UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
2443 WARRENVILLE ROAD, SUITE 210
LISLE, IL 60532-4352

February 7, 2013

Mr. Michael J. Pacilio
Senior Vice President, Exelon Generation Company, LLC
President and Chief Nuclear Officer (CNO), Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: BRAIDWOOD STATION, UNITS 1 AND 2, NUCLEAR REGULATORY COMMISSION INTEGRATED INSPECTION REPORT 05000456/2012005; 05000457/2012005

Dear Mr. Pacilio:

On December 31, 2012, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Braidwood Station, Units 1 and 2. The enclosed inspection report documents the results of this inspection, which were discussed at an exit meeting on January 9, 2013, with the Mr. M. Kanavos and other members of your staff.

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

One self-revealed finding and three NRC-identified findings of very low safety significance were identified. Three of these findings involved violations of NRC requirements. However, because of their very low safety significance, and because the issues were entered into your corrective action program, the NRC is treating these violations as non-cited violations (NCVs) in accordance with Section 2.3.2 of the NRC Enforcement Policy. Additionally, one licensee-identified violation is listed in Section 4OA7 of this report.

If you contest these NCVs, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with a copy to the Regional Administrator, U.S. Nuclear Regulatory Commission - Region III, 2443 Warrenville Road, Suite 210, Lisle, IL 60532-4352; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and to the Resident Inspector Office at the Braidwood Station.

If you disagree with a cross-cutting aspect assignment 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 to the Resident Inspector Office at the Braidwood Station.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records System (PARS) component of NRC's Agencywide Documents Access and Management System (ADAMS). 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: Inspection Report 05000456/2012005; 05000457/2012005
w/Attachment: Supplemental Information

cc w/encl: Distribution via ListServ

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Nos:	50-456; 50-457
License Nos:	NPF-72; NPF-77
Report No:	05000456/2012005; 05000457/2012005
Licensee:	Exelon Generation Company, LLC
Facility:	Braidwood Station, Units 1 and 2
Location:	Braceville, IL
Dates:	October 1 through December 31, 2012
Inspectors:	J. Benjamin, Senior Resident Inspector A. Garmoe, Resident Inspector N. Feliz-Adorno, Reactor Inspector B. Bartlett, Senior Resident Inspector, Byron T. Go, Health Physicist Inspector M. Holmberg, Reactor Inspector J. Jandovitz, Project Engineer J. Laughlin, Emergency Preparedness Inspector V. Meghani, Reactor Inspector C. Moore, Operator Licensing Inspector R. Ng, Project Engineer J. Robbins, Resident Inspector, Byron D. Szwarc, Reactor Inspector C. Zoia, Operations Licensing Inspector M. Perry, Resident Inspector Illinois Emergency Management Agency
Approved by:	E. Duncan, Chief Branch 3 Division of Reactor Projects

Enclosure

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SUMMARY OF FINDINGS

Inspection Report (IR) 05000456/2012005, 05000457/2012005; Braidwood Station, Units 1 & 2; 10/01/2012 - 12/31/2012; Flooding; Operability Determinations and Functionality Assessments; Surveillance Testing.

This report covers a 3-month period of inspection by resident inspectors and announced baseline inspections by regional inspectors. Four Green findings of very low safety significance were identified by the inspectors. Three of these findings involved Non-Cited Violations (NCVs) of NRC requirements. The significance of inspection findings is indicated by their color (Greater than Green, or Green, White, Yellow, Red) and determined using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). Cross-cutting aspects are determined using IMC 0310, "Components Within the Cross-Cutting Areas," dated October 28, 2011. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy dated June 7, 2012. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process (ROP)," Revision 4, dated December 2006.

A. NRC-Identified and Self-Revealed Findings

Cornerstone: Mitigating Systems

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," when the licensee's Plant Barrier Impairment (PBI) control program permitted the Unit 1 and Unit 2 Emergency Diesel Generator (EDG) Diesel Oil Storage Tank (DOST) room watertight doors to be left open and unattended following normal ingress into the Unit 1 and Unit 2 DOST rooms. The licensee entered this issue into their corrective action program (CAP) as IR 1449644. Corrective actions included the creation and implementation of Operations Department Standing Order (SO) 12-004 on December 18, 2012, until BwAP 1110-3 was formally revised on December 21, 2012 to suspend the practice of permitting the Unit 1 and Unit 2 DOST watertight doors to be left open and unattended to perform tours, inspections, walkdowns, sampling, or other routine tasks in the DOST rooms.

The finding was determined to be more than minor because it was associated with the Protection Against External Factors attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, from August 1986 until December 7, 2012, the licensee permitted the practice of removing safety-related flood barriers from service for individually short periods of time, multiple times of day, without ensuring that the described barrier would be both available and capable of performing its safety function during an internal turbine building flooding event. The finding was determined to be of very low safety significance following a detailed risk evaluation by an NRC senior reactor analyst (SRA). This finding had a cross-cutting aspect in the Resources component of the Human Performance cross-cutting area since the licensee failed to ensure that an adequate procedure was maintained following a recent October 2011 revision to BwAP1110-3 that added specific requirements and expectations for normal passage through barrier doors. Specifically, the licensee specified new requirements for using safety-related doors in Section D.2.e of BwAP 1110-3, but failed to adequately apply these requirements to Section D.2.b of the same procedure (H.2(c)). (Section 1R06.1.b.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," when licensee personnel failed to recognize that when one of the two Unit 1 or Unit 2 DOST room watertight doors was impaired, the safety function of both associated safety-related EDGs was adversely impacted since the access door between the two DOST rooms was not designed to be watertight. The licensee entered this issue into their CAP as IR 1451835. Corrective actions included the creation and implementation SO 12-004 on December 18, 2012, until BwAP 1110-3 was formally revised on December 21, 2012. Both the interim SO and revision to BwAP 1110-3 required that both EDGs be considered inoperable if a flood watch was not implemented prior to the impairment of a DOST room watertight door.

The finding was determined to be more than minor because it was associated with the Protection Against External Factors attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, on at least one occurrence in the past three years, the licensee had unknowingly lost the EDG safety function when performing maintenance on DOST watertight doors. The finding was determined to be of very low safety significance following a detailed risk evaluation by an NRC SRA. There was no cross-cutting aspect associated with the finding because it was not indicative of current performance. Specifically, an Engineering Change Request (ECR) that identified and evaluated this issue was completed in 1999. (Section 1R06.1.b.2)

Green. The inspectors identified a finding of very low safety significance (Green) when licensee personnel failed to perform an adequate technical review to determine the operability of auxiliary building safety-related block walls affected by High Energy Line Break (HELB) pressure loading. The licensee entered this issue in their CAP as IR 1454143. Corrective actions included a significant revision to the Operability Evaluation to address each of the inspector's concerns.

The finding was determined to be 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 reliability, availability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e. core damage). Additionally, More than Minor Example 3.j of IMC 0612, Appendix E, "Examples of Minor Issues," was used to inform the answer to this more than minor screening question. Specifically, the licensee used non-conservative allowable stress values for masonry and steel support columns that, at the time of discovery, resulted in reasonable doubt of the operability of the affected walls. In accordance with IMC 0609, "Significance Determination Process," Attachment 4, "Initial Characterization of Findings," Table 2, the inspectors determined the finding affected the Mitigating Systems Cornerstone. As a result, the inspectors determined the finding could be evaluated using Appendix A, "The SDP for Findings At Power," Exhibit 2, for the Mitigating Systems Cornerstone. Because the finding did not ultimately affect the operability or functionality of any equipment, the inspectors answered 'Yes' to Screening Question 1 and determined the finding was of very low safety significance (Green). This finding had a cross-cutting aspect in the Decision-Making component of the Human Performance cross-cutting area because the licensee used non-conservative assumptions in an operability evaluation of auxiliary building block walls. Specifically, the licensee used non-conservative assumptions for masonry and steel allowable stresses in the evaluation of safety-related walls, which could not be justified (H.1(b)). (Section 1R15.1.b.1)

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 when on October 23, 2012, the 2A EDG lower jacket water cooler developed a leak due to inadequate work instructions that resulted in insufficient stationary head to cooler shell gasket compression. The licensee entered this issue into their CAP as IR1430575. Corrective actions included a replacement of the 2A jacket water cooler gasket utilizing proper torque values. In addition, the licensee’s planned and implemented corrective actions included development of new work instructions that included joint torque values, lubrication of fasteners, and use of hardened washers when reinstalling safety-related EDG lube oil and jacket water heads.

The finding was determined to be more than minor because it was associated with the Procedure Quality attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). In particular, although Unit 2 was defueled at the time of the event, Unit 1 was in Mode 1 and the ability to cross-tie the 2A EDG to Unit 1 safety-related 4 kilovolt (kV) Bus 141, which was credited in the licensee’s Updated Final Safety Analysis Report (UFSAR), was unavailable for greater than 5 days. In accordance with IMC 0609, “Significance Determination Process,” Attachment 4, “Initial Characterization of Findings,” Table 2, the inspectors determined the finding affected the Mitigating Systems cornerstone. As a result, the inspectors determined the finding could be evaluated using Appendix A, “The SDP for Findings At Power,” Exhibit 2, for the Mitigating Systems cornerstone. The inspectors answered ‘No’ to the Mitigating Systems cornerstone questions in IMC 0609, Appendix A, Exhibit 2.A, and, as a result, the finding screened as having very low safety significance (Green). This finding had a cross-cutting aspect in the Operating Experience component of the Problem Identification and Resolution cross-cutting area since licensee personnel failed to adequately evaluate and translate into work instructions available applicable operating experience regarding installation of EDG jacket water or lube oil cooler stationary heads (P.2(b)). (Section 1R22.1.b)

B. Licensee-Identified Violations

A violation of very low safety significance that was identified by the licensee has been reviewed by inspectors. Corrective actions planned or taken by the licensee have been entered into the licensee’s CAP. This violation and corrective action tracking number is listed in Section 4OA7 of this report.

REPORT DETAILS

Summary of Plant Status

Unit 1 operated at or near full power during the inspection period.

Unit 2 operated at or near full power during the inspection period with one exception. On October 14, 2012, Unit 2 was shut down for a scheduled refueling outage. Unit 2 was restarted on November 8, 2012, and synchronized to the grid that same day. Unit 2 reached full power on November 14, 2012.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection (71111.01)

.1 Winter Seasonal Readiness Preparations

a. Inspection Scope

The inspectors conducted a review of the licensee's preparations for winter conditions to verify that the plant's design features and implementation of procedures were sufficient to protect mitigating systems from the effects of adverse weather. Documentation for selected risk-significant systems was reviewed to ensure that these systems would remain functional when challenged by inclement weather. During the inspection, the inspectors focused on plant specific design features and the licensee's procedures used to mitigate or respond to adverse weather conditions. Additionally, the inspectors reviewed the Updated Final Safety Analysis Report (UFSAR) and performance requirements for systems selected for inspection, and verified that operator actions were appropriate as specified by plant specific procedures. Cold weather protection, such as heat tracing and area heaters, was verified to be in operation where applicable. The inspectors also reviewed corrective action program (CAP) items to verify that the licensee was identifying adverse weather issues at an appropriate threshold and entering them into their CAP in accordance with station corrective action procedures. Documents reviewed are listed in the Attachment. The inspectors' reviews focused on the following plant systems due to their risk significance or susceptibility to cold weather issues:

- Refueling Water Storage Tanks;
- Condensate Storage Tanks; and
- B.5.b Equipment.

This inspection constituted one winter seasonal readiness preparations sample as defined in Inspection Procedure (IP) 71111.01-05.

b. Findings

No findings were identified.

.2 External Flooding

a. Inspection Scope

The inspectors evaluated the design, material condition, and procedures for coping with the design basis probable maximum flood. The evaluation included a review to check for deviations from the descriptions provided in the UFSAR for features intended to mitigate the potential for flooding from external factors. As part of this evaluation, the inspectors checked for obstructions that could prevent draining, checked that the roofs did not contain obvious loose items that could clog drains in the event of heavy precipitation, and determined that barriers required to mitigate the flood were in place and operable. Additionally, the inspectors performed a walkdown of the protected area to identify any modification to the site which would inhibit site drainage during a probable maximum precipitation event or allow water ingress past a barrier. The inspectors also walked down underground bunkers and manholes subject to flooding that contained multiple train or multiple function risk-significant cables. The inspectors also reviewed the Abnormal Operating Procedure for mitigating the design basis flood to ensure it could be implemented as written. Documents reviewed are listed in the Attachment.

This inspection constituted one external flooding sample as defined in IP 71111.01-05.

b. Findings

No findings were identified.

1R04 Equipment Alignment (71111.04)

.1 Quarterly Partial System Walkdowns

a. Inspection Scope

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

- Unit 2 “B” (2B) Emergency Diesel Generator (EDG) with the 2A EDG Inoperable;
- 2A EDG Restoration following a Maintenance Window; and
- Unit 1 Steam Generator Power Operated Relief Valves.

The inspectors selected these systems based on their risk significance relative to the reactor safety cornerstones at the time they were inspected. The inspectors attempted to identify any discrepancies that could impact the function of the system and, therefore, potentially increase risk. The inspectors reviewed applicable operating procedures, system diagrams, the UFSAR, Technical Specification (TS) requirements, outstanding work orders (WOs), condition reports, and the impact of ongoing work activities on redundant trains of equipment in order to identify conditions that could have rendered the systems incapable of performing their intended functions. The inspectors also walked down accessible portions of the systems to verify system components and support equipment were aligned correctly and operable. The inspectors examined the material condition of the components and observed operating parameters of equipment to verify that there were no obvious deficiencies. The inspectors also verified that the licensee had properly identified and resolved equipment alignment problems that could cause initiating events or impact the capability of mitigating systems or barriers and entered them into the CAP with the appropriate significance characterization. Documents reviewed are listed in the Attachment.

This inspection constituted three partial system walkdown samples as defined in IP 71111.04-05.

b. Findings

No findings were identified.

1R05 Fire Protection (71111.05)

.1 Routine Resident Inspector Tours (71111.05Q)

a. Inspection Scope

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

- Unit 1 364' Auxiliary Building General Area - Fire Zone 11.3-0;
- Unit 1 364' Containment Pipe Penetration Area - Fire Zone 11.3-1;
- 1A EDG Room – Fire Zone 18.2-1;
- Fuel Handling Building – Fire Zone 12.1-0; and
- 2B Diesel Oil Storage Tank Room (DOST) – Fire Zone 10.1-2.

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

This inspection constituted five quarterly fire protection inspection samples as defined in IP 71111.05-05.

b. Findings

No findings were identified.

.2 Annual Fire Protection Drill Observation (7111.05A)

a. Inspection Scope

On June 14, 2012, the inspectors observed fire brigade activation for Drill Scenario: Fire in the Turbine Building. This inspection sample was discussed and documented in Section 4OA5 of NRC Inspection Report 050004562012008; 05000457/2012008, "Triennial Fire Protection Inspection Report."

This inspection constituted one annual fire protection inspection sample as defined in IP 71111.05-05.

b. Findings

One finding was discussed in Section 4OA5 of NRC Inspection Report 05000456/2012008; 05000457/2012008.

1R06 Flooding (71111.06)

.1 Internal Flooding

a. Inspection Scope

The inspectors reviewed selected risk important plant design features and licensee procedures intended to protect the plant and its safety-related equipment from internal flooding events. The inspectors reviewed flood analyses and design documents, including the UFSAR, engineering calculations, and abnormal operating procedures to identify licensee commitments. Documents reviewed are listed in the Attachment. In addition, the inspectors reviewed licensee drawings to identify areas and equipment that may be affected by internal flooding caused by the failure or misalignment of nearby sources of water, such as the fire suppression or the circulating water (CW) systems. The inspectors also reviewed the licensee's corrective action documents with respect to past flood-related items identified in the CAP to verify the adequacy of the corrective actions. The inspectors performed a walkdown of the following plant areas to assess the adequacy of watertight doors and verify drains and sumps were clear of debris and were operable, and that the licensee complied with its commitments:

- Unit 1 and Unit 2 DOST Rooms.

This inspection constituted one internal flooding sample as defined in IP 71111.06-05.

b. Findings

(1) Failure to Ensure Watertight Door Safety Function Maintained After Routine Passage

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," when the licensee's Plant Barrier Impairment (PBI) control program permitted the Unit 1 and Unit 2 EDG DOST room watertight doors to be left open and unattended following normal ingress into the Unit 1 and Unit 2 DOST rooms.

Description: At Braidwood, the safety-related EDGs that supply power to the 4160 kilovolt (kV) buses have their own dedicated Unit 1 and Unit 2 DOST rooms. The DOST rooms are located below grade in the auxiliary building and share a common wall with the turbine building (i.e., the L-wall). These watertight doors permit access into the Unit 1 and Unit 2 DOST rooms through the L-wall from the turbine building. When properly closed, these watertight doors (SD-192, SD-193, SD-194, SD-195) protect safety-related equipment, including the DOSTs and fuel oil transfer pumps, from a spectrum of postulated CW and other piping breaks within the turbine building.

During a system walkdown, the inspectors noticed a sign posted outside of the Unit 1 and Unit 2 DOST rooms that permitted the watertight doors to be left open and unattended for up to 15 minutes to allow personnel to perform tours, inspections, walkdowns, sampling, or other routine tasks in the DOST rooms.

Immediately following the walkdown, the inspectors questioned whether the practice of leaving the watertight doors open and uncontrolled could prevent the watertight doors from performing a credited safety function. The licensee entered the issue into their CAP as Issue Report (IR) 1449644, "NRC Question Regarding BwAP 1110-3 and DOST Watertight Door." During the licensee's review of the issue, the inspectors independently reviewed BwAP 1110-3, "Plant Barrier Impairment Program," Revision 28, and Exelon corporate procedure CC-AA-201, "Plant Barrier Control Program," Revision 9, for controlling plant barriers. The inspectors identified the following instructions on a placard adjacent to the DOST watertight doors and in Section D.2.b of BwAP 1110-3, Revision 28:

> *"All safety-related system equipment rooms equipped with watertight doors will have the watertight door(s) closed and its closure mechanism aligned in its "closed" position with the following exception: Diesel Oil Storage Tank Room watertight doors may be left in the open position when tours, inspections, walkdowns, sampling, or other routine tasks of short duration (<15 minutes) are being performed inside of the room."*

Additionally, the inspectors reviewed the UFSAR to better understand the function of the watertight doors. The design function for these doors was described in UFSAR Chapter 10.4.5, "Circulating Water System," as follows:

> *The circulating water (CW) system does not enter the plant at grade level. A complete rupture of the CW system would cause flooding of one-half of the turbine building up to the elevation of the steam tunnel within 30 seconds. Collapse of the central fire wall in the turbine building and resultant flooding of the other half of the building would lead to an elapsed time of 11 minutes for water to reach the 383' elevation.*

Note: The DOST watertight doors are located at approximately the 383' elevation.

Upon comparison of the UFSAR and PBI procedure excerpts described above, the licensee promptly suspended the practice of allowing the Unit 1 and Unit 2 DOST watertight doors to be left open and unattended and implemented immediate actions to ensure that the Unit 1 and Unit 2 DOST watertight doors would be closed following normal ingress into the rooms. The inspectors discussed with licensee personnel their concern that the door was not previously considered to be impaired; and that an individual within the room could not ensure the door would be closed in a manner to preserve the safety function of the watertight door.

The inspector's also reviewed the licensee's corrective actions to address NCV 05000456/2011005-05; 05000457/2011005-05, "Failure to Follow and Establish Adequate Hazard Barrier Impairment Procedures," due to the similarity between the two issues and to evaluate the adequacy of the corrective actions previously implemented. In particular, one aspect of NCV 05000456/2011005-05; 05000457/2011005-05 described inappropriate discretion that any plant door could be open for up to 30 minutes during normal passage of personnel and equipment without any additional controls. The movement of large pieces of equipment through a barrier that could prevent the barrier from closing during events, such as a high energy line break (HELB), was discussed with the licensee at the time. These two issues were broadly similar because they involved unacceptable practices related to the control of a safety-related barrier during routine activities involving the ingress of people and equipment. As a corrective action to the previous NCV, the licensee revised BwAP 1110-3 and removed the 30 minute discretionary note and established stricter controls for the normal ingress of personnel and equipment. Specifically, a new section, Section D.2.e, was added to BwAP 1110-3, "Plant Barrier Impairment Program," that clarified the expectations for using doors as follows:

> *D.2.e Hazard Barrier Ingress/Egress*
>
> *2) The door is opened only for the minimum time required for passage;*
>
> *4) The door is secured immediately after passage or personnel or equipment;*
>
> *6) Occasions where a more than momentary opening of a barrier door is required would not be considered routine ingress or egress. Prior to opening the barrier, the activity will undergo appropriate review of alternative options (rescheduling or alternative routing) and challenges of methods of movement (to reduce open door time). An approved PBI permit will be required for these activities.*

The inspectors determined that the licensee failed to evaluate the impact that these new station requirements would have on other activities described in the procedure. Specifically, the discretionary Note in Section D.2.b of BwAP 1110-3, which permitted the Unit 1 and Unit 2 DOST watertight doors to be open and unattended for up to 15 minutes, conflicted with Section D.2.e of BwAP 1110-3, which permitted doors to be open only momentarily without requiring a PBI permit.

The licensee performed a historical review and identified that some similar form of discretion had existed since August 1986. Additionally, the licensee concluded that there had been multiple missed opportunities over the years to recognize the risk and develop appropriate compensatory actions. Examples included the following:

- August 1986: BwAP 380-3 (the licensee's PBI procedure at the time) permitted the DOST watertight doors to be open for up to 1 hour without posting a flood watch.

- December 1994: Braidwood's evaluation of Byron Nuclear Design Information Transmittal (NDIT) BYR-94-075 identified that the failure of the Unit 1 or Unit 2 main condenser expansion boot could lead to flooding into the DOST room within minutes. The NDIT concluded that the EDG should be declared inoperable when a DOST watertight door was impaired.

- October 1999: Corporate procedure CC-AA-201, "Plant Barrier Control Program," was implemented at Braidwood station and permitted a door to be manually held open for up to 15 minutes without a PBI permit.

- November 1999: The requirements of BwAP 380-3 were transferred to a new PBI procedure, BwAP 1110-3.

- February 2002: IR 93970, "Watertight Door Found Open With No Personnel in Room," documented that a watertight door was found open and unattended with the DOST room unoccupied. Actions from the IR included a change to permit the Unit 1 and Unit 2 DOST watertight doors to be open for up to 15 minutes with an individual in the DOST room.

- October 2011: BwAP 1110-3 was revised to provide explicit direction for hazard barrier ingress/egress in response to NRC NCV 05000456/2011005-05; 05000457/2011005-05, "Failure to Follow and Establish Adequate Hazard Barrier Impairment Procedures," as discussed above.

Corrective actions included the creation and implementation of Operations Department Standing Order (SO) 12-004 on December 18, 2012, until BwAP 1110-3 was formally revised on December 21, 2012 to suspend the practice of permitting the Unit 1 and Unit 2 DOST watertight doors to be left open and unattended to perform tours, inspections, walkdowns, sampling, or other routine tasks in the DOST rooms.

Analysis: The inspectors determined that the licensee's failure to ensure that Unit 1 and Unit 2 DOST watertight doors SD-192, SD-193, SD-194, SD-195 were adequately controlled during tours, inspections, walkdowns, sampling, or other routine tasks was a performance deficiency. Specifically, the licensee did not have an adequate basis to support EDG TS Operability when leaving the Unit 1 and Unit 2 watertight doors open and unattended.

The performance deficiency was screened in accordance with Inspection Manual Chapter (IMC) 0612, Appendix B, "Issue Screening." The inspectors determined that the performance deficiency did not involve a violation that impeded the regulatory process or contribute to actual safety consequences. The inspectors determined that the finding was more than minor because it was associated with the Protection Against External Factors attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, from August 1986 until December 7, 2012, the licensee permitted the practice of removing safety-related flood barriers from service for individually short periods of time, multiple times per day, without ensuring that the described barrier would be both available and capable of performing its safety function during an internal turbine building flooding event.

The inspectors evaluated this finding using the SDP in accordance with IMC 0609, Attachment 4, "Initial Characterization of Findings." The inspectors determined that the finding affected the Mitigating Systems Cornerstone and evaluated the finding using Appendix A, "The Significance Determination Process for Findings At Power," Exhibit 2, for the Mitigating Systems Cornerstone. Since the finding resulted in the potential for a loss of the emergency power function during a turbine building flooding event, the inspectors answered 'Yes' to Question A.2 in Exhibit 2: "Does the finding represent a loss of system and/or function?" and determined a detailed risk evaluation was required. The inspectors reached this conclusion upon the identification that an impaired DOST watertight door could adversely effects both EDG trains as discussed in NCV 05000456/2012005-02; 05000457/2012005-02, "Inadequate PBI Allowance for One EDG DOST Flood Door Inoperable."

To evaluate this finding, the SRAs utilized two cases that bounded the risk significance of the finding.

- Case 1: A random break in either the CW piping or the CW expansion joints (EJs) results in a reactor trip, followed by a consequential loss of offsite power (LOOP) on the affected Unit, followed by a consequential LOOP on the unaffected unit.

- Case 2: A seismic event (earthquake) results in a LOOP on both Units and a failure of either the CW piping or the CW EJs.

In both Cases 1 and 2, it was assumed that the Unit 1 and Unit 2 DOST room watertight doors were open and unattended for 2.4 hours per day (i.e. a probability of 0.1 that the doors would be open).

<u>Case 1</u>: Random Break in CW Piping or CW EJs Followed by a Dual Unit Loss of Offsite Power (DLOOP)

The frequency of a break in either the CW piping or the CW EJs was evaluated using Electric Power Research Institute (EPRI) Report 1021086, "Pipe Rupture Frequencies for Internal Flooding Probabilistic Risk Assessments," Revision 2. Using Table ES-2 in the EPRI report, the following failure rate information was obtained:

System	Description	Value
CW Piping	Frequency of Piping Break Causing a Major Flood (i.e., greater than 2000 gallons per minute (gpm) leak)	7.95E-7/yr/foot
CW EJs	Frequency of Major Flood (i.e., greater than 2000 gpm leak) with flood rate ≤ 10,000 gpm	9.17E-6/yr/EJ
	Frequency of Major Flood with Flood Rate ≥ 10,000 gpm	6.08E-6/yr/EJ
	Total Frequency of Major Flood	1.53E-5/yr/EJ

The following information and assumptions were used to obtain the frequency of a major flooding event in the turbine building due to a break in either the CW piping or the CW EJs:

- It was estimated that there was approximately 400 feet of CW piping per Unit in the turbine building.
- There were four CW EJs per unit.
- A flooding event on either Unit would affect both units as described in the UFSAR.

Using the above information, the initiating event frequency (IEF) of a major flooding event in the turbine building due to a break in either the CW piping or the CW EJs is given by the following:

IEF = [(7.95E-7/yr/ft) x (400 ft/Unit) + (1.53E-5/yr/ EJ) x (4 EJs/Unit)] x [2 Units]
= 7.6E-4/year

The Braidwood Standardized Plant Analysis Risk (SPAR) model version 8.21 and Systems Analysis Programs for Hands-on Integrated Reliability Evaluations version 8.0.8.0 software was used to obtain the probability of a DLOOP following a reactor trip. From the SPAR model, the following information was obtained:

SPAR Model Designation	Description	Value
ZT-VCF-LP-GT	Probability of a LOOP Given a Reactor Trip	5.29E-3
ZT-LOOP-SITE-SC	Probability of a Dual Unit LOOP (Switchyard-Centered)	1.94E-1

The exposure time for the finding was assessed to be 1 year, since the finding duration was greater than 1 year and 1 year was the maximum exposure time per the NRC's Risk Assessment Standardization Project (RASP) Handbook. Using the above information, the probability of a DLOOP following a reactor trip was obtained as follows:

DLOOP = [ZT-VCF-LP-GT] x [ZT-LOOP-SITE-SC]
= [5.29E-3] x [1.94E-1]
= 1.0E-3

Taking into account that it was assumed that the watertight doors for the DOST rooms were open for 2.4 hours per day (i.e. with a probability of 0.1), and assuming that a DLOOP with a failure of both EDGs would result in a core damage event, the differential core damage frequency (ΔCDF) for Case 1 was obtained as the product of the following factors:

Case 1 ΔCDF = [IEF] x [DLOOP] x [0.1]
= [7.6E-4/yr] x [1.0E-3] x [0.1]
= 7.6E-8/yr

<u>Case 2</u>: Seismic Event That Results in a DLOOP and a Break in CW Piping or CW EJs

A seismic event can result in the failure of either the CW piping or the CW EJs resulting in turbine building flooding. It was expected that a seismic event would also result in a DLOOP. Since DLOOP is a consequence of the initiator, the EDG function was required. To obtain a bounding estimate of the ΔCDF, the frequency of a seismic event sufficient to cause plant damage was multiplied by the probability of failure of either the CW piping or the CW EJs due to the seismic event.

Using guidance from NRC's RASP handbook, only the "Bin 2" seismic events were assumed to represent a ΔCDF. "Bin 2" was defined in the RASP handbook as seismic events with intensities greater then 0.3g, but less than 0.5g. Earthquakes of lesser severity are unlikely to result in large pipe failures and earthquakes of a larger magnitude could result in major structural damage throughout the plant, which would not be representative of a differential risk. The IEF of an earthquake in "Bin 2" was estimated to be 1.2E-5/yr (1.6E-5/yr for Byron) using Table 4A-1 of Section 4 of the RASP handbook. To estimate the seismic capacity of the CW piping and the CW EJs, an evaluation of the seismic capacity for CW piping and EJs for another Westinghouse plant was referenced. For this plant, it stated that the CW piping and the CW EJs had high seismic capacity, and a flooding assessment due to seismic concerns was screened from the assessment. However, making the conservative assumption that the high confidence of low probability of failure capacity for the CW piping and the CW EJs was 0.3g, a failure probability of 3.9E-2 was obtained for the CW system.

Taking into account that it was assumed that the watertight doors for the DOST rooms were open for 2.4 hours per day (i.e. with a probability of 0.1), and assuming that a DLOOP with a failure of both EDGs would result in a core damage event, a bounding value for the ΔCDF for Case 2 was obtained as the product of the following factors:

Case 2 ΔCDF = [IEF] x [DLOOP] x [CW Failure Probability] x [0.1]
= [1.2E-5/yr] x [1.0] x [3.9E-2] x [0.1]
= 4.7E-8/yr

A bounding ΔCDF of 4.7E-8/yr was estimated for seismically-induced flooding of the CW piping and CW EJs.

The final ΔCDF associated with the finding was obtained as the sum of the ΔCDF for both Case 1 and Case 2:

ΔCDF = [7.6E-8/yr] + [4.7E-8] = 1.2E-7/yr

Since the total estimated change in core damage frequency was greater than 1.0E-7/yr, IMC 0609, Appendix H, "Containment Integrity Significance Determination Process," was used to determine the potential risk contribution due to large early release frequency (LERF). Braidwood Station is a 4-loop Westinghouse Pressurized Water Reactor with a large dry containment. Sequences important to LERF include steam generator tube rupture events and inter-system loss-of-coolant-accident (LOCA) events. These were not the dominant core damage sequences for this finding.

Therefore, based on the detailed risk evaluation, the inspectors determined that the finding was of very low safety-significance (Green).

This finding had a cross-cutting aspect in the Resources component of the Human Performance cross-cutting area since the licensee failed to ensure that an adequate procedure was maintained following a recent October 2011 revision to the procedure that added specific requirements and expectations for normal passage through barrier doors. Specifically, the licensee specified new requirements for using safety-related doors in Section D.2.e of BwAP 1110-3, but failed to adequately apply these requirements to Section D.2.b of the same procedure (H.2(c)).

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

Contrary to the above, from August 1986 to December 7, 2012, Braidwood procedure BwAP 380-3 that was later incorporated into BwAP1110-3, was not adequate because the procedure provided instructions that permitted safety-related Unit 1 and Unit 2 DOST room watertight doors SD-192, SD-193, SD-194, and SD-195 to be left opened and unattended for up to 15 minutes to perform tours, inspections, walkdowns, sampling, or other routine tasks in the DOST rooms.

Corrective actions to address this issue included the implementation of a temporary standing order followed by a revision to procedure BwAP1110-3 on December 21, 2012, to suspend the practice of permitting the Unit 1 and Unit 2 DOST watertight doors to be left open and unattended to perform tours, inspections, walkdowns, sampling, or other routine tasks in the DOST rooms.

Because this violation was of very low safety significance and because the issue was entered into the licensee's CAP as IR 1449644, "NRC Question Regarding BwAP 1110-3 and DOST Watertight Door," this violation is being treated as a NCV consistent with Section 2.3.2 of the NRC Enforcement Policy.
(NCV 05000456/2012005-01; 05000457/2012005-01, Failure to Maintain Watertight Door Safety Function After Routine Passage)

(1) Inadequate PBI Allowance for One EDG DOST Flood Door Inoperable

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," when licensee personnel failed to recognize that when one of the two Unit 1 or Unit 2 DOST room watertight doors was impaired, the safety function of both associated safety-related EDGs was adversely impacted since the internal access door separating the two DOST rooms was not designed to be watertight.

Description: During inspection follow-up activities related to an extent of condition review for NCV 05000456/2012005-01; 050004572012005-01, "Failure to Maintain Watertight Door Safety Function After Routine Passage," the inspectors reviewed licensee PBI procedure BwAP 1110-3, to fully understand the actions the licensee would perform if any DOST watertight door was impaired for any reason.

At Braidwood, the safety-related EDGs that supply power to the 4160 kV buses have their own dedicated Unit 1 and Unit 2 DOST rooms. The DOST rooms are located below grade in the auxiliary building and share a common wall with the turbine building (i.e., the L-wall). Watertight doors permit access into the Unit 1 and Unit 2 DOST rooms through the L-wall from the turbine building. These watertight doors (SD-192, SD-193, SD-194, SD-195), when properly closed, protect safety-related equipment, including the DOSTs and fuel oil transfer pumps, from a spectrum of postulated CW and other piping breaks within the turbine building.

The DOST rooms house the quality EDG fuel oil to support the TS mission time, and the safety-related diesel oil transfer pumps that transfer the fuel oil from the DOST to the much smaller EDG day tanks. The 1A DOST watertight door, SD-191, and 1B DOST watertight door, SDF-192, are located at Elevation 373'. The 2A DOST watertight door, SD-193, and 2B DOST watertight door, SD-194, are located at Elevation 383'. The barrier between the Unit 1 and Unit 2 DOST rooms consists of a concrete wall and a fire door (Unit 1: Door D-286 and Unit 2: Door D-309). These fire doors are at an elevation of approximately 383' and are not credited as a flood door.

Licensee procedure BwAP-1103, "Plant Barrier Impairment Program," Revision 28, pre-evaluated the impairment of a single DOST watertight door and required the following compensatory actions:

a) *Verify no open PBIs which compromise the opposite train DOST room; and either b.1 or b.2 below.*

   b.1 *Consider affected Emergency Diesel Generator inoperable and enter applicable LCO* [Limiting Condition for Operation]*; or*

   b.2 *Verify capability of door to close and latch. Post a dedicated individual to maintain a continuous flood watch. The door shall be closed upon observation of water accumulating in the turbine building in excess of the building drainage capacity.*

The Braidwood UFSAR described that a complete rupture of the CW system would cause flooding of one-half of the turbine building up to the elevation of the steam tunnel within 30 seconds. The subsequent anticipated collapse of the central fire wall in the turbine building and resultant flooding was estimated to reach the 383' elevation in about 11 minutes. The plant's design basis assumed that the CW isolation valves fail to close and that the turbine building would flood up about to the 396' elevation (i.e., the nominal Braidwood lake level).

The inspector inspected the barriers protecting the Unit 1 and Unit 2 DOST rooms and identified that a turbine building flooding event that was not isolated due to an impaired DOST room watertight door could not only flood the DOST room with the impaired watertight door, but could also flood the redundant DOST room and render the fuel oil transfer pumps and associated EDGs in both DOST rooms inoperable since the internal access door separating the two DOST rooms was not designed to be watertight. Specifically, with a Unit 1 or Unit 2 DOST watertight door impaired, an internal flooding event in the turbine building could flood up to and above the Unit 1 or Unit 2 DOST watertight door elevation, enter the DOST room with the impaired watertight door, flood the DOST room up to the elevation of the internal access door between the two DOST rooms, and adversely impact the EDG fuel oil transfer pumps in the opposite train, resulting in a complete loss of the EDG safety function. The fuel oil transfer pumps (and their associated motors) were located approximately 4-5 inches off the DOST floors and were not qualified to operate submerged.

The licensee entered this issue into their CAP as IR 1451835, “NRC Raised Concern About BwAP 1110-3 with DOST Doors.” As part of their review, the licensee evaluated whether the turbine building L-wall fire doors immediately in-line with the Unit 1 and Unit 2 DOST room watertight doors could be credited as a flood barrier when the watertight doors were impaired. The licensee concluded that an L-wall fire door could not be credited as a flood barrier because the door could experience a differential pressure as high as 8 pounds per square inch differential (psid) during a design basis flooding event, and the L-wall fire door was only rated for 0.25 psid. Additionally, the licensee determined that even with these fire doors closed, the internal access door between the Unit 1 and Unit 2 DOST rooms could not be credited as a flood barrier since leakage between the DOST rooms could be as high as 1200 gpm.

During the licensee’s review of the history related to the DOST watertight doors and PBI process, the licensee identified a significant missed opportunity to have resolved this issue earlier. In September 1999, ECR 81420, “Provide Temporary Flood Barrier at Door D-309,” was performed which concluded that a temporary flood barrier between the DOST rooms was required prior to impairing the DOST watertight doors. The ECR specifically discussed the fact that a flood in one DOST room would render both EDGs inoperable. The closure notes for the ECR stated that the temporary flood barrier was designed and approved; however, there was no mention of actions for a revision to BwAP 1110-3.

The licensee performed a past reportability review and identified two occurrences within the past 3 years in which a DOST watertight door had been impaired and a flood watch was not posted. On April 23, 2012, a Unit 1 DOST watertight door was impaired; however, the unit was defueled, and therefore an operable EDG was not required by TSs. In a second example on September 11, 2012, 1B DOST watertight door SD-192 was disassembled for repair. The licensee reviewed the activities associated with this work and concluded that the door was fully impaired since the hand wheel was disassembled. Unit 1 was operating in Mode 1 that required both EDGs to be operable. At the end of this inspection period, the licensee planned to report this condition as a loss of EDG safety function in accordance with 10 CFR 50.73.

This issue was entered into the licensee’s CAP as IR 1451835, “NRC Raised Concern about BwAP 1110-3 with DOST Doors.” Corrective actions included the creation and implementation of SO 12-004 on December 18, 2012, until BwAP 1110-3 was formally revised on December 21, 2012. Both the interim SO and revision to BwAP 1110-3 required that both EDGs be considered inoperable if a flood watch was not implemented as required by Action B.1 for the impairment for a single DOST watertight door.

Analysis: The inspectors determined that the failure to establish and maintain a quality procedure that appropriately prescribed the required actions to address impaired Unit 1 or Unit 2 DOST watertight doors was a performance deficiency.

The performance deficiency was screened in accordance with IMC 0612, Appendix B, “Issue Screening.” The inspectors determined that the performance deficiency did not involve a violation that impacted the regulatory process or contribute to actual consequences. The inspectors determined that the finding was more than minor because it was associated with the Protection Against External Factors attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, on at least one occasion in the past 3 years, the licensee had unknowingly lost the EDG safety function when performing maintenance on DOST watertight doors.

The inspectors evaluated this finding using the SDP in accordance with IMC 0609, Attachment 4, "Initial Characterization of Findings," Table 2. The inspectors determined that the finding affected the Mitigating Systems Cornerstone and evaluated the finding using Appendix A, "The Significance Determination Process for Findings At Power," Exhibit 2, for the Mitigating Systems cornerstone. Since the finding resulted in the potential for a loss of the emergency power function during a turbine building flooding event, the inspectors answered 'Yes' to Question A.2 in Exhibit 2: "Does the finding represent a loss of system and/or function?" and determined a detailed risk evaluation was required.

The finding was determined to be of very low safety significance (Green) through a detailed risk evaluation by an NRC SRA. This evaluation reviewed the issue against the detailed risk evaluation performed for an earlier finding affecting DOST watertight door impairment (NCV 05000456/2012005-01, 05000457/2012005-01, "Failure to Maintain Watertight Door Safety Function after Routine Passage.") The detailed risk evaluation performed for that issue assumed a much longer EDG loss of function exposure time and was therefore considered bounding from both a ΔCDF (1.2E-7/yr) and ΔLERF standpoint.

There was no cross-cutting aspect associated with the finding because it was not indicative of current performance. Specifically, the ECR that previously identified and evaluated this issue was completed in 1999.

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

Contrary to the above, from 1994 to December 13, 2012, Braidwood procedure BwAP 380-3 that was later incorporated into BwAP1110-3, failed to provide adequate instructions for maintaining the function of both EDG trains when any of the safety-related DOST watertight doors SD-192, SD-193, SD-194, SD-194 was impaired.

Corrective actions included the creation and implementation of SO 12-004 on December 18, 2012, until BwAP 1110-3 was formally revised on December 21, 2012. Both the interim SO and revision to BwAP 1110-3 required that both EDGs be considered inoperable if a flood watch was not implemented as required by Action B.1 for the impairment for a single DOST watertight door.

Because this violation was of very low safety significance and because the issue was entered into the licensee's CAP as IR 1451835, "NRC Raised Concern about BwAP 1110-3 with DOST Doors," this violation is being treated as a NCV in accordance with Section 2.3.2 of the NRC Enforcement Policy. **(NCV 05000456/2012005-02; 05000457/2012005-02, Inadequate PBI Allowance for One EDG DOST Flood Door Inoperable)**

.2 Underground Vaults

a. Inspection Scope

The inspectors selected underground manholes subject to flooding that contained cables whose failure could disable risk-significant equipment. The inspectors observed the installation of dewatering devices (sump pumps) as part of the licensee's plan to address submerged cables. The inspectors also reviewed the licensee's corrective action documents with respect to submerged cable issues identified in the CAP to verify the adequacy of the corrective actions. The inspectors specifically reviewed the following:

- Results of Installation of Sump Pumps in Manholes 1D, 1E, 1F, 1G, 1H, 1J, 2D, 2E, 2F, 2G, 2H, and 2J; and

- Status of Sump Pump Installation and Operation in Manholes 1A, 2A, 2B, 2C, and 2N.

Documents reviewed are listed in the Attachment.

This inspection constituted one underground vault sample as defined in IP 71111.06-05.

b. Findings

No findings were identified.

1R08 Inservice Inspection Activities (71111.08P)

From October 17, 2012, through October 30, 2012, the inspectors conducted a review of the implementation of the licensee's Inservice Inspection (ISI) Program for monitoring degradation of the Unit 2 reactor coolant system (RCS), steam generator (SG) tubes, emergency feedwater systems, risk-significant piping and components, and containment systems. Documents reviewed are listed in the Attachment.

The inspections described in Sections 1R08.1, 1R08.2, 1R08.3, IR08.4, and 1R08.5 below constituted one inservice inspection sample as defined in IP 71111.08-05.

a. Inspection Scope

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

- Manual Ultrasonic (UT) Examination of 8" Inch Austenitic Welds on RCS Crossover Line 2RC-09-5,6,9 and 10;
- Liquid Dye Penetrant (PT) Examination of Saddle Weld Supporting Six-Inch Core Spray Line 2CS-03-SW-01;
- Automated UT and Eddy Current (ET) Examination of Reactor Vessel Outlet Nozzle-to-Safe End and Safe End-to-Pipe Welds 2RV-01-025, 2RV-01-028, 2RV-01-033, 2RV-01-034;
- Visual Examination of Containment Dome Tendon D4.11; and

- Visual Examination of the Containment Liner Behind the Removed Moisture Barrier Between Azimuth R-34 and R-35 at the 377' Elevation.

During non-destructive surface and volumetric examinations performed since the previous refueling outage, the licensee had not identified any recordable indications. Therefore, no NRC review was completed for this inspection procedure attribute.

The inspectors observed and reviewed records of the following pressure boundary weld completed for a risk-significant system during the Unit 2 refueling outage to determine if the welding activities and any applicable NDE performed were completed in accordance with the ASME Code or NRC-approved alternative.

- Weld FW-10 on the 4-inch Diameter Stainless Pipe Run Line 2SI08CA/CB-4" Fabricated under WO 01450738-01 – (EC 385012, Add Isolation Valves Upstream of Valve 2SI-8801A/B)

b. Findings

No findings were identified.

.2 Reactor Pressure Vessel Upper Head Penetration Inspection Activities

a. Inspection Scope

For the Unit 2 reactor vessel head, no examination was required pursuant to 10 CFR 50.55a(g)(6)(ii)(D) during the Unit 2 refueling outage. Therefore, no NRC review was completed for this inspection procedure attribute.

b. Findings

No findings were identified.

.3 Boric Acid Corrosion Control

a. Inspection Scope

The inspectors independently walked down the Unit 2 RCS loop piping, including the reactor coolant pumps, pressurizer, and emergency core cooling system (ECCS) within containment to identify boric acid (BA) leakage. These walkdown activities included a Mode 3 walkdown by the Resident Inspectors during the licensee's shutdown activities. The inspectors then reviewed the walkdown performed by the licensee to ensure that components with BA deposits were identified and entered into the CAP. The inspectors performed this review to determine whether the licensee focused on locations where BA leaks could cause degradation of safety-related components.

The inspectors reviewed the following licensee evaluations of components with BA deposits to determine if degraded components were documented in the CAP. The inspectors also evaluated corrective actions for any degraded components to determine if they met the component Construction Code, ASME Section XI Code, and/or an NRC-approved alternative:

- IR 1235739, Borid Acid Corrosion Control (BACC) Evaluation, Attachment 2; 2FIS-0191, Reactor Coolant Pump 2D Seal 2 Leak Off Flow Indicating Switch;
- IR 1338820, BACC Evaluation, Attachment 2; 2VF-87BA, Reactor Coolant Pump 2C Seal Injection Isolation Valve;
- IR 1203888, BACC Evaluation, Attachment 3; 2CV-8104, Body to Bonnet Packing Gland Area; and
- IR 1214416, BACC Evaluation, Attachment 3; 2SI-08JB, Flanged Connection.

The inspectors reviewed the following corrective actions related to evidence of BA leakage to determine if the corrective actions completed were consistent with the requirements of the ASME Code Section XI and 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action":

- IR 1287810, Active BA Leak/Borated Water Leakage (2CV216 Pipe Cap);
- IR 1207152, Dry BA Deposits at 2CV8444 Body-to-Bonnet;
- IR 1205433, Dry BA at 2BR7003B Body-to-Bonnet;
- IR 1287853, Dry BA Deposit on 2AB8547; and
- IR 1213307, Active Weepage at No. 9 Bolt of 2B RHR [Residual Heat Removal] Heat Exchanger Flange.

b. <u>Findings</u>

No findings were identified.

.4 <u>Steam Generator Tube Inspection Activities</u>

a. <u>Inspection Scope</u>

The inspectors observed acquisition of ET data, interviewed ET personnel, observed in situ pressure testing of tubes R44 and C47 in SG 2C and reviewed documentation related to the SG ISI program to determine if:

- in-situ SG tube pressure testing screening criteria used were consistent with those identified in EPRI TR-107620, "Steam Generator In-Situ Pressure Test Guidelines," and whether these criteria were properly applied to screen degraded SG tubes for in-situ pressure testing;

- in situ pressure test records demonstrated pressure and hold times consistent with EPRI TR 107620;

- in situ pressure test results were properly applied to SG tube integrity performance criteria identified in EPRI TR 107621, "Steam Generator Integrity Assessment Guidelines;"

- the numbers and sizes of SG tube flaws/degradation identified was bounded by the licensee's previous outage Operational Assessment predictions;

- the SG tube ET examination scope and expansion criteria were sufficient to meet the TSs and EPRI 1003138, "Pressurized Water Reactor Steam Generator Examination Guidelines;"

- the SG tube ET examination scope included potential areas of tube degradation identified in prior outage SG tube inspections and/or as identified in NRC generic industry operating experience applicable to these SG tubes;

- the licensee identified new tube degradation mechanisms and implemented an adequate extent of condition inspection scope and repairs for the new tube degradation mechanisms;

- the licensee implemented repair methods which were consistent with the repair processes allowed in the plant TS requirements and whether qualified depth sizing methods were applied to degraded tubes accepted for continued service;

- the licensee implemented an inappropriate "plug on detection" tube repair threshold (e.g., no attempt at sizing of flaws to confirm tube integrity);

- the primary-to-secondary leakage (e.g., SG tube leakage) was below 3 gallons-per-day or the detection threshold during the previous operating cycle;

- the ET probes and equipment configurations used to acquire data from the SG tubes were qualified to detect the known/expected types of SG tube degradation in accordance with Appendix H, "Performance Demonstration for Eddy Current Examination," of EPRI 1003138;

- the licensee performed secondary side SG inspections for location and removal of foreign materials; and

- the licensee implemented repairs for SG tubes and the licensee applied the repairs to the appropriate tubes.

b. Findings

No findings were identified.

.5 Identification and Resolution of Problems

a. Inspection Scope

The inspectors performed a review of ISI-related problems entered into the licensee's CAP and conducted interviews with licensee staff to determine whether:

- the licensee had established an appropriate threshold for identifying ISI-related problems;

- the licensee had performed a root cause (if applicable) and taken appropriate corrective actions; and

- the licensee had evaluated operating experience and industry generic issues related to ISI and pressure boundary integrity.

The inspectors performed these reviews to evaluate compliance with 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requirements. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

1R11 Licensed Operator Requalification Program (71111.11)

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

a. Inspection Scope

On December 11, 2012, the inspectors observed a crew of licensed operators in the plant simulator during Licensed Operator Requalification Training (LORT) to determine whether operator performance was adequate, evaluators were identifying and documenting crew performance problems, and training was being conducted in accordance with licensee procedures. The inspectors evaluated overall crew performance in the following areas:

- licensed operator performance;
- clarity and formality of communications;
- ability to take timely actions in the conservative direction;
- prioritization, interpretation, and verification of annunciator alarms;
- correct use and implementation of abnormal and emergency procedures;
- control board manipulations;
- oversight and direction from supervisors; and
- ability to identify and implement appropriate TS actions and Emergency Plan actions and notifications.

The crew's performance in these areas was compared to pre-established operator action expectations, procedural compliance, and successful critical task completion requirements. Documents reviewed are listed in the Attachment.

This inspection constituted one quarterly licensed operator requalification program simulator sample as defined in IP 71111.11-05.

b. Findings

No findings were identified.

.2 Resident Inspector Quarterly Observation of Heightened Activity or Risk (71111.11Q)

a. Inspection Scope

On October 15, 2012, the inspectors observed operators fill the Unit 2 pressurizer and operate the RCS in a solid condition. This was an activity that required heightened awareness or was related to increased risk. The inspectors evaluated overall crew performance in the following areas, as applicable:

- licensed operator performance;
- clarity and formality of communications;
- ability to take timely actions in the conservative direction;
- prioritization, interpretation, and verification of annunciator alarms;

- correct use and implementation of procedures;
- control board manipulations;
- oversight and direction from supervisors; and
- ability to identify and implement appropriate TS actions and Emergency Plan actions and notifications.

The crew's performance in these areas was compared to pre-established operator action expectations, procedural compliance, and critical task completion requirements. Documents reviewed are listed in the Attachment.

This inspection constituted one quarterly licensed operator heightened activity/risk sample as defined in IP 71111.11-05.

b. Findings

No findings were identified.

.3 Biennial Written and Annual Operating Test Results (71111.11A)

a. Inspection Scope

The inspectors reviewed the overall pass/fail results of the Biennial Written Examination administered by the licensee from August 31, 2012, through September 28, 2012, and the Annual Operating Test administered by the licensee from August 23, 2012, through October 8, 2012, required by 10 CFR 55.59(a). The results were compared to the thresholds established in IMC 0609, Appendix I, "Licensed Operator Requalification Significance Determination Process," to assess the overall adequacy of the licensee's LORT program in meeting the requirements of 10 CFR 55.59. Documents reviewed are listed in the Attachment.

This inspection constituted one annual licensed operator requalification sample as defined in IP 71111.11A.

b. Findings

No findings were identified.

.4 Biennial Review (71111.11B)

a. Inspection Scope

The following inspection activities were conducted during the week of September 24, 2012, to assess: 1) the effectiveness and adequacy of the licensee's implementation of its Systems Approach to Training (SAT)-based LORT program, implemented to satisfy the requirements of 10 CFR 55.59; and 2) conformance with the requirements of 10 CFR 55.46 for use of a plant reference simulator to conduct operator licensing examinations. Documents reviewed are listed in the Attachment.

- Facility Operating History and Licensee Training Feedback System (10 CFR 55.59(c); SAT Element 5 as Defined in 10 CFR 55.4): The inspectors evaluated the licensee's ability to assess the effectiveness of its LORT program and their ability to implement appropriate corrective actions to maintain its LORT

Program up-to-date. The inspectors reviewed documents related to the plant's operating history and their associated responses (e.g., operations related action requests (ARs), Quick Human Performance Investigations (QHPIs), and a Licensee Event Report (LER)).

- Licensee Requalification Examinations (10 CFR 55.59(c); SAT Element 4 as Defined in 10 CFR 55.4): The inspectors reviewed the administration of LORT annual operating tests to assess the licensee's ability to administer examinations that are acceptable for meeting the requirements of 10 CFR 55.59(a).

  - The inspectors reviewed the annual operating test including content, level of difficulty, and general quality of the examination/test materials.

  - The inspectors observed the administration of the annual operating test to assess the licensee's effectiveness in conducting the examinations, including the conduct of pre-examination briefings, evaluations of individual operator and crew performance, and post-examination analysis. The inspectors evaluated the performance of two crews in parallel with the facility evaluators during one dynamic simulator scenario.

- Conformance with Examination Security Requirements (10 CFR 55.49): The inspectors conducted an assessment of the licensee's processes related to examination physical security and integrity (e.g., predictability and bias) to verify compliance with 10 CFR 55.49, "Integrity of Examinations and Tests." The inspector observed the implementation of physical security controls (e.g., access restrictions and simulator input/output (I/O) controls) throughout the inspection period.

- Conformance with Simulator Requirements (10 CFR 55.46): The inspectors assessed the adequacy of the licensee's simulation facility (simulator) for use in operator licensing examinations and for satisfying experience requirements. The inspectors reviewed a sample of simulator discrepancies and evaluated the discrepancy corrective action process to ensure that simulator fidelity was being maintained. Open simulator discrepancies were reviewed for importance relative to the impact on 10 CFR 55.45 and 55.59 operator actions as well as on nuclear and thermal hydraulic operating characteristics.

This inspection constituted one biennial licensed operator requalification sample as defined in IP 71111.11B.

a. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12)

.1 Routine Quarterly Evaluations (71111.12Q)

a. Inspection Scope

The inspectors evaluated degraded performance issues involving the following risk significant systems or components:

- Seal Water Return Containment Isolation Valves 2CV8112 and 2CV8113;
- Main Turbine Generator Automatic Voltage Regulator; and
- Safety-Related 125 Volt Direct Current (Vdc) System.

The inspectors reviewed events including those in which ineffective equipment maintenance had resulted in valid or invalid automatic actuations of engineered safeguards systems and independently verified the licensee's actions to address system performance issues in terms of the following:

- implementing appropriate work practices;
- identifying and addressing common cause failures;
- scoping of systems in accordance with 10 CFR 50.65(b) of the Maintenance Rule;
- characterizing system reliability issues for performance;
- crediting unavailability for performance;
- trending key parameters for condition monitoring;
- ensuring 10 CFR 50.65(a)(1) or (a)(2) classification or re-classification; and
- verifying appropriate performance criteria for structures, systems, or components (SSCs)/functions classified as (a)(2), or appropriate and adequate goals and corrective actions for systems classified as (a)(1).

The inspectors assessed performance issues with respect to the reliability, availability, and condition monitoring of the system. In addition, the inspectors verified maintenance effectiveness issues were entered into the CAP with the appropriate significance characterization. Documents reviewed are listed in the Attachment.

This inspection constituted three quarterly maintenance effectiveness samples as defined in IP 71111.12-05.

b. Findings

No findings were identified.

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

.1 Maintenance Risk Assessments and Emergent Work Control

a. Inspection Scope

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

- Unit 2 Planned Yellow Risk, Reduced Inventory During First Refueling Outage RCS Drain Down Activity;
- Unit 2 Planned Yellow Risk, 2A EDG Work Window;
- Unit 2 Planned Yellow Risk, Reduced Inventory During Second Refueling Outage RCS Drain Down Activity; and
- Unplanned TS 3.0.3 Entry Associated with an Auxiliary Building Ventilation Damper Failure.

These activities were selected based on their potential risk significance relative to the reactor safety cornerstones. As applicable for each activity, the inspectors verified that risk assessments were performed as required by 10 CFR 50.65(a)(4) and were accurate and complete. When emergent work was performed, the inspectors verified that plant risk was promptly reassessed and managed. The inspectors reviewed the scope of maintenance work, discussed the results of the assessment with the licensee's probabilistic risk analyst or shift technical advisor, and verified plant conditions were consistent with the risk assessment. The inspectors also reviewed TS requirements and walked down portions of redundant safety systems, when applicable, to verify risk analysis assumptions were valid and applicable requirements were met. Documents reviewed are listed in the Attachment.

This inspection constituted four maintenance risk assessments and emergent work control activities samples as defined in IP 71111.13-05.

b. Findings

No findings were identified.

1R15 Operability Determinations and Functionality Assessments (71111.15)

.1 Operability Evaluations

a. Inspection Scope

The inspectors reviewed the following issues:

- HELB Abnormal Loading Not Previously Evaluated;
- 2B RHR Pump Degraded Snubber and Supports;
- Unit 2 Containment Sump Isolation Valve 2SI8811A Failure to Stroke;
- 2A Main Steam Isolation Valve (MSIV) Failed to Stroke;
- Unit 2 Slave Relay K603A Failed During Safety Injection Actuation Testing; and
- 2A EDG 50 gpm Essential Service Water Leak through Jacket Water Heat Exchanger Flange.

The inspectors selected these potential operability issues based on the risk significance of the associated components and systems. The inspectors evaluated the technical adequacy of the evaluations to ensure that TS operability was properly justified and the subject component or system remained available such that no unrecognized increase in risk occurred. The inspectors compared the operability and design criteria in the appropriate sections of the TS and UFSAR to the licensee’s evaluations to determine whether the components or systems were operable. Where compensatory measures were required to maintain operability, the inspectors determined whether the measures in place would function as intended and were properly controlled. The inspectors determined, where appropriate, compliance with bounding limitations associated with the evaluations. Additionally, the inspectors reviewed a sample of corrective action documents to verify that the licensee was identifying and correcting any deficiencies associated with operability evaluations. Documents reviewed are listed in the Attachment.

This inspection constituted six operability and functionality assessment samples as defined in IP 71111.15-05.

b. Findings

(1) Inadequate Operability Evaluation of Block Walls for HELB Loads

Introduction: The inspectors identified a finding of very low safety significance (Green) when licensee personnel failed to perform an adequate technical review to determine the operability of auxiliary building safety-related block walls affected by HELB pressure loading.

Description: In response to questions raised by the inspectors, certain safety-related block walls in the auxiliary building were identified to be subject to pressure loads resulting from a turbine building HELB event. These walls were constructed of 12-inch thick unreinforced hollow masonry and were required to provide a fire and ventilation barrier function while maintaining structural integrity, such that their failure did not adversely affect nearby safety-related equipment. Turbine building HELB pressure loads were not considered in the original seismic evaluation of these walls. The licensee documented this issue in their CAP as IR 1389889, “NRC Questions on HELB Pressure Loads,” and performed Operability Evaluation 12-004, “HELB Load Not Considered in Structural Calculations,” Revision 1, in accordance with procedure OP-AA-108-115, “Operability Determinations,” to demonstrate that the walls would remain operable under seismic and HELB loads. During the review of this operability evaluation, the inspectors identified the following deficiencies:

- The licensee used a modulus of rupture (MOR) value of 250 pounds per square inch (psi) based on a 1983 masonry wall test at Clinton Power Station. Allowable stresses were derived by dividing the MOR by a safety factor. The licensee failed to provide adequate justification for the applicability of the Clinton tests to the Braidwood walls. The inspectors discovered that the MOR values for 12-inch thick hollow block walls referenced in Table 3.8-16 of the Byron/Braidwood UFSAR ranged from 127 psi to 142 psi, which were comparable with the 125 psi value recommended in Table 3.1.8.2 of American Concrete Institute 530-11, “Building Code Requirements for Masonry Structures.” However, the licensee used 250 psi in the evaluation. This was based on data in the Byron/Braidwood UFSAR, which indicated a MOR averaging 232 psi for 8” walls. The inspectors noted that 12-inch thick walls had a significantly lower MOR than 8-inch thick walls. The inspectors also noted that the blocks used in the Clinton tests had a compressive strength of approximately 2400 psi and a unit weight of 131 pounds per cubic foot (pcf), and the Braidwood specification for masonry work specified a minimum compressive strength of 800 psi and a minimum unit weight of 105 pcf. As a result of these differences, the MOR and allowable stresses for the Braidwood walls were potentially significantly lower. Based on the above, the inspectors concluded that the allowable stresses used in the evaluation were non-conservative and were not adequately justified.

- The original block wall calculations analyzed all block walls as spanning horizontally. In Operability Evaluation 12-004, Revision 1, the walls were assumed to also be supported at the floor. This would result in a two-way action causing horizontal and vertical bending stresses in the wall and a horizontal reaction at the base. Operability Evaluation 12-004, Revision 1, addressed horizontal moments, but did not address vertical moments and the reaction at the base of the wall. The inspectors noted that vertical moment capacity was required to be evaluated because, based on the UFSAR, the allowable stresses in the vertical direction was only 50 percent of the allowable stresses in the horizontal direction. Similarly, the evaluation of horizontal reaction at the base of the wall was required to be evaluated because there was no positive connection between the wall and the slab, thus frictional force must be relied upon for resisting the load.

- For the steel columns that were provided to laterally support the wall, the evaluation calculated allowable stresses, but did not determine and compare these stresses against predicted stresses. A simple hand calculation indicated that the acceptance criteria could be exceeded and that a detailed and more refined analysis was required. In addition, the allowable stresses were incorrectly increased by a dynamic increase factor (DIF) of 1.1, which was not appropriate since the applied pressure load was static.

The inspectors reviewed OP-AA-108-115 to determine whether the licensee had adequately evaluated the non-conforming condition in accordance with station standards. The inspectors concluded that Operability Evaluation 12-004, Revision 1, did not meet at least two requirements of OP-AA-108-115. First, Section 4.4.3.2 of OP-AA-108-115 required the reviewer to “technically review assumptions, engineering judgment, and or numerical evaluations.” The inspectors concluded that this standard was not met because the three non-conservative assumptions identified by the inspectors and discussed above were not identified by the reviewer. Secondly, Section 4.4.3.3 required that the Operability Evaluation be sufficiently detailed to be able to be “stand alone.” Section 4.4.2 discussed that the Operability Evaluation should contain sufficient detail for a knowledgeable individual to independently reach the same conclusions as the Preparer (i.e. the Operability Evaluation must be able to stand alone). The inspectors concluded that the Operability Evaluation 12-004, Revision 1, did not “stand alone.”

Operability Evaluation 12-004, “HELB Load Not Considered in Structural calculations,” Revision 1, documented only very small margins and, based on the issues discussed above, the licensee performed significant re-evaluations, including a refined computer model, to demonstrate that the stresses in the masonry as well as the steel columns remained within specified limits and that operability was maintained. In the revised evaluation, the licensee did not use the masonry MOR values from Clinton and removed the DIF multiplier for steel allowable stresses. The inspectors reviewed the revised evaluation and concluded that the licensee had corrected the deficiencies and adequately demonstrated operability of the block walls. The licensee entered this issue in their CAP as IR 1454143, “NRC Comments on OPEVAL 12-004.”

Analysis: The inspectors determined that the failure to perform an adequate operability evaluation was contrary to the requirements of OP-AA-108-115, “Operability Determinations,” Revision 11, and was a performance deficiency. In particular, the failure to adequately justify the masonry allowable stresses, to evaluate the walls for vertical moments and base shear, and to perform a proper check for the column stresses, resulted in an inadequate operability evaluation. Section 4.4.3.2 of OP-AA-108-115 required the reviewer to technically review assumptions, engineering judgments, and/or numerical evaluations, which, if properly performed, would have identified and corrected the deficiencies identified by the inspectors.

The finding was determined to be 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 reliability, availability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e. core damage). Additionally, More than Minor Example 3.j of IMC 0612, Appendix E, "Examples of Minor Issues," was used to inform the answer to this more than minor screening question. Specifically, the licensee used non-conservative allowable stress values for masonry and steel support columns that, at the time of discovery, resulted in reasonable doubt of the operability of the subject walls. In accordance with IMC 0609, "Significance Determination Process," Attachment 4, "Initial Characterization of Findings," Table 2, the inspectors determined the finding affected the Mitigating Systems cornerstone. As a result, the inspectors determined the finding could be evaluated using Appendix A, "The SDP for Findings At Power," Exhibit 2, for the Mitigating Systems Cornerstone. Because the finding did not ultimately affect the operability or functionality of any equipment, the inspectors answered 'Yes' to Screening Question 1 and determined the finding was of very low safety significance (Green).

This finding had a cross-cutting aspect in the Decision-Making component of the Human Performance cross-cutting area because the licensee used non-conservative assumptions in an operability evaluation of auxiliary building block walls. Specifically, the licensee used non-conservative assumptions for masonry and steel allowable stresses in the evaluation of safety-related walls, which could not be justified (H.1(b)).

Enforcement: This finding did not involve enforcement action because no regulatory requirement was violated. (**FIN 05000456/2012005-03; 05000457/2012005-03, Inadequate Functionality Evaluation of Block Walls for High Energy Line Break Loads)**

(1) Operability Evaluation of Block Walls for HELB Loads

Introduction: The inspectors identified an Unresolved Item (URI) to determine whether the licensee's Operability Evaluation 12-004 adequately addressed the combined seismic and HELB loading on auxiliary building block walls. Specifically, the licensee did not apply seismic and turbine building HELB loads concurrently and, when considering HELB loads without seismic loads, did not use a 1.5 load factor as specified in the Braidwood design basis. As a result, the inspectors were unable to determine whether the existing evaluation adequately demonstrated operability of the subject walls.

Description: Safety-related auxiliary building block walls at Braidwood were previously evaluated for seismic loads in accordance with the "Interim Criteria for Safety-Related Masonry Wall Evaluation," provided in NUREG-0800 (Standard Review Plan), Attachment A, Section 3.8.4, "Other Category I Structures." The subject walls, consisting of 12-inch thick unreinforced hollow masonry units, are divisional separation walls in the auxiliary building required to maintain the fire and ventilation barrier function while not failing in a manner that would adversely affect safety-related equipment. These walls were assumed to span horizontally in the evaluations and steel columns were provided for additional support along the length of the walls as needed to limit the spans. The HELB analyses at the time did not identify any pressure loading on the walls resulting from postulated pipe breaks.

During a turbine building HELB design basis reconstitution effort, the licensee identified the existence of differential pressure on certain auxiliary building safety-related block walls following postulated pipe break events. The HELB scenario involved a pipe break in the turbine building that would initially communicate with the auxiliary building rooms through open fire dampers. After a period of time, as the temperature rises, the fire damper in one room closes while the fire damper in the other room fails to close (single active failure assumption), which would result in a buildup of a differential pressure across the block wall separating the two rooms containing safety-related equipment. The licensee performed an operability evaluation, documented as Braidwood Operability Evaluation 12-004, “HELB Load Not Considered in Structural Calculations,” for the subject walls and concluded that the walls remained operable, but were non-conforming.

The inspectors noted that the functionality evaluation did not consider seismic loads acting concurrently with pressure loads due to the pipe break. The Standard Review Plan, Attachment A, Section 3.8.4, which was consistent with the design basis described in the Braidwood UFSAR, required consideration of the following load combinations:

6. *D + L + 1.5 Pa*

7. *D + L + 1.25 Pa + 1.25 E*

8. *D + L + Pa + E’*

(D = dead load, L = Live loads, E = operating basis earthquake, E’ = safe shutdown earthquake, Pa = Pipe break pressure load; terms not applicable are omitted in the above load combinations)

In their evaluation, the licensee assumed that the seismic and HELB events started at the same time. The pressure buildup would not start until 200 seconds after the event, at the time when one fire damper closes. Since the seismic event was not assumed to last for more than 200 seconds, the licensee concluded that it was not necessary to aggregate the effects of seismic and HELB loads. In addition, the licensee also concluded that it was not necessary to consider any load factors for the operability evaluation. Consequently, the three load combinations noted above were reduced to the following governing combinations:

- Initial 30 seconds: Seismic activity ends within 30 seconds, pressure negligible
  - D + L + E’ - condition previously evaluated in the original calculations
- After 200 seconds: No seismic activity, HELB pressure starts to build
  - D + L + Pa - the operability evaluation addressed this condition

The inspectors reviewed the Braidwood design basis documents; OP-AA-108-115, “Operability Determinations;” the Standard Review Plan; and NRC Inspection Manual Part 9900, “Technical Guidance for Operability and Functionality Determinations,” but did not find any basis for using a time sequence of events in combining the effects of the two loadings. Additionally, the inspectors could not find any basis to conclude that the load factors for the HELB pressure were specified for additional safety margin only and were not required to account for the other considerations, such as the inherent uncertainty of the calculated values based on methodologies and inputs involved in such calculations.

The inspectors further noted that the masonry allowable stress used in the licensee's evaluation was equal to the MOR value based on test data documented in the UFSAR, which was about 65 percent higher than the allowable stress for the design basis Safe Shutdown Earthquake load combination. By omitting the load factor and not considering combined effects of seismic and HELB, the licensee also significantly reduced the design basis loads. The licensee's current evaluation documented an overall very small margin, suggesting that applying a load factor of 1.25 or 1.5 to the pipe break pressure load, or combining a seismic event of much smaller intensity than a Safe Shutdown Earthquake or an Operational Basis Earthquake, could result in the walls exceeding the operability acceptance criteria. While the licensee's analysis may be reasonable based on assumptions regarding the sequencing of HELB and seismic events, there may be other scenarios with a slightly different sequence of events that may not be bounded by the current evaluation. Specifically, the possibility of a seismic event or a seismic aftershock occurring after the HELB while a differential pressure across the block wall was present would subject the wall to a combined seismic and HELB effect. The inspectors further noted that while the probability of such occurrence could be very low, the current staff guidance precludes the use of probabilities in operability considerations. Specifically, Section C.6 of Inspection Manual Part 9900 Technical Guidance states, in part, "the definition of operability is that the SSC must be capable of performing its specified safety function or functions, which inherently assumes that the event occurs and that the safety function or functions can be performed. Therefore, the use of Probabilistic Risk Assessment or probabilities of occurrence of accidents or external events is not consistent with the assumption that the event occurs, and is not acceptable for making operability decisions." The inspectors also reviewed the licensee's procedure for operability determinations and found that it was consistent with Section C.6 of the NRC's Part 9900 Technical Guidance.

Based on the above, the inspectors questioned whether the effect of the load factors and that of concurrent application of the seismic and the HELB must be considered to be consistent with the Braidwood design basis and the operability determination procedure requirements, and whether the licensee provided an adequate justification for not including these factors in their operability evaluation. The inspectors were unable to determine during the inspection whether the licensee's justification was acceptable and therefore this issue will be considered an URI pending further NRC review. **(URI 05000456/2012005-04; 05000457/2012005-04, Functionality Evaluation of Block Walls for High Energy Line Break Loads)**

1R18 Plant Modifications (71111.18)

.1 Plant Modifications

a. Inspection Scope

The inspectors reviewed the following plant modifications:

- Unit 2 Main Power Transformers;
- Unit 1 and Unit 2 DOST Room HELB Temperature Switches; and

- Unit 2 Bypass Testing Instrumentation Modification for 7300 Protection Channels.

The inspectors reviewed the configuration changes and associated 10 CFR 50.59 safety evaluation screening against the design basis, the UFSAR, and the TS, as applicable, to verify that the modification did not affect the operability or availability of the affected systems. The inspectors, as applicable, observed ongoing and completed work activities to ensure that the modifications were installed as directed and were consistent with the design control documents; the modifications operated as expected; post-modification testing adequately demonstrated continued system operability, availability, and reliability; and that operation of the modifications did not impact the operability of any interfacing systems. As applicable, the inspectors verified that relevant procedure, design, and licensing documents were properly updated. Lastly, the inspectors discussed the plant modification with operations, engineering, and training personnel to ensure that the individuals were aware of how the operation with the plant modification in place could impact overall plant performance. Documents reviewed are listed in the Attachment.

This inspection constituted three plant modification samples as defined in IP 71111.18-05.

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19)

.1 Post-Maintenance Testing

a. Inspection Scope

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

- 2SX027B Valve Following Modification Related to Multiple Spurious Short Operations;
- 2B Safety Injection Full Flow Test Following Emergency Core Cooling System Valve Work;
- 2A EDG Following Jacket Water Cooler Maintenance and Gasket Replacement; and
- Anticipate Transient Without Scram Surveillance Following Logic Cabinet Failure.

These activities were selected based upon the SSCs ability to impact risk. The inspectors evaluated these activities for the following (as applicable): the effect of testing on the plant had been adequately addressed; testing was adequate for the maintenance performed; acceptance criteria were clear and demonstrated operational readiness; test instrumentation was appropriate; tests were performed as written in accordance with properly reviewed and approved procedures; equipment was returned to its operational status following testing (temporary modifications or jumpers required for test performance were properly removed after test completion); and test documentation was properly evaluated. The inspectors evaluated the activities against TSs, the UFSAR, 10 CFR Part 50 requirements, licensee procedures, and various NRC generic communications to ensure that the test results ensured that the equipment met the licensing basis and design requirements. In addition, the inspectors reviewed corrective action documents associated with post-maintenance tests to determine whether the licensee was identifying problems and entering them in the CAP and whether problems were being corrected commensurate with their importance to safety. Documents reviewed are listed in the Attachment.

This inspection constituted four post-maintenance testing samples as defined in IP 71111.19-05.

b. Findings

No findings were identified.

1R20 Outage Activities (71111.20)

.1 Refueling Outage Activities

a. Inspection Scope

The inspectors reviewed the Outage Safety Plan (OSP) and contingency plans for the Unit 2 Refueling Outage (RFO) conducted from October 14 through November 8, 2012, to confirm that the licensee had appropriately considered risk, industry operating experience, and previous site-specific problems in developing and implementing a plan that assured maintenance of defense-in-depth. During the RFO, the inspectors observed portions of the shutdown and cooldown processes and monitored licensee controls over the outage activities listed below:

- licensee configuration management, including maintenance of defense-in-depth commensurate with the OSP for key safety functions and compliance with the applicable TS when taking equipment out of service;
- implementation of clearance activities and confirmation that tags were properly hung and equipment appropriately configured to safely support the work or testing;
- installation and configuration of reactor coolant pressure, level, and temperature instruments to provide accurate indication, accounting for instrument error;
- controls over the status and configuration of electrical systems to ensure that TS and OSP requirements were met, and controls over switchyard activities;
- monitoring of decay heat removal processes, systems, and components;
- controls to ensure that outage work was not impacting the ability of the operators to operate the spent fuel pool cooling system;
- reactor water inventory controls including flow paths, configurations, and alternative means for inventory addition, and controls to prevent inventory loss;
- controls over activities that could affect reactivity;
- maintenance of secondary containment as required by TS;
- licensee fatigue management, as required by 10 CFR 26, Subpart I;
- refueling activities, including fuel handling and sipping to detect fuel assembly leakage;

- startup and ascension to full power operation, tracking of startup prerequisites, walkdown of the drywell (primary containment) to verify that debris had not been left which could block emergency core cooling system suction strainers, and reactor physics testing;
- licensee identification and resolution of problems related to RFO activities.

Documents reviewed are listed in the Attachment.

This inspection constituted one RFO sample as defined in IP 71111.20-05.

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22)

.1 Surveillance Testing

a. Inspection Scope

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

- Unit 2 Main Steam Safety Valve Trevitest (Routine);
- 2B Safety Injection Full Flow Test Flow Anomalies (Routine)
- Unit 1 and Unit 2 DOST Watertight Door Quarterly Functional Verification (Routine);
- 2A EDG Monthly Run (Routine);
- Unit 2 Auxiliary Feedwater Full Flow Testing (Inservice Testing); and
- Unit 2 Local Leak Rate Test for Instrument Air System (Containment Isolation Valve).

The inspectors observed in-plant activities and reviewed procedures and associated records to determine the following:

- did preconditioning occur;
- were the effects of the testing adequately addressed by control room personnel or engineers prior to the commencement of the testing;
- were acceptance criteria clearly stated, demonstrate operational readiness, and consistent with the system design basis;
- was plant equipment calibration correct, accurate, and properly documented;
- were as left setpoints within required ranges; and was the calibration frequency in accordance with TSs, the UFSAR, plant procedures, and applicable commitments;
- was measuring and test equipment calibration current;
- was the test equipment used within the required range and accuracy and were applicable prerequisites described in the test procedures satisfied;
- did test frequencies meet TS requirements to demonstrate operability and reliability;

- were tests performed in accordance with the test procedures and other applicable procedures;
- were jumpers and lifted leads controlled and restored where used;
- were test data and results accurate, complete, within limits, and valid;
- was test equipment removed following testing;
- where applicable for IST activities, was testing performed in accordance with the applicable version of Section XI of the ASME Code, and were reference values consistent with the system design basis;
- was the unavailability of the tested equipment appropriately considered in the performance indicator data;
- where applicable, were test results not meeting acceptance criteria addressed with an adequate operability evaluation, or was the system or component declared inoperable;
- where applicable for safety-related instrument control surveillance tests, was the reference setting data accurately incorporated into the test procedure;
- was equipment returned to a position or status required to support the performance of its safety function following testing;
- were all problems identified during the testing appropriately documented and dispositioned in the licensee's CAP;
- where applicable, were annunciators and other alarms demonstrated to be functional and were annunicator and alarm setpoints consistent with design documents; and
- where applicable, were alarm response procedure entry points and actions consistent with the plant design and licensing documents.

Documents reviewed are listed in the Attachment.

This inspection constituted four routine surveillance testing samples, one inservice testing sample, and one containment isolation valve sample as defined in IP 71111.22, Sections -02 and -05.

b. Findings:

Inadequate Work Instructions for Ensuring Unit 2 "A" EDG Jacket Water Heat Exchanger Gasket Compression

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 when on October 23, 2012, the 2A EDG lower jacket water cooler developed a 50 gpm essential service water (SX) leak due to inadequate work instructions that resulted in insufficient stationary head to cooler shell gasket compression.

Description: On October 23, 2012, with Unit 1 operating at full power and Unit 2 defueled during a planned refueling outage, the licensee performed a series of surveillance tests on the 2A EDG. Following the last of these tests, the 2A EDG was being unloaded in preparation for shutting it down. During the shutdown, operators identified an approximate 5 gpm leak from the lower jacket water cooler. Once the EDG was shut down, the leak increased to greater than 50 gpm. Operators installed a catch container to route the leak to a floor drain and the jacket water cooler was isolated to stop the leak, which rendered the EDG inoperable and unavailable. To address the issue, the licensee performed WO 1585362, “2A DG Jacket Water Lower Cooler Leak 2DG01KA-X2,” which replaced the upper and lower jacket water cooler stationary head to tube sheet gaskets and installed them with proper torque values (100 ft-lbs). On October 29, the 2A EDG was returned to service and declared operable.

A licensee investigation identified a protruding stationary head gasket on the west end of the lower jacket water cooler. When the gasket was removed for replacement, it was found to be torn. The licensee performed an Apparent Cause Evaluation (ACE) and concluded that the apparent cause was insufficient stationary head to cooler shell gasket compression due to inadequate detail in the joint assembly instructions. The licensee reviewed the 2A EDG work history and found that the jacket water cooler stationary heads had been removed and reinstalled in March 7, 2012 under WO 1394162, “2DG01KA-X1 Inspect/Clean and Eddy Current Test,” dated June 20, 2012, and WO 1394163, “2DG01KA-X2 Inspect/Clean and Eddy Current Test,” dated June 20, 2012. At that time, the heads were reinstalled in accordance with the work instructions, which did not include specific torque values, require the lubrication of fasteners, or specify the use of hardened washers.

The licensee performed an extent of condition review and determined the issue was applicable to all safety-related EDG jacket water and lube oil coolers. Work Orders for the 1A and 1B EDGs included torque values (100 ft-lbs) for installing jacket water cooler stationary heads, whereas the same WOs for the 2A and 2B EDGs directed that jacket water cooler stationary heads be reinstalled wrench-tight. At the end of the inspection period, the cause of this work instruction discrepancy was not known and was being investigated by the licensee.

In 2004, the 2B EDG jacket water cooler stationary heads were installed wrench-tight, rather than with a specified torque value. The licensee installed new jacket water cooler stationary head gaskets with appropriate torque values during a planned 2B EDG work window in December 2012, which was completed as scheduled. The licensee’s review of lube oil cooler stationary head gaskets revealed that only the 1B EDG lower and 2A EDG upper lube oil coolers have had the stationary heads removed. In both cases the heads were reinstalled using 100 ft-lbs of torque.

The licensee’s ACE also reviewed previous related events and prior opportunities for discovery. Numerous gasket compression issues were identified; the most recent and significant of these occurred at Byron Station on November 17, 2010. In this case, the 2A EDG at Byron had an oil leak at the upper lube oil cooler stationary head to shell gasket due to a loss of bolt torque and clamping force on the gasket. The cause was determined to be the lack of appropriate torque values in work instructions for re-assembly of lube oil cooler stationary heads. The licensee correctly viewed this as a missed opportunity to identify the inadequate work instructions for jacket water cooler stationary head installation at Braidwood.

The licensee entered this issue into their CAP as IR1430575, “2A DG Jacket Water Cooler SX Leak.” Corrective Actions to address this issue included a replacement of the associated 2A jacket water cooler gasket utilizing the proper torque values. In addition, the licensee’s planned and implemented corrective actions included development of new work instructions that included joint torque values, lubrication of fasteners, and use of hardened washers when reinstalling safety-related EDG lube oil and jacket water heads.

Analysis: The inspectors determined that the use of work instructions without proper joint assembly instructions for the 2A EDG lower jacket water cooler stationary head, which resulted in a 50 gpm SX leak, was a performance deficiency.

The inspectors did not identify any potentially willful aspects of this issue. Because the issue did not impact the regulatory process and did not result in actual safety consequences, the inspectors determined that traditional enforcement did not apply. The finding was determined to be more than minor because it was associated with the Procedure Quality attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). In particular, although Unit 2 was defueled at the time of the event, Unit 1 was in Mode 1 and the ability to cross-tie the 2A EDG to Unit 1 safety-related 4kV Bus 141, which was credited in the licensee's UFSAR, Section 8.3, in the event of a station blackout, was unavailable for greater than 5 days. In accordance with IMC 0609, "Significance Determination Process," Attachment 4, "Initial Characterization of Findings," Table 2, the inspectors determined the finding affected the Mitigating Systems cornerstone. As a result, the inspectors determined the finding could be evaluated using Appendix A, "The SDP for Findings At Power," Exhibit 2, for the Mitigating Systems cornerstone. The inspectors answered 'No' to the Mitigating Systems cornerstone questions in IMC 0609, Appendix A, Exhibit 2.A, and, as a result, the finding screened as having very low safety significance (Green).

This finding had a cross-cutting aspect in the Operating Experience component of the Problem Identification and Resolution cross-cutting area since licensee personnel failed to adequately evaluate and translate into work instructions available applicable operating experience regarding installation of EDG jacket water or lube oil cooler stationary heads (P.2(b)).

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

Contrary to the above, on March 7, 2012, WO 1394162, "2DG01KA-X1 Inspect/Clean and Eddy Current Test," dated June 20, 2012, and WO 1394163, "2DG01KA-X2 Inspect/Clean and Eddy Current Test," dated June 20, 2012 did not contain appropriate torque values for the reinstallation of 2A EDG jacket water cooler stationary heads, which resulted in the failure of the lower jacket water cooler stationary head gasket and a large leak which rendered the 2A EDG inoperable on October 23, 2012.

Corrective Actions to address this issue included a replacement of the associated 2A jacket water cooler gasket utilizing proper torque values. In addition, the licensee's planned and implemented corrective actions included development of new work instructions that included joint torque values, lubrication of fasteners, and use of hardened washers when reinstalling safety-related EDG lube oil and jacket water heads.

Because this violation was of very low safety significance and because the issue was entered into the licensee's CAP as IR1430575, "2A DG Jacket water Cooler SX Leak," it is being treated as a NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy.

(NCV 05000457/2012005-05, Inadequate Work Instructions for Ensuring 2A EDG Jacket Water Heat Exchanger Gasket Compression)

Cornerstone: Emergency Preparedness

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

a. Inspection Scope

The Nuclear Security and Incident Response (NSIR) staff performed an in-office review of the latest revisions of the Emergency Plan and various Emergency Plan Implementing Procedures (EPIPs) located under ADAMS Accession Numbers ML12088A343 and ML12192A510 as listed in the Attachment.

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

This inspection constituted one emergency action level and emergency plan changes sample as defined in IP 71114.04-05.

b. Findings

No findings were identified.

2. RADIATION SAFETY

2RS1 Radiological Hazard Assessment and Exposure Controls (71124.01)

The following inspection activities supplemented those documented in NRC Inspection Report 05000456/2012003; 05000457/2012003 and together constituted one complete sample as defined in IP 71124.01-05.

.1 Instructions to Workers (02.03)

a. Inspection Scope

The inspectors selected various containers holding non-exempt licensed radioactive materials that may cause unplanned or inadvertent exposure of workers, and assessed whether the containers were labeled and controlled in accordance with 10 CFR 20.1904, "Labeling Containers," or met the requirements of 10 CFR 20.1905(g), "Exemptions To Labeling Requirements."

b. Findings

No findings were identified.

.2 Contamination and Radioactive Material Control (02.04)

a. Inspection Scope

The inspectors selected several sealed sources from the licensee's inventory records and assessed whether the sources were accounted for and verified to be intact.

The inspectors evaluated whether any transactions, since the last inspection, involving nationally tracked sources were reported in accordance with 10 CFR 20.2207.

b. Findings

No findings were identified.

.3 Radiological Hazards Control and Work Coverage (02.05)

a. Inspection Scope

The inspectors examined the licensee's physical and programmatic controls for highly activated or contaminated materials (nonfuel) stored within spent fuel and other storage pools. The inspectors assessed whether appropriate controls (i.e., administrative and physical controls) were in place to preclude inadvertent removal of these materials from the pool.

The inspectors examined the posting and physical controls for selected high radiation areas and very high radiation areas to verify conformance with the occupational performance indicator.

b. Findings

No findings were identified.

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

The following inspection activities supplemented those documented in NRC Inspection Report 05000456/2012003; 05000457/2012003 and together constituted a partial sample as defined in IP 71124.02-05.

.1 Radiological Work Planning (02.02)

a. Inspection Scope

The inspectors assessed whether the licensee's planning identified appropriate dose mitigation features; considered alternate mitigation features; and defined reasonable dose goals. The inspectors evaluated whether the licensee's as-low-as-is-reasonably-achievable (ALARA) assessment had taken into account decreased worker efficiency from use of respiratory protective devices and/or heat stress mitigation equipment (e.g., ice vests). The inspectors determined whether the licensee's work planning considered the use of remote technologies (e.g., teledosimetry, remote visual monitoring, and robotics) as a means to reduce dose and the use of dose reduction insights from industry operating experience and plant-specific lessons learned. The inspectors assessed the integration of ALARA requirements into work procedure and radiation work permit documents.

b. Findings

No findings were identified.

.2 Verification of Dose Estimates and Exposure Tracking Systems (02.03)

a. Inspection Scope

The inspectors reviewed the assumptions and basis (including dose rate and person-hour estimates) for the current annual collective exposure estimate for reasonable accuracy for select ALARA work packages. The inspectors reviewed applicable procedures to determine the methodology for estimating exposures from specific work activities and the intended dose outcome.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

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

4OA1 Performance Indicator Verification (71151)

.1 Safety System Functional Failures

a. Inspection Scope

The inspectors sampled licensee submittals for the Safety System Functional Failures Performance Indicator (PI) for Braidwood Unit 1 and Unit 2 for the period from the third quarter 2011 to the third quarter 2012. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in NEI 99-02, “Regulatory Assessment Performance Indicator Guideline,” Revision 6, dated October 2009, and NUREG-1022, “Event Reporting Guidelines 10 CFR 50.72 and 50.73," definitions and guidance was used. The inspectors reviewed the licensee’s operator narrative logs, operability assessments, maintenance rule records, maintenance work orders, IRs, event reports and NRC Inspection Reports for the period of July 1, 2011 through September 30, 2012, to validate the accuracy of the submittals. The inspectors also reviewed the licensee’s IR database to determine if any problems had been identified with the PI data collected or transmitted for this indicator. Documents reviewed are listed in the Attachment.

This inspection constituted two safety system functional failures samples as defined in IP 71151-05.

b. Findings

No findings were identified.

.2 Mitigating Systems Performance Index - High Pressure Injection Systems

a. Inspection Scope

The inspectors sampled licensee submittals for the Mitigating Systems Performance Index (MSPI) - High Pressure Injection Systems PI for Braidwood Unit 1 and Unit 2 for the period from the first quarter 2012 through the third quarter 2012. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6, dated October 2009, was used. The inspectors reviewed the licensee's operator narrative logs, IRs, MSPI derivation reports, event reports, and NRC Inspection Reports for the period of the January 1, 2012 through September 30, 2012, to validate the accuracy of the submittals. The inspectors reviewed the MSPI component risk coefficient to determine if it had changed by more than 25 percent in value since the previous inspection, and if so, whether the change was in accordance with applicable NEI guidance. The inspectors also reviewed the licensee's IR database to determine if any problems had been identified with the PI data collected or transmitted for this indicator. Documents reviewed are listed in the Attachment.

This inspection constituted two MSPI high pressure injection system samples as defined in IP 71151-05.

b. Findings

No findings were identified.

.3 Mitigating Systems Performance Index - Heat Removal System

a. Inspection Scope

The inspectors sampled licensee submittals for the MSPI - Heat Removal System PI for Braidwood Unit 1 and Unit 2 for the period from the third quarter 2011 through the third quarter 2012. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6, dated October 2009, was used. The inspectors reviewed the licensee's operator narrative logs, IRs, event reports, MSPI derivation reports, and NRC Inspection Reports for the period of July 1, 2011 through September 30, 2012 to validate the accuracy of the submittals. The inspectors reviewed the MSPI component risk coefficient to determine if it had changed by more than 25 percent in value since the previous inspection, and if so, whether the change was in accordance with applicable NEI guidance. The inspectors also reviewed the licensee's IR database to determine if any problems had been identified with the PI data collected or transmitted for this indicator. Documents reviewed are listed in the Attachment.

This inspection constituted two MSPI heat removal system samples as defined in IP 71151-05.

b. Findings

No findings were identified.

.4 Mitigating Systems Performance Index – Residual Heat Removal System

a. Inspection Scope

The inspectors sampled licensee submittals for MSPI – Residual Heat Removal System (RHR) System PI for Braidwood Unit 1 and Unit 2 for the period from the third quarter 2011 to the third quarter 2012. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6, dated October 2009, was used. The inspectors reviewed the licensee's operator narrative logs, IRs, MSPI derivation reports, event reports and NRC Inspection Reports for the period of July 1, 2011, through September 30, 2012, to validate the accuracy of the submittals. The inspectors reviewed the MSPI component risk coefficient to determine if it had changed by more than 25 percent in value since the previous inspection, and if so, whether the change was in accordance with applicable NEI guidance. The inspectors also reviewed the licensee's IR database to determine if any problems had been identified with the PI data collected or transmitted for this indicator. Documents reviewed are listed in the Attachment.

This inspection constituted two MSPI RHR system samples as defined in IP 71151-05.

b. Findings

No findings were identified.

.5 Mitigating Systems Performance Index - Cooling Water Systems

a. Inspection Scope

The inspectors sampled licensee submittals for the MSPI - Cooling Water Systems PI for Braidwood Unit 1 and Unit 2 for the third quarter 2011 to the third quarter 2012. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6, dated October 2009, was used. The inspectors reviewed the licensee's operator narrative logs, IRs, MSPI derivation reports, event reports and NRC Inspection Reports for the period of July 1, 2011 through September 30, 2012, to validate the accuracy of the submittals. The inspectors reviewed the MSPI component risk coefficient to determine if it had changed by more than 25 percent in value since the previous inspection, and if so, whether the change was in accordance with applicable NEI guidance. The inspectors also reviewed the licensee's IR database to determine if any problems had been identified with the PI data collected or transmitted for this indicator. Documents reviewed are listed in the Attachment.

This inspection constituted two MSPI cooling water system samples as defined in IP 71151-05.

b. Findings

No findings were identified.

.6 Reactor Coolant System Leakage

a. Inspection Scope

The inspectors sampled licensee submittals for the RCS Leakage PI for Braidwood Unit 1 and Unit 2 for the period from the first quarter 2012 through the third quarter 2012. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6, dated October 2009, was used. The inspectors reviewed the licensee's operator logs, RCS leakage tracking data, IRs, event reports and NRC Inspection Reports for the period of January 1, 2012 through September 30, 2012, to validate the accuracy of the submittals. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the PI data collected or transmitted for this indicator. Documents reviewed are listed in the Attachment.

This inspection constituted two RCS leakage samples as defined in IP 71151-05.

b. Findings

No findings were identified.

4OA2 Identification and Resolution of Problems (71152)

.1 Routine Review of Items Entered into the Corrective Action Program

a. Inspection Scope

As part of the various baseline inspection procedures discussed in previous sections of this report, the inspectors routinely reviewed issues during baseline inspection activities and plant status reviews to verify they were being entered into the licensee's CAP at an appropriate threshold, that adequate attention was being given to timely corrective actions, and that adverse trends were identified and addressed. Attributes reviewed included whether identification of the problem was complete and accurate; timeliness was commensurate with the safety significance of the issue; whether the evaluation and disposition of performance issues, generic implications, common causes, contributing factors, root causes, extent-of-condition reviews, and previous occurrences reviews were proper and adequate; and whether the classification, prioritization, focus, and timeliness of corrective actions were commensurate with safety and sufficient to prevent recurrence of the issue. Minor issues entered into the licensee's CAP as a result of the inspectors' observations are included in the Attachment.

These routine reviews for the identification and resolution of problems did not constitute any additional inspection samples. Instead, by procedure they were considered an integral part of the inspections performed during the quarter and documented in Section 1 of this report.

b. Findings

No findings were identified.

.2 Daily Corrective Action Program Reviews

a. Inspection Scope

In order to assist with the identification of repetitive equipment failures and specific human performance issues for followup, the inspectors performed a daily screening of items entered into the licensee's CAP. This review was accomplished through inspection of the station's daily condition report packages.

These daily reviews were performed by procedure as part of the inspectors' daily plant status monitoring activities and, as such, did not constitute any separate inspection samples.

b. Findings

No findings were identified.

.3 Semiannual Trend Review

a. Inspection Scope

The inspectors performed a review of the licensee's CAP and associated documents to identify trends that could indicate the existence of a more significant safety issue. The inspectors' review was focused on repetitive equipment issues, but also considered the results of daily inspector CAP item screening discussed in Section 4OA2.2 above, licensee trending efforts, and licensee human performance results. The inspectors' review nominally considered the 6 month period of July 1, 2012, through December 31, 2012, although some examples expanded beyond those dates where the scope of the trend warranted.

The review also included issues documented outside the normal CAP in major equipment problem lists, repetitive and/or rework maintenance lists, departmental problem/challenges lists, system health reports, quality assurance audit/surveillance reports, self-assessment reports, and Maintenance Rule assessments. The inspectors compared and contrasted their results with the results contained in the licensee's CAP trending reports. Corrective actions associated with a sample of the issues identified in the licensee's trending reports were reviewed for adequacy.

This review constituted a single semiannual trend inspection sample as defined in IP 71152-05.

b. Findings

No findings were identified.

4OA5 Other Activities

.1 (Closed) NRC Temporary Instruction 2515/177, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems (NRC Generic Letter 2008-01)"

a. Inspection Scope

During an earlier inspection period, the inspectors verified the licensee implemented or was in the process of implementing the commitments, modifications, and programmatically controlled actions described in the licensee's response to NRC Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems." This earlier activity was conducted in accordance with Temporary Instruction (TI) 2515/177 and was documented in NRC Inspection Report 05000456/2011002; 05000457/2011002. The TI remained open at Braidwood Station because, at the conclusion of that inspection, questions remained unresolved regarding the use of the software GOTHIC to justify the acceptability of a design bases change which assumed the presence of gas voids in the suction piping from the containment emergency sump.

During this inspection period, the inspectors consulted with the Office of Nuclear Reactor Regulation (NRR) and determined that this application of GOTHIC for gas voiding required further evaluation by NRR. Therefore, this issue is being identified as an URI as described in Section 4OA5.1.b(1). Based on the inspection results documented in NRC Inspection Report 05000456/2011002; 05000457/2011002 and the identification of the resolution for the acceptability of GOTHIC for predicting void transport behavior as an URI, this TI is considered closed for Braidwood Station.

Documents reviewed are listed in the Attachment.

b. Findings

Concerns with the Bases for the Acceptability of GOTHIC for Void Transport Prediction

Introduction: The inspectors identified an URI regarding the use of the software GOTHIC to justify the acceptability of a design bases change, which incorporated gas voids in the suction piping from the containment emergency sump into the design of the plant.

Description: The licensee identified unventable sections at the suction piping from the containment emergency sump downstream of the Unit 1 and Unit 2 SI8811 and CS009A valves. As a result, the licensee evaluated the impact of a maximum potential void size into their licensing and design bases. The licensee justified the maximum potential void size through the use of the software GOTHIC. However, the inspectors noted instances where the basis of GOTHIC as a void assessment tool was questionable. Specifically, the licensee used WCAP-16631-NP, "Testing and Evaluation of Gas Transport to the Suction of ECCS [Emergency Core Cooling System] Pumps," to demonstrate that GOTHIC could acceptably predict quantitative void transport behavior. WCAP-16631-NP documented tests that were conducted by Westinghouse to study the transport of a gas void through a piping system. As discussed in NRC Inspection Report 05000456/2011002; 05000457/2011002, the inspectors noted several differences between test and actual plant configurations and conditions that could impact the overall gas void assessment results as follows:

a) The difference between test and plant pressures was not considered in assessing a void decrease in the vertical test section. The pressure range used during the test was significantly lower than the typical range in nuclear power plants. This effect would be insignificant in a nuclear power plant due to the higher pressures. Therefore, the inspectors questioned if the void fraction change observed during testing would be analogous in a nuclear power plant.

b) Two phase fluid flow test data typically exhibited significant scatter. This was addressed by running many duplicate tests and carefully examining the test results. However, NRR stated in ML090150637, "Forthcoming Meeting with the Nuclear Energy Institute (NEI) to Discuss NRC Generic Letter 2008-01," that this effort was not fully successful and some of the conclusions were not adequately supported by the test data due to data scatter. For example, this effort did not address allowance for uncertainty and the effect of actual plant pressures in contrast to test pressures.

c) The inspectors questioned if the test report adequately considered a "water fall" effect (also known as "hydraulic jump") when the upper part of the vertical pipe was voided. Specifically, the inspectors questioned if the pipe length used for the test was representative of the limiting conditions of a plant. The inspectors were concerned that such an effect could propel air further down in the pipe than would be predicted using a single dimensional Froude number and would be of concern if the vertical pipe length was significantly less than the pipe used for the test.

d) The use of an average of pipe slopes to determine an equivalent pipe length associated with an elbow with a void reduction of 20 percent was debatable. For example, the average slope of -0.055 was obtained from slopes of -0.333, -0.15, and -0.0883. In addition, as discussed above, the 20 percent factor did not consider the pressures that would be typically present in nuclear power plants.

Although the basis for this void assessment tool was questionable, the inspectors noted that the licensee used significant conservatisms when assessing the void sizes at these locations. Consequently, it was determined, with assistance from NRR, that there was reasonable assurance that these unventable locations did not represent an adverse condition pending further assessment of GOTHIC. This issue is an URI pending further NRC review of the use of GOTHIC to justify the acceptability of the design bases change, which incorporated the potential unventable voids in the suction piping from the containment emergency sump into the UFSAR and determination of further NRC actions to resolve the issue **(URI 05000456/2012005-06; 05000457/2012005-06, Concerns with the Bases for the Acceptability of GOTHIC for Void Transport Prediction)**.

.2 <u>(Discussed) NRC Temporary Instruction 2515/187 - Inspection of Near-Term Task Force Recommendation 2.3 Flooding Walkdowns</u>

a. <u>Inspection Scope</u>

The inspectors verified that the licensee's walkdown packages contained the elements as specified in the NEI 12-07 Walkdown Guidance document.

On August 1, 2012, the inspectors accompanied the licensee on their walkdown of the Unit 1, Area 5 Walls and Floors (Unit 1 RHR and Containment Spray (CS) Pump Rooms); and the Unit 2 Area 5 Walls and Floors (Unit 2 RHR and CS Pump Rooms). The inspectors verified that the licensee confirmed the following flood protection features:

- Visual inspection of the flood protection feature was performed if the flood protection feature was relevant. External visual inspection for indications of degradation that would prevent its credited function from being performed was performed;
- Critical SSC dimensions were measured;
- Available physical margin, where applicable, was determined; and
- Flood protection feature functionality was determined using either visual observation or by review of other documents.

The inspectors verified that non-compliances with current licensing requirements, and issues identified in accordance with the 10 CFR 50.54(f) letter, Item 2.g of Enclosure 4, were entered into the licensee's CAP. In addition, issues identified in response to Item 2.g that could challenge risk-significant equipment and the licensee's ability to mitigate the consequences will be subject to additional NRC evaluation.

At the end of the inspection period, the inspectors planned to perform additional independent walkdowns during the first quarter of 2013.

b. Findings

No findings were identified.

.3 (Completed) NRC Temporary Instruction 2515/188 - Inspection of Near-Term Task Force Recommendation 2.3 Seismic Walkdowns

a. Inspection Scope

The inspectors accompanied the licensee on their seismic walkdowns of the Spent Pool Fuel Heat Exchanger Rooms on July 19, 2012 and the 125 Vdc Engineered Safety Feature (ESF) Distribution Center 211 on July 30, 2012. The inspectors verified that the licensee confirmed that the following seismic features associated with the SSCs within these areas were free of potential adverse seismic conditions:

- Anchorages were free of bent, broken, missing or loose hardware;
- Anchorages were free of corrosion that was more than mild surface oxidation;
- Anchorages were free of visible cracks in the concrete near the anchors;
- Anchorage configuration was consistent with plant documentation;

- SSCs would not be damaged from impact by nearby equipment or structures;

- Overhead equipment, distribution systems, ceiling tiles and lighting, and masonry block walls were secure and not likely to collapse onto the equipment;

- Attached lines had adequate flexibility to avoid damage;

- The area appeared to be free of potentially adverse seismic interactions that could cause flooding or spray in the area;

- The area appeared to be free of potentially adverse seismic interactions that could cause a fire in the area; and

- The area appeared to be free of potentially adverse seismic interactions associated with housekeeping practices, storage of portable equipment, and temporary installations (e.g., scaffolding, lead shielding).

The inspectors performed independent walkdowns and verified that the following areas or components were properly inspected:

- Unit 1 Safety-Related 125 Vdc Battery Rooms;

- Unit 2 Safety-Related 125 Vdc Battery Rooms;

- Unit 1 Steam Generator Power Operated Relief Valve Battery;

- Unit 2 Steam Generator Power Operated Relief Valve Battery;

- Unit 1 Pressurizer Power Operated Relief Valve Accumulators;

- Unit 2 Pressurizer Power Operated Relief Valve Accumulators; and

- 1A Main Steam Isolation Valve.

Observations made during the walkdowns that could not be determined to be acceptable were entered into the license's CAP for evaluation.

Additionally, the inspectors verified that items that could allow the spent fuel pool to drain down rapidly were added to the SWEL and these items were walked down by the licensee.

b. Findings

No findings were identified.

4OA6 Management Meetings

.1 Exit Meeting Summary

On January 9, 2013, the inspectors presented the inspection results to Mr. M. Kanavos, Braidwood Plant Manager, and other members of the licensee's staff. The licensee acknowledged the issues presented. The inspectors confirmed that none of the potential report input discussed was considered proprietary.

.2 Interim Exit Meetings

Interim exits were conducted for:

- The licensed operator requalification training biennial written examination and annual operating test results with Mr. R. Cameron, Braidwood Licensed Operator Requalification Lead Instructor, via telephone on October 9, 2012;

- The radiological hazard assessment and exposure controls, and occupational ALARA planning and controls inspection results with Mr. D. Enright, Braidwood Site Vice President, on October 26, 2012;

- The inservice inspection results with Mr. D. Enright, Braidwood Site Vice President, on October 30, 2012; and

- The TI-177 inspection results with Mr. C. VanDenburg, Braidwood Regulatory Assurance Manager, on December 5, 2012.

The inspectors confirmed that none of the potential report input discussed was considered proprietary. Proprietary material received during the inspection was returned to the licensee.

4OA7 Licensee-Identified Violations

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

- 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that design control measures shall be provided for verifying or checking the adequacy of the design. Contrary to the above, from March 28, 2000, to September 13, 2012, the licensee's design control measures failed to verify the adequacy of installing thermal relief valves on the MSIV accumulators to address issues associated with pressure-related alarms. Specifically, on September 6, 2012, the licensee identified that the MSIV accumulators could experience a higher temperature than previously considered. Changes in ambient temperatures from a HELB in the area will cause pressure to rise and actuate a small relief valve which bleeds oil back to the MSIV oil reservoir. If too much oil is relieved to the reservoir, there may not be sufficient oil remaining to fully close the MSIV regardless of the accumulator pressure. The licensee performed an operability evaluation and concluded that the thermal relief valves must be isolated to prevent a loss of fluid during these conditions, and instituted a compensatory action that isolated the relief valves. At the time of the exit meeting, the licensee had not determined how compliance would be restored long-term. The licensee entered this issue into their CAP as IR 1409900. This issue was determined to be of very low safety significance (Green) based upon a detailed risk evaluation performed by an NRC SRA.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

D. Enright, Site Vice President
M. Kanavos, Plant Manager
D. Anthony, Exelon Corporate NDE Services Manager
P. Boyle, Director, Site Maintenance
S. Butler, Manager, Corrective Action Program
R. Cameron, Licensed Operator Requalification Lead Instructor
J. Delbusso, Wesdyne NDE Manager
G. Dudek, Training Director
A. Ferko, Director, Site Engineering
B. Finlay, Manager, Site Security
J. Gerrity, Site Emergency Preparedness Manager
R. Leasure, Manager, Site Radiation Protection
D. Lesnick, Emergency Preparedness Manager
M. Marchionda-Palmer, Director, Site Operations
J. Odeen, Manager, Site Project Management
D. Palmer, Radiation Protection Superintendent
R. Radulovich, Manager, Site Nuclear Oversight
J. Rappeport, Manager, Site Chemical Environment & Radwaste
M. Sears, Program Engineer Manager
D. Stiles, Manager, Operations Training
G. Stopka, Shift Operations Superintendent
C. VanDenburg, Manager, Site Regulatory Assurance

Nuclear Regulatory Commission

E. Duncan, Chief, Reactor Projects Branch 3

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened

05000456/2012005-01; 05000457/2012005-01	NCV	Failure to Ensure Watertight Door Safety Function Maintained After Routine Passage (Section 1R06.1.b.1)
05000456/2012005-02; 05000457/2012005-02	NCV	Inadequate PBI Allowance for One EDG DOST Watertight Door Inoperable (Section 1R06.1.b.2)
05000456/2012005-03; 05000457/2012005-03	FIN	Inadequate Operability Evaluation of Block Walls for High Energy Line Break Loads (Section 1R15.1.b)
05000456/2012005-04; 05000457/2012005-04	URI	Operability Evaluation of Block Walls for High Energy Line Break Loads (Section 1R15.1.b.1)
05000457/2012005-05	NCV	Inadequate Work Instructions for Ensuring 2A EDG Jacket Water Heat Exchanger Gasket Compression (Section 1R22.1.b)
05000456/2012005-06; 05000457/2012005-06	URI	Concerns with the Bases for the Acceptability of GOTHIC for Void Transport Prediction (Section 4OA5.1.b)

Closed

05000456/2012005-01; 05000457/2012005-01	NCV	Failure to Ensure Watertight Door Safety Function Maintained After Routine Passage (Section 1R06.1.b.1)
05000456/2012005-02; 05000457/2012005-02	NCV	Inadequate PBI Allowance for One EDG DOST Watertight Door Inoperable (Section 1R06.1.b.2)
05000456/2012005-03; 05000457/2012005-03	FIN	Inadequate Operability Evaluation of Block Walls for High Energy Line Break Loads (Section 1R15.1.b.1)
05000457/2012005-05	NCV	Inadequate Work Instructions for Ensuring 2A EDG Jacket Water Heat Exchanger Gasket Compression (Section 1R22.1.b)
TI-2515/177	TI	Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems (NRC Generic Letter 2008-01) (Section 4OA5.1)
TI-2515/188	TI	Inspection of Near-Term Task Force Recommendation 2.3 Seismic Walkdowns (Section 4OA5.2)

Discussed

05000456/2011005-05; 05000457/2011005-05	NCV	Failure to Follow and Establish Adequate Hazard Barrier Impairment Procedures (Section 1R06.1.b)
TI-2515/187	TI	Inspection of Near-Term Task Force Recommendation 2.3 Flooding Walkdowns (Section 4OA5.2)

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.

1R01 Adverse Weather Protection

- IR 1426258; Entered 0/1/2 BwOA ENV-1 Adverse Weather Conditions; October 14, 2012
- IR 1427443; PMP Calculation Issue Discovered During Fukushima Review; October 16, 2012
- IR 1444726; Fukushima Available Physical Margin (APM); November 27, 2012
- 0BwOS XFT-A4; Unit Common Freezing Temperature Equipment Protection Inside Surveillance; Revision 6
- CC-AA-309-1001; Design Analysis WR-BR-PF-10; Effect of Local Probable Maximum Precipitation (PMP) at Plant Site; Revision 14
- WO 01491920 01; U0 Cold Weather Annual Surveillance; October 7, 2012

1R04 Equipment Alignment

- IR 1424376; 2A DG Governor Replacement Deferred to A2R17; October 9, 2012
- IR 1429196; 1MS018D Exceeded Alert Limits on Initial Stroke; October 20, 2012
- IR 1430461; 2A DG Jacket Water Lower Cooler Leak; October 23, 2012
- IR 1430515; 2A DG Jacket Water Heat Exchanger Leak; October 24, 2012
- IR 1430575; 2A DG Jacket Water Cooler SX Leak; October 23, 2012
- IR 1430799; Extent of Condition of 2A DG SX Jacket Water Leak (IR 1430575); October 24, 2012
- IR 1433000; 2A DG Leak Template for Upper Cooler; October 28, 2012
- IR 1438912; Adjust 2A DG Monitoring System Speed - 2ST - DG249A; November 12, 2012
- IR 1442833; 1MS018D Stroke Time Outside Alert Range on First Stroke Test; November 20, 2012
- BwOP DG-M4; Operating Mechanical Lineup 2DG; Revision 16
- BwOP MS-M1; Main Steam Operating Mechanical Lineup Unit 1; Revision 22

1R05 Fire Protection

- IR 1423399; GOCAR BwAP 1110-1A3 for OFP531B > 5 Weeks; October 6, 2012
- IR 1426976; NOS ID: Fire Impairment Not Initiated for Blocked Fire Hose; October 15, 2012
- IR 1427293; NOS ID: Fire Door Found Unsecured; October 16, 2012
- IR 1439638; UCSR 1S-34 Trouble Coming in Every 30 Seconds - 1FP09J; November 13, 2012
- IR 1439724; GOCAR/PBI Needs to be Closed Out; November 14, 2012
- IR 1440725; NRC Question Concerning PBIs and GOCARs; November 15, 2012
- IR 1444357; Fire Protection Hose Station Not Restored in a Timely Manner; November 26, 2012
- Pre-Fire Plan # 93; DOST 383’ Diesel Fuel Oil Storage Room 2B; Revision 0
- Pre-Fire Plan #111; AB 364’ Auxiliary Building General Area – Center (FZ 11.3-0 Center); Revision 0
- Pre-Fire Plan #112; AB 364’ Auxiliary Building General Area – North (FZ 11.3-0 North); Revision 0

- Pre-Fire Plan #113; AB 364’ Auxiliary Building General Area – South (FZ 11.3-0 South); Revision 0
- Pre-Fire Plan #114; AB 364’ Unit 1 Containment Pipe Penetration Area (FZ 11.3-1); Revision 0
- Pre-Fire Plan #178; FH 401’ Fuel Handling Building (FZ 12.1-0); Revision 0
- Pre-Fire Plan #197; AB 401’ DG 1A & Switchgear Room Air Shaft (FZ 18.2-1); Revision 0

<u>1R06 Flood Protection Measures</u>

- IR 1405851; Vertical Turbine Building Floor Drain Riser is Plugged; August 28, 2012
- IR 1410172; Turbine Building Floor Drain System May be Degraded; September 7, 2012
- IR 1424159; Turbine Building Floor Drain System Unit 2 Plugged; October 9, 2012
- IR 1441175; Turbine Building Floor Drain System is Highly Degraded; November 15, 2012
- IR 1454059; Safety - 2A RH HX RM Permanent Scaffold Overhangs Railing; December 19, 2012
- BwAP 1110-3; Plant Barrier Impairment Program; Revisions 11 and 28
- BwMS 3350-004; Quarterly Watertight Door Surveillance; Revisions 3 and 7
- 1BwOA ELEC-4; Loss of Offsite Power; Revision 104
- 0BwOA SEC-5; WS System Malfunction; Revision 101
- 1BwOA SEC-5; WS System Malfunction; Revision 101
- CC-AA-201; Plant Barrier Control Program; Revision 9
- WO 1601839 01; Inspection of Watertight Doors; December 21, 2012

<u>1R08 Inservice Inspection Activities</u> (71111.08P)

- Annual Boric Acid Corrective Maintenance Effectiveness Review for 2011
- IR 1431542; 2003 WE SG Data Review Report Issue; October 25, 2012
- IR 1430542; Re-Analysis of SG ET Data; October 24, 2012
- IR 1329406; NRC Identified Enhancements for ALARA for NDE; October 19, 2012
- IR 1428005; NRC Identified Skewed Pipe Clamp; October 18, 2012
- IR 1422784; Non-Conservative Snubber Test Procedures; October 5, 2012
- IR 1321545; Line 2SX93AA-4 Does Not Meet 87.5 Percent Screening Criteria; June 8, 2012
- IR 1376098; Line 2SX25AA-6 Does Not Meet 87.5 Percent Screening Criteria; February 1, 2012
- IR 1375677; Line 2CD A4A-8 0.013” Wall Measured; September 7, 2012
- IR 1338820; BACC Evaluation, Attachment 2; 2VF-87BA, RCP 2C Seal Injection Isolation Valve; March 9, 2012
- IR 1287853; Dry Boric Acid Deposit on 2AB8547; November 8, 2011
- IR 1287810; Active Boric Acid Leak/Borated Water Leakage (2CV216 Pipe Cap), November 2, 2011
- IR 1236493; Line 1SXG8AB-4 Does Not Meet 87.5 Percent Screening Criteria; June 20, 2011
- IR 1235813; ISI FASA Deficiency; July 1, 2011
- IR 1235739; BACC Evaluation, Attachment 2; 2FIS-0191, RCP 2D Seal 2 Leak Off Flow Indicating Switch; July 1, 2011
- IR 1214416; BACC Evaluation, Attachment 3; 2SI-08JB, Flanged Connection; May 11, 2011
- IR 1213307; Active Weepage at #9 Bolt of 2B RH Heat Exchanger Flange; May 9, 2011
- IR 1209234; Reactor Head Lift Lug Inspection; April 28, 2011
- IR 1207152; Dry Boric Acid Deposits at 2CV8444 Body-to-Bonnet; November 8, 2011
- IR 1205433; Dry Boric Acid on 2BR7003B at Body-to-Bonnet; April 20, 2011.
- IR 1203888; BACC Evaluation, Attachment 3; 2CV-8104, Body to Bonnet Packing Gland Area; April 18, 2011
- ASME Weld Data Record 2SI08CA/CB-4”, FW-10 October 26, 201

- ASME Weld Data Record 2SI08CA/CB-4”, FW-11B October 25, 2012
- Calculation S.2.6-BRW-98-1090; Revision 6
- Calculation S.2.6-BRW-09-0041-S; Revision OA
- DIT-BB-EXT-0779; Containment Liner Evaluation of Local Bulges; April 15, 1994
- EC 384017; Braidwood Unit 2 EDY and RIY Evaluation Per ASME Code Case N-729-1; Revision 0
- EC 377438; Engineering Evaluation to Address All Aspects of Braidwood Unit 2 Containment Moisture Barrier Class CC Degraded Areas Found During the Performance of the Augmented Examinations in A2R14; Revision 0
- ETSS 96004.3, Bobbin, Revision 13
- ETSS 0010-1012, Ghent G3/4, Revision 0
- ETSS I28413; Bobbin; February 2011
- NES-MS-04.1; Seismic Prequalified Scaffolds; Revision 5
- Procedure EXE-PDI-UT-2; Ultrasonic Examination of Austenitic Piping Welds in Accordance with PDI-UT-2; Revision 7
- Procedure ER-AA-335-002; Liquid Penetrant Examination; Revision 6
- Procedure ER-AA-335-1008; Code Acceptance and Recording Criteria for NDE Surface Examinations; Revision 2
- Procedure ER-AA-335-018; Visual Examination of ASME IWE Class MC and Metallic Liners of Class CC Components; Revision 7
- Procedure ER-AA-335-019; Visual Examination of ASME IWL Class CC Containment Components; Revision 0
- Procedure ER-AA-330-006; Inservice Inspection and Testing of Pre-Stressed Concrete Containment Post Tensioning Systems; Revision 6
- Procedure ER-AA-330-007; Visual Examination of Section XI Class MC Surfaces and Class CC Liners; Revision 8
- Procedure ER-AP-331-1002; Boric Acid Corrosion Control Program Identification Screening and Evaluation; Revision 7
- Procedure ER-AP-331-1001; Boric Acid Corrosion Control (BACC) Inspection Locations, Implementation and Inspection Guidelines; Revision 6
- Procedure ER-AP-331; Boric Acid Corrosion Control (BACC) Program; Revision 6
- Procedure ER-AA-335-015; VT-2 Visual Examination; Revision 11
- Procedure ER-AA-420-002; Byron/Braidwood Unit 2 Steam Generator Eddy Current Activities; Revision 11
- Procedure PDI-ISI-254-SE-NB; Remote Inservice Examination of Reactor Vessel Nozzle-to-Safe End, Nozzle-to-Pipe, and Safe End-to-Pipe Welds Using the Nozzle Scanner; Revision 2
- Procedure MRS 2.4.2 GEN-45; Standard In-Situ Pressure Test Using the Computerized Data Acquisition System; Revision 7
- PDQS; WDI-STD-1040; March 4, 2010
- PDQS; WDI-STD-1041; March 2, 2010
- PQR 1-51A; December 28; 1983
- PQR 4-51A; September 12, 1986
- PQR A-003; February 8, 2000
- PQR A-004; February 8, 2000
- Radiographic Film Record and Reader Sheet For Weld FW-10 On Line 2SI08CA/CB-4”; October 27, 2012
- Radiographic Film Record and Reader Sheet For Weld FW-11B On Line 2SI08CA/CB-4”; October 28, 2012
- Report A2R15-IWE-017; April 27, 2011
- Report A2R15-IWE-018; April 26, 2011

- Report A2R15-IWE-019; April 26, 2011
- Report A2R15-IWE-012; April 27, 2011
- Report A2R15-IWE-014; April 28, 2011
- Report A2R16-PT-001; October 20, 2012
- Report A2R16-UT-012; October 20, 2012
- Report A2R16-UT-013; October 20, 2012
- Report A2R16-UT-014; October 20, 2012
- Report A2R16-UT-015; October 20, 2012
- Report A2R16-UT-016; October 20, 2012
- Report - Ultrasonic Examination Data Report for Reactor Vessel (RV) Outlet Nozzle-To-Safe End and Safe End-To-Pipe Welds 2RV-01-025 and 2RV-01-033; October 29, 2012
- Report - Ultrasonic Examination Data Report for Reactor Vessel (RV) Outlet Nozzle-To-Safe End and Safe End-To-Pipe Welds 2RV-01-028 and 2RV-01-034; October 29, 2012
- Report - Eddy Current Examination Data Report for Reactor Vessel (RV) Outlet Nozzle-To-Safe End and Safe End-To-Pipe Welds 2RV-01-025 and 2RV-01-033; October 29, 2012
- Report - Eddy Current Examination Data Report for Reactor Vessel (RV) Outlet Nozzle-To-Safe End and Safe End-To-Pipe Welds 2RV-01-028 and 2RV-01-034; October 29, 2012
- Rod Ticket; HT No. 2912161; October 5, 2012
- Rod Ticket; HT No. 2944699; October 8, 2012
- SG-SGDA-03-38; U-bend Offset Study for Braidwood Unit 2 to Identify Tubes Potentially More Susceptible to ODSCC; September 19, 2003
- Welder K9814; Qualification Record; March 22, 2012
- Welder JL076; Qualification Record; March 22, 2012
- WO 01462830; Perform ISI Inspections on Shop-End-Dome Tendon D4-11; November 12, 2012
- WPS 8-8-GTSM; GTAW/SMAW P-8 to P-8 Material; Revision 2
- WDI-PJF-1304755-EPP-00; Reactor Vessel Nozzle DM and Safe-End Weld Examinations Pre and Post MSIP – Examination Scan Plan; Revision 0

1R11   Licensed Operator Requalification Program and Licensed Operator Performance

- BR-13; Licensed Operator Requalification Scenario; Revision 2012
- BR-17; Licensed Operator Requalification Scenario; Revision 2012
- BwAP 335-1T6; Scenario BR-17 Turnover; Revision 11
- TQ-AA-155-F02; Shift Manager Evaluations for Scenario BR-17; Revision 1
- TQ-AA-155-F05; Crew Evaluations for Scenario BR-17; Revision 1
- TQ-AA-155-F04; Individual Evaluations for Scenario BR-17; Revision 1
- IR 1309913; Two Ops QHPIs Rejected at MRC; January 5, 2012
- IR 1293970; Ops QHPI Rejected at MRC; November 23, 2011
- IR 1293445; Procedure Step Missed in BwOP PW-5 (QHPI); January 5, 2012
- IR 1262638; Unexpected Power Range Lower Detector Alarm; September 13, 2011
- IR 1373856; Emergent Tech Spec 1AR12J Non-Conservative Setpoint; June 30, 2012
- LER 2012-003-00; Fuel Handling Incident AR Monitors Inoperable Due to Incorrect Setpoints; August 2, 2012
- IR 1372968; RCS Leakrate Deviation Action I and III Exceeded; May 31, 2012
- IR 1372288; Adjust Mechanical Stops on 1CV8524B; May 30, 2012
- IR 1372291; Adjust Mechanical Stops on 1CV8522B; May 30, 2012
- IR 1372310; Adjust Mechanical Stops on 1CV8518; May 30, 2012
- IR 1265232; Possible Water Intrusion on 1A CW Pump 1CW01PA; September 19, 2011

- IR 1271242; 2A DG Has Jacket Water Leak Above 10L Cylinder; October 2, 2011
- IR 1271570; Fidelity Differences Between LORT Simulator and MCR; October 3, 2011
- IR 1275965; U2 Containment Release Terminated on 2PR28J Alert; October 13, 2011
- IR 1277791; Preconditioning Concern for Hydrogen Monitoring Valve Stroke; October 18, 2011
- IR 1281256; 2B CW Pump Tripped; Unexpected MCR Alarm – 2CW01PB; October 25, 2011
- IR 1357282; RP-AA-503 Restricts Emergency Response by Operators; April 23, 2012
- IR 1365865; 1FW510A Hesitates While Stroking Open; May 13, 2012
- IR 1375159; 2B SX Pump Auxiliary Lube Oil Pump Weeping Oil; June 6, 2012
- IR 1386383; Safety Near Miss – Vent Off With No Warning Signs; July 10, 2012
- IR 1391644; Unit 1 RWST Low Level; July 22, 2012
- IR 1293056; DSA/WSA 11/14 Week – Ops Staffing Impacts Adherence; November 21, 2011
- IR 1324626; Pressurizer Pressure Channel 1PI-0458 Failure; February 8, 2012
- SWR 12810; Simulator Halt During RCS Depressurization; September 29, 2010
- SWR 12758; DG Voltage Response vs. BwOP AP-23; August 30, 2010
- SWR 12762; Post-Trip Annunciator Analysis Issues; September 1, 2010
- SWR 12764; Dynamic Simulator Issues From Recent Plant Trip; September 1, 2010
- SWR 12808; Miscellaneous SDG Corrections Needed; September 28, 2010
- SWR 13429; Auto Turbine Trip Failure Prevents Local Turbine Trip; July 28, 2011
- SWR 13553; During LORT Scenario 1167, SER Printed and the Sim Stopped; October 18, 2011
- SWR 13679; 1B AF Pump Temperatures Too High; December 16, 2011
- SWR 13824; Degraded Grid Voltage vs. Breakers 1414/24 Response; February 13, 2012
- SWR 14036; Incorrect C-9 Setpoint; June 7, 2012

1R12 Maintenance Effectiveness

IR 1046538; Data Table Missing in Tech Spec Surveillance; March 23, 2010
IR 1226090; Potential Vulnerability with 125 VDC ESF Bus Ground AAR; June 8, 2011
IR 1267815; DC 212 Lessons Learned - Procedure Enhancements; September 24, 2011
IR 1268371; AC Input Breaker Tripped on 0DC06E RSH Battery Charger; September 26, 2011
IR 1285089; Request Engineering Qualify Components for DC Bus 111 Jumper; November 2, 2011
IR 1285352; Lapse in DC Battery ICV Trending Leads to Emergent LCO Entry; November 1, 2011
IR 1316094; Byron CDBI FASA Identified Calculation Discrepancies; January 20, 2012
IR 1326123; OPEX - Review of Byron CDBI FASA: DC Crosstie Breaker Testing; February 13, 2012
IR 1326349; High Indicated CO Levels in Battery Rooms 123 and 223; February 13, 2012
IR 1369185; 211 Battery Surveillance Results - 2DC01E; May 22, 2012
IR 1417073; 3D Corrosion - Batt 211 Cells 2, 4, 5, 10, 23, 24, 43, 45, 55; September 23, 2012
IR 1417077; Charger 211 Trips When Selected to Equalize; September 23, 2012
IR 1420269; Debris Identified in Cells 15 and 32 for DC Battery 111; September 30, 2012
IR 1424234; Revise 125VDC ESF Battery Equalization Procedure; October 9, 2012
IR 1424411; 125VDC Temporary Charger Failure; October 9, 2012
IR 1426185; 3D Corrosion on Several Cells of DC Battery 211; October 14, 2012
IR 1428948, Penetration 28 2CV8112 & 2CV8113 Leakrate Failed, October 19, 2012
IR 1429160, LLRT of 2CV8112 and 2CV8113 Failed, October 20, 2012
IR 1438353; Received Unexpected Alarm Generator Volt Reg Trouble; November 10, 2012
IR 1438444; 250VDC Battery 123, Outside of Admin and Admin Limits; November 10, 2012
IR 1439606; Voltage Regulator Trip - 1MP09E; November 13, 2012

IR 1439836; Adverse Trend in Voltage Regulator System Performance; November 11, 2012
IR 1441626; Battery 223 Did Not Meet Acceptance Criteria of 2BwOS DC-Q3; November 17, 2012
IR 1444637; Decreasing Trend on 125VDC ESF Battery 111 Specific Gravity; November 27, 2012
IR 1452983; Debris Left in 125VDC ESF Battery Room; December 17, 2012
IR 1453041; Unit 1 ESF Spare Cells Not Connected to Spare Charger; December 17, 2012
IR 1453043; Spare Battery Charger for Spare ESF Cells Not Connected; December 17, 2012
IR 1453051; ESF Battery Cells Installed in Div 21 Spare Rack; December 17, 2012
IR 1452983; Debris Left in 125VDC ESF Battery Room; December 17, 2012
1BwHSR 3.8.4.3-111; U1 125 Volt ESF Battery Bank 111 Service Test; Revision 00
1BwHSR 3.8.4.3-112; U1 125 Volt ESF Battery Bank 112 Service Test; Revision 00
1BwHSR 3.8.6.6-111; U1 125 Volt ESF Battery Bank 111 Modified Performance Test; Revision 0
1BwHSR 3.8.6.6-112; U1 125 Volt ESF Battery Bank 112 Modified Performance Test; Revision 0
1BwOSR 3.8.6.5-1; U1 125V DC ESF Battery Bank 111 Operability Surveillance; Revision 6 and 11
1BwOSR 3.8.6.5-2; U1 125V DC ESF Battery Bank 112 Operability Surveillance; Revision 10
EC 389896 000; U1 SAT Loss of Phase Relay Installation; October 6, 2012
MA-AA-723-325; Molded Case Circuit Breaker Testing; Revision 10
WC-AA-108; Perform Initial Battery Cell Measurements Per 1BwHSR 3.8.6.6-111 Section F.1.0; Revision 1
WO 01124457 01; 1DC01E 125 Volt Battery Modified Performance Test; April 11, 2009
WO 01125453 01; Unit One 125V Battery Modified Performance Test; April 2, 2009
WO 01378676 01; Unit One 125 Volt ESF Battery Bank 111 Service Test; April 27, 2012
WO 01378961 01; Unit One 125 Volt ESF Battery Bank 112 Service Test; April 30, 2012
WO 01569552 01; U1 125VDC ESF Battery Bank 111 Operability Quarterly Surveillance; October 14, 2012
System Health Report; 125VDC Non-Safety TSC/Security/48VDC River Screen House; July 1 through September 30, 2012
ER-AA-380, Primary Containment Leakrate Testing Program, Revision 9
BwVP 200-25, Braidwood Containment Leakage Rate Testing Program, Revision 11
2BwVSR 3.6.1.1.25, Summation of Type B & C Tests for Acceptance Criteria, Revision 7
2BwOSR 3.6.1.1-9, Primary Containment Type C Local Leakage Rate Tests of Chemical and Volume Control System, Revision 11
Maintenance Rule Evaluation – Chemical and Volume Control System, Third Quarter 2012
Maintenance Rule Evaluation – Primary Containment, Third Quarter 2012
Chron 216680, Administrative Leakage Limits for Appendix J Components, December 12, 1995
In-service Testing Program Bases for 2CV8112
In-service Testing Program Bases for 2CV8113

1R13 Maintenance Risk Assessments and Emergent Work Control

- IR 1430461; 2A DG JW Lower Cooler Leak; October 23, 2012
- IR1430515; 2A DG Jacket Water HX Leak; October 24, 2012
- IR 1430575; 2A DG JW Cooler SX Leak; October 23, 2012
- IR 1430799; Extent of Condition of 2A Dg SX Jacket Water Leak (IR 1430575); October 24, 2012
- IR 1431574; Replace Gaskets in 2B DG JW Coolers Stationary Heads; October 25, 2012

- IR 1435017; NRC ID’d - 2AF05071R Hanger Rod in contact with 2AF01CF-4”; January 1, 2001
- IR 1435056; 2B MSIV Hydraulic Leak on Pump Discharge Fitting; November 2, 2012
- IR 1435271; Short Term EOC Recommendation for 2DG01KB-X1/2; November 2, 2012
- IR 1435586; Recommendations for Reducing Diesel Generator Leaks; November 4, 2012
- IR 1435785; Improve DG Cooler Floating Head Gaskets; November 4, 2012
- Event/Issues Report Equipment Issue; IR 142574 - A Train Auxiliary Building Ventilation Damper Failure
- Protected Equipment – U2 RWST Makeup Source, October 15, 2012
- Protected Equipment – 2B RH Protected for S/D Cooling, October 15, 2012
- Protected Equipment – SFP Time to Boil Comp Measures, October 15, 2012 & October 19, 2012
- Protected Equipment – ACB 14-15 and U2 SATs, October 14, 2012
- Protected Equipment – DC Bus 212 Unavailable, October 23, 2012
- Shutdown Safety Equipment Status Checklist, October 15, 2012 & October 24, 2012
- OP-AA-108-117, Protected Equipment Program, Revision 2
- OU-AA-103, Shutdown Safety Management Program, Revision 12
- OU-AP-104, Shutdown Safety Management Program – Byron/Braidwood Annex, Revision 17

1R15 Operability Determinations and Functionality Assessments

- IR 0901606; A1R14LL - Door SD-191 Open Without PBI; April 2, 2009
- IR 1389889; NRC Questions on HELB Pressure Loads; July 17, 2012
- IR 1395277; IEMA Question: Clarify Requirements for Leak Tight Barriers; July 7, 2012
- IR 1413150; Procedure Enhancement: Water Tight Door Inspection LMS-ZZ-04; September 14, 2012
- IR 1418222; U2 Natural Circ Cooldown - Impact on PZR PORV Cycles; September 25, 2012
- IR 1425619; Zero GPM Flow Indicated with 2A AF Pump Operating; October 12, 2012
- IR 1426698; Failure of Slave Relay K603A to Latch;
- IR 1430451; 2RH05005X, Support/Restraint has Dislodged Spherical Bearing; October 23, 2012
- IR 1430461; 2A DG JW Lower Cooler Leak; October 23, 2012
- IR1430515; 2A DG Jacket Water HX Leak; October 24, 2012
- IR 1430569; A2R16 Post Transient Walkdown Review of Line 2RH10CB; October 24, 2012
- IR 1430575; 2A DG JW Cooler SX Leak; October 23, 2012
- IR 1430799; Extent of Condition of 2A DG SX Jacket Water Leak (IR 1430575); October 24, 2012
- IR 1431574; Replace Gaskets in 2B DG JW Coolers Stationary Heads; October 25, 2012
- IR 1435017; NRC ID’d - 2AF05071R Hanger Rod in Contact with 2AF01CF-4”; January 1, 2001
- IR 1435056; 2B MSIV Hydraulic Leak on Pump Discharge Fitting; November 2, 2012
- IR 1435271; Short Term EOC Recommendation for 2DG01KB-X1/2; November 2, 2012
- IR 1435425; Request WO to Troubleshoot 2SI8811B Circuit; November 3, 2012
- IR 1435586; Recommendations for Reducing Diesel Generator Leaks; November 4, 2012
- IR 1435785; Improve DG Cooler Floating Head Gaskets; November 4, 2012
- IR 1437799; Discrepancy Noted During Performance of WO 1568122-01; November 9, 2012
- IR 1454143; NRC Comments on OPEVAL 12-004; December 19, 2012
- 1BwEP ES-0.1; Reactor Trip Response; Revision 203 WOG 2
- 1BwEP-0; Reactor Trip or Safety Injection; Revision 204 WOG 2
- 1BwGP 100-5; Plant Shutdown and Cooldown; Revision 46
- BwMP 3215-001; Periodic Inspections and Repair of MSIV Actuators; Revision 17

- 1BwOA SEC-4; Loss of Instrument Air; Revision 103
- BwOP CV-7; Makeup to RCS Using RX Makeup System in Auto of Manual Mode of Using RWST, or for RCS Feed and Bleed for Chemistry Control; Revision 26
- CC-AA-309-1001; Byron/Braidwood Natural Circulation Cooldown TREAT Analysis for RSG and Uprating Program; Revision 6
- WO 970618 01; MM-2MS001A Contingency Troubleshoot/Repair Actuator; November 6, 2012
- OpEval 12-004; HELB Load Not Considered In Structural Calculations; Revision 1
- PROC OP-AA-108-115; Operability Determinations; Revision 11
- SLS-I-3805; Letter Sargent & Lundy to Illinois Power Company, Clinton Power Station – Unit 1, Masonry Wall Test; February 28, 1983
- Form BY/BR/MW; Sargent & Lundy, Standard Specification for Masonry Work; May 17, 1985
- Drawing D-10239; Spec. L-2756 Schematic for A/DV Self Contained Hydraulic Actuator; September 15, 1977
- Drawing M-60; Diagram of Reactor Coolant (PZR PORV Accumulators)
- Reg Guide 1.33; Quality Assurance Program Requirements (Operation); Revision 2 - February 1978
- NUREG 0800; Flood Protection; Revision 2 - July 1981
- NUREG 0800; Residual Heat Removal System; Revision 3, - April 1984

1R18 Plant Modifications

- NERC ES-ISAC; RuggedCom Public Disclosure Allowing Remove Unauthorized Access; May 7, 2012
- RuggedCom Security Updates; Vulnerabilities for HTTPS/SSL and SSH; April 26, 2012
- Siemens Security Advisory SSA-826381; Multiple Vulnerabilities in RuggedCom ROS-based Devices; June 14, 2012
- Siemens Transformers Austria AG; RuggedCom Switch Firmware Upgrade; September 26, 2012
- EC 389506, DOST Room HELB Temperature Switches
- IR 1424297; 1E MPT Serveron - Service Bulletin - 20120619; October 9, 2012
- IR 1424298; 1W MPT Serveron - Service Bulletin - 20120619; October 9, 2012
- IR 1424299; 2E MPT Serveron - Service Bulletin - 20120619; October 9, 2012
- IR 1424306; 2W MPT Serveron - Service Bulletin - 20120619; October 9, 2012

1R19 Post-Maintenance Testing

- IR 1430461; 2A DG JW Lower Cooler Leak; October 23, 2012
- IR 1430515; 2A DG Jacket Water HX Leak; October 24, 2012
- IR 1430556; FME Event - FM Found in 2SI8816A (2A SI Hot Leg Throttle Valve); October 24, 2012
- IR 1430564; FME Event - FM Found Upstream of 2SI9916D; October 24, 2012
- IR 1430575; 2A DG JW Cooler SX Leak; October 23, 2012
- IR 1430799; Extent of Condition of 2A DG SX Jacket Water Leak (IR 1430575); October 24, 2012
- IR 1431574; Replace Gaskets in 2B DG JW Coolers Stationary Heads; October 25, 2012
- IR 1435017; NRC Id'd - 2AF05071R Hanger Rod in Contact with 2AF01CF-4"; January 1, 2001
- IR 1435056; 2B MSIV Hydraulic Leak on Pump Discharge Fitting; November 2, 2012
- IR 1435271; Short Term EOC Recommendation for 2DG01KB-X1/2; November 2, 2012
- IR 1435586; Recommendations for Reducing Diesel Generator Leaks; November 4, 2012
- IR 1435785; Improve DG Cooler Floating Head Gaskets; November 4, 2012

- 2BwOSR 5.5.8.SI-11; Comprehensive Inservice Testing Requirements for Unit 2 Safety Injection Pumps and Safety Injection System Check Valve Stroke Test; Revision 3
- 2BwOSR 5.5.8.SX-1B, Essential Service Water Train B Valve Stroke Surveillance; Revision 13
- WO 1435884 01; Review Need for ECCS Flow Bal During Outage CV RH and SI; November 4, 2012
- WO 1509516 01, Perform Wiring Changes at 2SX027B Per EC 385243
- WO 1509516 03, OPS PMT – 2SX027B Stroke Test, October 26, 2012
- WO 1509516 05, Wiring Verifications for 2SX027B Per EC 385243

1R20 Refueling and Other Outage Activities

- IR 1420451; Recurring Reactor Services Outage Activities from RCR 263845; October 1, 2012
- IR 1420787; Spent Fuel Bridge Crane: EC Wiring Changes Not Complete; September 28, 2012
- IR 1421299; CW Blowdown Alternative Analysis Report Issued to Final; October 2, 2012
- IR 1425834; Fuel Transfer System Proximity Switch Testing Results; October 12, 2012
- IR 1426362; Boric Acid Accumulation at 2CV222 Pipe Cap; October 15, 2012
- IR 1426367; 2RC8037A Dry Boric Acid at the Body to Bonnet Bolts (DUP); October 15, 2012
- IR 1426368; 2RC8037B Dry Boric Acid at the Body to Bonnet Bolts (Clean); October 15, 2012
- IR 1426371; 2RC8037C Dry Boric Acid at the Body to Bonnet Bolts (Clean); October 15, 2012
- IR 1426375; 2RH030B Dry Boric Acid at the Packing (Clean & Tighten); October 15, 2012
- IR 1426383; Boric Acid Leak Found on 2PT-0964; October 15, 2012
- IR 1426418; FME: Cloth Bucket Next to Unit 2 Pressurizer Surge Line; October 15, 2012
- IR 1426678; 2BwOS XPC-W1 and A2R16 Closure Enhancements; October 15, 2012
- 2BwGP 100-3; Power Ascension 5 Percent to 100 Percent; Revision 60
- 2BwGP 100-4; Power Descension; Revision 33
- 2BwGP 100-6; Refueling Outage, Revision 23
- Response to IR 1436643; November 6, 2012

1R22 Surveillance Testing

- IR 1425699; Zero GPM Flow Indicated with 2A AF Pump Operating; October 12, 2012
- IR 1428506; Flow Anomaly Observed During Section 3 of 2BwOSR 5.5.8.SI-11; October 18, 2012
- IR 1428813; Need WO to Access/Inspect/Clean 2SI19916A During A2R16; October 19, 2012
- IR 1428816; Need WO to Access/Inspect/Clean 2SI19916D During A2R16; October 19, 2012
- IR 1429053; Contingency - Disassemble and Inspect 2SI8905A in A2R16; October 18, 2012
- IR 1429054; Contingency - Disassemble and Inspect 2SI8905D in A2R16; October 18, 2012
- IR 1429121; 2FE-0985 Has Flexitalic Gasket/Needs to be Replaced (Dup); October 20, 2012
- IR 1429379; FME: 2FE0918 (SI Pump 2A Discharge Flow Element) Insp Results; October 20, 2012
- IR 1430056; Contingency - Replace 2SI8905A in A2R16; October 18, 2012
- IR 1430058; Contingency - Replace 2SI8905D in A2R16; October 18, 2012
- IR 1430556; FME Event - FM Found in 2SI8816A (2A SI Hot Leg Throttle Valve); October 24, 2012
- IR 1430564; FME Event - Foreign Material Found Upstream of 2SI9916D; October 24, 2012
- IR 1430617; Locks on 2SI8816B and 2SI8816C; October 24, 2012
- IR 1432298; A2R16LL - ECCS Throttle Valve Spare Parts Availability; October 27, 2012
- IR 1437297; Failed ATWS Surveillance as PMT; November 8, 2012

- 2BwOSR 5.5.8.AF-4A; Comprehensive Inservice Testing Requirements for 2A Auxiliary Feedwater Pump; Revision 6
- 2BwOSR 5.5.8.AF-4B; Comprehensive Inservice Testing Requirements for 2A Auxiliary Feedwater Pump; Revision 7
- 2BwOSR 5.5.8.SI-11; Comprehensive Inservice Testing Requirements for Unit 2 Safety Injection Pumps and Safety Injection System Check Valve Stroke Test; Revision 3
- BwMSR 3.7.1.1;Main Steam Safety Valves Operability Test (Setpoint Verification Using the Furmanite Trevitest System); Revision 7
- WO 1431793 01; IST-RT-2MS013S/014S/015S/016S/017S-MSSV Operability Test; October 12, 2012
- WO 1431793 08; IST-RT-2MS013S/014S/015S/016S/017S-MSSV Operability Test; October 12, 2012
- WO 1431793 10; IST-RT-2MS013S/014S/015S/016S/017S-MSSV Operability Test; October 12, 2012
- WO 1431793 11; IST-RT-2MS013S/014S/015S/016S/017S-MSSV Operability Test; October 12, 2012
- WO 1431793 12; IST-RT-2MS013S/014S/015S/016S/017S-MSSV Operability Test; October 12, 2012
- WO 1431793 14; IST-RT-2MS013S/014S/015S/016S/017S-MSSV Operability Test; October 12, 2012
- WO 1431793 15; IST-RT-2MS013S/014S/015S/016S/017S-MSSV Operability Test; October 12, 2012
- WO 1431793 16; IST-RT-2MS013S/014S/015S/016S/017S-MSSV Operability Test; October 12, 2012
- WO 1431793 18; IST-RT-2MS013S/014S/015S/016S/017S-MSSV Operability Test; October 12, 2012
- WO 1431793 19; IST-RT-2MS013S/014S/015S/016S/017S-MSSV Operability Test; October 12, 2012
- WO 1431793 01; IST-RT-2MS013S/014S/015S/016S/017S-MSSV Operability Test; October 12, 2012
- WO 1437880 20; IST-U2 Full Flow Test & Equipment Response Time of AFW Pumps; October 12, 2012
- WR 00416743; Troubleshoot Failed ATWS Surveillance; November 8, 2012
- Braidwood NPP A2R16 Refueling Outage Turnover; October 25, 2012
- 2BwOSR 3.6.1.1-15, Primary Containment Type C Local Leakage Rate Test of Instrument Air System, Revision 13
- Drawing M-55, Sheet 2B, Diagram of Instrument Air, Revision H
- Drawing M-55, Sheet 15, Diagram of Instrument Air Containment Building Unit 2, Revision G

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

- EP-AA-112; Emergency Response Organization (ERO) Emergency Response Facility (ERF) Activation and Operation; Revision 16
- EP-AA-112-200; TSC Activation and Operation; Revision 8
- EP-AA-112-400; Emergency Operations Facility Activation and Operation; Revision 11
- EP-AA-1000; Standardized Radiological Emergency Plan; Revision 21

2RS1 Radiological Hazard Assessment and Exposure Controls (71124.01)

- RP-AA-210; Dosimetry Issue, Usage, and Control; Revision 22
- RP-AA-401; Operational ALARA Planning and Control; Revision 13

- RP-AA-441; Evaluation and Selection Process for Radiological Respiratory Use; Revision 4
- RP-AA-460; Controls for High and Locked High Radiation Areas; Revision 23A
- RP-AA-460-001; Controls for Very High Radiation Areas; Revision 4
- RP-AA-460-002; Additional High Radiation Exposure Control; Revision 1
- RP-AA-460-003; Access to HRAs/LHRAs in Response to a Potential or Actual Emergency; Revision 2
- RP-BR-904; Response to High Radiation Monitor Alarms; Revision 0
- National Source Tracking System; Confirmation Form 2012 Annual Inventory Reconciliation; February 23, 2012
- Radioactive Source Inventory and Leak Test Certificates; August 6, 2012
- RP-AA-800; Control, Inventory, and Leak Testing of Radioactive Sources; Revision 6
- NF-AA-390; Spent Fuel Pool Material Log; Revision 4
- IR-01404746; NRC Locked High Radiation Area Observation; August 24, 2012

2RS2 Occupational ALARA Planning and Controls (71124.02)

- A2R16 SAC Meeting - S/G Projected Dose Increase Due to 60 Percent Higher Post Peroxide
- ALARA Work-In-Progress Review for A2R16 RCP Seal Replacement Activities; RWP 10013429
- RP-AA-401; Operational ALARA Planning and Control; Revision 15
- RP-AA-400; ALARA Program; Revision 9
- RWP-10013470; ALARA Plan A2R16; Sludge Lance and Associated Activities; Revision 1
- RWP-10013463; ALARA Plan A2R16; MSIP; Revision 0
- RWP-10013474; ALARA Plan A2R16; Man Way and Diaphragm Removal/Installation and Bolt Cleaning; Revision 0
- RWP-10013469; ALARA Plan A2R16; Steam Generator Eddy Current Testing and Tube Repairs; Revision 1
- RWP-10013433; ALARA Plan A2R16; Reactor Head Disassembly and Reassembly and Lift Prep; Revision 1
- RWP-10013430; ALARA Plan A2R16; Perform 2C RCP Motor 10 Year Inspections; Revision 1
- RWP-10014292; ALARA Plan A2R16; Reactor MSIP Support to Include Sandbox Cover Removal; Revision 0

4OA1 Performance Indicator Verification (71151)

- IR 1391609; 0VA84YA and B Damper Founded Failed Open; July 22, 2012
- IR 1421574; 0VA84Y Damper Failed Open; October 2, 2012
- RR 1422296; Loss of UHS Safety Function Not Reported Via 50.72 and 50.73; October 3, 2012

4OA2 Problem Identification and Resolution

- IR 1289597; Braidwood Lake High Alkalinity May Require Sulfuric Acid Add; November 11, 2011
- IR 1426389; 2MS004E Failed Closed During Plant Cooldown; October 15, 2012
- IR 1426418; FME: Cloth Bucket Next to Unit 2 Pressurizer Surge Line; October 15, 2012
- IR 1426658; ACE 1408849 Rejected at MRC (Maint); October 15, 2012
- IR 1426698; Slave Relay Didn't Latch During 2BwOST 3.3.2.9-1 Surveillance; October 15, 2012
- IR 1426758; FME: 2MS02KB ¾" Bolt/Washer Dropped Into LP "B" Condenser; October 15, 2012
- IR 1426821; FME: Fuse and Fuse Holder Broke During Removal; October 15, 2012

- IR 1428481; OSHA Recordable - Forehead Injury - Shaw Boilermaker; October 18, 2012
- IR 1428530; FME: 2PA03J Potential Foreign Material; October 18, 2012
- IR 1428943; Missing Amphenol Connector Parts - Main Turb Thrust BRG T/C; October 19, 2012
- IR 1429250; FME: Unit 2 ECCS Recirc Sumps As-Found Insp Results A2R16; October 20, 2012
- IR 1429386; FME: Debris Discovered in 2C Isophase During Inspection; October 21, 2012
- IR 1429421; FME: Piece of Orange Glove Floating in Reactor Cavity; October 21, 2012
- IR 1429557; FME: 2AP06EC-C-FU-1 Tabs Broken; October 22, 20112
- IR 1429559; FME: 2AP06EL-FU-13 Tabs Broken; October 22, 2012
- IR 1429561; FME: 2AP06EM-FU-14 Tabs Broken; October 22, 2012
- IR 1429568; Single Isolation From the Cavity to the 2RY8051 Failed; October 21, 2012
- IR 1430298; A2R16 ODEN Breaker 2AP59E-E2(233Z2-E2) 2OG01P-A Failed to Trip; October 23, 2012
- IR 1430446; FME Found in 2C FW Pump Suction Strainer; October 23, 2012
- IR 1430556; FME Event - FM Found in 2SI8816A (2A SI Hot Leg Throttle Valve); October 24, 2012
- IR 1430564; FME Event - Foreign Material Found Upstream of 2SI8816D; October 24, 2012
- IR 1430939; NDE Results for 2CV9321A Weld Prep Area on Valve Bonnet; October 24, 2012
- IR 1430950; A2R16LL - Thimble Plug Tool Stuck in Fuel Assembly; October 24, 2012
- IR 1430969; 2SX143B Work to be Rescheduled Due to Emergent Work on 2A DG; October 24, 2012
- IR 1431077; FME: 2AP74E-B-FU-6 Missing Two Metal Tips; October 25, 2012
- IR 1431079; FME: 2AP04E-B-FU-11 Missing One Metal Tip; October 25, 2012
- IR 1431081; FME: 2AP04E-B-FU-6 Missing One Metal Tip; October 25, 2012
- IR 1431523; 2MP06E Portion of Generator Diffuser Mounting Pant Leg Missing; October 25, 2012
- IR 1431541; A2R16 ODEN Breaker 2AP57E-G4 (233V5) 2AS01PA Failed to Trip; October 25, 2012
- IR 1431702; Pressurizer Safety Valve Lift Test Results; October 26, 2012
- IR 1431732; 2SI8811A Failed to Stroke During 2BwOSR 3.5.2.5; October 26, 2012
- IR 1431877; Proceduralized Operation of Turbine Building Louvers/Windows; October 26, 2012
- IR 1431996; NOS Id'd Red NER Actions Not Fully Implemented; October 26, 2012
- IR 1432051; FME in Cavity After MSIP; October 26, 2012
- IR 1432058; IEMA Identified Housekeeping Discrepancies; October 26, 2012
- IR 1432064; Weld Performed Incorrectly - Id'd In-Process; October 26, 2012
- IR 1432082; NOS ID: At Risk Behavior From Crane Operators on Turb Crane; October 26, 2012
- IR 1432091; FME: Foreign Objects Found in 2D SG Secondary A2R16; October 26, 2012
- IR 1432103; FME: Foreign Objects Found in 2B SG Secondary A2R16; October 27, 2012
- IR 1432105; FME: Foreign Objects Found in 2C SG Secondary A2R16; October 27, 2012
- IR 1432136; Bus 256 Cubicle 5 FU-14 Fuseholder Found Chipped; October 27, 2012
- IR 1432163; 2AF005B Plug was Found Galled; October 27, 2012
- IR 1432253; FME-Items Lodged in MS Dump Sparger Holes in Main Condenser; October 27, 2012
- IR 1432259; NOS ID Safety Concern with Chemical Addition; October 27, 2012
- IR 1432310; FME-Plastic Bristles Found on Main Condenser False Floor; October 27, 2012
- IR 1432330; Create WR to Overhaul and Inspect MOV 2CV112C Actuator; October 27, 2012
- IR 1432377; Received DC Bus 212 Ground; October 28, 2012
- IR 1432386; SX Spraying from 2A DG JW Cooler and Drain Hose on RTS; October 28, 2012

- IR 1432404; 2SI8811A Failed to Stroke Open; October 28, 2012
- IR 1432406; FME: Reactor Cavity FME Area Barrier Compromised; October 28, 2012
- IR 1432409; FME: Core Barrel Foreign Object From A2R13 Removed/Relocated; October 28, 2012
- IR 1432436; Fire Marshal ID: TCP Wrong Location Repeat Violation; October 28, 2012
- IR 1432553; Auxiliary Building Chiller in Action Level-1 Low Nitrites; October 28, 2012
- IR 1432613; Inappropriate Response to Unplanned ED Dose Rate Alarm; October 29, 2012
- IR 1432952; FME: Tape Found Floating Over Up-Ender Area; October 29, 2012
- IR 1433123; A2R16 - RFM Main Hoist Switch Required Replacement; October 30, 2012
- IR 1433712; Fukushima Walkdown Identified Screwdriver in MCC 1AP38E; October 31, 2012
- IR 1433715; Perform Trend Analysis of 2012 (YTD) Config Control Issues; October 31, 2012
- IR 1433889; Unit 2 RX Cavity Boot Pressure Required Adjustment; October 31, 2012
- IR 1434021; Unit 2 Reactor Cavity Input with Sump OOS; October 31, 2012
- IR 1434021; U2 Reactor Cavity Input with Sump OOS; October 31, 2012
- IR 1434068; A2R16 (2RC01R Remove Insul., Inspect Underside of RPV ASAP); October 31, 2012
- IR 1434191; Error in Braidwood ISFSI Pad Design Analysis; November 1, 2012
- IR 1434195; 2B CV Pump Coupling Guard Rubs on Shaft; November 1, 2012
- IR 1436053; HELB: Missed Engineering Milestone; November 5, 2012
- IR 1436233; 2MS001A Exceeded Stroke Time; November 5, 2012
- IR 1436277; When AF Diesel Started and Heated Up Site Glass Started Leak; November 5, 2012
- IR 1436316; IT Informed of ERDS Communication Issue; November 6, 2012
- IR 1436335; Large Delta Between Unit 2 HI Range Rad Monitors; November 6, 2012
- IR 1436349; EC #389459 - Wired Incorrectly Per the EC; November 6, 2012
- IR 1436357; Permanent Scaffold Needs Modification; November 6, 2012
- IR 1446361; NRC Question on 2DO002D; November 30, 2012
- IR 1436392; NOS ID Issues During Unit 2 Containment Walkdown; November 5, 2012
- IR 1436484; Unit 2 Incore Thermocouple #13 Has Failed; November 6, 2012
- IR 1436537; Could Not Complete Re-Install of Bent Over Stud; November 6, 2012
- IR 1436555; 2CV8146 Failed PMT Stroke; November 6, 2012
- IR 1436697; Valve Stroke 2SI8808D Leads to Pressure Drop and Alarms; November 6, 2012
- IR 1436643; A2R16: NRC Walkdown of Containment; November 6, 2012
- IR 1436714; Inadequate Deletion of TRM Section “Structural Integrity”; November 6, 2012
- IR 1436720; 2FI-928A Indication Issues During 2BwOSR 3.4.14.1; November 6, 2012
- IR 1436731; A2R17 (Snubber 2RY09062S, Reposition Spherical Bearing); November 6, 2012
- IR 1436777; Startup Feedwater Pump 2FW02P Failed to Start; November 6, 2012
- IR 1436787; NOS ID: FP Compensatory Actions Not in Place; November 7, 2012
- IR 1436795; Create EACE Assignments for 2MS004E Valve Failure; November 7, 2012
- IR 1436809; UAT 241-1 and UAT 241-2 Have Moisture in Cabinets; November 7, 2012
- IR 1436812; Known Gas Void Trended Upstream of 2SI8822A; November 7, 2012
- IR 1436815; Unit 2 In-Hold-Out Switch is Sticking; November 7, 2012
- IR 1437495; Spare Low Pressure Turbine Rotor Storage on Turbine Deck; November 8, 2012
- IR 1437603; Suitable Replacement Test Report Needed for Ametek Relays; November 8, 2012
- IR 1437682; 2A RCP Cooling Line 2VE-LM013 Causes Lo-Alarm; November 8, 2012
- IR 1437692; 2B RCP Cooling Line 2VE-LM014 Causes Lo-Alarm; November 8, 2012
- IR 1437771; Standing Order for Structural Integrity; November 8, 2012
- IR 1439340; Weather Balloon Fell Onto OCA Parking Lot; November 13, 2012
- IR 1453646; Actions Not Implemented to Correct a 2009 NRC NCV; December 18, 2012

- IR 1453677; Actions Were Potentially Not Implemented to Correct a 2010 NCV; December 18, 2012
- BwMS 3350-004; Quarterly Watertight Door Surveillance; Revision 4
- CY-BR-120-4120; Braidwood Station Lake Chemistry Strategic Plan; Revisions 4 and 5
- LS-AA-125; Corrective Action Program Procedure; Revision 17
- LS-AA-125-1003; Apparent Cause Evaluation Manual; Revision 10
- OP-AA-102-104; TRM 3.4.1 - Structural Integrity, Lot Number 12-013; November 8, 2012
- Nuclear Plant Chemistry Report; December 13, 2012
- Common Cause Analysis Report; Adverse Trends in Cooling Lake Water Quality; Revision 1
- Root Cause Investigation Report; Lake Chemistry Trends; January 22 through February 5, 2004
- Root Cause Investigation; Non-Essential Service Water Strainer Plugging (IR 0095525)

4OA5 Temporary Instruction TI-2515/187 and TIO-2515/188

- IR 1384815; Operations Support Required for Fukushima Seismic Walkdowns; July 3, 2012
- IR 1385063; Maintenance Support Required for Fukushima Seismic Walkdowns; July 3, 2012
- IR 1385069; RP Support Required for Fukushima Seismic Walkdowns; July 3, 2012
- IR 1396037; During Fukushima Seismic Walkdown MIN Clearance 2AF005G; August 1, 2012
- IR 1380104; Station Support Required for Fukushima Seismic Walkdowns; June 20, 2012
- IR 1387898; Emergent Dose Request to Support Fukushima Seismic Walkdowns; July 12, 2012
- IR 1389727; Fukushima Junction Box 1VX07J Not Mounted Per Design Drawing; July 17, 2012
- IR 1389743; Fukushima: Hairline Cracks Found at Anchors for Tank 1DO01TB; July 17, 2012
- IR 1389755; Fukushima: Hairline Cracks Found at Anchors for Tank 1DO01TD; July 17, 2012
- IR 1390326; Fukushima: Seismic Housekeeping Concern with RX Services Cabinet; July 18, 2012
- IR 1390831; Fukushima: Potential Unit 1 RWST Hatch Leakage; July 19, 2012
- IR 1394916; During Fukushima Seismic Walkdowns Loose Nut Found; July 30, 2012
- IR 1389428; Fukushima: Gap Identified in Unit 1 MESAC Machine Floor Shims; July 16, 2012
- IR 1394927; C Clamp Found Attached to Tube Steel in Fukushima Walkdown; July 30, 2012
- IR 1395456; During Fukushima Seismic Walkdown Open S-Hook Found; July 31, 2012
- IR 1395981; During Fukushima Seismic Walkdown Open S-Hook Found; August 1, 2012
- IR 1395992; During Fukushima Walkdown Open S-Hooks Found; August 1, 2012
- IR 1396940; Seismic Housekeeping Issues Found During Fukushima Walkdown; August 3, 2012
- IR 1396953; Housekeeping Issue Found During Fukushima Seismic Walkdown; August 3, 2012
- IR 1396872; Seismic Housekeeping Issues Found During Fukushima Walkdown; August 3, 2012
- IR 1396891; Seismic Housekeeping Issues Found During Fukushima Walkdown; August 3, 2012
- IR 1397564; Housekeeping Issues Found During Fukushima Seismic Walkdowns; August 6, 2012
- IR 1396566; During Fukushima Walkdown Cracks in 2DO01TA Tank Pad; August 2, 2012
- IR 1397619; Seismic Housekeeping Issues Found During Fukushima Walkdown; August 6, 2012
- IR 1397627; Seismic Housekeeping Issues Found During Fukushima Walkdown; August 6, 2012

- IR 1397636; Seismic Housekeeping Issues Found During Fukushima Walkdown; August 6, 2012
- IR 1397642; Seismic Housekeeping Issues Found During Fukushima Walkdown; August 6, 2012
- IR 1397654; Seismic Housekeeping Issues Found During Fukushima Walkdown; August 6, 2012
- IR 1397680; Seismic Housekeeping Issues Found During Fukushima Walkdown; August 6, 2012
- IR 1400011; Emergent Dose Required to Support Fukushima Walkdowns; August 13, 2012
- IR 1402163; Fukushima Flood Walkdowns Found Seismic Housekeeping Issues; August 17, 2012
- IR 1400245; During Fukushima Walkdowns Evidence of Past Water Intrusion; August 13, 2012
- IR 1400261; During Fukushima Walkdowns Evidence of Past Water Intrusion; August 13, 2012
- IR 1400267; During Fukushima Walkdown Evidence of Ground Water Intrusion; August 13, 2012
- IR 1400269; During Fukushima Walkdowns Evidence of Past Water Intrusion; August 13, 2012
- IR 1400274; During Fukushima Walkdowns Evidence of Past Water Intrusion; August 13, 2012
- IR 1400727; During Fukushima Walkdowns Evidence of Past Water Intrusion; August 14, 2012
- IR 1400728; During Fukushima Walkdowns Evidence of Past Water Intrusion; August 14, 2012
- IR 1400730; During Fukushima Walkdowns Evidence of Past Water Intrusion; August 14, 2012
- IR 1400732; During Fukushima Walkdowns Evidence of Past Water Intrusion; August 14, 2012
- IR 1401170; During Fukushima Walkdowns Topography Changes Identified; August 15, 2012
- IR 1402113; Fukushima Walkdown Pipe in Exterior Seismic Joint; August 17, 2012
- IR 1402151; Fukushima Determine Long-Term Resolution of Drain Pipes; August 17, 2012
- IR 1402170; Fukushima Unit 2 RWST Hatch Leakage; August 17, 2012
- IR 1402633; Fukushima Walkdown MSIV Room Interior Seismic Joint; August 20, 2012
- IR 1402706; During Fukushima Walkdown Housekeeping Issue Identified; August 20, 2012
- IR 1402752; During Fukushima Walkdowns Evidence of Ground Water Intrusion; August 20, 2012
- IR 1402930; During Fukushima Walkdowns Evidence of Past Water Intrusion; August 21, 2012
- IR 1402965; Fukushima Walkdown Identified Concrete Spall on Curved Wall; August 21, 2012
- IR 1403499; During Fukushima Walkdowns Evidence of Past Water Intrusion; August 22, 2012
- IR 1404165; During Fukushima Walkdowns Evidence of Past Water Intrusion; August 23, 2012
- IR 1404765; During Fukushima Walkdowns Evidence of Past Water Intrusion; August 24, 2012
- IR 1404810; Fukushima Effect of Local Probable Maximum Precipitation; August 24, 2012
- IR 1427471; Groundwater in-Leakage Fukushima Walkdown U2 AF Tunnel; October 17, 2012
- IR 1428041; Fukushima Flooding Walkdown Inactive Leaks in U2 AF Tunnel; October 18, 2012
- IR 1429724; Fukushima Walkdown Tray Hanger in Contact with Bus 231X; October 22, 2012

- IR 1433712; Fukushima Walkdown Identified Screwdriver in MCC 1AP38E; October 31, 2012
- IR 1455106; Fukushima Flooding Walkdowns; December 21, 2012
- IR 1457895; Fukushima: Supplemental E-2 Seismic Walkdown Inspections; January 3, 2012
- IR 1457902; Fukushima: Supplemental E-2 Seismic Walkdown Inspections; January 3, 2012

4OA5 Temporary Instruction 2515/177

- EC378161; Revise the Design Bases to Accept Potential Voided Piping Downstream of the 1/2CS009A Valves and the 1/2SI8811A/B Valves; October 22, 2010
- NAI-1459-001; "Comparison Of GOTHIC Gas Transport Calculations With Test Data;" Revision 1

LIST OF ACRONYMS USED

ACE	Apparent Cause Evaluation
ADAMS	Agencywide Document Access Management System
ALARA	As-Low-As-Is-Reasonably-Achievable
AR	Action Request
ASME	American Society of Mechanical Engineers
BA	Boric Acid
BACC	Boric Acid Corrosion Control
CAP	Corrective Action Program
CFR	Code of Federal Regulations
CS	Containment Spray
CW	Circulating Water
ΔCDF	Delta Core Damage Frequency
DIF	Dynamic Increase Factor
DLOOP	Dual Unit Loss of Off-Site Power
DOST	Diesel Oil Storage Tank
ECCS	Emergency Core Cooling System
ECR	Engineering Change Request
EDG	Emergency Diesel Generator
EJ	Expansion Joint
EPRI	Electric Power Research Institute
EPIP	Emergency Plan Implementing Procedure
ESF	Engineered Safety Feature
ET	Eddy Current
HELB	High Energy Line Break
gpm	gallons per minute
IEF	Initiating Event Frequency
IMC	Inspection Manual Chapter
I/O	Input/Output
IP	Inspection Procedure
IR	Issue Report/Inspection Report
ISI	Inservice Inspection
kV	Kilovolt
LCO	Limiting Condition for Operation
LER	Licensee Event Report
LERF	Large Early Release Frequency
LOCA	Loss-of-Coolant-Accident
LOOP	Loss of Offsite Power
LORT	Licensed Operator Requalification Training
MOR	Modulus of Rupture
MSIV	Main Steam Isolation Valve
MSPI	Mitigating Systems Performance Index
NCV	Non-Cited Violation
NDE	Non-Destructive Examination
NDIT	Nuclear Design Information Transmittal
NEI	Nuclear Energy Institute
NRC	U.S. Nuclear Regulatory Commission
NRR	Office of Nuclear Reactor Regulation
NSIR	Nuclear Security and Incident Response

OSP	Outage Safety Plan
PARS	Publicly Available Records System
PBI	Plant Barrier Impairment
pcf	pounds per cubic foot
PI	Performance Indicator
psi	pounds per square inch
psid	pounds per square inch differential
PT	Dye Penetrant
QHPI	Quick Human Performance Investigation
RASP	Risk Assessment Standardization Prospect
RCS	Reactor Coolant System
RFO	Refueling Outage
RHR	Residual Heat Removal
ROP	Reactor Oversight Process
SAT	Systems Approach to Training
SDP	Significance Determination Process
SG	Steam Generator
SO	Operations Department Standing Order
SPAR	Standardized Plant Analysis Risk
SRA	Senior Reactor Analyst
SSC	Structures, Systems, and Components
SX	Essential Service Water
TI	Temporary Instruction
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
URI	Unresolved Item
UT	Ultrasonic Examination
Vdc	Volts Direct Current
WO	Work Order

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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: Inspection Report 05000456/2012005; 05000457/2012005
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Letter to M. Pacilio from E. Duncan dated February 7, 2013.

SUBJECT: BRAIDWOOD STATION, UNITS 1 AND 2, NUCLEAR REGULATORY COMMISSION INTEGRATED INSPECTION REPORT 05000456/2012005; 05000457/2012005

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