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

November 13, 2014

Mr. Michael J. Pacilio
Senior VP, Exelon Generation Co., LLC
President and CNO, Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: BRAIDWOOD STATION, UNITS 1 AND 2, NRC INTEGRATED INSPECTION REPORT 05000456/2014004; 05000457/2014004 AND 07200073/2014001

Dear Mr. Pacilio:

On September 30, 2014, the U.S. Nuclear Regulatory Commission (NRC) completed an integrated inspection at your Braidwood Station, Units 1 and 2. On October 22, 2014, the NRC inspectors discussed the results of this inspection with Mr. M. Kanavos, and other members of your staff. The inspectors documented the results of this inspection in the enclosed inspection report.

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.

Based on the results of this inspection, three NRC-identified and two self-revealed findings of very low safety significance were identified. 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, a licensee-identified violation is listed in Section 4OA7 of this report.

If you contest the subject or severity of these NCVs, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with 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 the Resident Inspector Office at the Braidwood Station. In addition, if you disagree with the cross-cutting aspect assigned to any finding in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region III, and the NRC Resident Inspector at 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.htm (the Public Electronic Reading Room).

Sincerely,

/RA/

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

Docket Nos. 50–456; 50–457
License Nos. NPF–72; NPF–77

Enclosure:
IR 05000456/2014004; 05000457/2014004
and 07200073/2014001
w/Attachment: Supplemental Information

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Nos:	50–456; 50–457
License Nos:	NPF–72; NPF–77
Report No:	05000456/2014004; 05000457/2014004
Licensee:	Exelon Generation Company, LLC
Facility:	Braidwood Station, Units 1 and 2
Location:	Braceville, IL
Dates:	July 1 through September 30, 2014
Inspectors:	J. Benjamin, Senior Resident Inspector D. Betancourt, Resident Inspector R. Jickling, Senior Emergency Preparedness Inspector, Region III B. Boston, Reactor Inspector R. Edwards, Reactor Inspector, Materials Control, ISFSI, and Decommissioning Branch J. Laughlin, Emergency Preparedness Inspector, Nuclear Security and Incident Response (NSIR) M. Learn, Reactor Inspector, Materials Control, ISFSI, and Decommissioning Branch L. Rodriguez, Reactor Inspector T. Go, Health Physicist 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 05000456/2014004; 05000457/2014004 and 07200073/2014001; 07/01/2014–09/30/2014; Braidwood Station, Units 1 & 2; Flood Protection Measures; Operability Determinations and Functionality Assessments; Post-Maintenance Testing; Emergency Preparedness.

This report covers a 3-month period of inspection by resident inspectors and announced baseline inspections by regional inspectors. Three Green findings were identified by the inspectors and two Green findings were self-revealed. The findings were considered Non-Cited Violations (NCVs) of NRC regulations. The significance of inspection findings is indicated by their color (i.e., Greater than Green, or Green, White, Yellow, Red) and determined using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process (SDP)," dated June 2, 2011. Cross-cutting aspects are determined using IMC 0310, "Aspects Within the Cross-Cutting Areas," dated January 1, 2014. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy dated July 9, 2013. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG–1649, "Reactor Oversight Process," Revision 5, dated February 2014.

Cornerstone: Mitigating Systems

Green. The inspectors identified a finding of very low safety significance and an associated NCV of 10 CFR Part 50, Appendix B, Criterion III "Design Control," when licensee personnel failed to verify the design of bag-strainers in the floor drains of the auxiliary building and their impact on the associated flooding analysis. Specifically, when Calculation 3C8–0686–002, "Auxiliary Building Flood Level Calculation," was revised on May 16, 2013, the licensee credited the use of floor drains, which had bag-type strainers that were designed in such a way that they increased the potential for blockage, and therefore adversely impacted the analysis of record for internal flooding. This issue was entered into the licensee's Corrective Action Program (CAP) as Issue Report (IR) 2385204, "NRC Questions on Aux [Auxiliary] Building Flood Evaluation." Corrective actions for this issue included instituting Standing Order 14–005 to prevent the interim removal of flood seals, and a plan to revise Calculation 3C8–0685–002 to resolve the identified non-conformances.

The inspectors determined that the performance deficiency was more than minor in accordance with IMC 0612, Appendix B, "Issue Screening," because the issue was associated with the Design Control attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, the floor drain strainer bags were inadequately designed in such a manner that instead of ensuring that the floor drains would be able to function properly to remove flood water, they would act to increase the possibility that the floor drains would become plugged and unable to perform this function adequately. The inspectors concluded that the finding was of very low safety significance in accordance with IMC 0609, Appendix A, Exhibit 2 and Exhibit 4. The inspectors determined that the finding had a cross-cutting aspect in the Evaluation component of the Problem Identification and Resolution (PI&R) cross-cutting area because the licensee failed to thoroughly evaluate the issue to ensure that the resolution addressed the causes. Specifically, when the licensee made a major revision to Calculation 3C8–0685–002 in 2013 to, in part, incorporate minor revisions and address non-conservatisms in the calculation, the licensee failed to adequately consider a previous minor revision that had removed credit for

the drain system due to problems with its design that were previously identified by the NRC (P.2). (Section 1R06.1b)

Green. The inspectors identified a finding of very low safety significance and an associated NCV of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," when licensee personnel failed to follow procedure OP–AA–108–115, "Operability Determinations." Specifically, licensee personnel failed to adhere to numerous Operability Determination Process standards after identifying a non-conforming condition that had the potential to impact the operability of the Ultimate Heat Sink (UHS). This issue was entered into the licensee's CAP as IR 1674557, "Question on UHS License Amendment Request Impact on Pumps," and IR 1675291, "Unanalyzed Condition Identified During IR 1674557 Response." Corrective actions included correcting the non-conforming condition by revising the abnormal operating procedures to be aligned with the current licensing basis (CLB).

The inspectors determined that the performance deficiency was more than minor in accordance with IMC 0612, Appendix B, "Issue Screening," because the issue was associated with the Design Control 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, based on the analysis of record, at the time of discovery there was reasonable doubt that the UHS could meet its mission time of 30 days. The inspectors determined that the finding was of very low safety significance in accordance with IMC 0609, Appendix A, Exhibit 2, since it was determined to not represent a confirmed loss of operability. The inspectors concluded that this finding had a cross-cutting aspect in the Conservative Bias component of the Human Performance cross-cutting area because the licensee failed to use conservative assumptions in their decision-making when evaluating the operability of the UHS. Specifically, operations did not request a documented evaluation to support understanding why the UHS was operable and to verify that their assumptions regarding operator actions were feasible (H.14). (Section 1R15.2b)

Green. A finding of very low safety significance and an associated NCV of Braidwood Operating License Condition 2.E, "Fire Protection Program," was self-revealed during the performance of a scheduled diesel-driven fire pump (DDFP) sequential start surveillance when the DDFP was observed by operators to start, but then cycle on and off. The DDFP was declared non-functional and a subsequent causal evaluation determined that an incorrectly designed DDFP stop pushbutton switch had been installed several months prior to the identification of the issue. The licensee entered this issue into their CAP as IR 1649515, "Incorrect Stop Pushbutton Installed on 0B Fire Pump." Corrective actions included replacing the switch with a switch of a correct design.

The inspectors determined that the performance deficiency was more than minor in accordance with IMC 0612, Appendix B, "Issue Screening," because the issue was associated with the Equipment Performance attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, the performance deficiency resulted in a non-functional DDFP. The finding was determined to be of very low safety significance by a NRC Senior Reactor Analyst. The inspectors concluded that this finding had a cross-cutting aspect in the Avoid Complacency component of the Human Performance cross-cutting area because the licensee did not adequately recognize and plan for the possibility that the DDFP stop pushbutton replacement

switch design could have been different than plant-specific design requirements (H.12). (Section 1R19.1b)

Green. A finding of very low safety significance and an associated NCV of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," was self-revealed on May 21, 2014, when licensee personnel failed to use a quality instruction to reposition Unit 2 safety-related pressurizer pressure transmitter isolation valve 2PT–458. Specifically, although the licensee identified that safety-related 2PT–458 had been isolated from service and was not in service during a plant startup, as anticipated, the licensee could not locate the work instruction that isolated the instrument from service. The licensee entered this issue into their CAP as IR 1663588, "Level 3 CCE–2PT–0458 Found Isolated." Corrective actions included restoring the pressure transmitter to service by opening a shut isolation valve and performing a causal evaluation.

The inspectors determined that the performance deficiency was more than minor in accordance with IMC 0612, Appendix B, "Issue Screening," because the issue was associated with the Equipment Performance attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, as a result of the performance deficiency, the automatic function of pressurizer power-operated relief valve (PORV) 2RY–455A was not available for a number of days to perform its design function to mitigate an Anticipated Transient Without Scram (ATWS) event. In addition, IMC 0612, Appendix E, "Examples of More than Minor Inspection Findings," Example 7e, informed this more-than-minor bases. Specifically, the issue was more than minor because it resulted in overall plant risk being in a higher risk category (i.e., Yellow vs. Green). The inspectors determined that the issue was of very low safety significance in accordance with IMC 0609, Attachment 4, "Initial Characterization of Findings." In particular, Table 3, "SDP Appendix Router," directed that the finding be screened using IMC 0609, Appendix A, "The Significance Determination Process for At-Power Findings." The inspector answered 'No' to all of the associated Mitigating Systems screening questions. This finding did not have an assigned cross-cutting aspect because the cause of the performance deficiency was indeterminate. (Section 1R19.2b)

Cornerstone: Emergency Preparedness

Green. The NRC identified a finding of very low safety significance and an associated NCV of 10 CFR 50.54(q)(2) related to 10 CFR 50.47(b)(10) and 10 CFR Part 50, Appendix E, Section IV.4, for failing to maintain the effectiveness of the Braidwood Station Emergency Plan as a result of failing to provide the station Evacuation Time Estimate (ETE) to the responsible offsite response organizations by the required due date.

Exelon submitted the Braidwood Station ETE to the NRC on December 12, 2012, prior to the required due date of December 22, 2012. However, an NRC review found the ETE to be incomplete due to Exelon fleet common and site-specific deficiencies, thereby preventing Exelon from providing the ETE to responsible offsite response organizations and from updating site-specific protective action strategies as necessary. The NRC discussed its concerns regarding the completeness of the ETE in a teleconference with Exelon on June 10, 2013, and on September 5, 2013, Exelon resubmitted the ETEs for its sites. Subsequently, the NRC again found the ETE to be incomplete. Exelon's failure to submit a complete updated ETE for Braidwood Station by December 22, 2012, was a licensee performance deficiency because the issue was a failure to comply with a regulatory requirement and the issue was reasonably within

the licensee's ability to foresee and correct, and therefore should have been prevented. The inspectors determined the performance deficiency was more than minor because it was associated with the Emergency Preparedness cornerstone attribute of Procedure Quality and adversely affected the cornerstone objective of ensuring that the licensee was capable of implementing adequate measures to protect the health and safety of the public in the event of a radiological emergency. The finding was of very low safety significance because it was a failure to comply with a non-risk significant portion of 10 CFR 50.47(b)(10). The licensee entered this issue into their CAP and re-submitted a new revision of the Braidwood Station ETE to the NRC on May 2, 2014. The inspectors concluded that this finding had a cross-cutting aspect in the Documentation component of the Human Performance cross-cutting area (H.7). (Section 1EP5.1b)

Licensee-Identified Violations

A violation of very low safety significance that was identified by the licensee was reviewed by the NRC. Corrective actions taken or planned by the licensee were entered into the licensee's CAP. This violation and CAP 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 entire inspection period.

Unit 2 operated at or near full power during the entire inspection period.

1. REACTOR SAFETY

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

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:

- 1A Auxiliary Feedwater System with 1B Auxiliary Feedwater Out-of-Service for Planned Maintenance;
- Direct Current Bus 112 with Direct Current Bus 111 Out-of-Service for Planned Maintenance; and
- Alternating Current Bus 141 in Conjunction with System Auxiliary Transformer Maintenance.

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 Updated Final Safety Analysis Report (UFSAR), Technical Specification (TS) requirements, outstanding Work Orders (WOs), Issue Reports (IRs), 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 Corrective Action Program (CAP) with the appropriate significance characterization. Documents reviewed are listed in the Attachment.

These activities constituted three partial system walkdown samples as defined in Inspection Procedure (IP) 71111.04–05.

b. Findings

No findings were identified.

.2 Semi-Annual Complete System Walkdown

a. Inspection Scope

On July 30, 2014, the inspectors performed a complete system alignment inspection of the Unit 2 auxiliary feedwater system to verify the functional capability of the system. This system was selected because it was considered both safety-significant and risk-significant in the licensee's probabilistic risk assessment. The inspectors walked down the system to review mechanical and electrical equipment lineups, electrical power availability, system pressure and temperature indications, component labeling, component lubrication, component and equipment cooling, hangers and supports, the operability of support systems, and to ensure that ancillary equipment or debris did not interfere with equipment operation. A review of a sample of past and outstanding WOs was performed to determine whether any deficiencies significantly affected the system function. In addition, the inspectors reviewed the CAP database to ensure that system equipment alignment problems were being identified and appropriately resolved. Documents reviewed are listed in the Attachment.

These activities constituted one complete system walkdown sample 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:

- Fire Zone 11.4–0 South, "AB [Auxiliary Building] 383' Unit 2 Auxiliary Building General Area–South;"
- Fire Zone 5.4–1, "Switchgear 451' Division 12 MEER [Miscellaneous Electrical Equipment Room] & Battery Room;"
- Fire Zone 5.5–2, "Switchgear 451' Unit 2 Auxiliary Electrical Equipment Room;"
- Fire Zone 11.3A–1, "AB 364' Safety Injection Pump 1A Room;"
- Fire Zone 11.4A–2, "AB 383' Unit 2 Auxiliary Feedwater Pump Diesel Room;" and
- Fire Zone 8.6–D, "Turbine Building 451' Unit 1 Operating Floor South East Corner."

The inspectors reviewed areas to assess if the licensee had implemented a fire protection program that adequately controlled combustibles and ignition sources within

the plant, effectively maintained fire detection and suppression capability, maintained passive fire protection features in good material condition, and implemented adequate compensatory measures for out-of-service, degraded, or inoperable fire protection equipment, systems, or features in accordance with the licensee's fire 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 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.

These activities constituted six quarterly fire protection inspection samples as defined in IP 71111.05–05.

b. Findings

No findings were identified.

.2 Annual Fire Protection Drill Observation (71111.05A)

a. Inspection Scope

On August 28, 2014, the inspectors observed an announced fire drill for a simulated fire in the vicinity of the Unit 1 Station Air Compressor. Based on this observation, the inspectors evaluated the readiness of the plant fire brigade to fight fires. The inspectors determined whether the licensee staff identified deficiencies, openly discussed them in a self-critical manner at the drill debrief, and took appropriate corrective actions. Specific attributes evaluated included the following:

- proper wearing of turnout gear and self-contained breathing apparatus;
- proper use and layout of fire hoses;
- employment of appropriate firefighting techniques;
- sufficient firefighting equipment brought to the scene;
- effectiveness of fire brigade leader communications, command, and control;
- search for victims and propagation of the fire into other plant areas;
- smoke removal operations;
- utilization of pre-planned strategies;
- adherence to the pre-planned drill scenario; and
- drill objectives.

Documents reviewed are listed in the Attachment. These activities constituted one annual fire protection inspection sample as defined in IP 71111.05–05.

b. Findings

No findings were identified.

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. The 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 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 area 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:

- Essential Service Water (SX) Pump Room Flooding Hatches.

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

b. Findings

Adverse Impact of Floor Drain Design on Flooding Analysis

Introduction: The inspectors identified a finding of very low safety significance (Green) and an associated NCV of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," when licensee personnel failed to verify the impact of bag-strainers in the floor drains of the auxiliary building and their impact on the flooding analysis. Specifically, when Calculation 3C8–0686–002, "Auxiliary Building Flood Level Calculation," was revised on May 16, 2013, the licensee credited the use of floor drains which had bag-type strainers, and which were designed in such a way that they increased the potential for blockage, and therefore adversely impacted the analysis of record for internal flooding.

Description: On September 11, 2014, the licensee identified through IR 2238242, "BwAP 1110–3 Flood Measures Non–Conservative," that there were inconsistencies in the basis for flood measures associated with the removal of flood seals (large rectangular concrete plugs) on the 346' elevation of the auxiliary building. These flood seals were designed to protect the safety-related equipment within the SX pump rooms from flooding from above on the 346' elevation of the auxiliary building. On occasion, these flood seals were removed in order to access equipment in the room for maintenance.

A plant barrier impairment permit was used to facilitate the removal of the flood seals at power and without causing the equipment in the SX pump rooms below the seals to be inoperable by demonstrating, in part, that the design basis operational flood level of 12 inches in the SX pump rooms would not be achieved within 30 minutes, by which time the leak would be terminated in accordance with the licensing bases. As part of the evaluation, the drain system was credited for diverting 2 ft^3/sec (cubic feet per second) of

water away from the flood seals during a design basis flooding event. However, the licensee identified in IR 2238242 that Calculation 3C8–0686–002 specified that the drain system could only divert 0.992 ft^3/sec. After discovering this error, the licensee instituted Standing Order 14–005, "Awareness of SX Pump Room Flood Barrier Requirements," to prevent the removal of the flood seals and created Engineering Change (EC) 399386, "SX Pump Room Flood Seal Opening Evaluation," to evaluate the past operability of the SX pumps during times when the flood seals were removed.

The inspectors reviewed Standing Order 14-005, EC 399386, and Calculation 3C8–0686–002, to better understand the issue. During this review, the inspectors identified that in 2010 the licensee had received an NRC violation as documented in NRC Inspection Report 05000456/2010007–04; 05000456/2010007–04, "Adverse Impact of Flood Drain Strainer Design Modification on Flooding Analysis," related to the adverse impact of a floor drain strainer design modification on the flooding analysis. Specifically, the issue involved the concern that, "during an internal flooding event, foreign material washed into the drain could quickly build-up in the bottom of the [strainer basket] bag to the point of completely plugging the floor drain outlet pipe by the hydraulic force of the flood water." The issue was documented in IR 1043396, "CDBI [Component Design Bases Inspection]–Basket Strainers May Adversely Affect Some Floor Drains." As part of the interim actions taken by the licensee for this violation, the licensee performed a preliminary flood re-analysis through EC 379355, "Blocked Floor Drain Evaluation," which took no credit for the drain system and was used to demonstrate that safe shutdown could still be attained for certain critical areas. Critical areas, in this context, were areas the licensee had determined were required for safe shutdown. One of the planned corrective actions for this issue was a revision to the auxiliary building flooding calculation to remove credit for the outflow from local floor drains that had strainer baskets installed. This action was closed to IR1290617, "Inaccuracies in Flood Level Calculation for Flood Zone G9–1." The corrective action that resulted from IR 1290617 was a minor revision (Revision 13I) to Calculation 3C8–0685–002, which incorporated EC 379355 as an Appendix to the calculation on December 14, 2012. However, the inspectors' review of EC 379355 identified that not all areas discussed in Calculation 3C8–0685–002 were evaluated in the EC. For example, "general area" breaks and their effect on safe shutdown were not considered.

The inspectors also noted that in the major revision to Calculation 3C8–0685–002, which was issued on May 16, 2013, the licensee re-introduced the credit for the drain system without evaluating the impact of the drain system design deficiency. The inspectors were concerned that since the original issue was corrected by not crediting the drain, re-introducing the credit without understanding the impact could lead to future modifications to the site that credited a system that did not function as designed. As a result, the level of water in the SX pump rooms may be higher than predicted and potentially impact operability. The inspectors discussed this issue with the licensee and expressed their concern with crediting the drain system when there was a known design deficiency associated with it that had not been adequately addressed.

The licensee subsequently re-evaluated the issue and generated IR 2385204, "NRC Questions on Aux [Auxiliary] Building Flood Evaluation." The inspectors noted that without crediting the drain system, there were breaks that were assumed to occur which could have an adverse impact in the room and potentially exceed the operational flood level of 12 inches in 30 minutes. The licensee stated that from Calculation 3C8–0685–002 there were three breaks in general areas that had the potential to affect

the SX pump room with the flood seals removed: 1) a leak on a 30-inch non-essential service water line at elevation 383', and 2) a leak on a 20-inch non-essential service water line at elevation 401' and 3) a leak on a 20-inch non-essential service water line at elevation 451'. For the two breaks associated with the 20-inch line, the licensee credited a small break size based on an over-conservatism used in the break. In the case of the 30-inch line, the licensee postulated that the break did not need to be assumed based on the stresses of the line being below that required by the Standard Review Plan and associated CLB requirements.

The licensee entered the issues described above into their CAP as IR 2385204. Corrective actions for this issue included instituting Standing Order 14–005 to prevent the interim removal of the flood seals, and a plan to revise Calculation 3C8–0685–002 to resolve the identified non-conformances.

Analysis: The inspectors determined that the failure to fully verify the adequacy of the design of bag-type strainer baskets related to the potential to plug the floor drains was contrary to the requirements of 10 CFR 50, Appendix B, Criterion III, "Design Control," and was a performance deficiency.

The inspectors determined that the performance deficiency was more than minor in accordance with IMC 0612, Appendix B, "Issue Screening," because the issue was associated with the Design Control attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, the floor drain strainer bags were inadequately designed such that instead of ensuring that the floor drains would be able to function properly to remove water, they would act to increase the potential that the floor drains would become plugged and be unable to perform this function adequately. This condition was first identified in 2010, and in 2013 the licensee credited the use of floor drains which had bag-type strainers without verifying the design, which therefore adversely impacted the analysis of record for internal flooding. The inspectors determined that the finding could be evaluated using the SDP in accordance with IMC 0609, "Significance Determination Process," Attachment 0609.04, "Initial Characterization of Findings," dated June 19, 2012, and Appendix A, "The Significance Determination Process for Findings At-Power," Exhibit 2 and Exhibit 4, "Mitigating Systems Screening Questions," dated June 19, 2012. The inspectors determined that the finding did not involve the confirmed loss or degradation of equipment or function specifically designed to mitigate a flooding event and therefore the issue screened as having very low safety significance (Green).

The inspectors determined that the finding had a cross-cutting aspect in the Evaluation component of the PI&R cross-cutting area because the licensee failed to thoroughly evaluate the issue to ensure that that resolution addressed the causes. Specifically, when the licensee made a major revision to Calculation 3C8–0685–002 in 2013 to, in part, incorporate minor revisions and address non-conservatisms in the calculation, they did not take into consideration that a previous minor revision had removed credit for the drain system due to problems with its design that were previously identified by the NRC (P.2).

Enforcement: Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that design control measures provide for verifying or checking the adequacy of

design, by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable design program.

Contrary to the above, as of September 30, 2014, the licensee failed to verify the design adequacy of the basket-style bag strainers installed since 1996. Specifically, the licensee failed to adequately ensure that bag-type strainers installed in the auxiliary building did not adversely impact the system design.

Corrective actions for this issue included instituting Standing Order 14–005 to prevent the interim removal of the flood seals, and a plan to revise Calculation 3C8–0685–002 to resolve the identified non-conformances. Because this violation was of very low safety significance and it was entered into the licensee's CAP as IR 2385204, this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy **(NCV 05000456/2014004–01; 05000457/2014004–01, Adverse Impact of Floor Drain Design on Flooding Analysis)**.

.2 Underground Vaults

a. Inspection Scope

The inspectors selected underground bunkers/manholes subject to flooding that contained cables whose failure could disable risk-significant equipment. The inspectors determined whether the cables were submerged, whether splices were intact, and whether appropriate cable support structures were in place. In those areas where dewatering devices were used, such as a sump pump, the inspectors determined whether the device was operable and level alarm circuits were set appropriately to ensure that the cables would not be submerged. In those areas without dewatering devices, the inspectors verified that drainage of the area was available, or that the cables were qualified for submerged conditions. The inspectors also reviewed the licensee's corrective action documents with respect to past submerged cable issues identified in the CAP to verify the adequacy of the corrective actions. The inspectors performed a walkdown of the following underground bunkers/manholes subject to flooding:

- Cable Vault Pumps 2A, 2B, 2C, 2G, 2N, 1E, 1F, and 1K.

Documents reviewed are listed in the Attachment. This inspection constituted one underground vaults sample as defined in IP 71111.06–05.

b. Findings

No findings were identified.

1R07 Annual Heat Sink Performance (71111.07)

.1 Heat Sink Performance

a. Inspection Scope

The inspectors reviewed the licensee's testing of Unit 0 component cooling water heat exchanger performance to determine whether potential deficiencies masked the licensee's ability to detect degraded performance, to identify any common cause issues

that had the potential to increase risk, and to ensure that the licensee was adequately addressing problems that could result in initiating events that would cause an increase in risk. The inspectors compared the licensee's observations to testing acceptance criteria, the correlation of scheduled testing and the frequency of testing, and the impact of instrument inaccuracies on test results. The inspectors also verified that test acceptance criteria considered differences between test conditions and design conditions. Documents reviewed are listed in the Attachment.

This annual heat sink performance inspection constituted one sample as defined in IP 71111.07–05.

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 September 2, 2014, the inspectors observed a crew of licensed operators in the plant simulator during licensed operator requalification training to determine whether operator performance was adequate, whether evaluators were identifying and documenting crew performance problems, and whether training was being conducted in accordance with licensee procedures. The inspectors evaluated the following areas:

- licensed operator performance;
- crew clarity and formality of communications;
- the 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
- the 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 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.

b. Findings

No findings were identified.

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

a. Inspection Scope

On September 4, 2014, the inspectors observed the operation of Unit 2 with control rods in manual (Shutdown Bank E failed to move during a routine surveillance). This was an activity that required heightened awareness or was related to increased risk. The inspectors evaluated the following areas:

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

The performance in these areas was compared to pre-established operator action expectations, procedural compliance, and 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.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12)

.1 Routine Quarterly Evaluations

a. Inspection Scope

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

- Radiation Monitors; and
- Auxiliary Building Ventilation System.

The inspectors reviewed events including those where 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 or condition problems 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;
- charging 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 systems, structures, and 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 licensee's CAP with the appropriate significance characterization. Documents reviewed are listed in the Attachment.

This inspection constituted two 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 the appropriate risk assessments were performed prior to removing equipment for work:

- Unit 2 Voltage Regulator Firing Card Replacement;
- Unit 2 Main Power Transformer 'Y' Connection 'A' Phase Bypass Jumper Installation;
- 1B Auxiliary Feedwater Pump Out-of-Service for Planned Maintenance–Planned Yellow Risk; and
- Battery Bus 111 Out-of-Service for Planned Maintenance–Planned Yellow Risk.

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 complete and accurate. 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. These maintenance risk assessments and emergent work control activities constituted four 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:

- Functionality of Extraction Steam Line With a Broken Support;
- Functionality Assessment of Unit 1 Loose Parts Monitor (1VE–LM–006) Background Noise;
- Potential Quality Issues with Nozzle Fuel Assemblies;
- Part 21 ABB K–Line Circuit Breakers; and
- Unit 2 Area Radiation Monitor (2AR12) Adverse Trend Identified.

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 TSs and the 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 operability inspection constituted five samples as defined in IP 71111.15–05.

b. Findings

No findings were identified.

.2 (Discussed) Unresolved Item 05000456/2014003–01;05000457/2014003–01: Issues That Could Adversely Affect the Ultimate Heat Sink

a. Inspection Scope

As discussed in NRC Inspection Report 05000456/2014003; 05000457/2014003, this unresolved item (URI) was opened to evaluate four issues of concern after the licensee discovered that station procedures to address a failure of the Braidwood cooling lake

dike did not include steps to secure nonsafety-related pumps, although the UFSAR stated and design calculations assumed that all nonsafety-related circulating water pumps and service water pumps would be secured.

During this inspection period, the inspectors reviewed the licensee's past operability determination, timeline of events, and the UFSAR to address Issues of Concern #1, #2 and #3. Issue of Concern #1 questioned whether the bases for UHS operability were consistent with the definition of operability in the site-specific TSs and the licensee's Operability Determination procedure. Issue of Concern #2 questioned whether the station had adhered to OP–AA–108–115, "Operability Determinations," that required the Shift Manager and/or Unit Supervisor to be informed of a potential operability issue in a timely manner. Finally, Issue of Concern #3 was related to the implementation of a Standing Order without performing a 10 CFR 50.59 and/or Generic Letter 86–10 review. The inspectors identified a finding related to these items. Additionally, a related licensee-identified NCV is discussed in Section 4OA7 of this report.

This URI remains open pending resolution of Issue of Concern #4 associated with the Safety Category II SSC interaction with the UHS.

b. Findings

Multiple Failures to Follow the Operability Evaluation Process Following the Discovery of a Non-Conforming Condition in the Ultimate Heat Sink

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 adhere to Operability Determination Process standards after identifying a non-conforming condition that had the potential to impact the operability of the UHS.

Description: On June 24, 2014, the licensee identified that station procedures used to address a failure of the Braidwood cooling lake dike did not include steps to secure nonsafety-related pumps, including circulating water pumps and non-essential service water pumps, that take a suction from the UHS and discharge to a location outside of the UHS. Securing these nonsafety-related pumps was a design assumption that was specified in the UFSAR and supported in an associated calculation.

Following the discovery of this issue, the licensee generated IR 1674557, "Question on UHS License Amendment Request Impact on Pumps," which documented that Abnormal Operating Procedure BwOA ENV–3, "Braidwood Cooling Lake Low Level," did not direct nonsafety-related pumps that take a suction from the UHS and discharge outside of the UHS to be secured following a dike failure. During the review of this IR, on June 25, 2014, the inspectors noted that the "Operability" section of IR 1674557 was left blank, and the "Reviewed" section stated, in part, that the issue was "a process issue regarding future planned actions." The inspectors concluded from their review of IR 1674557 that although the title of IR 1674557 suggested that this issue only impacted future planned actions, the context discussed within the IR documented a condition that could adversely impact current UHS operability. As a result, the inspectors promptly discussed this issue with the Operations Shift Manager, who was not aware of any operability concerns associated with the issue or station actions to address the issue.

Later, during that shift, the Shift Manager determined that the issue was reportable under 10 CFR 50.72(b)(3)(ii)(B), "Unanalyzed Condition."

On June 25, 2014, IR1675291, "Unanalyzed Condition Identified During IR 1674557 Response," was generated by the Engineering department. The licensee also implemented a Standing Order that included interim guidance. The Standing Order stated, in part, that:

> *"To preserve the UHS function in the event of cooling pond dike failure, the following guidance is provided until 0/1/2BwOA ENV–3 is revised.*
>
> *Braidwood Operations will take the following actions in the event of a dike failure and lake level is just above 590' (1ft. on 0LI–CW041):*
>
> - *Trip both Units*
> - *Secure all circulation water pumps*
> - *Secure all non-essential service water pumps by placing them in pull to lock*
> - *Secure all running main fire pumps (jockey pumps are excluded)*
> - *Perform the actions of 0/1/2BwOA ENV–3 and the Braidwood Cooling Pond Safety Emergency Plan"*

The inspectors noted that IR 1674557 included a preliminarily determination that operation of a single nonsafety-related service water pump at full flow would deplete the UHS in approximately 3.6 days and did not meet the 30 day mission time required by design. However, the inspectors also noted that the licensee's operability discussion in the IR stated, *"The UHS meets its surveillance requirements for minimum level, maximum temperature, and maximum bottom level. Limiting Condition for Operation 3.7.9 [UHS] is met and the UHS is operable."*

The inspectors expressed a concern that the operability assessment did not specifically address the 30 day mission time discussed in the IR. The inspectors also noted that Step 2.14 of OP–AA–108–115 stated, in part, that, *"In order to be considered operable, structures, systems and components must be capable of performing safety functions specified by its design, within the required range of design physical conditions, initiation times and mission times."*

Contrary to what the procedure specified, the licensee's operability assessment did not address mission time. Following conversations with site personnel, the licensee updated their operability assessment to reflect that even though procedural guidance did not explicitly reflect the assumptions in the UHS analysis in that nonsafety-related pumps were not directed to be secured, the UHS would still be able to perform its safety function since operators would recognize the problem and take actions to secure the nonsafety-related pumps. When questioned by the inspectors on what would prompt the operators to take action to secure nonsafety-related pumps, what procedures would be used, and how these actions ensured the specified safety function would be met, the licensee was unable to provide further information other than what had already been presented.

In July 2014, the licensee completed a past operability evaluation, which provided the bases for UHS TS operability consistent with the definition of operability in the

site-specific TSs. In the evaluation, the licensee concluded that based on the breach size evaluated in station calculations of record it would take approximately 16 hours to drain the lake level from 594 feet to 591 feet 10 inches. The UHS TS minimum level was 590 feet. At 591 feet 10 inches, minimum submergence to satisfy net positive suction head requirements for the nonsafety-related service water pumps would not be met. The vendor for the pump specified that at that point a vortex could form, which could introduce air into the pump. The vendor also specified that unless the pump became air bound, the pump would continue to operate, but with reduced performance. Based upon this information, the licensee did not predict at what lake level the pump would cease to operate. The licensee concluded that mechanical pump vibrations, fluctuations in pump discharge pressure, and variations in motor currents would likely require that an operator trip the nonsafety-related service water pumps to prevent damage before 590' lake level was reached.

The inspectors reviewed the licensee's past operability determination, timeline of events, and the Operability Determination Procedure, and identified the following examples where the procedure standard was not followed:

- Step 4.1.2 of OP–AA–108–115, stated that, *"If the originator or supervisor identifies any potential operability or reportability issues, the originator or supervisor shall personally contact Operations Shift Management of the affected facility/unit and discuss the issue."* However, upon discovery on June 24, 2014, that nonsafety-related pumps would not be secured following a lake dike failure, although this was assumed in design basis calculations, licensee personnel did not inform Operations Shift Management. The licensee documented this issue in IR 1681326 "Untimely Notification to Shift Manager of a Potential Plant Issue."

- Step 2.14 of OP–AA–108–115, stated, in part, that, *"In order to be considered operable, structures, systems and components must be capable of performing safety functions specified by its design, within the required range of design physical conditions, initiation times and mission times."* However, the licensee's operability assessment discussed in IR 1674557 and IR 1675291 did not address mission time even though Engineering had determined that the identified issue had the potential to affect mission time. The operability assessment specified that operators would recognize the problem and take actions to ensure that the UHS would still be able to perform its safety function and meet all design basis requirements. However, the licensee did not adequately consider what would prompt the operators to take action, what procedures they would use, and how the actions correlated to meeting the specified safety function.

- Step 4.5.2.5 of OP–AA–108–115 stated, in part, that, *"The technical acceptability and effectiveness of a compensatory measure with respect to the degraded or non-conforming condition and the affected structures, systems and components should be evaluated. The evaluation should also consider the effects of the compensatory measures to other aspects of the facility…"* However, when instituting the Standing Order, no evaluation was performed even though the Standing Order met the procedural definition of what constituted a compensatory measure.

The licensee entered the issues described above into their CAP as IR1674557 and IR 1675291. Corrective actions for this issue included revising procedures to secure

nonsafety-related pumps upon reaching a low lake level condition consistent with plant design calculations, and addressing the untimely notification of the shift.

Analysis: The inspectors determined that the failure to adhere to the Operability Determination Process standard outlined in OP–AA–108–115, Revision 13, during the evaluation of a non-conforming condition that affected the UHS was a performance deficiency.

The inspectors determined that the performance deficiency was more than minor in accordance with IMC 0612, Appendix B, "Issue Screening," because the issue was associated with the Design Control 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, based on the analysis of record at the time of discovery, there was reasonable doubt that the UHS could meet its mission time of 30 days. The inspectors determined the finding could be evaluated using the SDP in accordance with IMC 0609, "Significance Determination Process," Attachment 0609.04, "Initial Characterization of Findings," dated June 19, 2012, and Appendix A, "The Significance Determination Process for Findings At-Power," Exhibit 2, "Mitigating Systems Screening Questions," dated June 19, 2012. The inspectors determined that the finding did not result in the confirmed loss of operability, and therefore the finding screened as having very low safety significance (Green).

The inspectors concluded that this finding had a cross-cutting aspect in the Conservative Bias component of the Human Performance cross-cutting area because the licensee failed to use conservative assumptions in their decision-making when analyzing the operability of the UHS. Specifically, Operations did not request a documented evaluation to support understanding why the UHS was operable, and verify that their assumptions regarding operator actions were feasible (H.14).

Enforcement: Title 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," requires, in part, that activities affecting quality be prescribed and accomplished by instructions, procedures, and drawings appropriate to the circumstances, and shall be accomplished in accordance with those instructions, procedures, and drawings. The licensee implemented the operability determination process (an activity affecting quality) using procedure OP–AA–108–115, "Operability Determination Procedure," Revision 13.

- Step 2.14 of OP–AA–108–115 stated, in part: "In order to be considered operable structures, systems and components must be capable of performing safety functions specified by its design, within the required range of design, physical conditions, initiation times, and mission times."

- Step 4.1.2 of OP–AA–108–115 stated: "If the originator or supervisor identifies any potential operability or reportability issues, the originator or supervisor shall personally contact Operations Shift Management of the affected facility/unit and discuss the issue."

- Step 4.1.3 of OP–AA–108–115 stated: "Route the issue for immediate review by Operations Shift Management when immediate actions are required by operations."

- Step 4.5.2.5 of OP–AA–108–115 stated, in part: "The technical acceptability and effectiveness of a Compensatory Measure with respect to the degraded or non-conforming condition and the affected structures, systems and components should be evaluated. The evaluation should also consider the effects of the compensatory measures on other aspects of the facility…"

Contrary to the above, on June 25, 2014, following the discovery of a non-conforming condition in the UHS, licensee personnel failed to notify the shift management upon discovery of a potential operability concern, failed to adequately assess operability based on information provided by Engineering which specified that the condition could lead to not meeting the mission time, and failed to evaluate compensatory measures as required by procedure OP–AA–108–115.

Corrective actions for this issue included revising procedures to secure nonsafety-related pumps prior to reaching a low lake level condition consistent with plant design calculations, and addressing the untimely notification of the shift management. Because this violation was of very low safety significance and it was entered into the licensee's CAP as IR 1674557 and IR 1675291, this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy **(NCV 05000456/2014004–02; 05000457/2014004–02, Multiple Failures to Follow Operability Evaluation Process Following Discovery of a Non-Conforming Condition in the Ultimate Heat Sink)**.

1R18 Plant Modifications (71111.18)

.1 Plant Modifications

a. Inspection Scope

The inspectors reviewed the following modification:

- EC 399116, Temporary Configuration Change Process Bypass Degraded Unit 2 Main Power Transformer Line 'Y' Connection, Phase A.

The inspectors reviewed the configuration changes and associated 10 CFR 50.59 safety evaluation screening against the design basis, the UFSAR, and the TSs, as applicable, to verify that the modification did not affect the operability or availability of the affected system. The inspectors observed ongoing and completed work activities to ensure that the modification was installed as directed and consistent with the design control documents; the modification operated as expected; post-modification testing adequately demonstrated continued system operability, availability, and reliability; and that operation of the modification did not impact the operability of any interfacing systems. The inspectors also 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 one modification sample 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:

- Unit 2 Instrument Inverter 212 Preventative Maintenance;
- Unit 2 Main Generator Voltage Regulator Firing Card Replacement;
- Unit 1 1C Steam Generator Power Operated Relief Valve Preventative Maintenance;
- Unit 2 Main Power Transformer Preventative Maintenance; and
- Station Diesel-Driven Fire Pump Stop Pushbutton Switch Replacement.

These activities were selected based upon the SSC's 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 adequately ensured that the equipment met 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 that the problems were being corrected commensurate with their importance to safety. Documents reviewed are listed in the Attachment.

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

b. Findings

Station Diesel-Driven Fire Pump Restored to Service Non-Functional Due to Incorrect Stop Push Button Switch Replacement

Introduction: A finding of very low safety significance (Green) and an associated NCV of Braidwood Operating License Condition 2.E, "Fire Protection Program," was self-revealed during the performance of a scheduled 0B DDFP sequential start surveillance when the DDFP was observed by operators to start, but then cycle on and off. The DDFP was declared non-functional and a subsequent causal evaluation

determined that a DDFP stop pushbutton switch of an incorrect design had been installed several months prior to the sequential start surveillance test.

Description: In February 2012, an operator identified that the stop pushbutton for the DDFP was missing and generated IR 1327715, “Stop Pushbutton on 0FP03JB Missing/Broken.” A WO was initiated to replace the missing pushbutton and in April 2014, a work instruction was prepared to replace the pushbutton. The work instruction failed to identify the correct pushbutton part number and an incorrect part number was ordered that was of a different design than that which was required. The characteristics of the incorrect pushbutton switch ordered, procured, and later installed were that of a normally open switch with push-to-close contacts, although the correct pushbutton was required to be designed with a normally closed switch with push-to-open contacts.

On January 13, 2014, the licensee bench-tested the replacement pushbutton switch prior to installation as specified in WO 1516601. During this activity, the licensee did not verify that the new switch performed in the same manner as the existing switch, and therefore did not identify the discrepancy in the design and operation of the switch.

The stop pushbutton switch was subsequently installed on January 13, 2014, and on January 19, 2014, a post-maintenance test (PMT) was performed that consisted of manually starting the DDFP and subsequently stopping the DDFP by pushing the stop pushbutton switch. During the PMT, the DDFP did not stop when the pushbutton stop switch was pushed. The DDFP was subsequently stopped by placing the DDFP selector switch in the “OFF” position. The failed PMT was documented in IR 1609934, “Failed PMT for Emergency Stop Pushbutton.” Because the pump started without issue and could be stopped from the local switch, on January 22, 2014, Operations concluded that the DDFP was functional. The licensee did not identify the issue with the design and operation of the new switch during the process of evaluating IR 1609934.

On April 11, 2014, a routinely scheduled DDFP sequential start surveillance using 0BwOS FP 2.1.E–2 was performed. During the surveillance, the DDFP automatically started upon the receipt of a simulated low system header pressure signal, as expected, but would not run normally and was reported to be surging by the operators performing the test. As a result, the DDFP was declared non-functional. On April 19, 2014, the licensee determined that the non-conforming switch installed on January 13, 2014 and tested on January 19, 2014, caused the DDFP to stop as soon as the fire main header pressure approached normal operating system pressure and, as a result, the pump started, raising header pressure, and then stopped. Since the surveillance simulated a low system header pressure, the pump then restarted as soon as the header pressure was again low, and the cycle repeated until the DDFP was secured by the operators.

The licensee performed a causal evaluation and identified that the incorrect pushbutton had been installed on January 13, 2014. The licensee concluded that the DDFP was in a non-functional condition from January 22, 2014 until April 19, 2014. Additionally, the licensee’s evaluation concluded that even if the correct replacement switch had been installed, the PMT would still have failed to effectively test the pushbutton since the DDFP stop pushbutton switch did not operate in the circuit when the DDFP was manually started, but rather only functioned when the DDFP was started automatically from a low main fire pump header pressure condition.

The licensee entered this issue into their CAP as IR 1649515, “Incorrect Stop Pushbutton Installed on 0B Fire Pump.” Corrective actions consisted of replacing the switch with a switch of a correct design, performing an adequate post-maintenance test, and declaring the DDFP functional on April 19, 2014.

Analysis: The inspectors determined that the failure to ensure that the DDFP was functional from January 22, 2014 through April 19, 2014 was a performance deficiency. Specifically, this performance deficiency included a number of process and program barriers that were not effective at ensuring the DDFP was restored to a functional status:

- The licensee did not ensure that the correct switch was procured consistent with the existing DDFP design requirements;
- The licensee did not identify the non-conforming design issue during the pre-installation bench test prior to installation;
- The licensee did not identify the non-conforming design issue after the switch failed to perform its function during the January 22, 2014 PMT; and
- The licensee did not perform an adequate PMT to ensure that the DDFP was restored to a functional state following the maintenance activity that installed the switch.

The inspectors determined that the performance deficiency was more than minor in accordance with IMC 0612, Appendix B, “Issue Screening,” because the issue was associated with the Equipment Performance attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, the performance deficiency resulted in the DDFP being non-functional for approximately 3 months.

The performance deficiency was screened in accordance with the IMC 0612, Attachment 4, “Initial Characterization of Findings.” The inspectors determined that the issue resulted in a degraded External Event Mitigation System of the Mitigating Systems Cornerstone. Because the finding involved fixed fire protection systems, the inspectors used IMC 0609, Appendix F, “Fire Protection Significance Determination Process,” to determine the significance of the finding.

The inspectors evaluated the finding in accordance with IMC 0609, “Significance Determination Process,” Attachment 0609.04, “Table 3–SDP APPENDIX ROUTER.” The inspectors answered ‘Yes’ to Question E.2, “Does the finding involve: … (2) Fixed fire protection systems….” Therefore, the finding required analysis using IMC 0609 Appendix F, “Fire Protection Significance Determination Process.” Additionally, the fire pumps were credited as a mitigating system for a backup cooling water supply to the charging pumps’ seals. As a result, a detailed risk evaluation was performed by Region III Senior Reactor Analysts (SRAs) using Systems Analysis Programs for Hands-on Integrated Reliability Evaluations, Version 8.1.0 software and the Braidwood Standardized Plant Analysis Risk (SPAR) model, Version 8.24. The total increase in differential core damage frequency (ΔCDF) was calculated for fire and for non-fire induced initiating events. Based on information from the inspectors, the DDFP was unavailable for a bounding 4-month timeframe.

Fire-Induced Initiating Events

The SRAs used the Braidwood Station Individual Plant Examination of External Events Submittal Report, dated June 1997, and the Braidwood Station SPAR Model to estimate the risk impact due to fires. Section 1.4.2 of the Individual Plant Examination of External Events listed the CDF of Unit 1 as 2.50E–06/year and the CDF of Unit 2 as 2.40E–06/year. The SRAs solved the portion of the fire water system fault tree in the SPAR Model accounting for fire-induced initiating events and obtained a base case failure probability of 6.44E–04. The SRAs also solved the same portion of the fire water system fault tree, setting the DDFP failure to run to "True" and obtained a deficient case failure probability of 9.36E–03. The difference between the base case and deficient case values was 8.72E–03, which could be interpreted as the change in the probability of the fire water system being unavailable considering the failed DDFP.

The failure probability of wet-pipe sprinklers was 0.02, consistent with NUREG/CR–6850 Supplement 1, "Fire Probabilistic Risk Assessment Methods Enhancements." The SRAs made a conservative assumption that all fire zones take credit for water-based suppression (i.e., wet-pipe sprinklers). Thus, the ∆CDF for Unit 1 for the 4-month exposure period was 3.63E–07/year:

$\Delta\ CDF_{Unit\ 1}$ = [2.50E–06/year] * [1/3 year] * [1/0.02] * [8.72E–03] = 3.63E–07/year;

Similarly, the ∆CDF for Unit 2 for the 4-month exposure period was 3.49E–07/year; and

$\Delta\ CDF_{Unit\ 2}$ = [2.40E–06/year] * [1/3 yr] * [1/0.02] * [8.72E–03] = 3.49E–07/year.

Non-Fire Induced Initiating Events

For the 4-month period of time the DDFP was unavailable, the SRAs performed a condition assessment using the Braidwood SPAR model with the basic event representing a failure of the DDFP to run set to "True." The result was a ∆CDF of 3.05E–07/year and was assumed to apply equally to Unit 1 and Unit 2. The dominant sequence involved a Loss of 4160 Volt AC [Alternating Current] Bus 141, with failures of auxiliary feedwater, main feedwater, and feed-and-bleed cooling.

Total Risk Results

Using the above information, the total ∆CDF for Unit 1 was bounded at 6.68E–07/year. The total ∆CDF for Unit 2 was bounded at 6.54E–07/year.

Large Early Release Frequency

Inspection Manual Chapter 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).

The inspectors concluded that this finding had a cross-cutting aspect in the Avoid Complacency component of the Human Performance cross-cutting area. Specifically, the licensee did not adequately recognize and plan for the possibility that the DDFP stop pushbutton replacement switch design could have been different than plant-specific design requirements (H.12).

Enforcement: Braidwood Operating License Condition 2.E of the station TSs required, in part, that, "The licensee shall implement and maintain, in effect, all provisions of the approved fire protection program as described in the UFSAR, as supplemented and amended, and as approved in the SER [Safety Evaluation Report] dated November 1983. . . "

Braidwood Fire Protection Program Section 3.1–10 states that the Fire Protection Program Administrative Procedure identified that Fire Protection Activities are treated as augmented quality per the Quality Assurance Program.

Augmented Quality for Fire Protection systems states that Quality Assurance Topical Report Chapters that are applicable to the Fire Protection area are 1 through 7, 10, 11, and 14–18. Chapter 3 is "Design Control."

Title 10 CFR 50, Appendix B, Criterion III, "Design Control," states, in part, that, "Design changes, including field changes, shall be subject to design control measures commensurate with those applied to the original design. . . The design control measures shall provide for verifying or checking the adequacy of design. . ."

Contrary to the above, on January 22, 2014 and through April 11, 2014, Braidwood failed to ensure that a DDFP stop pushbutton modification/replacement field change was adequate to the system design requirements. Specifically, the licensee replacement switch was of an incorrect design (i.e., normally open switch with push-to-close contacts whereas the correct pushbutton design is a normally closed switch with push-to-open contacts.)

Corrective actions consisted of replacing the switch with a switch of a correct design, performing an adequate PMT, and declaring the DDFP functional on April 19, 2014. Because this violation was of very low safety significance, and because the issue was entered into the licensee's CAP as IR 1649515, "Incorrect Stop Pushbutton Installed on 0B Fire Pump," this violation is being treated as an NCV consistent with Section 2.3.2 of the NRC Enforcement Policy. **(NCV 05000456/2014003; 05000457/2014003, Station Diesel Driven Fire Pump Restored to Service Non-Functional Due to Incorrect Stop Push Button Switch Replacement)**

.2 (Closed) Unresolved Item 05000457/2014003–02; Unit 2 Pressurizer Pressure Transmitter 2PT–458 Returned to Service Isolated

a. Inspection Scope

The inspectors documented unresolved item (URI) 05000457/2014003–02 regarding a configuration control event in which Unit 2 safety-related pressurizer pressure transmitter 2PT–458 failed to respond as expected during a plant startup following the A2R17 refueling outage. Subsequent troubleshooting determined that the pressure transmitter was isolated and inoperable. The URI was opened pending the completion of the licensee's causal evaluation and associated inspector review.

b. Findings

Pressurizer Pressure Transmitter 458 Returned to Service with Instrument Isolated

Introduction: A finding of very low safety significance (Green) and an associated NCV of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," was self-revealed when licensee personnel repositioned isolation valves associated with the Unit 2 safety-related pressurizer pressure transmitter 2PT–458 without a quality instruction. Specifically, although the licensee identified that safety-related 2PT–458 had been isolated from service and was not in service during a plant startup, the licensee could not locate the work instruction that isolated the instrument from service.

Description: On May 21, 2014, as Operations was raising reactor coolant system (RCS) pressure during a Unit 2 startup, several control room indications revealed that pressurizer pressure loop 0048 was not operating properly. Specifically:

- Reactor Protection System Pressurizer Low Pressure bistable (16–4) light did not clear upon reaching the required reset value;
- Engineered Safeguards Feature Pressurizer Low Pressure bistable (19–4) light did not clear upon reaching the required reset value;
- Main Control Room Annunciator 2–12A1, "Pressurizer Low Reactor Trip Setpoint Alert," alarm did not clear as expected during RCS pressurization;
- Main Control Room Annunciator 2–12B1, "Pressurizer Pressure Low," alarm did not clear as expected during RCS pressurization;
- Main Control Room Annunciator 2–12C1, "Pressurizer Pressure Control Deviation Low Heaters," alarm did not clear as expected during RCS pressurization; and
- The associated instrument loop Pressurizer Pressure meter pressure indicator did not increase above the 1700 pounds per square inch gauge lower indication limit during the RCS pressurization.

The licensee determined, based upon the main control room indications identified above, that the transmitter had failed and entered Abnormal Operating Procedure, "Unit 2 INST–2," as required. As a result, Operations also entered TS Limiting Condition for Operation (LCO) Action Statements 3.3.1, "Reactor Trip System Instrumentation," and TS LCO 3.3.2, "Engineered Safety Feature Actuation System Instrumentation," and changed Unit 2 reactor safety risk from Green to Yellow. Unit 2 risk changed from Green to Yellow because the failure of 2PT–458 resulted in the loss of the automatic function for pressurizer power-operated relief valve (PORV) 2RY455A and therefore increased plant risk since the automatic function of PORV 2RY455A was credited in an Anticipated Transients Without Scram (ATWS) CLB scenario. To comply with the TSs, Operations tripped the associated reactor protection system (RPS) engineered safety feature channels.

On May 23, 2014, with Unit 2 power at 50 percent, Instrument Maintenance workers entered the containment to troubleshoot the failed pressure transmitter and identified that the pressure transmitter was isolated from service by a closed valve on an

instrument rack. The workers opened the closed isolation valve and pressurizer pressure loop 0048 promptly responded correctly. The licensee subsequently exited the associated TS LCO action statements and returned station risk to Green.

The licensee performed an apparent cause evaluation and concluded that the cause of the issue was indeterminate. Specifically, the licensee did not identify any activity that caused the pressurizer pressure transmitter to be isolated during the plant startup. However, due to the configuration of this valve requiring several turns to shut, the licensee concluded that the valve was shut intentionally, and was not accidently bumped shut.

This issue was entered into the licensee's CAP as IR 1663588, "Level 3 CCE-2PT–0458 Found Isolated." Corrective actions included restoring 2PT–458 to service.

Analysis: The inspectors determined that the failure to have Unit 2 PT–458 in service when required in accordance with quality work instructions was a performance deficiency. Specifically, although the licensee identified that safety-related pressure transmitter 2PT–458 had been isolated from service and was not in service during a plant startup, as required, the licensee could not locate the work instruction that isolated the instrument from service.

The inspectors determined that the performance deficiency was more than minor in accordance with IMC 0612, Appendix B, "Issue Screening," because the issue was associated with the Equipment Performance attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, the automatic function of pressurizer PORV 2RY–455A was not available during a design basis ATWS event. In addition, IMC 0612, Appendix E, "Examples of More than Minor Inspection Findings," Example 7e, informed this more-than-minor basis. Specifically, the issue was more than minor because it resulted in overall plant risk being in a higher risk category (i.e., Yellow vs. Green).

The inspectors performed a significance review in accordance with IMC 0609, Attachment 4, "Initial Characterization of Findings." Table 3, "SDP Appendix Router," directed that the finding be screened using IMC 0609, Appendix A, "The Significance Determination Process for At-Power Findings." The inspector answered 'No' to all of the associated Mitigating Systems screening questions and therefore the finding screened as having very low safety significance (Green).

This finding did not have an associated cross-cutting aspect because the cause of the performance deficiency was indeterminate.

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

Contrary to the above, between May 2, 2014 and May 23, 2014, licensee personnel isolated safety-related Unit 2 Pressurizer Pressure Transmitter 2PT–458, which was an activity affecting quality, without a documented instruction, procedure, or drawing.

Corrective actions included restoring 2PT–458 to service. Because this violation was of very low safety significance and was entered into the licensee's CAP as IR 1663588, this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy. **(NCV 05000457/2014002–04; Unit 2 Pressurizer Pressure Transmitter 458 Returned to Service with Instrument Isolated)**

1R22 Surveillance Testing (71111.22)

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:

- 2A Containment Spray (CS) Additive Tank Flow Surveillance (Routine);
- 1A Diesel Generator Slave Relay Start and Monthly/Semiannual Surveillance (Routine);
- 2B CS Additive Flow Rate 5 Year Surveillance (Routine);
- Annual National Fire Protection Association Motor-Driven Fire Pump Test (Routine); and
- 1A Auxiliary Feedwater American Society of Mechanical Engineers (ASME) (IST).

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, sufficient to 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 annunciator 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 and one IST sample as defined in IP 71111.22, Sections–02 and-05.

b. Findings

No findings were identified.

1EP4 Emergency Action and Emergency Plan Changes (71114.04)

.1 Emergency Action and Emergency Plan Changes

a. Inspection Scope

The Nuclear Security and Incident Response headquarters staff performed an in-office review of the latest revision to ETE Analysis for Braidwood Station, Units 1 and 2 available in ADAMS through Accession Number ML14141A046 as listed in the Attachment.

The staff performed a review of the ETE using the guidance in NUREG/CR–7002, "Criteria for Development of Evacuation Time Estimate Studies." The Updated ETE was found to be complete in accordance with 10 CFR Part 50, Appendix E.IV.3. The NRC review was only intended to verify consistent application of the ETE guidance contained in NUREG/CR–7002, and therefore remains subject to future NRC inspection in its entirety. Documents reviewed are listed in the Attachment.

This emergency plan review inspection did not constitute a sample as defined in Inspection Procedure 71114.04–06.

b. Findings

No findings were identified.

1EP5 Maintenance and Emergency Preparedness (71114.05)

.1 Maintaining Emergency Preparedness

a. Inspection Scope

Nuclear Regulatory Commission Emergency Preparedness rulemaking, which became effective on December 23, 2011, added a new regulation that required a licensee to develop an ETE analysis and submit it to the NRC by December 22, 2012. This inspection was a follow-up of issues identified by the NRC Headquarters staff during its review of the Exelon submittal of the ETE for the ten sites that it operates. The NRC Headquarters staff related those issues to Exelon, which provided responses through 2013 and into 2014. During this inspection period, regional Emergency Preparedness inspectors reviewed applicable licensee documents, conducted discussions with licensee personnel, and provided an assessment of the Exelon response.

This emergency preparedness inspection constituted no samples as defined in Inspection Procedure 71114.05.

b. Findings

Introduction: The NRC identified a finding of very low safety significance (Green) and an associated NCV of 10 CFR 50.54(q)(2) for failing to maintain the effectiveness of the Braidwood Station Emergency Plan. Specifically, the licensee failed to provide the station ETE to responsible offsite response organizations and failed to update their site-specific protective action strategies as necessary and as required by 10 CFR 50.47(b)(10), and Section IV, Paragraph 4 of Appendix E to 10 CFR Part 50.

Description: The NRC issued final new and amended emergency preparedness regulations on November 23, 2011 (76 Federal Register 72560). This rulemaking, which became effective on December 23, 2011, amended 10 CFR 50.47(b)(10) to require licensees to update the ETE on a periodic basis. The rulemaking also added new regulation 10 CFR Part 50, Appendix E, Section IV.4, which required a licensee to develop an ETE analysis using the most recent decennial census data and submit it to the NRC within 365 days of December 23, 2011. Concurrent with the issuance of the rulemaking, the NRC published a new report entitled, “Criteria for Development of Evacuation Time Estimate Studies,” NUREG/CR–7002. The Statements of Consideration for the rulemaking (76 Federal Register 72580) identified that the NRC would review the submitted ETEs for completeness using that document. The Statements also provided that the guidance of NUREG/CR–7002 was an acceptable template to meet the requirements and that licensees should use the guidance or an appropriate alternative.

By individual letters dated December 12, 2012, Exelon submitted the ETEs for the sites for which it holds the operating licenses, including Braidwood Station. By letter dated January 23, 2013, Exelon submitted the NUREG/CR–7002 checklists for these ETEs. These checklists identified where a particular criterion was addressed in the ETEs, facilitating the NRC review.

As provided in the Statements of Consideration, the NRC performed a completeness review using the checklists and found the ETEs (including that for Braidwood Station) to be incomplete due to common and site-specific deficiencies. The NRC discussed its concerns regarding the completeness of the ETEs in a teleconference with Exelon conducted on June 10, 2013. By letter dated September 5, 2013, Exelon re-submitted the ETEs and the associated checklists for its sites. The NRC performed another completeness review and again found the ETEs to be incomplete. Examples of information missing from the submittal included: 1) peak and average attendance were not stated (NUREG/CR–7002 Criteria Item 2.1.2.a); 2) the ETE used a value based on campsite and hotel capacity, vice an average value (2.1.2.b); 3) the basis for speed and capacity reduction factors due to weather was not provided (3.4.b); 4) snow removal was not addressed (3.4.c); 5) bus routes or plans were not included in the ETE analysis (4.1.2.a); and, 5) no discussion was provided on the means of evacuating ambulatory and non-ambulatory residents (4.1.2.b).

Exelon entered this issue into their CAP as IR 1525923 and IR 1578649. Exelon submitted a third ETE for Braidwood Station on May 2, 2014. The NRC's review which found that ETE complete is documented in Section 1EP4 of this report.

Analysis: The inspectors determined that Exelon's failure to submit a complete, updated ETE for Braidwood Station by December 22, 2012, was a performance deficiency because the issue was a failure to comply with a regulatory requirement and the issue was reasonably within the licensee's ability to foresee and correct and therefore should have been prevented.

Using IMC 0612, Appendix B, "Issue Screening," the inspectors determined that the performance deficiency was more than minor because it was associated with the Emergency Preparedness cornerstone attribute of Procedure Quality and adversely affected the cornerstone objective of ensuring that the licensee was capable of implementing adequate measures to protect the health and safety of the public in the event of a radiological emergency. The ETE was an input into the development of protective action strategies prior to an accident and to the protective action recommendation decision-making process during an accident. Inadequate ETEs have the potential to reduce the effectiveness of public protective actions implemented by offsite response organizations.

The inspectors utilized IMC 0609, Appendix B, "Emergency Preparedness Significance Determination Process (SDP)," to determine the significance of the performance deficiency. The performance deficiency was associated with Planning Standard 10 CFR 50.47(b)(10). Emergency Preparedness SDP Table 5.10–1, "Significance Examples 10 CFR 50.47(b)(10)," included two Green significance examples: 1) "ETEs and updates to the ETEs were not provided to responsible offsite response organizations," and, 2) "The current public protective action strategies documented in Emergency Preparedness Implementing Procedures (EPIPs) are not consistent with the current ETE." Specifically, the inspectors concluded that because the issue delayed the NRC's approval of the Braidwood Station ETE, the ETE was not provided to the site offsite response organizations nor was it used to inform the site EPIPs as required by 10 CFR 50.47(b)(10), and Section IV, Paragraph 4 of Appendix E to 10 CFR Part 50. Therefore, in accordance with Emergency Preparedness SDP Table 5.10–1, this finding screened as having very low safety significance (Green).

This finding had a cross-cutting aspect in the area of Human Performance, Documentation, because Exelon personnel did not create and maintain complete, accurate, and up-to-date documentation. Specifically, the Emergency Preparedness organization did not develop the Braidwood Station ETE as required by the new regulation introduced by the NRC's Emergency Preparedness Rule. (IMC 0310 H.7)

Enforcement: Title 10 CFR 50.54(q)(2) requires, in part, that a licensee shall follow and maintain the effectiveness of an emergency plan that meets the requirements in Appendix E to this part and, for nuclear power reactor licensees, the planning standards of 10 CFR 50.47(b). Title 10 CFR 50.47(b)(10) requires, in part, that licensees shall develop an ETE and update it on a periodic basis. Title 10 CFR Part 50, Appendix E, Section IV.4, states that within 365 days of December 23, 2011, nuclear power reactor licensees shall develop an ETE analysis and submit it under 10 CFR 50.4.

Contrary to the above, within 365 days of December 23, 2011, Exelon, the licensee for Braidwood Station, failed to develop a complete and adequate ETE analysis and submit it to the NRC as required by 10 CFR 50.4. Immediate corrective actions taken by Exelon included entering this issue into their CAP and revising the ETE to satisfy NRC requirements. Because this finding was of very low safety significance and was entered into Exelon's CAP as IR 1525923 and IR 1578649, this issue is being treated as an NCV consistent with Section 2.3.2 of the NRC Enforcement Policy. **(NCV 05000456/2014004–05; 05000457/2014004–05, Inadequate Evacuation Time Estimate Submittals)**.

1EP6 Drill Evaluation (71114.06)

.1 Emergency Preparedness Drill Observation

a. Inspection Scope

The inspectors evaluated the conduct of routine licensee emergency drills on June 11 and June 18, 2014, to identify any weaknesses and deficiencies in classification, notification, and protective action recommendation development activities. The inspectors observed emergency response operations in the simulator to determine whether the event classification, notifications, and protective action recommendations were performed in accordance with procedures. The inspectors also attended the licensee drill critique to compare any inspector-observed weakness with those identified by the licensee staff in order to evaluate the critique and to determine whether the licensee was properly identifying weaknesses and entering them into the CAP. As part of the inspection, the inspectors reviewed the drill package and other documents listed in the Attachment.

This emergency preparedness drill inspection constituted two samples as defined in IP 71114.06–05.

b. Findings

No findings were identified.

2. RADIATION SAFETY

2RS1 Radiological Hazard Assessment and Exposure Controls (71124.01)

The inspection activities supplement those documented in Inspection Report 05000456/2014003; 05000457/2014003 and constitute 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 Radiation Worker Performance (02.07)

a. Inspection Scope

The inspectors reviewed radiological problem reports since the last inspection that found the cause of the event to be human performance errors. The inspectors evaluated whether there was an observable pattern traceable to a similar cause. The inspectors assessed whether this perspective matched the corrective action approach taken by the licensee to resolve the reported problems. The inspectors discussed with the radiation protection manager any problems with the corrective actions planned or taken.

b. Findings

No findings were identified.

2RS5 Radiation Monitoring Instrumentation (71124.05)

This inspection constituted one complete sample as defined in IP 71124.05–05.

.1 Inspection Planning (02.01)

a. Inspection Scope

The inspectors reviewed the UFSAR to identify radiation instruments associated with monitoring area radiological conditions including airborne radioactivity, process streams, effluents, materials/articles, and workers. Additionally, the inspectors reviewed the instrumentation and associated TS requirements for post-accident monitoring instrumentation, including instruments used for remote emergency assessment.

The inspectors reviewed a listing of in-service survey instrumentation including air samplers and small article monitors, along with instruments used to detect and analyze workers' external contamination. Additionally, the inspectors reviewed personnel contamination monitors and portal monitors, including whole-body counters, used to detect workers' internal contamination. The inspectors reviewed this list to assess whether an adequate number and type of instruments were available to support operations.

The inspectors reviewed licensee and third-party evaluation reports of the Radiation Monitoring Program since the last inspection. These reports were reviewed for insights into the licensee's program and to aid in selecting areas for review ("smart sampling").

The inspectors reviewed procedures that governed instrument source checks and calibrations, focusing on instruments used for monitoring transient high radiological conditions, including instruments used for underwater surveys. The inspectors reviewed the calibration and source check procedures for adequacy and as an aid to smart sampling.

The inspectors reviewed the area radiation monitor alarm setpoint values and setpoint bases as provided in the TS and the UFSAR.

The inspectors reviewed effluent monitor alarm setpoint bases and the calculation methods provided in the Offsite Dose Calculation Manual.

b. Findings

No findings were identified.

.2 Walkdowns and Observations (02.02)

a. Inspection Scope

The inspectors walked down effluent radiation monitoring systems, including at least one liquid and one airborne system. Focus was placed on flow measurement devices and all accessible point-of-discharge liquid and gaseous effluent monitors of the selected systems. The inspectors assessed whether the effluent/process monitor configurations aligned with Offsite Dose Calculation Manual descriptions and observed monitors for degradation and out-of-service tags.

The inspectors selected portable survey instruments that were in use or available for issuance and assessed calibration and source check stickers for currency as well as instrument material condition and operability.

The inspectors observed licensee staff performance as the staff demonstrated source checks for various types of portable survey instruments. The inspectors assessed whether high-range instruments were source checked on all appropriate scales.

The inspectors walked down area radiation monitors and continuous air monitors to determine whether they were appropriately positioned relative to the radiation sources or areas they were intended to monitor. Selectively, the inspectors compared monitor response (via local or remote control room indications) with actual area conditions for consistency.

The inspectors selected personnel contamination monitors, portal monitors, and small article monitors and evaluated whether the periodic source checks were performed in accordance with the manufacturer's recommendations and the licensee's procedures.

b. Findings

No findings were identified.

.3 Calibration and Testing Program (02.03)

Process and Effluent Monitors

a. Inspection Scope

The inspectors selected effluent monitor instruments (such as gaseous and liquid) and evaluated whether channel calibration and functional tests were performed consistent with radiological effluent Technical Specifications/Offsite Dose Calculation Manual. The inspectors assessed whether: (a) the licensee calibrated its monitors with National Institute of Standards and Technology traceable sources; (b) the primary calibrations adequately represented the plant nuclide mix; (c) when secondary calibration sources were used, the sources were verified by the primary calibration; and (d) the licensee's channel calibrations encompassed the instrument's alarm setpoints.

The inspectors assessed whether the effluent monitor alarm setpoints were established as provided in the Offsite Dose Calculation Manual and station procedures.

For changes to effluent monitor setpoints, the inspectors evaluated the basis for changes to ensure that an adequate justification existed.

b. Findings

No findings were identified.

.4 Laboratory Instrumentation

a. Inspection Scope

The inspectors assessed laboratory analytical instruments used for radiological analyses to determine whether daily performance checks and calibration data indicated that the

frequency of the calibrations was adequate and there were no indications of degraded instrument performance.

The inspectors assessed whether appropriate corrective actions were implemented in response to indications of degraded instrument performance.

b. Findings

No findings were identified.

.5 Whole Body Counter

a. Inspection Scope

The inspectors reviewed the methods and sources used to perform whole body count functional checks before daily use of the instrument and assessed whether check sources were appropriate and aligned with the plant's isotopic mix.

The inspectors reviewed whole body count calibration records since the last inspection and evaluated whether calibration sources were representative of the plant source term and that appropriate calibration phantoms were used. The inspectors looked for anomalous results or other indications of instrument performance problems.

b. Findings

No findings were identified.

.6 Post-Accident Monitoring Instrumentation

a. Inspection Scope

The inspectors selected containment high-range monitors and reviewed the calibration documentation since the last inspection.

The inspectors assessed whether an electronic calibration was completed for all range decades above 10 rem/hour and whether at least 1 decade at or below 10 rem/hour was calibrated using an appropriate radiation source.

The inspectors assessed whether calibration acceptance criteria were reasonable; accounting for the large measuring range and the intended purpose of the instruments.

The inspectors selected effluent/process monitors that were relied on by the licensee in its emergency operating procedures as a basis for triggering emergency action levels and subsequent emergency classifications, or to make protective action recommendations during an accident. The inspectors evaluated the calibration and availability of these instruments.

The inspectors reviewed the licensee's capability to collect high-range, post-accident iodine effluent samples.

As available, the inspectors observed electronic and radiation calibration of these instruments to assess conformity with the licensee's calibration and test protocols.

b. Findings

No findings were identified.

.7 Portal Monitors, Personnel Contamination Monitors, and Small Article Monitors

a. Inspection Scope

For each type of these instruments used on site, the inspectors assessed whether the alarm setpoint values were reasonable under the circumstances to ensure that licensed material is not released from the site.

The inspectors reviewed the calibration documentation for each instrument selected and discussed the calibration methods with the licensee to determine consistency with the manufacturer's recommendations.

b. Findings

No findings were identified.

.8 Portable Survey Instruments, Area Radiation Monitors, Electronic Dosimetry, and Air Samplers/Continuous Air Monitors

a. Inspection Scope

The inspectors reviewed calibration documentation for at least one of each type of instrument. For portable survey instruments and area radiation monitors, the inspectors reviewed detector measurement geometry and calibration methods and had the licensee demonstrate use of its instrument calibrator, as applicable. The inspectors conducted comparison of instrument readings versus an NRC survey instrument if problems were suspected.

As available, the inspectors selected portable survey instruments that did not meet acceptance criteria during calibration or source checks to assess whether the licensee had taken appropriate corrective action for instruments found significantly out of calibration (e.g., greater than 50 percent). The inspectors evaluated whether the licensee evaluated the possible consequences of instrument use since the last successful calibration or source check.

b. Findings

No findings were identified.

.9 Instrument Calibrator

a. Inspection Scope

As applicable, the inspectors reviewed the current output values for the licensee's portable survey and area radiation monitor instrument calibrator unit(s). The inspectors assessed whether the licensee periodically measures calibrator output over the range of the instruments used through measurements by ion chamber/electrometer.

The inspectors assessed whether the measuring devices had been calibrated by a facility using National Institute of Standards and Technology traceable sources and whether corrective factors for these measuring devices were properly applied by the licensee in its output verification.

b. Findings

No findings were identified.

.10 Calibration and Check Sources

a. Inspection Scope

The inspectors reviewed the licensee's 10 CFR Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste," source term to assess whether calibration sources used were representative of the types and energies of radiation encountered in the plant.

b. Findings

No findings were identified.

.11 Problem Identification and Resolution (02.04)

a. Inspection Scope

The inspectors evaluated whether problems associated with radiation monitoring instrumentation were being identified by the licensee at an appropriate threshold and were properly addressed for resolution in the licensee's CAP. The inspectors assessed the appropriateness of the corrective actions for a selected sample of problems documented by the licensee that involve radiation monitoring instrumentation.

b. Findings

No findings were identified.

2RS7 Radiological Environmental Monitoring Program (71124.07)

This inspection constituted one complete sample as defined in IP 71124.07–05.

.1 Inspection Planning (02.01)

a. Inspection Scope

The inspectors reviewed the annual radiological environmental operating reports and the results of any licensee assessments since the last inspection to assess whether the Radiological Environmental Monitoring Program was implemented in accordance with the Technical Specification/Offsite Dose Calculation Manual. This review included reported changes to the Offsite Dose Calculation Manual with respect to environmental monitoring, commitments in terms of sampling locations, monitoring and measurement frequencies, land use census, Inter-Laboratory Comparison Program, and analysis of data.

The inspectors reviewed the Offsite Dose Calculation Manual to identify locations of environmental monitoring stations.

The inspectors reviewed the UFSAR for information regarding the environmental monitoring program and meteorological monitoring instrumentation.

The inspectors reviewed quality assurance audit results of the program to assist in choosing inspection "smart samples." The inspectors also reviewed audits and technical evaluations performed on the vendor laboratory if used.

The inspectors reviewed the annual effluent release report and the 10 CFR Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste," report, to determine if the licensee was sampling, as appropriate, for the predominant and dose-causing radionuclides likely to be released in effluents.

b. Findings

No findings were identified.

Site Inspection (02.02)

a. Inspection Scope

The inspectors walked down select air sampling stations and dosimeter monitoring stations to determine whether they were located as described in the Offsite Dose Calculation Manual and to determine the equipment material condition. Consistent with smart sampling, the air sampling stations were selected based on the locations with the highest X/Q, D/Q wind sectors, and dosimeters were selected based on the most risk-significant locations (e.g., those that have the highest potential for public dose impact).

For the air samplers and dosimeters selected, the inspectors reviewed the calibration and maintenance records to evaluate whether they demonstrated adequate operability of these components. Additionally, the review included the calibration and maintenance records of select composite water samplers.

The inspectors assessed whether the licensee initiated sampling of other appropriate media upon loss of a required sampling station.

The inspectors observed the collection and preparation of environmental samples from different environmental media (e.g., ground and surface water, milk, vegetation, sediment, and soil) as available to determine if environmental sampling was representative of the release pathways as specified in the Offsite Dose Calculation Manual and if sampling techniques were in accordance with procedures.

Based on direct observation and review of records, the inspectors assessed whether the meteorological instruments were operable, calibrated, and maintained in accordance with guidance contained in the UFSAR, NRC Regulatory Guide 1.23, "Meteorological Monitoring Programs for Nuclear Power Plants," and licensee procedures. The inspectors assessed whether the meteorological data readout and recording instruments in the control room and, if applicable, at the tower were operable.

The inspectors evaluated whether missed and/or anomalous environmental samples were identified and reported in the annual environmental monitoring report. The inspectors selected events that involved a missed sample, inoperable sampler, lost dosimeter, or anomalous measurement to determine if the licensee had identified the cause and had implemented corrective actions. The inspectors reviewed the licensee's assessment of any positive sample results (i.e., licensed radioactive material detected above the lower limits of detection) and reviewed the associated radioactive effluent release data that was the source of the released material.

The inspectors selected structures, systems, or components that involve or could reasonably involve licensed material for which there is a credible mechanism for licensed material to reach ground water, and assessed whether the licensee had implemented a Sampling and Monitoring Program sufficient to detect leakage of these structures, systems, or components to ground water.

The inspectors evaluated whether records, as required by 10 CFR 50.75(g), of leaks, spills, and remediation since the previous inspection were retained in a retrievable manner.

The inspectors reviewed any significant changes made by the licensee to the Offsite Dose Calculation Manual as the result of changes to the land census, long-term meteorological conditions (3-year average), or modifications to the sampler stations since the last inspection. They reviewed technical justifications for any changed sampling locations to evaluate whether the licensee performed the reviews required to ensure that the changes did not affect its ability to monitor the impacts of radioactive effluent releases on the environment.

The inspectors assessed whether the appropriate detection sensitivities with respect to Technical Specifications/Offsite Dose Calculation Manual were used for counting samples (i.e., the samples meet the Technical Specifications/Offsite Dose Calculation Manual required lower limits of detection). The licensee uses a vendor laboratory to analyze the Radiological Environmental Monitoring Program samples so the inspectors reviewed the results of the vendor's Quality Control Program, including the inter-laboratory comparison, to assess the adequacy of the vendor's program.

The inspectors reviewed the results of the licensee's Inter-Laboratory Comparison Program to evaluate the adequacy of environmental sample analyses performed by the licensee. The inspectors assessed whether the inter-laboratory comparison test included the media/nuclide mix appropriate for the facility. If applicable, the inspectors reviewed the licensee's determination of any bias to the data and the overall effect on the Radiological Environmental Monitoring Program.

b. Findings

No findings were identified.

.3 Identification and Resolution of Problems (02.03)

a. Inspection Scope

The inspectors assessed whether problems associated with the Radiological Environmental Monitoring Program were being identified by the licensee at an

appropriate threshold and were properly addressed for resolution in the licensee's CAP. Additionally, the inspectors assessed the appropriateness of the corrective actions for a selected sample of problems documented by the licensee that involved the Radiological Environmental Monitoring Program.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity, Emergency Preparedness, Public Radiation Safety, Occupational Radiation Safety, and Security

4OA1 Performance Indicator Verification (71151)

.1 Reactor Coolant System–Specific Activity

a. Inspection Scope

The inspectors sampled licensee submittals for the RCS specific activity Performance Indicator (PI) for Braidwood Station, Units 1 and 2, for the period from the first quarter 2013 through the second quarter 2014. The inspectors used PI definitions and guidance contained in Nuclear Energy Institute (NEI) 99–02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, dated August 2013, to determine the accuracy of the PI data reported during those periods. The inspectors reviewed the licensee's RCS chemistry samples, TS requirements, IRs, event reports, and NRC Integrated Inspection Reports 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. In addition to record reviews, the inspectors observed a chemistry technician obtain and analyze a RCS sample. Documents reviewed are listed in the Attachment.

This inspection constituted two RCS-specific activity samples as defined in IP 71151–05.

b. Findings

No findings were identified.

.2 Radiological Effluent Technical Specification/Offsite Dose Calculation Manual Radiological Effluent Occurrences

a. Inspection Scope

The inspectors sampled licensee submittals for the radiological effluent Technical Specification/Offsite Dose Calculation Manual occurrences PI for the period from the first quarter 2013 through the second quarter 2014. The inspectors used PI definitions and guidance contained in NEI 99–02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, dated August 2013, to determine the accuracy of the PI data reported during those periods. The inspectors reviewed the licensee's IR database and selected individual reports generated since this indicator was last reviewed to identify

any potential occurrences such as unmonitored, uncontrolled, or improperly calculated effluent releases that may have impacted offsite dose. The inspectors reviewed gaseous effluent summary data and the results of associated offsite dose calculations for selected dates to determine if indicator results were accurately reported. The inspectors also reviewed the licensee's methods for quantifying gaseous and liquid effluents and determining effluent dose. Documents reviewed are listed in the Attachment to this report.

This inspection constituted one Radiological Effluent Technical Specification/Offsite Dose Calculation Manual radiological effluent occurrences sample 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; whether timeliness was commensurate with safety significance; whether 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 Plan Reviews

a. Inspection Scope

In order to assist with the identification of repetitive equipment failures and specific human performance issues for follow-up, 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 IR 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 Selected Issue Follow-Up Inspection: Containment Spray Flow Verification Test Failures

a. Inspection Scope

On June 11, 2014, the 1A CS additive flow rate failed to meet the as-found acceptance criteria during the performance of 1BwOSR 3.6.7.5.1, "Unit 1 Train A Containment Spray Additive Flow Rate Verification." The licensee reported this event to the NRC under 10 CFR 50.72(b)(3)(ii)(B)–Unanalyzed Condition–using Event Report #50189. The unanalyzed condition was reported, in part, because operators recognized that insufficient chemical additive flow might have resulted in lower than assumed CS pH values.

On July 15, 2014, the 2A CS additive flow rate failed to meet the as-found acceptance criteria during the performance of 2BwOSR 3.6.7.5.1, "Unit 2 Train A Containment Spray Additive Flow Rate Verification." Once again, the licensee reported this event to the NRC under 10 CFR 50.72(b)(3)(ii)(B)–Unanalyzed Condition–using Event Report #50282. Based on this information, the inspectors recognized through corrective action items that in 2014 two (1A and 2A) out of the four trains of CS (two per unit) had failed to meet the as-found acceptance criteria during the performance of the 5-year CS Additive Flow Rate Surveillance.

During this inspection period, the inspectors reviewed the licensee's investigation of the events, discussed the results of the investigation with engineering department staff, and observed in-plant activities to determine whether the corrective actions planned addressed the issues identified.

This review constituted one in-depth PI&R sample as defined in IP 71152–05.

b. Observations and Findings

No findings were identified. The CS system uses pumps to draw water from the refueling water storage tank and spray the water into containment during some accidents to absorb heat from the containment atmosphere during the injection phase. Flow driven by the CS pump passing through an eductor draws water from the CS additive tank. Operations personnel perform 5-year surveillance on the CS system to verify that the eductor will provide the required flow from the additive tank.

On June 11, 2014, the 1A CS additive flow failed the as-found acceptance criteria during its 5 year surveillance. For the 1A CS educator, the flow required by the surveillance acceptance criteria was 30–63 gallons per minute (gpm). The measured flow during the surveillance was 27 gpm. A subsequent engineering evaluation was performed to

incorporate an approved alternate source term license amendment which had resulted in the elimination of minimum CS pH value. The only requirement from the amendment was that long-term retention of captured fission products in the sump water assumed the sump water pH was greater than 7. With this knowledge, it was then determined that in order to transfer maximum CS additive tank inventory into containment within 8 hours, an eductor flow of 10 gpm was required. Based on the results of this evaluation, Event Report #50189 was retracted. For the 2A CS educator, the measured as-found flow during the surveillance was 17.96 gpm. A similar evaluation to the one previously described for the 1A CS was performed and it determined that a flow of 10 gpm was required. Based on the results of this evaluation, Event Report #50282 was also retracted.

The licensee performed an Apparent Cause Evaluation (IR 1669853) to determine whether any latent organizational weaknesses associated with the surveillance acceptance criteria existed. The investigation concluded that even though Braidwood had received a license amendment that incorporated the use of Alternate Source Term in 2006, the acceptance criteria was never revised to reflect the changes to the licensing basis. Additionally, the investigation concluded that the failure rate of the spray additive flow surveillance over the last 20 years at Braidwood was approximately 70 percent. The investigation reflected that over the years multiple corrective actions had been implemented, which included changes to the acceptance criteria and test setup criteria. It also reflected that there was a need to better understand the reason behind the failures. Additionally, at least one Root Cause Evaluation (2002) and an Apparent Cause Evaluation (2007) had been previously performed to investigate the issue.

Based on all the information previously provided, the inspectors were concerned that even though as-found criteria were ultimately found acceptable, the decreasing as-found flow in surveillances over the last 20 years could suggest the existence of potential adverse equipment issues or performance changes in the system. Over the past 20 years, it did not appear that there was an effective identification of issues related to the system or the surveillance that led to the high rate of failed surveillances. Instead, the corrective actions focused on revising the acceptance criteria and test setup. The inspectors shared these concerns with licensee personnel.

The licensee provided the inspectors their planned corrective actions to revise the acceptance criteria and to investigate the reasons behind the failures. They also provided information regarding the equipment inspections and work that had been completed that led them to believe that the reason behind the failure was not related to equipment deficiencies. In IR 1683215, “U2 CS Additive Flow Rate Test Lessons Learned,” the licensee documented that test pressures were critical steps and that procedure changes were needed to ensure test repeatability. The recommendations included a pressure stabilization period and venting air potentially introduced during the test. These recommendations were implemented in the subsequent test of the 2B CS additive flow that was performed in August 2014. The test of the 2B CS additive flow as-found data revealed data that was approximately the same as the as-left data from the last performed surveillance.

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

.1 Unusual Event Declared Based on Shots Fired in the Owner Controlled Area

a. Inspection Scope

The inspectors reviewed the plant's response to a Notice of Unusual Event that was declared on July 23, 2014 at 7:43 p.m. Central Daylight Time due to gunshots being heard within the Owner Controlled Area. No hostile action was identified. Local law enforcement was contacted and investigated the event. The Notice of Unusual Event was terminated at 9:34 p.m. Central Daylight Time based on local law enforcement calling an "all clear" and station security restoring the normal security posture. Documents reviewed are listed in the Attachment.

This event follow-up review constituted one sample as defined in IP 71153–05.

b. Findings

No findings were identified.

4OA5 Other Activities

.1 Operation of an Independent Spent Fuel Storage Istallation at Operating Plants (60855.1)

a. Inspection Scope

The inspectors, with the assistance of the Division of Spent Fuel Storage and Transportation, reviewed the licensee's proposed changes to the cask stack-up configuration and fuel handling building structure to ensure the stability and structural integrity of an unrestrained stack-up. The stack-up configuration referred to the condition when a transfer cask (HI-TRAC) containing a multi-purpose canister (MPC) loaded with spent fuel is resting on a storage overpack (HI-STORM). While in the stack-up configuration, the loaded MPC is lowered from the HI-TRAC to the HI-STORM. During this transfer, when the HI-TRAC is not attached to a crane, the stack-up is either rigidly restrained from movement by a restraint system, or is free-standing.

In past dry cask storage campaigns, the HI-TRAC and HI-STORM casks were restrained by temporary steel supports/restraints attached to the fuel handling building structure and qualified for seismic loads. The licensee completed drawings and analyses that evaluated an alternate method for supporting a freestanding stack-up configuration of a HI-TRAC on top of a HI-STORM. As a result, the download of an MPC loaded with spent nuclear fuel in the fuel handling building of Braidwood Station could be conducted without the use of seismic restraints. The alternate method utilizes a new removable grillage platform containing a low friction surface material that supports the base of the HI-STORM in the fuel handling building, and a modified mating device that transfers the weight of the HI-TRAC to the HI-STORM.

The inspectors, with the assistance of the Division of Spent Fuel Storage and Transportation, reviewed a dynamic nonlinear time history analysis that was performed for unrestrained stack-up configuration during a design basis seismic event in order to evaluate the rocking and sliding stability of the unrestrained stack-up configuration. The

results of the analysis indicated that the maximum expected rocking angles were less than the minimum acceptable rocking angle with a factor of safety of at least 2.0 and maximum expected sliding distances were less than the minimum clearance distance to the fuel handling building structure and/or adjacent fuel handling building SSCs with a factor of safety of at least 3.0. The evaluations for SSCs required to implement unrestrained stack-up configuration and the fuel handling building structure determined that they remained within Code allowables for the design basis loads during a seismic event. As a result, the licensee determined the proposed activity would not impact plant operations, nor did it adversely affect the function of any plant equipment or structure that was used in establishing the Plant or Independent Spent Fuel Storage Installation (ISFSI) Design Basis.

b. Findings

No findings were identified.

4OA6 Management Meetings

.1 Exit Meeting Summary

On October 22, 2014, the inspectors presented the inspection results to Mr. M. Kanavos, Site Vice President, and other members of the licensee staff. The licensee acknowledged the issues presented. The inspectors confirmed that proprietary material received during the inspection period that was no longer under review was returned to the licensee and none of the potential input discussed was considered proprietary.

.2 Interim Exit Meetings

Interim exits were conducted for:

- The inspection results for the areas of radiological environmental monitoring and RCS specific activity performance indicator verification with Ms. M. Marchionda, Plant Manager, on July 18, 2014.

- The inspection results for the areas of radiological hazard assessment and exposure controls, radiation monitoring instrumentation, and Radiological Effluent Technical Specification/Offsite Dose Calculation Manual occurrences PI verification with Ms. A. Ferko, Operations Manager, on August 15, 2014.

- The inspection results of the Emergency Preparedness Program inspection with Ms. D. Poi, Emergency Preparedness Manager, conducted by telephone, on September 8, 2014.

- The inspection results of the ISFSI operational inspection with Ms. M. Marchionda, Plant Manager, on October 1, 2014.

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 met 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 measures shall be established to assure that applicable regulatory requirements and the design basis are appropriately translated into specifications, drawings, procedures, and instructions. Contrary to the above, as of June 25, 2014, the licensee had failed to translate the design basis of the UHS into procedures and instructions. Specifically, procedure 0BwOA–ENV–3, "Braidwood Cooling Lake Low Level Unit 0," did not reflect the assumptions in the UHS analysis in that non-essential service water pumps were not directed to be secured to prevent loss of inventory in the UHS. This issue was entered into the CAP as IR1674557 and the procedure was corrected.

  The inspectors determined that the performance deficiency was more than minor in accordance with IMC 0612, Appendix B, "Issue Screening," because the issue was associated with the Design Control 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, based on the analysis of record, at the time of discovery, there was reasonable doubt that the UHS could meet its mission time of 30 days. The inspectors determined the finding could be evaluated using the SDP in accordance with IMC 0609, "Significance Determination Process," Attachment 0609.04, "Initial Characterization of Findings," dated June 19, 2012, and Appendix A, "The Significance Determination Process for Findings At-Power," Exhibit 2, "Mitigating Systems Screening Questions," dated June 19, 2012. The inspectors determined that the finding affected the design of the UHS, but did not result in a loss of operability, and therefore screened the finding as having very low safety significance (Green).

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

M. Kanavos, Site Vice President
M. Marchionda, Plant Manager
K. Aleshire, Corporate Emergency Preparedness Manager
T. Barren, Dry Cask Storage Project Manager
J. Bashor, Engineering Manager
V. Cwietniewicz, Corporate Emergency Preparedness Manager
A. Ferko, Operations Manager
B. Finlay, Site Security Manager
M. Gorge, Chemistry Supervisor
C. Hardy, System Engineer
M. Jesse, Corporate Regulatory Assurance Manager
D. Palmer, Radiation Protection Manager
D. Poi, Emergency Preparedness Manager
S. Reynolds, Nuclear Oversight Manager
C. Ingold, Site Chemical Environment & Radwaste Manager
P. Raush, Regulatory Assurance Manager
B. Sparr, Maintenance Director
R. Simonsen, Certified Health Physicist, Radiation Protection Technical Support
D. Stiles, Site Training Director
M. Abbas, NRC Coordinator

Nuclear Regulatory Commission
E. Duncan, Chief, Reactor Projects Branch 3

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened and Closed

05000456/2014004–01 05000457/2014004–01	NCV	Adverse Impact of Floor Drain Design on Flooding Analysis (Section 1R06.1b)
05000456/2014004–02 05000457/2014004–02	NCV	Multiple Failures to Follow Operability Evaluation Process Following Discovery of a Non-Conforming Condition in the Ultimate Heat Sink (Section 1R15.2.b)
05000456/2014004–03 05000457/2014004–03	NCV	Station Diesel-Driven Fire Pump Restored to Service Non-Functional Due to Incorrect Stop Push Button Switch Replacement (Section 1R19.1b)
05000457/2014004–04	NCV	Unit 2 Pressurizer Pressure Transmitter 458 Returned to Service with Instrument Isolated (Section 1R19.2b)
05000456/2014004–05 05000457/2014004–05	NCV	Inadequate Evacuation Time Estimate Submittals (1EP5.1b)

Closed

05000457/2014003–02	URI	Unit 2 Pressurizer Pressure Transmitter 2PT–458 Returned to Service Isolated (Section 1R19.2)

Discussed

05000456/2010007–04 05000457/2010007–04	NCV	Adverse Impact of Flood Drain Strainer Design Modification on Flooding Analysis (Section 1R06.1b)
05000456/2014003–01 05000457/2014003–01	URI	Issues That Could Adversely Affect the Ultimate Heat Sink (Section 1R15.2b)

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.

1R04 Equipment Alignment

- IR 1474584; 2A AF Pump Ready to Run Light Not Lit; February 13, 2013
- IR 1504200; 2AF005E Positioner Gauge Has Incorrect Indication; April 19, 2013
- IR 1519749; 2PS-AF121 Weeps Oil at Compression; May 31, 2013
- IR 1527611; Limit Switch Indicator Issue with 2AF005F; June 21, 2013
- IR 1533864; 2AF005A Didn't Indicate Closed on U2 RSDP During Valve Stroke; July 9, 2013
- IR 1543001; Designated Operator Actions for BwISR 3.3.2.10-217/218; August 3, 2013
- IR 1544999; AF Flow Indicator Reading on Low PEG (2FI-AF017B); August 9, 2013
- IR 1545006; AF Flow Indicator Reading on Low PEG (2FI-AF017B); August 9, 2013
- IR 1575314; Replace 2PT-AF055; October 22, 2013
- IR 1577753; Designated Operator Actions Not Documented in Operator Logs; October 28, 2013
- IR 1586063; Damaged Lagging in 2B AF Pump Room; November 16, 2013
- IR 1603528; NRC Questions on AF X-Tie Header Being Water Solid; January 3, 2014
- IR 1603715; Voids in 2A AF Suction Line Exceed Acceptance Criterion; January 3, 2014
- IR 1619829; CCP: Inaccurate Note on AF Drawings; February 11, 2014
- IR 1622620; Open Limit Switch Not Actuated Without Assistance – 2AF022B; February 18, 2014
- IR 1622986; SX to AF Vent Mod Documentation Question; February 18, 2014
- IR 1632005; Suspected Leak-By Past 2AF006A; March 11, 2014
- IR 1644274; 2AF006A Leak-By Increased After Quarterly Valve Strokes; April 7, 2014
- IR 1654669; OSP-A Graffiti in Unit 2 AF Tunnel; May 1, 2014
- IR 1655325; OSP-R Slight Packing Leak on 2AF005F; May 3, 2014
- IR 1659532; 2014 NRC PI&R FASA-2Q11 NRC Finding for Air in AFW System; May 13, 2014
- IR 1660522; 2AF014D Check Valve Serial # A1362 Failed As Found Testing; May 15, 2014
- IR 1661469; OSP-A 2B AF Pump Jacket Water Will Not fill – 2AF01PB; May 18, 2014
- IR 1662357; 2AF005A Indicated Dual When Full Open; May 20, 2014
- IR 1674352; AF Suction Swap Over Project Approved as Fast Track; June 23, 2014
- IR 1674967; Need WR to Replace Valve 2AF019A in A2R18; June 15, 2014
- IR 1685783; IEMA Question on Op Eval 11-003; July 25, 2014
- BwAP 340-2T1; Operating Mechanical Lineup Unit 2; May 9, 2002
- BwAP 340-2T1; Operating Mechanical Lineup, Auxiliary Feedwater, Unit 2; May 31, 2005
- BwAP 340-2T1; Operating Mechanical Lineup, Auxiliary Feedwater, Unit 2; November 18, 2011
- BwOP AF-M2; Operating Mechanical Lineup, Auxiliary Feedwater, Unit 2; Revision 16
- WO 01744014; OP 1AF01PA-A 15 Minute Monthly Run; July 7, 2014
- WO 01744022; OP 2AF01PA-A 15 Minute Monthly Run; July 7, 2014
- Drawing M-122; Diagram of Auxiliary Feedwater – Unit 2

1R05 Fire Protection

- IR 1693159; PRA Actions Not Logged IAW Expectations; August 15, 2014

- IR 1693160; IEMA Identified Potential Gap with Logging GOCAR Entry; April 18, 2014
- IR 1693739; Braidwood Pre-Fire Plan Drawings Have Byron Drawing on Them; August 18, 2014
- Braidwood Pre-Fire Plan Fire Zone 11.4-0 South, “AB 383’ Unit 2 Auxiliary Building General Area – South
- Braidwood Pre-Fire Plan Fire Zone 5.4-1, “Switchgear 451’ Division 12 MEER & Battery Room”
- Braidwood Pre-Fire Plan Fire Zone 5.5-2, “Switchgear 451’ Unit 2 Auxiliary Electrical Equipment Room”
- Braidwood Pre-Fire Plan Fire Zone 11.3A-1, “AB 364’ Safety Injection Pump 1A Room”
- Braidwood Pre-Fire Plan Fire Zone 11.4A-2, “AB 383’ Unit 2 Auxiliary Feedwater Pump Diesel Room”
- Braidwood Pre-Fire Plan Fire Zone 8.6-D, “Turbine Building 451’ Unit 1 Operating Floor South East Corner”

1R06 Flood Protection Measures

- 3B1-0985-001; Leakage Rates due to Through-Wall Cracks in Moderate Energy Lines; Revision 0
- 3C8-0685-002; Auxiliary Building Flood Level Calculations; Revision 14
- 3C8-0685-002; Auxiliary Building Flood Level Calculations; Revision 13
- EC 379355; Blocked Floor Drain Evaluation; Revision 0
- EC 3999386; SX Pump Room Flood Seal Opening Operational Evaluation; Revision 0
- Inspection of 1DM03J and 2DM08J; August 12, 2014
- IR 1043396; CDBI Basket Strainers May Adversely Affect Some Floor Drains; March 16, 2010
- IR 1290617; Inaccuracies in Flood Level Calculation for Flood Zone G9-1; November 14, 2011
- IR 1655544; Cable Vault 2B Sump Excessive Run Time – 2DM08P; May 3, 2014
- IR 1658710; Cable Vault 2A Sump Pump Not Running w/High Level Alarm; May 12, 2014
- IR 1691604; Cable Vaults 1E, 1F, and 1K in High Alarm; August 12, 2014
- IR 1691608; Cable Vaults 2C and 2N in Continuous Run; August 12, 2014
- IR 1691611; Cable Vault 2G Pump Controller Breaker in the “Off” Position; August 12, 2014
- IR 1692011; Cable Vault 2N Pump in Continuous Run – 2DM11P; August 13, 2014
- IR 1692430; Potential Trend in Materiel Condition of DM System; August 14, 2014
- IR 2238242; BWAP 1110-3 Flood Measure Non-Conservative; September 11, 2014
- IR 2385204; NRC Questions on Aux Building Flood Evaluation; September 23, 2014
- IR 2386384; NRC Questions on Closure Actions of 2010 CDBI NCV; September 22, 2014

1R07 Heat Sink Performance

- BwVS 900-28; Heat Transfer Test for Component Cooling Water Heat Exchanger 0CC01A; Revision 10
- BwVS 900-29; Heat Transfer Test for Component Cooling Water Heat Exchangers 0CC01A; Revision 17
- PMP-2350-INS-001; Conduct of Inspection Activities; Revision 2 – March 5, 2014
- WO 01576734 01; Therm PFMC Test at Start of Outage; June 16, 2014
- WO 01604813 01; Therm PFMC Test of Component Cooling Heat Exchangers; June 16, 2014

1R11 Licensed Operator Requalification Program

- LORT Training Scenario on September 2, 2014

1R12 Maintenance Effectiveness

- IR 1316720; 1PR09J Loss of Sample Flow Received, Unplanned Rets Entry; January 23, 2012
- IR 1316726; 1PR21J and 1PR28J High Alarms Received; January 23, 2012
- IR 1320393; 2PR28J Momentarily Loss Sample Flow; January 31, 2012
- IR 1326816; Iodine Channel on 1RE-PR028 Went Into High Alarm; February 14, 2012
- IR 1323605; Unexpected LCO Entry for 2PR11J – 2RE-PR011A; February 6, 2012
- IR 1338552; 2PR16J Communications Failure; March 8, 2012
- IR 1342334; 1PR18J Communication Failure; March 18, 2012
- IR 1343953; 2PR27J Possibly Spiking Due to EMI; March 21, 2012
- IR 1351964; 2PR11J Loss of Sample Flow; April 10, 2012
- IR 1357575; -PR05J Tripped Off; April 23, 2012
- IR 1357586; 2PR02J Causes Communications Loop 3 to Crash During 2BwIS RETS 2.1-2;April 23, 2012
- IR 1358118; 1PR02J Loss of RM-80 Communications; April 24, 2012
- IR 1376192; Failure by 1PR18J Radiation Monitor; June 9, 2012
- IR 1500325; 2PR17J was Found Indicating Low by 96,121 Counts; September 12, 2012
- IR 1384202; Loss of Sample Flow on 1PR08J; July 2, 2012
- IR 1400403; 1PR27J Tripped Off Due to Loss of Sample Flow; August 14, 2012
- IR 1420679; Attempt to Flow Portion of 1PR15J, Cannot Get Sufficient Flow; September 28, 2012
- IR 1425115; 1PR17J Pump Will Not Run; October 11, 2012
- IR 1461709; Loss of Communications for 1PR02J; January 11, 2013
- IR 1473869; 1PR07J Loss of Communications; February 11, 2013
- IR 1476655; 0PR05J Loss of Sample Flow; February 18, 2013
- IR 1482926; 0PR05J Tripped Offline Due to Monitor Loss of Sample Flow; March 4, 2013
- IR 1503635; 2PR18J Communication Failure; April 18, 2013
- IR 1540488; -PR05J F&O Sump PP Rad Monitor Tripped on Loss of Sample Flow; July 28, 2013
- IR 1515238; NOS ID: Rad Monitor CCA Action Item Closure Deficiencies; May 17, 2013
- IR 1518743; 2PR30J Inoperable; May 22, 2013
- IR 1524466; Not Operational Unit 1 Pipe Tunnel Exhaust Rad Sample; June 13, 2013
- IR 1532546; 1PR02J Loss of Sample Flow Operate Failure; July 4, 2013
- IR 1537362; Multiple Communications Failures on 1RT-PR015; July 18, 2013
- IR 1540426; -PR19J Caused Unplanned RETS Entry; July 28, 2013
- IR 1590904; 1PR27J Loss of Communication; November 28, 2013
- IR 1605149; 1PR08J Failed Check Source; January 7, 2014
- IR 1618444; 1PR14J Pump Failed; February 7, 2014
- IR 1646950; 1PR17J Operate Failure; April 13, 2014
- IR 1650084; 2PE18J Loss of Communications; April 21, 2014
- IR 1657237; 1PR18J Loss of Communications; May 7, 2014
- IR 1658929; 2PR18J Has a Loss of Communications Failure Alarm; May 12, 2014
- IR 1661710; 2PR03J Monitor Communications Failure; May 19, 2014
- IR 1661809; 1PR18J Monitor Communications Failure; May 19, 2014
- ER-AA-310; Implementation of the Maintenance Rule; Revision 9
- MR Document HT-02; Provide Temperature Control for Rad Monitoring for Vent Stacks and IDNS Building
- MR Document PC-04; Provide Method of Access to Containment Building
- MR Document PC-06; Provide Overpressure Protection for Piping Between containment Isolation Valves

- MR Document PR-01; Monitor Control Room Ventilation Radiation Monitors, Including Automatic Actuations as Required
- MR Document PR-02: Cubicle Monitors, Including Automatic Actuations as Required
- MR Document PR-03; Primary/Secondary Leak Monitors, Including Automatic Actuations as Required
- MR Document PR-04; Non-Safety Related Vent Stack Monitors, Including Automatic Actuations as Required
- MR Document PR-05; Safety-Related Vent Stack Monitors, Including Automatic Actuations as Required
- MR Document PR-06; CC Heat Exchanger Water Outlet Radiation Monitors, Including Automatic Actuation as Required
- MR Document PR-07; Containment Atmosphere Monitors, Including Automatic Actuations as Required
- MR Document PR-08; Non-Safety Related Process Radiation Monitors Outside Scope of the Maintenance Rule
- MR Document PR-09; Provide Continuous Monitoring for Control Room Indications
- MR Document PR-10; Provide for Containment Isolation
- MR Document PR-11; Radioactive Liquid Effluent Monitors, Including Automatic Actuations as Required

1R13 Maintenance Risk Assessments and Emergent Work Control

- Protected Equipment List Sheets Associated Activities

1R15 Operability Determinations and Functionality Assessments

- IR 1438353; Received Unexpected Alarm Generator Volt Reg Trouble; November 10, 2012
- IR 1674557; Question on UHS LAR Impact on Pumps; June 24, 2014
- IR 1675291; Unanalyzed Condition Identified During IR 1674557 Response; June 25, 2014
- IR 1676076; Discrepancy in the UFSAR UHS Description (Section 2.4.11.6); June 27, 2014
- IR 1680239; Broken ES Pipe Support/Excessive Pipe Movement; July 9, 2014
- IR 1681326; Untimely Notification to SM of Potential Plant Issue; June 24, 2014
- IR 1681799; Unexpected Annunciator 2-19-C8, Generator Volt Reg Trouble; July 14, 2014
- IR 1682267; 1VE-LM006 Procedurally Inoperable; July 15, 2014
- IR 1683253; Ambiguous Information in FSAR Question 10-60; July 18, 2014
- IR 1684277; WEC Audit Findings – KNF Nozzles for Byron and Braidwood; July 22, 2014
- IR 1696583; SX001 Valve Pit Flooding Clarification; August 26, 2014
- Apparent Cause Investigation; Historical Unanalyzed Condition Associated with the UHS Identified During Procedure Review (IR 1675291); July 15, 2014
- Event Report; IR 1681799; Main Control Room Received Annunciator 2-19-C8; July 14, 2014
- CC-AA-309-101; Engineering Technical Evaluations; Revision 14
- EC 398715; Support 1ES38046X Was Discovered Broken/Non-Functioning; Revision 0
- EC 398835; Braidwood Operability Evaluation 14-004, Westinghouse Audit Findings of KNF – Nozzles at Braidwood and Byron; Revision 00
- 0BwOA ENV-3; Braidwood Cooling Lake Low Level; Revisions 7, 101 and 102
- OP-AA-102-104; Interim Guidance for Cooling Pond Dike Failure; Revision 2
- OP-AA-102-104; Pertinent Information Program; Revision 2
- OP-AA-106-101-1006; IR 1681799; Main Control Room Received Annunciator 2-19-C8; July 22, 2014
- OP-SS-108-115; Operability Determinations (CM-1); Revision 13
- Regulatory Guide 1.27; Ultimate Heat Sink for Nuclear Power Plants; Revision 2

- Technical Evaluation of High Level of 50HZ Noise on Channel 6; July 22, 2014
- WO 01746657 01; MM Broken Pipe Support on U1 ES; June 12, 2014
- Westinghouse Memo; Product Engineering Evaluation of Potential Product Impacts at Korea Nuclear Fuel; March 9, 2014
- Westinghouse Letter to Exelon; Westinghouse Supplier Korea Nuclear Fuel Audit Quality Issues (14-IC-8); July 17, 2014
- Exelon Memo; Technical Assessment of Westinghouse Audit of Korea Nuclear Fuel; July 23, 2014
- Westinghouse Letter to Exelon; Westinghouse Responses to Questions from Exelon Braidwood Review of Korea Nuclear Fuel Audit; July 28, 2014

1R18 Plant Modifications

- EX 399116, "Temporary Configuration Change Process Bypass Degraded Unit 2 Main Power Transformer Line Y Connection, Phase A"

1R19 Post-Maintenance Testing

- IR 1686910; Instrument Inverter Restoration Difficulties; July 29, 2014
- IR 1694942; SG 1C PORV Assembly Currently OOS; August 21, 2014
- IR 1694597; SG 1C ATMOS Relief Valve; August 20, 2014
- EC 413068; 120 Vac ESF Instrument Inverter, Clean – Inspect – Testing (21P08E WO 01352523-01)
- HU-AA-1211-F-01; EM 21P06E Perform Loaded Capacity Test; Revision 2
- WC-AA-104; Perform Loaded Capacity Test; Revision 20a
- WO 01355425 05; 21P06E Inverter – Clean, Inspect and Load Test; July 29, 2014
- WO 01579648 01; 1MS018C Replace Actuator Hydraulic fluid; August 22, 2014
- WO 01762733 01; Elevated Temperature on Unit 2 MP A-Phase Y-Connector; August 21, 2014

1R22 Surveillance Testing

- IR 1681394; 2FI-CS015 CS Eductor 2A Add Flow is Pegged Low; July 13, 2014
- IR 1682209; 2A CS Additive Flow As Found Data Outside of Required Band; July 15, 2014
- IR 1682267; 1VE-LM006 Procedurally Inoperable; July 15, 2014
- IR 1682498; 2A CS Train Inside EC Limit But Outside Surv. Acc. Criteria; July 16, 2014
- IR 1683215; U2 Cs Additive Flow Rate Test Lessons Learned; July 16, 2014
- IR 1683413; NOS ID: EC 398472 GAP, CS Spray Add. Test; July 18, 2014
- IR 1683438; VI Chiller Tripped 4 Times in 24 Hours – 0VI03C; July 18, 2014
- IR 1690383; NRC Question; August 6, 2014
- BwOP AF-5; Motor Driven Auxiliary Feedwater Pump - A Startup on Recirculation; Revision 28
- BwOP AF-6; Motor Driven Auxiliary Feedwater Pump - A Shutdown; Revision 16
- 1BwOSR 3.3.2.8-611A; ESFAS Instrumentation Slave Relay Surveillance (Train A Automatic Safety Injection – K611); Revision 11
- 1BwOSR 3.8.1.2-1; 1A Diesel Generator Operability Surveillance; Revision 36
- 1BwOSR 5.5.8 AF-3A; Group A IST Requirements for Unit One Motor Driven Auxiliary Feedwater Pump; Revision 8
- EC 398472; Evaluation of As-Found Results for 1A Containment Spray NaOH Additive Flow
- Event # 50282; Unanalyzed Condition – Low Containment Spray flow Rate; July 15, 2014
- OP-AA-101-113-1004; 2A CS Pump – Low Eductor Flow During 2BwOSR 3.6.7.5.1; Revision 27

- Drawing M-37; Diagram of Auxiliary Feedwater Unit 1; February 23, 1978
- WO 01737047 01; IST 0 AF001A/3A-1AF01PA Group A Quarterly Pump Surveillance; July 7, 2014
- WO 01744988 01; U1 Train A Relay Surveillance K611; August 6, 2014
- WO 01754394 -1; IST – 1A DG Operability Monthly; August 6, 2014
- Daily Shift Log; July 7, 2014

1EP4 Emergency Action Level and Emergency Plan Changes

- Evacuation Time Estimate Analysis for Braidwood Generating Station; May 2, 2014

1EP5 Maintaining Emergency Preparedness

- Letter from D. M. Gullott (Exelon Generation Company, LLC) to U.S.N.R.C.; "10 CFR 50 Appendix E Evacuation Time Estimate Analysis for Braidwood Station"; December 12, 2012 [ML12348A223]
- Letter from D. M. Gullott (Exelon Generation Company, LLC) to U.S.N.R.C.; "10 CFR 50 Appendix E Evacuation Time Estimate Analysis Checklists"; January 23, 2013 [ML13024A209]
- Letter from J. Barstow (Exelon Generating Company, LLC) to U.S.N.R.C.; ”10 CFR 50, Appendix E. Evacuation Time Estimate Analysis Supplemental Response for Braidwood Station, Byron Station, Clinton Power Station, Dresden Nuclear Power Station, LaSalle County Station, Limerick Generating Station, Oyster Creek Nuclear Generating Station, Peach Bottom Atomic Power Station, Quad Cities Nuclear Power Station, and Three Mile Island Nuclear Station”; September 5, 2013 [ML13254A112]

1EP6 Drill Evaluation

- Drill Evaluation Scenario Performed on June 11, 2014, and June 18, 2014

2RS1 Radiological Hazard Assessment and Exposure Controls

- RP-AA-500; Radioactive Material (RAM) Control; Revision 17
- RP-AA-800-001; 2014 Annual Inventory Reconciliation; National Source Tracking System (NSTS); 2014 Annual Inventory Reconciliation; 2B.127
- NSTS; Correction Form 2014 Annual Inventory Reconciliation; January 15, 2014
- IR-01631922; Rising Trend in Tritium Air Concentration in Unit-1 Containment; March 11, 2014
- IR-01684334; Radioactive Source Check-in Deficiency; July 22, 2014
- CA-01684334; Add Metal Rod Cl-36 Check Source to Station Radioactive Source Inventory per RP-AA-800; Due Date August 22, 2014

2RS5 Radiation Monitoring Instrumentation

- WR-00458275; Auxiliary Building Vent Stack 2PR29J-1 WRGM Sample Skid Unexpected Indication; March 6, 2014
- IR-01676274; Missed Admin Limit for Gas Grab Sampling on 2RE-PR28J; June 27, 2014
- IR-01677034; Wide Range Gas Monitor (WRGM) Pump on Low Light Not Illuminated; June 30, 2014
- IR-01685779; 2AR12 Containment Fuel Handling Incident Radiation Monitor Reading Lower not Trending as Expected; July 25, 2014
- IR-01496404; NOS ID Concern on Small Article Monitor Installation; April 2, 2013
- IR-01676274; Missed Admin Limit for Gas Grab Sample on 2RE-PR28J; June 27, 2014
- IR-01496757; Licensee ID RP Instrument Control Database Deficiency; April 2, 2013
- IR-01564646; Malfunction Electronic Dosimeter Outside RCA; September 9, 2013

- IR-01474321; Elevated Tritium Levels in Fuel Handling Building; February 12, 2013
- IR-01519400; Determine the Background Reading for the OPR10J Radiation Monitor; May 30, 2013
- WR-01553893; 1AR20J Electronic Calibration High Range Containment Area Accident Radiation Monitor; December 27, 2013
- WR-01644907; Surveillance Calibration and Functional Check of Auxiliary Building Ventilation Stack Wide Range Gas Radiation Gas Monitor; Revision 12; May 28, 2013
- BwOP-GW-500T1; Gas Decay Tank Release Form; Approval for Release Analysis on May 15, 2014
- WR-01555301; 1PR30J Calibration of Auxiliary Building Ventilation Stack Wide Range Gas Rad Monitor; April 27, 2014
- CY-AA-130-201; Radiochemistry Quality Control; Revision 2
- RP-BR-928; Units 1 and 2 RE-PR028J Radiation Monitoring Air Sampling; Revision 5; Performed on August 13, 2014
- RP-AA-700-1002; Determination of Correction Factors for Radiation Protection Neutron Instrumentation; Revision 0
- WR-01538324; 1AR20J Detector Calibration/High Range Containment Monitor; September 16, 2013
- WR-01572316; 1PR011J Calibration of Gaseous Effluent Radiation Monitor RCS Leak Detection; June 27, 2014
- WR-01401228; 1PR011J Calibration of Gaseous Effluent Radiation Monitor RCS Leak Detection; August 30, 2012; Calibration Records
- Unit 1 and 2 RE-PR030; Wide Range Gas Monitor Setpoint Determination
- Letter NRC Plant Licensing to Exelon Chief Nuclear Officer; Braidwood Station Unit 1 and 2, and Byron Station on Issuance of Amendments to Revise Technical Specification 3.3.6, “Containment Ventilation Isolation Instrumentation”; July 21, 2014
- RP-AA-700-1101; Calibration of RO-2, RO-2A, RO-20, and RSO-50E Ion Chambers; Revision 1
- RP-AA-700-1203; Calibration of the MGP Instruments Telepole; Revision 0
- RP-AA-700-1208; Operation of Shepherd Model 89 Calibration; Revision 1a
- RP-AA-700-1240; Operation and Calibration of the Canberra ARGOS-5 Personnel Contamination Monitor; Revision 2
- RP-AA-700-1239; Operation and Calibration of the Model SAM-12 Small Articles Monitor; Revision 1
- RP-AA-700-1301; Calibration, Source Check, Operation, and Set-up of the Eberline Beta Monitor, Model AMS-4; Revision 1
- RP-AA-700-1002; Determination of Correction Factors for Radiation Protection Neutron Instrumentation; Revision 0
- BwOP-AR/PR-11T1; Radiation Monitor Interlock Function Table; Revision 14
- RP-BR-920; Setpoint Design Basis for Process Radiation Monitors; Revision 7
- RP-BR-902; Process Radiation Monitor Air Sampling; Revision 4
- RP-BR-929; Unit 1 and 2 PR029J, Wide Range Gas Monitor Particulate Filter/Iodine Cartridge Replacement During Normal Operation; Revision 4

2RS7 Radiological Environmental Monitoring Program

- GE Sensing and Inspection (Rover) Technologies of Braidwood Unit-1 and Unit-2 CST Tanks; September 18, 2013
- ER-AA-5400; Buried Piping and Raw Water Corrosion Program (BPRWCP) Guide; Revision 5
- CY-AA-170-1000; Radiological Environmental Monitoring Program and Meteorological Program Implementation; Revision 6

- Braidwood Station Units 1 and 2; Annual Radiological Environmental Operating Report from January 1 through December 31, 2013; Teledyne Brown Engineering Environmental Services; May 2014
- Braidwood Station Radioactive Effluent Release Report for 2013
- CY-BR-170-301; Braidwood Offsite Dose Calculation Manual (ODCM); Revision 8
- CY-AA-170-100; Radiological Environmental Monitoring Program; Revision 2
- CY-AA-170-000; Radioactive Effluent and Environmental Monitoring Programs; Revision 5
- IR 0147791; 34 Foot Meteorological Tower Wind Direction Unreliable; February 20, 2013
- Murray and Trettel, Inc.; Monthly Report on the Meteorological Monitoring Program at the Braidwood Station; May 2014
- Mistras Long Range Guided Wave Ultrasonic Pipe Screening Results; August 31, 2012
- IR 1547638; REMP Sample Anomaly - 2013 AREOR Entry; August 16, 2013
- IR 1559129; REMP Sample Anomaly BD-03 Air Sampler Station; September 16, 2013
- IR 1580749; REMP Sample Anomaly BD-03; November 4, 2013
- IR 1383503; Tree Growing Beside REMP Air Sampler at BD-5 Gardner Village; June 29, 2012
- IR 1483639; REMP Sample Locations Require Correction in ODCM; March 5, 2013
- IR 1547657; REMP Sample Spilled at Vendor Lab Teledyne Brown; August 16, 2013
- IR 1559109; REMP BD-22 Wilmington Water Facility Higher than Normal for Tritium Concentration; September 16, 2013
- IR 1567420; REMP BD-22 Result Higher than Normal for Tritium; October 3, 2013
- Braidwood X/Q and D/Q Maxima at Beyond the Unrestricted Area Boundary: 2011 Data
- Braidwood X/Q and D/Q Maxima at Beyond the Unrestricted Area Boundary: 2013 Data
  291551; Landauer Environmental Dosimetry Report; January 12, 2013

4OA1 Performance Indicator Verification

- CY-BR-110-208; Unit 2 CVCS Letdown Heat Exchanger Grab Sample; Revision 1
- Braidwood Station Unit 2; Reactor Coolant Sample PWR Coolant Radionuclide Analysis; July 16, 2014
- LS-AA-2090; Monthly Data Elements for NRC Reactor Coolant Specific Activity; Revision 4
- Performance Indicator Verification of Monthly Data Elements for RCS from January 2013 through July 2014
- LS-AA-2150; Monthly Data Elements for NRC RETS/ODCM Radiological Effluent Occurrences; Revision 5
- Reviewed the Radiological Effluent Occurrences Data Elements from January 2013 through June 2014

4OA2 Problem Identification and Resolution

- IR 1670747; 1A CS Flow Verification Test Failure; June 12, 2014
- IR 1682498; 2A CS Train Inside EC Limit But Outside Surveillance Acceptance Criteria; July 16, 2014
- IR 1683027; NRC Observations Near the 2A CS Spray Additive Tank and Pump; July 17, 2014
- IR 1683215; U2 CS Additive Flow Rate Test Lessons Learned; July 16, 2014
- Event Notification 40189; One Containment Spray Train Chemical Additive Flow Out of Specifications; June 11, 2014
- Event Notification 50282; Unanalyzed Condition – Low Containment Spray Flow Rate; July 15, 2014
- Apparent Cause Investigation; Indicated Flow Low During 1A CS Flow Verification Surveillance (IR 1669853); July 25, 2014

4OA3 Event Followup

- IR 1684988; Elevated Security Posture; July 23, 2014
- IR 1685031; 4.0 Critique for MCR Response to Emergency Declaration; July 23, 2014
- IR 1685179; Mazon Facility Lessons Learned for Unusual Event; July 23, 2014
- IR 1685388; Additional Actions Needed Section 4.3 of EP-AA-120; July 24, 2014
- IR 1685420; 4.0 Critique for Security Response to OCA Unusual Event; July 24, 2014
- IR 1687262; Braidwood UE Activation Issues; July 30, 2014
- Event Issues Report; Unusual Event Declared at Braidwood, Elevated Security Posture IR 1684988; July 23, 2014
- EOP-004 Attachment 2 – Event Reporting Form; Physical Threat to a Facility; July 23, 2014
- EP-MW-114-100-F-01; Nuclear Accident Reporting System Form; Actual Unusual Event; July 23, 2014

4OA5 Operation of an ISFSI at Operating Plants

- 50.59 Evaluation; Unrestrained HI-TRAC / HI-STORM stack-up configuration in the Fuel Handling Building; Revision 0
- 72.48 Evaluation; HI-STORM / HI-TRAC Unrestrained Stack-up Supports; Revision 00
- 72.48 Screening; HI-STORM / HI-TRAC Unrestrained Stack-up Supports; Revision 00
- Calculation BRW-13-0043-S; Evaluation of Unrestrained Freestanding Stack-up at Byron/Braidwood; Revision 0
- EC 390048; HI-STORM / HI-TRAC Unrestrained Stack-up Supports; Revision 000

LIST OF ACRONYMS USED

ADAMS	Agencywide Document Access Management System
ASME	American Society of Mechanical Engineers
ATWS	Anticipated Transient Without Scram
CAP	Corrective Action Program
CDF	Core Damage Frequency
CFR	Code of Federal Regulations
CLB	Current Licensing Basis
CS	Containment Spray
DDFP	Diesel-Driven Fire Pump
EC	Engineering Change
EPIP	Emergency Preparedness Implementing Procedure
ETE	Evacuation Time Estimate
gpm	gallons per minute
HI-STORM	Storage Cask
HI-TRAC	Transfer Cask
IMC	Inspection Manual Chapter
IP	Inspection Procedure
IR	Issue Report
ISFSI	Independent Spent Fuel Storage Installation
IST	Inservice Testing
LCO	Limiting Condition for Operation
LERF	Large Early Release Frequency
MPC	Multi-Purpose Canister
NCV	Non-Cited Violation
NEI	Nuclear Energy Institute
NRC	U.S. Nuclear Regulatory Commission
OSP	Outage Safety Plan
PARS	Publicly Available Records System
PI	Performance Indicator
PI&R	Problem Identification and Resolution
PMT	Post Maintenance Testing
PORV	Power Operated Relief Valve
RCS	Reactor Coolant System
RPS	Reactor Protection System
SDP	Significance Determination Process
SPAR	Standardized Plant Analysis Risk
SSC	Systems, Structures, and Components
SRA	Senior Reactor Analyst
SX	Essential Service Water
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
UHS	Ultimate Heat Sink
URI	Unresolved Item
WO	Work Order

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Sincerely,

/RA/

Eric R. Duncan, Chief
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Division of Reactor Projects

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