (Section 4OA2.1(2))
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LIST OF DOCUMENTS REVIEWED

The following is a list of documents reviewed during the inspection. Inclusion on this list does not imply that the NRC team 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.

Procedures

<u>Number</u>	<u>Description or Title</u>	<u>Revision</u>
PI-AA-115	Operating Experience Program	1
PI-AA-126	Self-Assessment and Benchmark Program	1
PI-AA-125	Corrective Action Program (CAP) Procedure	4
PI-AA-120	Issue Identification and Screening Process	6
PI-AA-125-1001	Root Cause Analysis Manual	2
PI-AA-125-1003	Apparent Cause Evaluation Manual	3
BwMS 3350-009	Auxiliary Building Floor Drain Basket Surveillance	12
NO-AA-110	Quality Assurance Topical Report	90
LS-AA-116	Nuclear Safety Review Board	12
LS-AA-106	Plant Operations Review Committee	10
EI-AA-101-1001	Employee Concerns Program Process	14
ER-AA-340	Generic Letter-8913 Program Implementing Procedure	3
ER-AA-5400-1001	Raw Water Corrosion Program Guide	0
ER-AA-340	Generic Letter-8913 Program Implementing Procedure	7
ER-AA-5400-1001	Raw Water Corrosion Program Guide	8

Action Request

<u>Number</u>	<u>Description or Title</u>
02457576	AFI IN CY.1 Monitoring MIC In SX Piping
02542819	2AF01PB – Diesel Driven Auxiliary Feed Pump 2B
02616619	CDBI FASA Calculation VD-100 Discrepancy
02616769	CDBI FASA Calculation VA-403 Discrepancy
02680210	Problem Identification & Resolution DEF #5: Generic Information Used for Operability
01697622	EACE For Through-Wall Leak on 1SX25AA
02386384	NRC Questions on Closure Actions of CDBI NCV
02487895	1B Turbine Driven Feedwater PP Improper Response on Pump Start
02501820	Thru Wall Leak Downstream of 1SX007
02582928	Voids Found During 2AF01PA SX Suction Piping Ultrasonic Testing Exam
02585155	Receipt of 2015 American Nuclear Insurers Inspection Report
02615400	Inadequate Test For Auxiliary Feedwater Pump Suction Press Loops

02618488	NOS ID: Parts/Material Control and Traceability
02642611	1B Auxiliary Feedwater Pump Non-Inservice Test Program Vibration Monitoring
02643379	2016 DCS – Fuel Assembly G28T Grid Strap Issue
01666784	1SX01PA-M – Essential Service Water Pump 1A Motor
01667656	1SX010 Diagnostic Testing Results
01667849	Unable to Perform Scheduled Leak Inspection
01688431	Monthly Chemistry Sampling Requirements Not Completed -
01694561	Low DO In Braidwood Lake
02383230	Jacket Water Heater Would Not Turn Off
02457552	Area for Improvement in WM.1, Shortfalls In Parts and Material Process
02478824	1CB01MA - 1A Feedwater Pump Suction Strainer
02479760	U1 Refuel Cavity Sulfate Above Limit
02238242	BWAP 1110-3 Flood Measure Non-Conservative
02385204	NRC Questions on Auxiliary Building Flood Evaluation
02419145	3Q14 - NRC Non-Cited Violation - CLS 2010 Violation for Floor Drains
02413941	EACE 1601971 (1B Essential Service Water System Oil Leak) Not Complete
02413452	Oil Leak from 1B Essential Service Water System Pump - 1SX01PB
02483208	NRC Bulletin 88-09 Not Incorporated into Updated Final Safety Analysis Report
02537481	2Q15 – NRC S/L 4 NCV – Not Updating Updated Final Safety Analysis Report for Bulletin 88-09
02519208	2A DOST Tank Valve 2DO001A Leakage
02582918	3Q15 NRC Licensee Identified Violation – Failure to Establish Performance Criteria
02482746	As Found Testing of 1CV8117 Failed Inservice Test
02391778-04	Rework Investigation for 0SX115C Leak
02610048-02	Rework Investigation for 0SX147
01164026	Failed Post-Maintenance Test WO#1359794 Boric Acid Leakage – 2RH02AB
01177608	2WF06PA Discharge Line is Leaking
01215761	2A Residual Heat Removal Pump Seal and Bolt Leak
02504226	Sulfur Reducing Bacteria Higher than Goal
01236673	0SX115A Leak through Valve Stem
01282930	2FT–0435–1 Drop per 5 Minute Leak Boric Acid
01327178	1SI087, Pipe Under Valve Covered with Boric Acid
01334192	Leakage at 2VF87BA
01424937	2RH03AB-8" Boric Acid Residue in ASME Bolted Connection
01472355	D-1 Fuel Building Door Not Opening From Inside
01472889	1A Residual Heat Removal Service Water Cubicle Cooler Leaking
01486881	OPS ID: 1SD045K Steam Leak (1A Main Steam Isolation Valve Room)
01498331	1SD054B Steam Leak
01503914	Borated Water Leak – Unknown Location
01542372	SX Piping Leak – 1SX27DA

01594572	Dry Boric Acid at Pump Seal on 1CV03P
01600510	30 DPM Outboard Bearing Leak
01599672	30 DPM Outboard Bearing Leak
01604876	2RY8028 Body to Bonnet Leak
01631448	1SX01PA Oil Pump Discharge Line Flange Weeping Oil
01659136	Pinhole Leak Upstream of 1AF017A
01661987	2B Residual Heat Removal Pump Seal Leak
01673324	0SX02P Leak
01696142	60-80 DPM Leak Fitting Downstream of 0TW081
02476256	2SX01FB Packing Leak
02529381	Gasket Leakage From Diaphragm Valve 1RY8028
02561390	1SX131-PLV Downstream Piping Has a Leak
02570122	Dry Boric Acid on 1AB03P Discharge Isolation Valve
02637257	60 DPM Leak at Pipe 1PS42A Coupling
02398394	NRC Question on Design Basis for Aux Building Flooding
02672421	2FW12016R Hanger Not Supporting Pipe (2FW12015R
02506005	Documentation of EDG Exhaust Pipe Minimum Wall
02503899	NRC Concern for Flood Seal PBI 17793
02672157	2Q13 NRC Non-Cited Violation – Inadequate Control of Special Lifting Device
02482749	OSP-A Wall Thickness Below ASME Code Limit on 1SX27DB
02421520	Failure of Embed Plate for Support M-1MS01027S
02545534	Potential Updated Final Safety Analysis Report Revision to Active Valve List
02401659	Adverse Trend in Engineering Cap Performance
02491314	Trend in Equipment Issues Associated with Cranes and Hoists
02502467	Permanent Scaffolds Lost Tracking Numbers
02538535	2SX01PA ASME Issues
02572587	2015 Equipment Reliability Evaluation
02644532	NRC Identified – Implementation of ER-AA-2009
02454721	4Q14 - NRC Non-Cited Violation – Incorporating Plant Mods into Design Basis for PMP
02397321	NRC Question on PMP Event Impact to Main Steam Isolation Valve Rooms
02396124	Effect of Site Flood on Turbine Building
02482480	CCR: 'A' Crew Surveillance Review
02482267	NRC Unresolved Item ASME Section XI Pressure Test Indication Resolution
02537499	2Q15 – NRC Non-Cited Violation* – Section XI Code Pressure Testing
02400960	The UHS Elevation at Top Of The East Slope Found Less Than 590 Feet
02582897	3Q15 NRC Licensee-Identified Violation For Ultimate Heat Sink Berm Height Not in Procedures
02482365	OSP-A IWF Pipe Support 1SI19013X Rotated Out of Tolerance
02655489	Lessons Learned From ECCS V&V of U-2 CS Piping

02414147	OPEX Evaluation For NRC IN 2014-12, Crane and Heavy Lift Issues Identified During NRC inspections
02658031	Incorrect Foundation Loads in 006160
02604989	2015 Motor-Operated Valve Program FASA Deficiencies
02604986	2015 Motor-Operated Valve Program FASA Deficiencies
02604984	2015 Motor-Operated Valve Program FASA Deficiencies
02602508	2015 Motor-Operated Valve Program FASA Deficiencies
02632243	Snubber IDDEAL Database: Inadequate Historic Data Migration
01667038	2A SJAЕ OG Flow Reads High
01662489	OSP-A GVN Differential Expansion Probe Reading Backwards – 2VE-TS002P
01661428	OSP-A 1/4" Solder Tubing Leak 2MS010A
01535396	PMT 1427356 02 Failed
01643505	SAT 242-2 Oil Sample Port Valve Not Working
01652546	Cannot Maintain Oil Level In Prestart of Chiller – 0WO03CC
01645591	1C Reactor Containment Fan Cooler Low Speed Time in Specifications But Out of Administrative Band
01637777	Sample Lines Not Properly Secured
01663900	Exciter Field Voltage Reading High (2ET-MP029)
01641794	New Turbine #4 Vibration Probe Potentially Bad
01630295	0PR05J Fire and Oil Sump PR Skid had Degrading Flow
01637776	Feedwater Pump Turbine Lube Oil Purifier Trouble
01678065	Maintenance Rule (A) (1) Determination Required 2LS-WF018
02516976	AP6 Criteria Requires Maintenance Rule (A)(1) Determination
02581898	RH2 Criteria Requires Maintenance Rule (A)(1) Determination
02537523	2Q15 – NRC Self Revealing Non-Cited Violation – Oil Addition to VC Chiller
02513190	Supply Identified: Ceiling in Office in Warehouse 17 Collapsing
02457537	Draft INPO AFI For OP.1 - CPE Observation
02457545	AFI in MA.1, Prevention of Foreign Material
02457552	AFI IN WM.1, Shortfalls in Parts and Material Process
02477095	B&W Steam Generator (SG) Tube/Tubesheet Weld ASME Section III Code Question
02494354	RSGS Lacking ASME Section III NB-3000 Analyses
02455800	Need WO to Support High Energy Line Break Barrier For 2A Emergency Diesel Generator Rollup Door
02381329	High Energy Line Break Mitigation Strategy Final Scope Additional Funding
01675107	High Energy Line Break Issue Resolution Needed for DOST Surveillance
02633579	Two Pipe Supports Broken on Line 2ES87AB-3"
01682938	A2R18 Prepare/Restore Steam Generator Snubber 2RC01BB-A
01682918	A2R18 Grating Work Requested for Snubber 2FW04005S, 401' IMB
01682877	A2R18 Insulation Request for Snubber 2RC19049S, Containment 390' IMB

01675053	Supply Review of Issues for Potential Trend, May 2014
01677706	Roll-Up of Issues with 0VI03C
01678043	M&TE Not Returned by Expected Return Date
01085729	IM OPS-1025 Needs to be Replaced
01605160	Associated with Operability Evaluation 14-001: Viscosity of Braidwood Fuel Oil Leads Roper to Recommend Pump with Outboard Bearing.
01658641	Associated with Operability Evaluation 14-002: Non-Safety Related Actuator Bearings
01673323	NOS Identified Exam Failure Not Recognized
01674557	Question on UHS License Amendment Request Impact on Pumps
01675291	Unanalyzed Condition Identified During IR 1674557 Response
01699087	NOS Identified: Elevation of Quality Parts Traceability Issues
02419179	4Q2014 NRC Non-Cited Violation – Multiple Failures to Follow the Operability Evaluation Process Following the Discovery of a Non-Conforming Condition in the Ultimate Heat Sink
02443510	1B EDG Emergency Stopped
02485172	Associated with Operability Evaluation 15-003, Rev. 0: Voiding Identified in CV Cold Leg Injection Piping
02490560	Weapon Discharge During Dry Fire Training
02565513	Auxiliary Feedwater Auto-Start On LO-2, Low Steam Generator Water Level
02566239	U2 AF Actuation On 2C Steam Generator Low Water Level
02567811	OSP – A 2RH606 2A Residual Heat Removal Heat Exchanger Flow Control Valve Mechanically Bound
02569022	Liquid Radwaste Discharge Flow Recorder
02589256	NSRB Top Site Issues - November 2015
02664542	Untimely IR Generation
02668842	1Q2016 NRC Non-Cited Violation – Loss of Shut Down Cooling Train During Cavity Fill
01678065	Maintenance Rule a(1) Determination Required
02627173	WGE Quality Needs Improvement
01669853	Indicated Flow Low during 1A CS Flow Verification Surveillance
02499616	What is the Max Reactor Coolant Pump Rating?
02550413	Train VC EMU Flow High
02500802	Obsolesce Procedure Adherence Issue
02439880	2A AF Follow-Up Ultrasonic Testing Troubleshooter Results
02479960	1RH-02207S – Mechanical Snubber Support
02570338	Refuel Bridge Mast Support Spring Needs Upgrade
02419219	3Q 2014 NRC Non-Cited Violation EP Evacuation Time Estimates
01625970	RCS Vacuum Fill – Potential to Exceed PTLR Limits

Root Cause Evaluations

<u>Number</u>	<u>Description or Title</u>
02589930	Severe Corrosion and Degraded Coating Observed on Line 0SXH2AA-6

01361456	Unit 1 Refuel Machine Gripper Failure
02490560	Root Cause Evaluation on Weapon Discharge During Dry Fire Training
02489348	Adverse Trend in Station Performance
02457674	AFI in RP.1 Planning for Unexpected Radiological Conditions

Apparent Cause Evaluations

<u>Number</u>	<u>Description or Title</u>
02615400	Inadequate Testing of the Auxiliary Feedwater (AF) Pump Suction Pressure Channels
01668160	Trend in Human Performance Errors Associated with Contracted Groups
1696160	Roll Up of Appendix J Program Issues
2460491	Perform an ACE to Address Issues in IR 2446357 (RW Crane)
01681037	Apparent Cause Evaluation for NSRB/NOS Manager Top Issue
02566239	Apparent Cause Evaluation for Post Event Critique of Auxiliary Feedwater Automatic Start on 2C Steam Generator Low Level
02567811	Power Labs Residual Heat Removal Key Failure Analysis
02517832	Adverse Trend in RD-10B Detector Performance
02601488	FIN Effectiveness

Operating Experience

<u>Number</u>	<u>Description or Title</u>
01641107	Potential Leak Pressurizer Heater Bank
02386729	Op Ex IN 2014-11
02438018	Op Ex IN 2015-01
02446609	Op Ex RIS 2015-01
02477095	Steam Generator Tube/Tubesheet Weld ASME Section III Code Question
02530719	Op Ex RIS 2015-10
02563163	OPEX Evaluation for NRC IN 2015-09, Mechanical Dynamic Restraint (Snubber) Lubricant Degradation Not Identified Due to Insufficient Service Life Monitoring
02592034	NRC RIS 2015-13, Seismic Stability Analysis Methodologies for Spent Fuel Dry Cask Loading Stack-Up Configuration
02668778	OPEX Evaluation for NRC RIS 2016-07: Containment Shell or Liner Moisture Barrier Inspection
02655994	OPEX Evaluation of NRC RIS 16-03: 10 CFR 50.59 Issues Identified in NRC's San Onofre Steam Generator Tube Degradation Lessons Learned Report
02384875	OPEX Evaluation For NRC IN 2014-11: Recent Issues Related to The Qualification of Safety-Related Components

Audits, Assessments, Effectiveness Reviews, and Self-Assessments

<u>Number</u>	<u>Description or Title</u>
01508489	Boric Acid Program FASA
02457552-EFR	Parts Issues Due to Planning or Procurement Errors
02457576-EFR	Implementation of Under-Deposit Sampling and Microbiological Analysis During Essential Service Water Heat Exchanger Inspections
02489348-EFR	Adverse Trend in Station Performance
NOSA-BRW-14-08 (AR 1604765)	Inservice Inspection, Inservice Testing, and Appendix J Audit Report NOSA-BRW-14-08
NOSA-BRW-15-07 (AR 2420107)	Nuclear Fuels Audit Report
01344435-04	Flow Accelerated Corrosion (FAC) Program Focused Area Self-Assessment
02447812-04	Raw Water Peer Review Self-Assessment
NOSA-BRW-15-05 (AR 2420104)	Engineering Design Control Audit Report Braidwood Station
NOSA-BRW-16-05 (AR 2637791)	Engineering Programs and Station Blackout Audit Report Braidwood Station
Self-Assessment 1350459-04	Braidwood Motor Operated Valve Program 2015 Engineering Programs
Self-Assessment 1684011-04	Braidwood Station Snubbers Engineering Programs
CIAR 2435892	Check-in on PCM Program
CIAR 2599122	IR 2452079; Material Storage Issues Identified During NOS Audit
NOSA-BRW-15-04 (AR 2420102)	Corrective Action Program Audit

Operability Evaluations

<u>Number</u>	<u>Description or Title</u>	<u>Date or Revision</u>
Operability Evaluation 14-001	EC 396606: Operability Evaluation for the Fuel Oil Replacement Pump Not Having Outboard Bushing Like Original Pump	Revision 0
Operability Evaluation 14-002	EC 398150: Non-Safety Related Actuator Bearings Installed on Three Unit 1 Safety Related Air-Operated Valves	Revision 0
Operability Evaluation 13-006	Potential High Energy Line Crack (HELC) Locations Identified In Auxiliary Feedwater Tunnel	Revision 1
Operability Evaluation 15-003	EC 401855: Voiding Identified in CV Cold Leg Injection Piping	Revision 0

Miscellaneous

<u>Number</u>	<u>Description or Title</u>	<u>Date or Revision</u>
Calculation No. BRW-15-0015-M	Evaluation of Through Wall Leakage for Line 1SX27DA-10" per Code Case N-513-3	Revision 0
Calculation No. 222-7720-B162	Damping Values For Steam Generator Lower Shell Internals	Revision 0
Nuclear Engineering Standard NES-MS-03.1	Piping Minimum Wall Thickness Calculation	Revision 5
Nuclear Engineering Standard NES-MS-03.2	Evaluation of Discrepant Piping and Support Systems	Revision 6
Calculation No. 13.1.30BR	Pipe Support Calculation for 1SI19013X	Revision 5
Work Request 531542	WM Pipe Support Clamp Disengaged	June 6, 2016
Work Request 211715	P/A Converter Control Bank Indication Digit Failing	June 8, 2006
Work Request 376456	SX Pipe Clamp in DG Room is Out of Alignment – 1SX46006X	August 15, 2011
Work Request 531174	Guide Support 1HD08004G Damaged	June 1, 2016
Work Request 517505	Broken Control Element Assembly in 1RE-AR023C Support	January 12, 2016
Work Request 491254	0TR01FB Degraded Concrete Support Base	March 19, 2015
Work Order 1463947	MM – SX Pipe Clamp in DG Room is Out of Alignment – 1SX46006X	October 16, 2012
Work Order 1215453	MM – Seismic Support 1CC03023X Has (Loose Clamp Bolting)	March 3, 2009
Work Order 1024862	MM-Clean Corrosion/Repaint Pipe Support and Bracket	April 20, 2007
Work Order 1919761	ES Pipe Support Disengaged/Not Supporting Pipe	April 27, 2016
Work Order 1623135	Pipe Support for Line 1HD34AD Rubbing on Line 1OG04C	March 13, 2013
Work Order 01356439	Repair IM 0PS-1025	March 5 2015
Work Order 01555778	Spent Resin Storage Tank 0WX07T Level Switch	August 13, 2012
Work Order 01869303	Repair Liquid Radwaste Discharge Flow Recorder	October 15, 2015
Work Order 01916868	IM 0PR31J Investigate and Repair Gas Channel Spiking	April 16, 2016
Work Order 01929422	Replaced SG 2C Steam Pressure Transmitter	July 22, 2016

Work Order 01926976	Revised Background Data for (2RE-PR006)	June 1, 2016
Work Order 01930572	Troubleshoot and Repair C/S 0WX707	June 9, 2016
Work Order 99284628	Baseline Test Case for, 1P-0507/1MS004H; Steam Dump Valve	June 29, 2002
Work Request 00340102	IM OPS-1025 Needs Replacement	June 29, 2002
Work Request 00406153	FNI: 0L-WX688; 0WX56JE-1-B4 Alarm In	June 29, 2002
Work Request 00491792	OSR-SY077 Indicating in Wide Range Frequency Mode	April 12, 2003
Work Request 00509590	Liquid Radwaste Discharge Flow Recorder	May 22, 2003
Work Request 00521847	1FT-SI052; Cold Leg Injection Flow Composite Point Shows Flow on 1B SI Pump	December 26, 2002
Work Request 00528460	0WX707 Control Switch Manipulated Ten Times Before Valve Closed	July 10, 2003
Work Request 00528965	2PR06J High Energy Channel (2RE-PR006) Reads Low	April 26, 2003
Work Request 00530827	2PI-0536 Appears to Be Slowly Drifting Low	May 17, 2003

Condition Reports Generated During the Inspection

<u>Number</u>	<u>Description or Title</u>
02693179	0FP221 Valve Leak Catch Basin Overflowing
02693222	2SX01PB Oil Reservoir Missing Level Indicator
02693233	Inconsistencies in Procedure Definitions
02696782	Need Revision to Auxiliary Building Floor Drain Surveillance
02696896	No Corrective Action Tracking Item (ATI) for Root Cause Identified for Contributing Cause
02697247	Electrical Equipment Room Unit 1 & 2 Floor Drain Not Inspected for 2015
02697529	Concern for OSX007 & 2SX007 Through Wall Leak Potential
02697874	Unit 1 and 2 Volume Control Tank Floor Drain Basket Changes
02697962	Inadequate Procedure Criteria for Throttling Valves
02701067	Quality Assurance Topical Report Implementing Procedures
02701070	Corrective Actions Taken Did Not Preclude Repetition
02701110	Potential Component Monitoring Implementation Deficiency

LIST OF ACRONYMS USED

ACE	Apparent Cause Evaluation
ADAMS	Agencywide Documents Access Management System
ATI	Action Tracking Item
CA	Corrective Action
CAP	Corrective Action Program
CAPR	Corrective Action to Prevent Recurrence
CC	Component Cooling Water
CFR	Code of Federal Regulations
ECP	Employee Concerns Program
HX	Heat Exchanger
IMC	Inspection Manual Chapter
gpm	gallons per minute
IP	Inspection Procedure
IR	Issue Report
LCO	Limiting Condition for Operation
MRC	Management Review Committee
NCV	Non-Cited Violation
NRC	Nuclear Regulatory Commission
OE	Operating Experience
PARS	Publicly Available Records System
PI&R	Problem Identification and Resolution
QATR	Quality Assurance Topical Report
RCE	Root Cause Evaluation
ROP	Reactor Oversight Proess
SOC	Station Ownership Committee
SCAQ	Significant Condition Adverse to Quality
SSCs	Structures, Systems, and Components
SX	Essential Service Water
TS	Technical Specification
URI	Unresolved Item
WO	Work Order

B. Hanson

- 2 -

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

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 System (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/

Eric R. Duncan, Chief
Branch 3
Division of Reactor Projects

Docket Nos. 50-456 and 50-457
License Nos. NPF-72 and NPF-77

Enclosure:
IR 05000456/2016007; 05000457/2016007

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