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

May 2, 2011

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

SUBJECT: BRAIDWOOD STATION, UNITS 1 AND 2, NRC INTEGRATED INSPECTION REPORT 05000456/2011002; 05000457/2011002

Dear Mr. Pacilio:

On March 31, 2011, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Braidwood Station, Units 1 and 2. The enclosed inspection report documents the results of this inspection, which were discussed on April 6, 2011, with Mr. D. Enright and other members of your staff.

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

Based on the results of this inspection, the NRC has determined that one Severity Level IV violation of NRC requirements occurred. The NRC has also identified three issues that were evaluated under the risk significance determination process as having very low safety significance (Green). The NRC has determined that three violations of NRC requirements are associated with these issues. However, because of their very low safety significance, and because the issues were entered into your corrective action program, the NRC is treating the violations as Non-Cited Violations (NCVs) in accordance with Section 2.3.2 of the NRC Enforcement Policy. Additionally, a licensee-identified violation which was determined to be of very low safety significance is listed in Section 4OA7 of this report.

If you contest the subject or severity of any 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 Senior Resident Inspector 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 Senior 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 document system (ADAMS). ADAMS is accessible from the NRC Website at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

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

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

Enclosure: Inspection Report 05000456/2011002; 05000457/2011002
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:	05000456/2011002; 05000457/2011002
Licensee:	Exelon Generation Company, LLC
Facility:	Braidwood Station, Units 1 and 2
Location:	Braceville, IL
Dates:	January 1 through March 31, 2011
Inspectors:	J. Benjamin, Senior Resident Inspector D. Betancourt-Roldan, Acting Resident Inspector N. Feliz-Adorno, Reactor Engineer J. Gall, Reactor Engineer J. Gilliam, Reactor Engineer, Electrical M. Holmberg, Senior Reactor Engineer R. Jickling, Senior Emergency Preparedness Inspector M. Thorpe-Kavanaugh, Reactor Engineer 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

IR 05000456/2011002, 05000457/2011002; 01/01/2011 – 03/31/2011; Braidwood Station, Units 1 & 2; Followup of Events; Other Activities.

This report covers a 3-month period of inspection by resident inspectors and announced baseline inspections by regional inspectors. This report contains three NRC-identified Green findings and one NRC-identified Severity Level IV violation. Three of these issues were considered Non-Cited Violations (NCVs) of NRC regulations. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). Assigned cross-cutting aspects were determined using IMC 0310, "Components Within the Cross-Cutting Areas." Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

A. NRC-Identified and Self-Revealed Findings

Severity Level IV: A Severity Level IV NCV of 10 CFR 50.9, "Completeness and Accuracy of Information," was identified by the inspectors when licensee personnel failed to provide information to the NRC that was complete and accurate in all material respects in Licensee Event Report (LER) 05000457/2010-004-00, "Unplanned Limiting Condition for Operation Entry Due to Low Header Pressure on the 2B Essential Service Water Pump." Specifically, the LER stated that an analysis had determined that both units and trains of the Essential Service Water (SX) system were capable of mitigating the effects of design basis events. However, the referenced analysis had not been performed at the time the LER was submitted.

The inspectors determined that this issue was a Severity Level IV violation based on a similar example referenced in Section 6.9, "Inaccurate and Incomplete Information or Failure to Make a Required Report," of the NRC Enforcement Policy. In particular, example d.1 identified that a licensee failing to make a required report which, had it been submitted, would have resulted in, for instance, increasing the scope of the next regularly scheduled inspection, was a Severity Level IV violation. The inaccurate information was considered to be material to the NRC because it potentially affected an NRC assessment of whether a loss of safety function occurred and whether it should have been reported to the NRC. This issue was entered into the licensee's corrective action program and corrective actions included the station performing the analysis referenced in the LER. The inspectors had previously reviewed the Reactor Oversight Process (ROP) aspect of this finding and a self-revealed NCV of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," was documented in Section 1R22 of NRC Integrated Inspection Report 05000456/2010004; 05000457/2010004 for this issue. (Section 4OA3.1)

Cornerstone: Mitigating Systems

Green. A finding of very low safety significance and an associated NCV of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," was identified by the inspectors when licensee personnel failed to establish instructions for measuring pipe voids detected during surveillances of the emergency core cooling

systems for gas accumulation. Specifically, instructions to measure the size of gas voids detected during venting at each safety injection and residual heat removal system vent location were not provided so that the effect of the void on system operability could be evaluated. The licensee entered this issue into the corrective action program and initiated procedure revisions to provide additional guidance for recording data to size voids identified during venting operations.

The performance deficiency was determined to be more than minor because if left uncorrected it would have the potential to lead to a more significant safety concern. The finding screened as having very low safety significance because it did not result in a loss of operability or functionality. Specifically, a qualitative assessment of the voids detected by venting since the implementation of the licensee's resolution of Generic Letter 2008-01 established reasonable assurance that the voids did not result in a loss of operability. The inspectors did not identify a cross-cutting aspect that represented the underlying cause of this performance deficiency. Therefore, no cross-cutting aspect was assigned. (Section 4OA5.2)

Cornerstone: Barrier Integrity

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 account for vortexing when determining the maximum available time to secure flow from the containment spray additive tank. Specifically, the applicable calculation failed to account for the impact of vortexing, but assumed that the nitrogen in the tank would not enter the system until the tank was completely drained. The licensee entered this issue into the corrective action program and, at the time of the inspection, planned to revise the applicable calculation.

The performance deficiency was determined to be more than minor because it was associated with the Structures, Systems, Components, and Barrier Performance attribute of the Barrier Integrity cornerstone and adversely affected the cornerstone objective of providing reasonable assurance that physical design barriers protect the public from radionuclide releases caused by accidents or events. The finding screened as having very low safety significance because it was a design deficiency of the physical integrity of the reactor containment that did not: (1) affect the barrier function of the control room against smoke or a toxic atmosphere; (2) represent an actual open pathway in the physical integrity of reactor containment; and (3) involve an actual reduction in function of hydrogen igniters in the reactor containment. The inspectors determined that this finding had a cross-cutting aspect in the area of Problem Identification and Resolution, Operating Experience, because the licensee did not thoroughly evaluate external operating experience. [P.2(a)] (Section 4OA5.2)

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 evaluate the effects of dynamic loads at the containment spray discharge piping. The inspectors were concerned because portions of the containment spray discharge piping were normally voided by design and neither the structural design nor operation of the system addressed the dynamic loads that would result when the voided piping was rapidly filled following system initiation. The licensee entered this issue into the corrective action program and, at the time of the inspection, planned to review the design to ensure compliance.

The performance deficiency was determined to be more than minor because it was associated with the Structures, Systems, Components, and Barrier Performance attribute of the Barrier Integrity Cornerstone and adversely affected the cornerstone objective of providing reasonable assurance that physical design barriers protect the public from radionuclide releases caused by accidents or events. The finding screened as having very low safety significance because it did not affect either core damage frequency or large early release frequency. The inspectors determined that this finding had a cross-cutting aspect in the area of Problem Identification and Resolution, Operating Experience, because the licensee did not thoroughly evaluate external operating experience. [P.2(a)] (Section 4OA5.2)

B. Licensee-Identified Violations

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

REPORT DETAILS

Summary of Plant Status

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

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

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection (71111.01)

.1 External Flooding

a. Inspection Scope

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

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

b. Findings

No findings of significance were identified.

.2 Readiness for Impending Adverse Weather Condition – Blizzard Conditions

a. Inspection Scope

On February 1 and February 2, 2011, a blizzard advisory was issued for the surrounding area. The inspectors observed the licensee's preparations and planning for the significant winter weather. The inspectors reviewed licensee procedures and discussed potential compensatory measures with control room personnel. The inspectors focused on plant management's actions for implementing the station's procedures for ensuring that adequate personnel for safe plant operation and emergency response would be available. The inspectors conducted a site walkdown that included plant structures and

systems to check for maintenance or other apparent deficiencies that could affect system operations during the predicted significant weather. The inspectors also reviewed corrective action program (CAP) items to verify that the licensee was identifying adverse weather issues at an appropriate threshold and entering them into their CAP in accordance with station corrective action procedures. Documents reviewed are listed in the Attachment.

This inspection constituted one readiness for impending adverse weather condition sample as defined in IP 71111.01-05.

b. Findings

No findings of significance were identified.

1R04 Equipment Alignment (71111.04)

.1 Quarterly Partial System Walkdowns

a. Inspection Scope

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

- 1B Residual Heat Removal System with the 1A Residual Heat Removal System Out-of-Service;
- 2A Emergency Diesel Generator with the 2B Emergency Diesel Generator Out-of-Service; and
- 2B Containment Spray System After Return to Service From 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, UFSAR, Technical Specification (TS) requirements, outstanding work orders (WOs), condition reports, and the impact of ongoing work activities on redundant trains of equipment in order to identify conditions that could have rendered the systems incapable of performing their intended functions. The inspectors also walked down accessible portions of the systems to verify system components and support equipment were aligned correctly and operable. The inspectors examined the material condition of the components and observed operating parameters of equipment to verify that there were no obvious deficiencies. The inspectors also verified that the licensee had properly identified and resolved equipment alignment problems that could cause initiating events or impact the capability of mitigating systems or barriers and entered them into the CAP with the appropriate significance characterization. Documents reviewed are listed in the Attachment.

These activities constituted three partial system walkdown samples as defined in IP 71111.04-05.

b. Findings

No findings of significance were identified.

.2 Semiannual Complete System Walkdown

a. Inspection Scope

On March 28, 2011, 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, and the operability of support systems, and to ensure that auxiliary 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 of significance 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 availability, accessibility, and the condition of firefighting equipment in the following risk-significant plant areas:

- Auxiliary Building 346' Elevation, Fire Zone 11.2-0;
- 2A Emergency Diesel Generator Room, Fire Zone 9.2-0;
- 2A Diesel Oil Storage Tank Room, Fire Zone 10.2-2;
- 1A Safety Injection Pump Room, Fire Zone 11.3A-1; and
- Unit 1 Auxiliary Building Basement Area, Fire Zone 11.1A-0.

The inspectors reviewed these areas to assess if the licensee had implemented a fire protection program that adequately controlled combustibles and ignition sources within the plant, effectively maintained fire detection and suppression capability, maintained passive fire protection features in good material condition, and implemented 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 the analyzed limits; and fire doors, dampers, and penetration seals appeared to be in satisfactory condition. The inspectors also verified that issues identified during the inspection were entered into the licensee's CAP.

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

b. Findings

No findings of significance 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. 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 corrective action program 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:

- 1A/2A Essential Service Water Room.

Documents reviewed are listed in the Attachment.

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

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification Program (71111.11)

.1 Resident Inspector Quarterly Review (71111.11Q)

a. Inspection Scope

On March 8, 2011 the inspectors observed a crew of licensed operators in the plant's simulator during licensed operator requalification examinations to verify that operator

performance was adequate, evaluators were identifying and documenting crew performance problems and training was being conducted in accordance with licensee procedures. The inspectors evaluated the following areas:

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

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

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

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness (71111.12)

.1 Routine Quarterly Evaluations (71111.12Q)

a. Inspection Scope

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

- Unit 2 Essential Service Water System;
- Unit 1 Auxiliary Feedwater System;

The inspectors reviewed events such as 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 structures, systems, and components/functions classified as (a)(2), or appropriate and adequate goals and corrective actions for systems classified as (a)(1).

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

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

b. Findings

No findings of significance 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 1 Rods in Manual – Rod Control Issue the Week of January 10 – Emergent Yellow;
- 1B Residual Heat Removal Work the Week of January 23 – Planned Yellow;
- 1A Diesel Generator Out-of-Service During a Blizzard the Week of January 31– Unplanned Orange;
- 2B Diesel Generator Out-of-Service for 6-Year Inspection the Week of February 13 – Planned Yellow;
- 2A Diesel Generator Ventilation Failure the Week of February 7 – Unplanned Yellow;
- 1A Safety Injection Pipe Replacement the Week of February 28– Unplanned Yellow; and
- 1A and 2A Motor Driven Auxiliary Feedwater Pump Declared Unavailable due to Voiding that Occurred the Week of March 30– Unplanned Orange.

These activities were selected based on their potential risk significance relative to the Reactor Safety Cornerstones. As applicable for each activity, the inspectors verified that risk assessments were performed as required by 10 CFR 50.65(a)(4) and were accurate and complete. When emergent work was performed, the inspectors verified that the 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.

These maintenance risk assessments and emergent work control activities constituted seven samples as defined in IP 71111.13-05.

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations (71111.15)

.1 Operability Evaluations

a. Inspection Scope

The inspectors reviewed the following issues:

- Bus 141 Degraded Voltage Capacitor, IR 1124974;
- Auxiliary Feedwater Essential Service Water Suction Void, IR 1173517;
- Westinghouse Software Issue Impacts Containment Analysis, IR 117319;
- 2CV8409 Inoperable Weld, IR 1166795;
- Residual Heat Removal Instrument Time Response, IR 1147181;
- Impact of Voids in Safety Injection Accumulators Not Accounted For, IR 1174764; and
- Degraded Stab Assemblies at Pressurizer Heaters, IR 1181341.

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

These operability evaluation inspection activities constituted seven samples as defined in IP 71111.15-05.

b. Findings

No findings of significance were identified.

1R18 Plant Modifications (71111.18)

.1 Plant Modifications

a. Inspection Scope

The inspectors reviewed the following modifications:

- Temporary Modification – Unit 1 Phase Sensing Transformer Modification in Rod Control Circuitry;
- Permanent Modification – Unit 2 Main Steam Leak Encapsulation and Bracing Repair from a Tap Line Off the 30-inch Main Steam Line Feeding the High Pressure Turbine;
- Permanent Modification - Unit 1 and Unit 2 Auxiliary Feedwater Voided Section Fill.

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

This inspection constituted one temporary modification sample and two permanent plant modification samples as defined in IP 71111.18-05.

b. Findings

No findings of significance were identified.

1R19 Post-Maintenance Testing (71111.19)

.1 Post-Maintenance Testing

a. Inspection Scope

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

- Post-Maintenance Testing Associated with Engineering Change 382805 – Unit 1 Phase Sensing Rod Control Transformer Modification;
- 1A Residual Heat Removal Pump Post-Maintenance Testing – Pump Oil Change
- 2B Emergency Diesel Generator 6-year Inspection;

- 1A Safety Injection Inoperable Weld– Radiography Test Associated with the Weld Repair;
- 1A Safety Injection Inoperable Weld – System Fill and Vent Associated with Piping Replacement; and
- 1A Safety Injection Inoperable Weld – Bonnet Replacement Associated with Drain Valve.

These activities were selected based upon the structure, system, or component'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 TS, 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 the licensing basis and design requirements. In addition, the inspectors reviewed corrective action documents associated with the 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 six post-maintenance testing samples as defined in IP 71111.19-05.

b. Findings

No findings of significance were identified.

1R20 Outage Activities (71111.20)

.1 New Fuel Receipt

a. Inspection Scope

During this quarter, the inspectors observed new fuel receipt inspections in anticipation of the Unit 2 refueling outage, 2AR15, which was scheduled to begin in the Spring of 2011. The inspectors verified that the licensee performed inspections in accordance with their procedures and that any issues were appropriately dispositioned.

The inspection did not constitute an outage sample as defined in IP 71111.20-05, but will be a part of the Unit 1 refueling outage sample planned for next quarter

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing (71111.22)

.1 Surveillance Testing

a. Inspection Scope

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

- Unit 1 Reactor Coolant System Unidentified Leakage – (Reactor Coolant System (RCS) Leak Detection sample);
- 1B Emergency Diesel Generator Bypass of Auto Trips – (Routine sample);
- Unit 1 Rod Drive Exercising – (Routine sample);
- 1B Auxiliary Feedwater Pump Monthly – (Routine sample);
- 1A Safety Injection System Fill and Vent – (Routine sample); and
- 2B Containment Spray Valve 2CS 003B/11B American Society of Mechanical Engineers Testing (ASME) – (In-Service Testing (IST) sample).

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, demonstrated operational readiness, and consistent with the system design basis;
- plant equipment calibration was correct, accurate, and properly documented;
- as-left setpoints were within required ranges; and the calibration frequency was in accordance with TS, the UFSAR, procedures, and applicable commitments;
- measuring and test equipment calibration was current;
- test equipment was used within the required range and accuracy;
- applicable prerequisites described in the test procedures were satisfied;
- test frequencies met TS requirements to demonstrate operability and reliability; tests were performed in accordance with the test procedures and other applicable procedures;
- jumpers and leads lifted were controlled and restored where used;
- test data and results were accurate, complete, within limits, and valid;
- test equipment was removed after testing;
- where applicable for inservice testing activities, testing was performed in accordance with the applicable version of Section XI, ASMEs code, and reference values were consistent with the system design basis;
- where applicable, test results not meeting acceptance criteria were addressed with an adequate operability evaluation or the system or component was declared inoperable;
- where applicable for safety-related instrument control surveillance tests, reference setting data were accurately incorporated in the test procedure;
- where applicable, actual conditions encountering high resistance electrical contacts were such that the intended safety function could still be accomplished;

- prior procedure changes had not provided an opportunity to identify problems encountered during the performance of the surveillance or calibration test;
- equipment was returned to a position or status required to support the performance of its safety functions; and
- all problems identified during the testing were appropriately documented and dispositioned in the CAP.

Documents reviewed are listed in the Attachment.

This inspection constituted four routine surveillance testing samples, one IST sample, and one RCS leak detection inspection sample as defined in IP 71111.22, Sections -02 and -05.

b. Findings

No findings were identified.

Cornerstone: Emergency Preparedness

1EP2 Alert and Notification System Evaluation (71114.02)

.1 Alert and Notification System Evaluation

a. Inspection Scope

The inspectors reviewed documents and conducted discussions with Emergency Preparedness (EP) staff and management regarding the operation, maintenance, and periodic testing of the Alert and Notification System (ANS) in the Braidwood Station's plume pathway Emergency Planning Zone. The inspectors reviewed monthly trend reports and the daily and monthly operability records from October 2009 through December 2010. Information gathered during document reviews and interviews was used to determine whether the ANS equipment was maintained and tested in accordance with Emergency Plan commitments and procedures. Documents reviewed are listed in the Attachment.

This Alert and Notification System inspection constituted one sample as defined in IP 71114.02-05.

b. Findings

No findings of significance were identified.

1EP3 Emergency Response Organization Staffing and Augmentation System (71114.03)

.1 Emergency Response Organization Staffing and Augmentation System

a. Inspection Scope

The inspectors reviewed and discussed with plant EP management and staff the emergency plan commitments and procedures that addressed the primary and alternate methods of initiating an Emergency Response Organization (ERO) activation to augment the on shift staff as well as the provisions for maintaining the station's ERO qualification

and team lists. The inspectors reviewed reports and a sample of corrective action program records of unannounced off-hour augmentation tests and pager test, which were conducted between December 2009 and December 2010, to determine the adequacy of the drill critiques and associated corrective actions. The inspectors also reviewed a sample of the EP training records of approximately 24 ERO personnel, who were assigned to key and support positions, to determine the status of their training as it related to their assigned ERO positions. Documents reviewed are listed in the Attachment.

This Emergency Response Organization Augmentation Testing inspection constituted one sample as defined in IP 71114.03-05.

b. Findings

No findings of significance were identified.

1EP5 Correction of Emergency Preparedness Weaknesses (71114.05)

.1 Correction of Emergency Preparedness Weaknesses

a. Inspection Scope

The inspectors reviewed the Nuclear Oversight staff's 2010 audit of the Braidwood Station's emergency preparedness program to determine that the independent assessments met the requirements of 10 CFR 50.54(t). The inspectors also reviewed samples of corrective action program records associated with the 2010 biennial exercise, as well as various EP drills conducted in 2009 and 2010, in order to determine whether the licensee fulfilled drill commitments and to evaluate the licensee's efforts to identify and resolve identified issues. The inspectors reviewed a sample of EP items and corrective actions related to the station's EP program and activities to determine whether corrective actions were completed in accordance with the site's corrective action program. Documents reviewed are listed in the Attachment.

This Correction of Emergency Preparedness Weaknesses and Deficiencies inspection constituted one sample as defined in IP 71114.05-05.

b. Findings

No findings of significance were identified.

1EP6 Drill Evaluation (71114.06)

.1 Training Observation

a. Inspection Scope

The inspector observed a simulator training evolution for licensed operators on March 10, 2011 which required emergency plan implementation by a licensee operations crew. This evolution was planned to be evaluated and included in performance indicator data regarding drill and exercise performance. The inspectors observed emergency response operations in the Control Room and Technical Support Center to determine whether the event classification, notifications, and protective actions recommendations

were performed in accordance with procedures. The inspectors also attended the post-evolution critique for the scenario. The focus of the inspectors' activities was to note any weaknesses and deficiencies in the crew's performance and ensure that the licensee evaluators noted the same issues and entered them into the corrective action program. As part of the inspection, the inspectors reviewed the scenario package and other documents listed in the Attachment.

This inspection of the licensee's training evolution with emergency preparedness drill aspects constituted one sample as defined in IP 71114.06-05.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

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

4OA1 Performance Indicator Verification (71151)

.1 Unplanned Scrams Per 7000 Critical Hours

a. Inspection Scope

The inspectors sampled licensee submittals for the Unplanned Scrams Per 7000 Critical Hours Performance Indicator (PI) for Braidwood Unit 1 and Unit 2. To determine the accuracy of the performance indicator (PI) data reported during those periods, PI definitions and guidance contained in Nuclear Energy Institute (NEI) 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6, dated October 2009, were used. The inspectors reviewed the licensee's operator narrative logs, issue reports, maintenance rule records, event reports and NRC Integrated Inspection Reports from January 1 through December 2010, to validate the accuracy of the submittals. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the PI data collected or transmitted for this indicator. Documents reviewed are listed in the Attachment.

This inspection constituted two Unplanned Scrams Per 7000 Critical Hours samples as defined in IP 71151-05.

b. Findings

No findings of significance were identified.

.2 Unplanned Scrams with Complications

a. Inspection Scope

The inspectors sampled licensee submittals for the Unplanned Scrams with Complications PI for Braidwood Unit 1 and Unit 2. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6, dated

October 2009, were used. The inspectors reviewed the licensee's operator narrative logs, issue reports, maintenance rule records, event reports and NRC Integrated Inspection Reports from January 1 through December 2010, to validate the accuracy of the submittals. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the PI data collected or transmitted for this indicator. Documents reviewed are listed in the Attachment.

This inspection constituted two Unplanned Scrams with Complications samples as defined in IP 71151-05.

b. Findings

No findings of significance were identified.

.3 Unplanned Transients Per 7000 Critical Hours

a. Inspection Scope

The inspectors sampled licensee submittals for the Unplanned Transients Per 7000 Critical Hours PI for Braidwood Unit 1 and Unit 2. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6, dated October 2009, were used. The inspectors reviewed the licensee's operator narrative logs, issue reports, maintenance rule records, event reports and NRC Integrated Inspection Reports from January 1 through December 2010, to validate the accuracy of the submittals. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the PI data collected or transmitted for this indicator. Documents reviewed are listed in the Attachment to this report.

This inspection constituted two Unplanned Transients Per 7000 Critical Hours samples as defined in IP 71151-05.

b. Findings

No findings of significance were identified.

.4 Emergency Response Organization Drill and Exercise Performance

a. Inspection Scope

The inspectors sampled licensee submittals for the Drill and Exercise Performance (DEP) PI for the period from the first quarter 2010 through fourth quarter 2010. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6, were used. The inspectors reviewed the licensee's records associated with the PI to verify that the licensee accurately reported the DEP indicator in accordance with relevant procedures and the NEI guidance. Specifically, the inspectors reviewed licensee records and processes including procedural guidance on assessing opportunities for the PI, assessments of PI opportunities during pre-designated control room simulator training sessions, performance during the 2010 biennial exercise, and performance during other drills. Documents reviewed are listed in the Attachment.

This inspection constitutes one Drill and Exercise Performance sample as defined in Inspection Procedure 71151-05.

b. Findings

No findings of significance were identified.

.5 Emergency Response Organization Readiness

a. Inspection Scope

The inspectors sampled licensee submittals for the Emergency Response Organization (ERO) Drill Participation PI for the period from the first quarter 2010 through fourth quarter 2010. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6, were used. The inspectors reviewed the licensee's records associated with the PI to verify that the licensee accurately reported the indicator in accordance with relevant procedures and the NEI guidance. Specifically, the inspectors reviewed licensee records and processes including procedural guidance on assessing opportunities for the PI, performance during the 2010 biennial exercise and other drills, and revisions of the roster of personnel assigned to key emergency response organization positions. Documents reviewed are described in the Attachment.

This inspection constitutes one ERO Drill Participation sample as defined in Inspection Procedure 71151-05.

b. Findings

No findings of significance were identified.

.6 Alert and Notification System Reliability

a. Inspection Scope

The inspectors sampled licensee submittals for the Alert and Notification System (ANS) PI for the period from the first quarter 2010 through fourth quarter 2010. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in the NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6, was used. The inspectors reviewed the licensee's records associated with the PI to verify that the licensee accurately reported the indicator in accordance with relevant procedures and the NEI guidance. Specifically, the inspectors reviewed licensee records and processes including procedural guidance on assessing opportunities for the PI and results of periodic ANS operability tests. Documents reviewed are listed in the Attachment.

This inspection constitutes one ANS sample as defined in Inspection Procedure 71151-05.

b. Findings

No findings of significance were identified.

4OA2 Identification and Resolution of Problems (71152)

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

.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 that 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: identification of the problem was complete and accurate; timeliness was commensurate with the safety significance; 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 that the classification, prioritization, focus, and timeliness of corrective actions were commensurate with safety and sufficient to prevent recurrence of the issue. Issues entered into the licensee's CAP as a result of the inspectors' observations are included in the Attachment to this report.

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 of significance were identified.

.2 Daily Corrective Action Program Reviews

a. Inspection Scope

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

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

b. Findings

No findings of significance were identified.

4OA3 Followup of Events and Notices of Enforcement Discretion (71153)

.1 (Closed) Licensee Event Report 05000457/2010-004-00, Unplanned Limiting Condition for Operation Entry Due to Low Header Pressure on the 2B Essential Service Water Pump

a. Inspection Scope

On August 24, 2010, Operations personnel performed a Unit 2 "B" train Essential Service Water (SX) pump surveillance. To establish test flow conditions, the operators were instructed by the procedure to throttle open the Unit 2 component cooling (CC) heat exchanger outlet valve to establish a flow rate of 24,000 gallons per minute (gpm) at the pump discharge. Instead of observing the flow rate at the pump discharge as prescribed in Step 3B of the procedure, operators used a flow meter that measured the flow rate at the inlet of the 2B CC heat exchanger. As a result of this error, the total flow at the pump discharge approached 36,000 gpm and the header pressure rapidly lowered from approximately 90 pounds per square inch (psig) to 65 psig. A low discharge pressure alarm was received in the control room and operators took prompt action to restore the discharge pressure to 90 psig by re-throttling closed the Unit 2 CC heat exchanger outlet valve. This action took approximately 5 minutes. During this time, Operations personnel entered multiple TS Limiting Conditions for Operations (LCOs) due to one inoperable SX train and two inoperable CC trains.

The inspectors reviewed this LER to determine if it was completed in accordance with NRC regulations. In addition, the inspectors reviewed the response to the event and the root cause evaluation.

Documents reviewed are listed in the Attachment. This LER is closed.

b. Findings

Introduction: A Severity Level IV NCV of 10 CFR 50.9, "Completeness and Accuracy of Information," was identified by the inspectors when licensee personnel failed to provide information that was complete and accurate in all material respects in LER 05000457/2010-004-00, "Unplanned Limiting Condition for Operation Entry Due to Low Header Pressure on the 2B Essential Service Water Pump."

Description: The inspectors assessed LER 05000457/2010004-00, "Unplanned Limiting Condition for Operation Entry Due to Low Header Pressure on the 2B Essential Service Water Pump," dated October 25, 2010. As part of this assessment, the inspectors reviewed operator logs, CAP documents, Root Cause Report 1105448, and 10 CFR 50.72 Event Notification System (ENS) Report 46203. The inspectors identified several inaccuracies in the 10 CFR 50.73 LER report.

For example, the LER was reported as a condition prohibited by TSs. This was not accurate, since although the station did enter the required LCO, the associated Allowed Outage Time (AOT) was not exceeded. The condition that required entry into the LCO only existed for 5 minutes.

In addition, the LER contained the following conflicting statements regarding the ability of the system to perform its safety function:

- "It was determined that with the essential service water system operating at reduced pressure, if an emergency actuation signal had occurred, the pump flow and performance could not be predicted based on the available vendor data. Therefore, this event is reportable under 10 CFR 50.73 (a)(2)(i)(B), any operation and condition prohibited by TSs."

- "Evaluation of the low essential service water pressure effects indicates that both units and trains of essential service water were capable of mitigating the effects of design basis events."

The first statement described a potential unanalyzed condition and a potential loss of safety function, neither of which were discussed in the LER. The second statement referenced an analysis that was performed to evaluate a potential loss of safety function.

The inspectors requested the analysis as referenced in the LER and associated Root Cause Report 1105448. Over the next 3 weeks the licensee was not able to obtain the analysis and determined that the engineering change tracking the analysis had been cancelled. The information used to develop the LER was based on Root Cause Report 1105448, which referenced the performance of an analysis. Based on numerous interviews with licensee staff, the inspectors determined that a lack of communication within the licensee's organization led to the inaccurate information in the LER.

Analysis: Because violations of 10 CFR 50.9, "Completeness and Accuracy of Information," are considered to potentially impede or impact the regulatory process, they are dispositioned using the traditional enforcement process. The inspectors concluded that the licensee had reasonable opportunity to foresee and correct the inaccurate information prior to the information being submitted to the NRC. As a result, the inaccurate information contained in LER 05000457/2010004-00, "Unplanned Limiting Condition for Operation Entry Due to Low Header Pressure on the 2B Essential Service Water Pump," dated October 25, 2010, was a performance deficiency.

The inspectors determined that this issue was a Severity Level IV violation based on a similar example referenced in Section 6.9, "Inaccurate and Incomplete Information or Failure to Make a Required Report," of the NRC Enforcement Policy. In particular, example d.1 identified that a licensee failing to make a required report which, had it been submitted, would have resulted in, for instance, increasing the scope of the next regularly scheduled inspection, as a Severity Level IV violation. The inaccurate information was considered to be material to the NRC because it potentially affected an NRC evaluation of whether a loss of safety function occurred and whether it should had been reported to the NRC.

The inspectors had previously reviewed the Reactor Oversight Process (ROP) aspect of this finding and a self-revealed violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," was documented in Section 1R22 of NRC Integrated Inspection Report 05000456/2010004; 05000457/2010004.

Enforcement: 10 CFR 50.9, "Completeness and Accuracy of Information," requires, in part, that information provided to the Commission by a licensee shall be complete and accurate in all material respects. Contrary to the above, on October 25, 2010, the licensee submitted LER 05000457/2010004-00, "Unplanned Limiting Condition for Operation Entry Due to Low Header Pressure on the 2B Essential Service Water Pump,"

involving an unplanned Limiting Condition of Operation entry due to low header pressure on the Unit 2 Train B Essential Service Water system, which was not complete and accurate in all material respects. Specifically, the LER had several contradictory statements related to the ability of the system to perform its safety function. The LER stated that an analysis had been performed although at the time the inspectors requested the analysis after the LER was submitted, the analysis had not been performed. As part of the licensee's corrective actions, this issue was entered into the licensee's corrective action program with an action to perform the analysis referenced in the LER. However, because the violation was a Severity Level IV issue and it was entered into the licensee's corrective action program as IR 1166336, this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy (**NCV 05000457/2011002-01, Failure to Provide Complete and Accurate Information in LER 05000457/2010-004-00**).

.2 March 24, 2011 Notice of Unusual Event Operator Response

a. Inspection Scope

On March 24, 2011, the inspectors reviewed the Unit 2 operator's response following an unexpected loss of all Unit 2 Control Room annunciators. This issue resulted in the licensee declaring a Notice of Unusual Event to the NRC. At the time of the event, the licensee was performing planned maintenance on the Unit 2 annunciator system, however, the maintenance and associated clearance order was not expected to result in a loss of all the Unit 2 control room annunciators. The inspectors responded to the control room to observe the operator's and plant's response. Documents reviewed are listed in the Attachment.

This inspection constituted one inspection sample as defined in Inspection Procedure 71153.

b. Findings

No findings of significance were identified in this inspection. However, aspects related to the scope of this inspection was also reviewed by a NRC Special Inspection Team. Related findings and observations will be documented in NRC Inspection Report 05000456/2011012.

4OA5 Other Activities

.1 (Closed) Unresolved Item 05000456/2010004-04; 05000457/2010004-04, Potentially Inadequate Emergency Preparedness Critique

As discussed in NRC Inspection Report 05000456/2010004; 05000457/2010004, the inspectors evaluated the conduct of a routine licensee emergency preparedness drill on July 21, 2010, to identify any weaknesses and deficiencies in classification, notification, and protective action recommendation (PAR) development activities, and identified an Unresolved Item (URI) due to concerns regarding the licensee's critique. This URI was opened to determine whether the licensee's critique process adequately identified the appropriate weaknesses associated with a DEP PI failure on July 21, 2010.

Specifically, the inspectors questioned the adequacy of the critique process regarding the basis for this DEP PI failure. According to the licensee's final critique, the scenario

was designed such that the first indication for meeting the General Emergency declaration threshold was given at 9:15 a.m. In the next 15 minutes, Technical Support Center players did not declare a General Emergency under Emergency Action Level (EAL) MG1 as expected and required. At 9:32 a.m., the lead controller informed the Station Emergency Director that the time limit for classification of the General Emergency under EAL MG1 was exceeded and instructed the Station Emergency Director to declare a General Emergency. However, the licensee's final critique concluded that the Station Emergency Director did not have sufficient evidence to support a realistic appraisal that plant conditions could not be recovered, and as a result, the threshold for declaring a General Emergency under EAL MG1 was not met. The licensee concluded that the reason for the DEP PI failure was due to an improper inject provided by the lead controller.

During this inspection period, the inspectors conducted a review of the licensee's critique process to determine if the licensee adequately identified the appropriate weakness associated with the DEP PI failure. Specifically, the inspectors reviewed additional information including player logs, controller logs, condition reports, corrective actions, and additional information provided by the licensee. Additionally, the inspectors reviewed the licensee's EAL basis document and NEI 99-01, "Methodology for Development of Emergency Action Levels," Revisions 4 and 5.

As a result of this review, the inspectors identified an opportunity for improvement regarding the timely assessment and evaluation of changing plant conditions. The inspectors noted that Braidwood's EAL MG1 for the prolonged loss of all offsite power and prolonged loss of all onsite alternating current power to essential buses stated that "the likelihood of restoring at least one Engineered Safety Feature (ESF) bus should be based on a realistic appraisal of the situation since a delay in an upgrade decision based on only a chance of mitigating the event could result in a loss of valuable time in preparing and implementing public protective actions." Specifically, the inspectors observed the licensee's ability to make a realistic appraisal was affected by missed opportunities in the Technical Support Center to promptly respond to changing plant conditions when issues were communicated. The indications regarding the status of damage to Bus 141, one of the required onsite ESF buses that had a potential impact on an EAL entry, were provided at approximately 8:29 a.m. However, the action to assess simulated damage to Bus 141 was not upgraded to a high priority until 9:24 a.m., and an assessment team was not dispatched until approximately 9:29 a.m. This delay in dispatching the team presented a missed opportunity and subsequent delay in making this realistic appraisal that was necessary for classifying the event.

Additionally, the inspectors noted that communications between the control room and the Technical Support Center was poor and caused confusion regarding plant conditions. Moreover, it was observed that there was a lack of questioning attitude with regard to clarification and verification of provided information. This further affected the licensee's ability to perform the required realistic appraisal.

As a result of this review, the inspectors determined the licensee's critique process adequately identified the appropriate weakness associated with the DEP PI failure on July 21, 2010. No findings of significance were identified and this item is closed.

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

a. Inspection Scope

The inspectors verified that the onsite documentation, system hardware, and licensee actions were consistent with the information provided in the licensee's response to NRC Generic Letter (GL) 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems." Specifically, the inspectors verified that the licensee has implemented or was in the process of implementing the commitments, modifications, and programmatically controlled actions described in the licensee's response to GL 2008-01. The inspection was conducted in accordance with Temporary Instruction (TI) 2515/177, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems (NRC GL 2008-01)," and considered the site-specific supplemental information provided by the Office of Nuclear Reactor Regulations (NRR) to the inspectors. In addition, a member of the NRR staff participated in this inspection.

b. Inspection Documentation

The selected TI areas of inspection were licensing basis, design, testing, and corrective actions. The documentation of the inspection effort and any resulting observations are below.

Licensing Basis: The inspectors reviewed selected portions of licensing basis documents to verify that they were consistent with the NRR assessment report and that they were processed by the licensee. The licensing basis verification included the verification of selected portions of TS, TS basis, and UFSAR.

The inspectors also verified that selected applicable documents that described the plant and plant operation, such as calculations, piping and instrumentation diagrams (P&IDs), procedures, and CAP documents, addressed the areas of concern and were changed if needed following plant changes. The inspectors noted one example where the onsite documentation was not consistent with the information provided in the licensee's response to GL 2008-01. Specifically, in the 9-month response to GL 2008-01, the licensee stated the containment spray piping was designed for the dynamic loads created when it fills with water. However, the inspectors noted Section CL2-3.5.3.6, "Flow transient analysis," of the design specification for containment spray, Document No. 01-10-52, "Commonwealth Edison Company, Byron/Braidwood Stations, Unit 1 and Unit 2, Piping Design Specifications," stated that, "No dynamic loads due to flow transient forces are considered in the analysis of the containment spray system." After discussion with NRR, the inspectors confirmed that the inaccurate information provided by the licensee was no material because it would likely not have caused NRR to reconsider a regulatory position or undertake a substantial further inquiry such as a formal request for additional information. The licensee captured this issue in their CAP as IR 1150198. The licensee's recommended corrective action at the time of the inspection was to revise the applicable calculation.

The inspectors confirmed that the frequency of selected surveillance procedures was at least as frequent as required by TSs and that the licensee will: (1) evaluate resolution of

TS issues with respect to the elements contained in the technical specification task force traveler; and (2) submit a license amendment request, if deemed necessary based on this evaluation, within 180 days following NRC approval of the technical specification task force. This commitment was captured in the CAP as IR 833259. In addition, the inspectors noted that, unlike the emergency core cooling system (ECCS), the containment spray did not have a TS surveillance to address gas accumulation/intrusion issues and that the licensee has elected to perform periodic monitoring of the containment spray suction piping only. The inspectors noted that the containment spray system discharge piping high point locations at the curved wall area in the auxiliary building were readily accessible for venting or ultrasonic testing (UT) to monitor for gas accumulation.

Design: The inspectors reviewed selected design documents, performed system walkdowns, and interviewed plant personnel to verify that the design and operating characteristics were addressed by the licensee. Specifically:

The inspectors assessed the licensee's efforts for identifying the gas intrusion mechanisms that apply to the plant and identified the following two examples where the licensee failed to recognize gas intrusion mechanisms associated with the residual heat removal (RHR) and containment spray systems:

1. The licensee did not identify all mechanisms that would lead to steam void formation at the RHR system during a loss of cooling accident (LOCA) at Mode 4. Specifically, the licensee determined that both RHR trains would experience steam void formation following RHR realignment from its decay heat removal (DHR) mode to its ECCS mode of operation when evaluating NSAL 09-08, "Presence of vapor in ECCS/RHR in Modes 3/4 LOCA," in 2010. The licensee was concerned that transferring the RHR suction to the refueling water storage tank (RWST) would lead to flash evaporation of the RHR system because RCS conditions exceed the saturation conditions provided by the RWST. The RHR system is subjected to RCS temperatures and pressures when operated in the DHR mode, which exceeds saturation conditions of water at atmospheric pressure. As a result, the licensee established corrective actions to protect one train of RHR in its ECCS mode of operation in Mode 4. However, the inspectors noted that steam voids would form before the suction of the RHR trains are transferred to the RWST if a LOCA occurs of sufficient size to depressurize the RCS because a shutdown-large-LOCA could depressurize the reactor to atmospheric conditions. This would result in the flash evaporation of water inside the RHR system because its temperature would be above the saturation temperature of water at atmospheric pressure.

   The licensee's failure to identify all flashing mechanisms of RHR in Mode 4 was contrary to 10 CFR Part 50, Appendix B, Criterion III, "Design Control," and was a performance deficiency. It was of minor significance because the corrective actions for the flashing mechanism that was identified by the licensee also addressed the performance deficiency identified by the inspectors. Thus, it was determined that the performance deficiency identified by the inspectors did not represent a safety concern. This issue was captured in the licensee's CAP as IR 1141819. The performance deficiency identified by the licensee was determined to be of more than minor significance and it is discussed in Section 4OA7 of this report. The inspectors also identified that the licensee

failed to report this condition within 60 days of discovery in accordance with 10 CFR 50.73. This issue is discussed in more detail under the Corrective Action subsection.

2. The licensee failed to identify that the calculation that determined the maximum available time to secure the containment spray additive tank did not account for vortexing. The details and enforcement of this issue are discussed in Section 4OA5.1.c of this report.

The inspectors also verified the licensee had identified the gas intrusion mechanisms associated with the operability evaluation associated with a void found at the suction of the 'A' train of the safety injection system in an earlier inspection period. This additional activity counted towards the completion of this TI and was documented in Inspection Report 05000456/2010005; 05000457/2010002.

The inspectors verified that the licensee's void acceptance criteria was consistent with NRR's void acceptance criteria. The inspectors also confirmed that: (1) the licensee addressed the effect of pressure changes during system startup and operation since such changes could significantly affect the void fraction from the initial value; and (2) the range of flow conditions evaluated by the licensee was consistent with the full range of design basis and expected flow rates for various break sizes and locations.

However, the inspectors noted that the licensee also relied on the use of the computer code GOTHIC to evaluate the acceptability of voids. This computer code factors in void transport behavior into the analysis by performing two-phase and two-component analysis of gas movement to predict such behavior as how a void volume in piping is translated into a transient void fraction at the entrance of a pump following pump start. The inspectors noted instances where the basis of this void assessment analysis tool was questionable. Specifically, the licensee used WCAP-16631-NP, "Testing and evaluation of gas transport to the suction of ECCS pumps," to show that GOTHIC can acceptably predict quantitative void transport behavior. WCAP-16631-NP documented tests that were conducted by Westinghouse to study the transport of a gas void through a piping system. The inspectors noted that test configuration and conditions differed from actual plant configuration and conditions, and questioned if the application of some of the test results was acceptable. For example:

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

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

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

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

The inspectors discussed these observations with NRR. It was determined that these observations required further evaluation by NRR to (1) better understand the acceptability of the application of the test results contained in WCAP-16631-NP to void assessment analysis and (2) assess potential generic implications. Therefore, this Temporary Instruction will remain open until this issue is resolved.

The inspectors also reviewed the void acceptance criteria used by the licensee when evaluating the operability of the ‘A’ train of the SI system in an earlier inspection period. This additional activity counted towards the completion of this TI and was documented in Inspection Report 05000456/2010005; 05000457/2010002.

The inspectors selectively reviewed applicable documents, including calculations and engineering evaluations, with respect to gas accumulation in containment spray and SI systems. Specifically, the inspectors verified that these documents addressed venting requirements, keep-full systems, aspects where pipes are normally voided such as some containment spray piping inside containment, and void control during system realignments.

The inspectors identified one example where the licensee had not properly evaluated the effects of gas accumulation with respect to dynamic loads. Specifically, portions of the containment spray discharge piping are normally voided by design. However, neither the design nor operation of the system addressed the dynamic loads that would result when the voided piping is rapidly filled following system initiation. The details and enforcement of this issue are discussed in Section 4OA5.1.c of this report.

In addition, the inspectors noted that the licensee intended to change their UFSAR to include the piping location near the SI8811 and CS009A valves as acceptable unventable locations. The licensee accepted the potential void sizes at these piping locations of SI and containment spray using GOTHIC. Although the basis of this void assessment tool was questionable, the inspectors noted that the licensee used significant conservatisms when assessing the void sizes at these locations. Consequently, it was determined, with assistance from NRR, that there is reasonable assurance that these unventable locations do not represent an adverse condition pending further assessment of GOTHIC. This TI will remain open pending the resolution of this issue.

The inspectors conducted a walkdown of selected regions of the 'B' train on the Unit 2 safety injection and 'B' train of the Unit 2 containment spray in sufficient detail to assess the licensee's walkdowns.

In addition, the inspectors verified that the licensee had P&IDs and isometric drawings that describe the containment spray and safety injection system configurations and had confirmed the accuracy of the drawings resolution. The inspectors' review of the selected portions of isometric drawings considered the following:

1. Selected high point vents were identified.

2. Selected high points that do not have vents were recognizable.

3. Other areas where gas can accumulate and potentially impact subject system operability, such as at orifices in horizontal pipes, isolated branch lines, heat exchangers, improperly sloped piping, and under closed valves, were described in the drawings or in referenced documentation.

4. Selected pipes and fittings were clearly shown.

The inspectors also conducted a similar walkdown of selected portions of safety injection in an earlier inspection period. This additional activity counted towards the completion of this TI and was documented in Inspection Report 05000456/2009005; 05000457/2009005.

The inspectors verified that licensee's walkdowns have been completed. In addition, the inspectors selectively verified that information obtained during the licensee's walkdowns were addressed in procedures, the CAP, and training documents.

Testing: The inspectors reviewed selected surveillance and post-maintenance procedures and results to verify that the licensee has approved and was using procedures that were adequate to address the issue of gas accumulation and/or intrusion in the safety injection and containment spray systems. In addition, the inspectors observed licensee staff conducting the monthly venting surveillance in the Unit 2 safety injection and RHR systems to evaluate procedure compliance. This review included the verification of procedures used for conducting surveillances and determination of void volumes to ensure that the void criteria was satisfied and will be reasonably ensured to be satisfied until the next scheduled void surveillance. The inspectors noted that the licensee had not established instructions for measuring pipe voids detected during surveillances of the ECCS performed using the venting method. The details and enforcement of this issue are discussed in Section 4OA5.1.c of this report. Also, the inspectors reviewed procedures used for filling and venting following conditions which may have introduced voids into the subject systems to verify that the procedures addressed testing for such voids and provided processes for their reduction or elimination. In addition, the inspectors reviewed training material associated with GL 2008-01 and noted that additional training was being pursued by the licensee.

The inspectors also review selected portions of procedures used during the surveillance testing of the ECCS in an earlier inspection period. This additional activity counted towards the completion of this TI and was documented in Inspection Report 05000456/2010002; 05000457/2010002.

Corrective Actions: The inspectors reviewed selected licensee's assessment reports, CAP documents, and trending data to assess the effectiveness of the licensee's CAP when addressing the issues associated with GL 2008-01. In addition, the inspectors verified that selected corrective actions identified in the licensee's 9-month and supplemental reports were documented. The inspectors also verified that commitments were included in the CAP.

The inspectors identified a Severity Level IV Non-Cited Violation of 10 CFR 50.73(a)(2)(v) in an earlier inspection period which counted towards the completion of this TI. Specifically, the licensee personnel failed to report known conditions that could have prevented the fulfillment of the RHR system to perform its ECCS function while operating in the DHR mode of operation within 60 days of discovery. This violation was documented in Inspection Report 05000456/2010005; 05000457/2010005 and is associated with the licensee-identified finding discussed in Section 4OA7 of this report.

This inspection concluded that this TI must remain open for Braidwood Station and additional inspection will be necessary using this TI. Specifically, at the conclusion of this inspection period, questions remained unresolved regarding the use of GOTHIC to justify the acceptability of design basis changes associated with the subject of gas accumulation.

c. Findings

(1) Failure To Account For Vortexing When Calculating The Maximum Available Time To Secure The Containment Spray Additive Tank

Introduction: A finding of very low safety significance and associated Non-Cited Violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," was identified by the inspectors for the failure to account for vortexing when determining the maximum available time to secure the containment spray additive tank. Specifically, the applicable calculation assumed that nitrogen would intrude the system only when the tank was completely drained.

Description: On November 16, 2010, the inspectors identified that the calculation that determined the maximum available time to secure the containment spray additive tank did not account for vortexing. The inspectors were concerned because nitrogen would intrude into the suction of the containment spray pumps if the containment spray additive tank is not secured before its level reached the submergence level to prevent vortexing. The nitrogen entrainment effects due to vortexing were not analyzed.

Section 6.5.2, "Containment Spray Systems," of the UFSAR stated that the containment spray system is designed to remove fission products, primarily iodine, from the containment atmosphere for the purpose of minimizing the offsite radiological consequences following the design-basis LOCA. At the same time, the spray water serves to nominally reduce containment temperature and pressure during the injection phase. In addition, the containment spray additive tank provide a sufficient quantity of 30 percent to 36 percent NaOH solution to the containment to form an 8.0-10.5 pH solution when combined with the spilled RCS water, the SI accumulator inventory, and the RWST inventory. This range of pH values bounds the evaluation of pH effects on equipment qualification and hydrogen generation described in the UFSAR.

The containment spray additive tank injects the NaOH solution via an eductor to the suction line headers of both containment spray pumps. The containment spray pumps would initially take suction from the RWST and, when reaching a predetermined low level, their suction is transferred to the containment recirculation sump. The time to deplete the containment spray additive tank is greater than the time to deplete the RWST under the worst-case condition for maximum spray pH described in UFSAR 6.5.2. This will result in transferring the suction of the containment spray pump to the containment recirculation sump and continuing eduction of NaOH from the containment spray additive tank until its Lo-2 level is reached. The containment spray additive tank is then manually isolated from the containment spray eductor.

Calculation BRW-97-0274, "Containment Spray Additive Tank Level Switch LO-2 Setpoint Analysis," determined, in part, the maximum time available to isolate the containment spray additive tank to prevent nitrogen from entering the process lines upon reaching the LO-2 level. It stated that the motivation of this part of the calculation was that the introduction of nitrogen into the process lines has not been evaluated. However, the inspectors noted that the calculation did not account for vortexing. That is, the calculation assumed that nitrogen would enter the process lines only when the tank was completely drained.

Vortexing is a gas intrusion mechanism identified in GL 2008-01. For instance, GL 2008-01 stated that additional work might be necessary to develop realistic criteria to determine the amount of gas that could impact operability resulting from the ingestion of gas from tanks (i.e., vortexing). In addition, GL 2008-01 requested, in part, the licensee to evaluate its containment spray system design to ensure that gas accumulation is maintained less than the amount that challenges operability of this system.

As a result of the inspectors concerns, the licensee calculated the required submergence and determined that 6.1 inches above the suction pipe inlet was necessary to prevent vortexing. The inspectors independently verified this value. When the submergence level was considered, the maximum available time to isolate the containment spray additive tank was reduced from 5.25 minutes to 4 minutes. The action to close the containment spray additive tank valves is listed in 1/2 BwEP-1, "Continuous Action Summary in Emergency Operating Procedures." The steps provided in this procedure are performed in a continuous basis and are a prompt to the operators for incomplete steps or conditions that may require further action. In addition, the LO-2 level is provided with an alarm at the control room which prompts the operators to respond using alarm response procedure BwAR 1-3-B3, "Spray Additive Tank Level LO-2." The combination of this programmatic controls provided reasonable assurance that the operators would respond within the required timeframe to isolate the containment spray additive tank. The licensee captured the inspectors concerns in their CAP as IR1146838. The licensee's recommended corrective action at the time of the inspection was to revise the applicable calculation.

Analysis: The inspectors determined that the failure to account for vortexing when determining the maximum available time to secure the containment spray additive tank was contrary to 10 CFR Part 50, Appendix B, Criterion III, "Design Control," and was a performance deficiency.

The performance deficiency was determined to be more than minor because it was associated with the containment barrier cornerstone attribute of structure, systems,

components, and barrier performance and affected the cornerstone objective of providing reasonable assurance that physical design barriers protect the public from radionuclide releases caused by accidents or events. Specifically, the inspectors had reasonable doubt on the operability of the containment spray system because the effects of vortexing in the tank and potential nitrogen entrainment to the system pumps suction were not analyzed.

The inspectors determined the finding could be evaluated using the SDP in accordance with IMC 0609, "Significance Determination Process," Attachment 0609.04, "Phase 1 - Initial Screening and Characterization of findings," Table 4a for the containment barrier cornerstone. The finding screened as of very low safety significance (Green) because it was a design deficiency of the physical integrity of the reactor containment that: (1) did not affect the barrier function of the control room against smoke or a toxic atmosphere; (2) did not represent an actual open pathway in the physical integrity of reactor containment; and (3) did not involve an actual reduction in function of hydrogen igniters in the reactor containment. Specifically, the licensee performed an additional evaluation that concluded that sufficient time would exist for the operators to take actions to preclude vortexing.

The inspectors determined that this finding had a cross-cutting aspect in the area of problem identification and resolution because the licensee did not thoroughly evaluate external operating experience. Specifically, the licensee did not address potential vortexing at the containment spray additive tank when evaluating the subject of gas accumulation/intrusion as requested by GL 2008-01. [P.2(a)]

Enforcement: 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that measures shall be established to assure that design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculation methods, or by the performance of a suitable testing program.

Contrary to the above, as of November 16, 2010, the licensee had not verified the adequacy of the containment spray additive tank design. Specifically, the licensee failed to account for vortexing when determining the maximum time available to secure the containment spray additive tank upon reaching the low level alarm. In addition, the effects of nitrogen entrainment into the pumps suction due to vortexing where not analyzed. Because this violation was of very low safety significance and it was entered into the licensee's corrective action program as IR 1146838, this violation is being treated as a Non-Cited Violation, consistent with Section 2.3.2 of the NRC Enforcement Policy **(NCV 05000456/2011002-02; 05000457/2011002-02, Failure to Account for Vortexing when Calculating the Maximum Available Time to Secure the Containment Spray Additive Tank)**.

(2) Inadequate Instructions For Measuring Emergency Core Cooling System Voids

Introduction: A finding of very low safety significance (Green) and associated Non-Cited Violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures and Drawings," was identified by the inspectors for the licensee's failure to establish instructions for measuring pipe voids detected during surveillances of the ECCS for gas accumulation. Specifically, instructions to measure the size of gas voids detected during

venting at each safety injection and RHR system vent location were not provided so that the effect of the void on system operability could be evaluated.

Description: On November 19, 2010, the inspectors identified that the licensee failed to establish adequate instructions in surveillance procedures used to monitor ECCS for gas accumulation.

In response to GL 2008-01, the licensee committed to revise the periodic venting procedures for the GL 2008-01 subject systems to include enhanced acceptance criteria and requirements to perform UT examinations on a graded approach as part of venting verifications of accessible high points.

In Section F.1 of procedures 1BwOSR 3.5.2.2-2, "Unit One ECCS Venting and Valve Alignment Surveillance," and 2BwOSR 3.5.2.2-2, "Unit Two ECCS Venting and Valve Alignment Surveillance," the licensee established instructions to vent the safety injection system, RHR pumps, and associated piping to satisfy TS Surveillance Requirement 3.5.2.3, "Verify ECCS piping is full of water." The completion of this surveillance for each pipe segment was accomplished by one of five conditions as recorded on Attachment D, "ECCS Venting and Valve Alignment Data Sheet," of these procedures. Condition 3 stated that the pipe segment was "Actually Vented." However, the inspectors noted that during venting to satisfy Condition 3, a gas void could be detected and vented off without estimating the size of the pipe void. Specifically, these procedures did not provide instructions to time the duration of the gas released during venting, nor were instructions provided to measure the void volume with a UT examination prior to venting. The inspectors were concerned that the lack of written instructions to record the as-found condition could result in the licensee's inability to properly assess the effect of a pipe void on ECCS functions (e.g., operability).

The operating surveillance procedures discussed above were accomplished in conjunction with procedures 1BwBVSR 3.5.2.3.1, "Unit 1 Periodic Monitoring and Trending of Containment Spray and Emergency Core Cooling Systems for Gas Accumulation," and 2BwBVSR 3.5.2.3.1, "Unit 2 Periodic Monitoring and Trending of Containment Spray and Emergency Core Cooling Systems for Gas Accumulation." These procedures directed licensee staff to complete UT examinations on ECCS high points to monitor for gas accumulation. However, the inspectors noted that these procedures also did not provide instructions to measure the duration of venting to estimate the gas void size when adequate UT data was could not be obtained. Specifically, Step E.10 of these procedures stated:

> "If UT exam cannot be performed due to extenuating circumstances (safe access, radiological concerns, etc.) at a location with an installed vent valve, then NOTIFY the Shift Manager to manually vent the location. An IR shall be generated to document the inability to perform the UT exam."

Therefore, this procedure step allowed venting ECCS pipe locations without recording any data to estimate the size of a gas void, if present. The licensee had applied Step E.10 provisions to vent in place of a UT examination since inception of these procedures. Specifically, in May of 2009 as documented in IR 924568, the licensee identified a dozen pipe locations in the Unit 1 and 2 ECCS with permanent insulation that precluded access for UT examinations. Consequently, each of these pipe segments required venting in accordance with Step E.10. The licensee staff stated that modifications were planned to remove this permanent insulation and replace it with

removable insulation to enable the UT examination. A due date of February 2, 2011 had been established for this action.

A precaution at step D.10 of procedures 1BwOSR 3.5.2.2-2 and 2BwOSR 3.5.2.2-2 required recording the duration of gas release and vent valve position for venting gas identified at the RHR pump suction high point vent valves. This information was necessary to ensure the licensee could estimate the size of gas voids identified during venting of ECCS piping. However, similar guidance was not provided for measuring the duration or recording the valve position at other RHR and safety injection vent valve locations that could be opened to detect the presence of gas voids. The inspectors also noted that these procedures did not specify how to time the duration of the venting operation (e.g., record duration of gas flow using a stopwatch).

As a corrective action, the licensee initiated an IR 1142820 to document the additional valve locations where these instructions were to be applied. In addition, during the monthly performance of 2BwOSR 3.5.2.2-2, the licensee's System Engineer briefed the operations staff to apply the precaution of Step D.10 to each of the ECCS vent locations and to use a stopwatch to measure gas vent durations. The licensee stated that they intended to continue to brief staff on their expectations for performing these surveillance procedures until procedure revisions were issued to provide additional guidance for recording data to size ECCS voids identified during venting operations.

Analysis: The inspectors determined that the licensee's failure to provide instructions for measuring pipe voids during ECCS venting was contrary to the requirements of 10 CFR Part 50, Appendix B, Criterion V, and was a performance deficiency. The performance deficiency was determined to be more than minor because if left uncorrected it would have the potential to lead to a more significant safety concern. Specifically, since the licensee's procedures do not contained instructions to properly document the void size when venting, the potential exists for an unacceptable void to go undetected affecting ECCS operability. Inoperable ECCS trains would place the plant at increased risk for core damage, which would affect the safety of an operating reactor.

The inspectors determined the finding could be evaluated using the SDP in accordance with IMC 0609, "Significance Determination Process," Attachment 0609.04, "Phase 1 - Initial Screening and Characterization of findings," Table 4a for the mitigating system cornerstone. The finding screened as of very low safety significance (Green) because the finding was a qualification deficiency confirmed not to result in loss of operability or functionality. Specifically, the licensee performed a history review of their corrective action program documents since the implementation of their resolution of GL 2008-01 and found two occasions where a void was detected by venting activities. A qualitative assessment of the voids established reasonable assurance that they did not represent loss of operability. The inspectors did not have further concerns.

The inspectors did not find an applicable cross-cutting aspect which represented the underlying cause of this performance deficiency; therefore, no cross-cutting aspect was assigned.

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

Contrary to the above, as of November 19, 2010, the licensee did not establish ECCS surveillance procedures appropriate to the circumstances. Specifically, instructions were not provided to measure the size of gas voids detected by venting surveillances at each safety injection and RHR system vent location so that the effect of a void on system operability could be evaluated. Because this violation was of very low safety significance and it was entered into the licensee's CAP as IR 1142820, this violation is being treated as a Non-Cited Violation, consistent with Section 2.3.2 of the NRC Enforcement Policy **(NCV 05000456/2011002-03; 05000457/2011002-03, Inadequate Instructions for Measuring ECCS Voids)**.

(3) Failure To Evaluate The Effects Of Dynamic Loads At The Containment Spray Discharge Piping

Introduction: A finding of very low safety significance and associated Non-Cited Violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," was identified by the inspectors for the failure to evaluate the effects of dynamic loads at the containment spray discharge piping. Specifically, neither the structural design nor operation of the containment spray system addressed the dynamic loads that would result when normally voided discharge piping rapidly fill following system initiation.

Description: On December 1, 2010, the inspectors identified that the licensee had not evaluated the potential effects of dynamic loads on the discharge piping of containment spray resulting from flow transients. The inspectors were concerned because portions of the containment spray discharge piping are normally voided by design and neither the structural design nor operation of the system addressed the dynamic loads that would result when the voided piping is rapidly filled following system initiation.

The containment spray system is designed to remove fission products, primarily iodine, from the containment atmosphere for the purpose of minimizing the offsite radiological consequences following the design-basis LOCA. At the same time, the spray water serves to nominally reduce containment temperature and pressure. In addition, the containment spray additive tank provide a sufficient quantity of 30 percent to 36 percent NaOH solution to the containment to form an 8.0-10.5 pH solution when combined with the spilled RCS water, the safety injection accumulator inventory, and the RWST inventory. This range of pH values bounds the evaluation of pH effects on equipment qualification and hydrogen generation described in the UFSAR.

The licensee incorporated ASME Section III into the design basis for the safety-related portion of containment spray. American Society of Mechanical Engineers Section III, 74-S75, NC-3112.3, "Design Mechanical Loads," stated that "Impact forces caused by either external or internal conditions shall be considered." Dynamic loads induced by flow transients are impact forces caused by an internal condition. However, the Piping System Specific Design Specification for containment spray, Document No. 01-10-52, "Commonwealth Edison Company, Byron/Braidwood Stations, Units 1 and 2, Piping Design Specifications," Section CL2-3.5.3.6, "Flow transient analysis," stated that "No dynamic loads due to flow transient forces are considered in the analysis of the containment spray system." Since the structural design of containment spray did not consider dynamic loads, the inspectors questioned if the system was operated in a manner that would ensure that the resulting dynamic loads would be negligible when the system fills with water following system initiation. The licensee confirmed that the operation of the system has not been evaluated to determine whether or not the

resulting dynamic loads were negligible. Specifically, the system is initiated via automatic action and the design of the automatic initiation did not consider dynamic loads induced by flow transients.

The resulting dynamic loads from a voided system are discussed in GL 2008-01. For instance, GL 2008-01 stated that additional work might be necessary to develop realistic criteria to determine the amount of gas that could impact operability including allowable limits for the pump discharge piping to alleviate water cannon effects on the piping. In addition, GL 2008-01 discusses operating experiences related to dynamic loads resulting from gas accumulation/intrusion issues.

The inspectors confirmed the piping at the containment penetration is always filled with water. Thus, no dynamic load will be induced on the penetration as the line fills. Specifically, the containment spray containment isolation valves are cycled (i.e., opened and closed) once a quarter allowing the water level in the containment spray piping in containment to equalize with the water level in the RWST. The elevation of the minimum water level required by TS is greater than the elevation of the containment penetrations. Therefore, the inspectors were not concerned with the integrity of the containment structure. However, an adverse dynamic load at the containment spray system discharge piping inside containment could render the system incapable of meeting its design basis functions.

As a result of the inspectors concerns, the licensee initiated an IR 1189277 and, at the time of the inspection, planned to review the design to ensure compliance with ASME Section III, 74-S75, NC-3112.3.

Analysis: The inspectors determined that the failure to evaluate the effects of dynamic loads at the containment spray discharge piping was contrary to ASME Section III, 74-S75, NC-3112.3 and was a performance deficiency. The performance deficiency was determined to be more than minor because it was associated with the containment barrier cornerstone attribute of system, structures, and components and barrier performance and affected the cornerstone objective of providing reasonable assurance that physical design barriers protect the public from radionuclide releases caused by accidents or events. Specifically, the inspectors had reasonable doubt on the operability of the containment spray system and the integrity of the reactor containment because the effects of flow transient induced dynamic loads in the containment spray discharge piping were not analyzed.

The inspectors determined the finding could be evaluated using the SDP in accordance with IMC 0609, “Significance Determination Process,” Appendix H, “Containment Integrity Significance Determination Process,” Table 6.1, “Phase 1 Screening-Type B Findings at Full Power.” The finding screened as Green because it did not affect either core damage frequency or large early release frequency. Specifically, containment spray impacts late containment failure and source terms, but not core damage frequency or large early release frequency.

The inspectors determined that this finding had a cross-cutting aspect in the area of problem identification and resolution because the licensee did not thoroughly evaluated external operating experience. Specifically, the licensee did not address potential water cannon effects at the containment spray discharge piping when evaluating the subject of gas accumulation/intrusion as requested by GL 2008-01. [P.2(a)]

Enforcement: 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 correctly translated into specifications, drawings, procedures, and instructions. American Society of Mechanical Engineers Section III, 74-S75, NC-3112.3 was included in the design bases for the safety-related portion of the containment spray system.

Contrary to the above, as of December 1, 2010, the design control measures failed to translate applicable design basis into specifications. Specifically, neither the structural nor automatic initiation design of the containment spray system considered flow transient induced dynamic loads as required by ASME Section III, 74-S75, NC-3112.3. Because this violation was of very low safety significance and it was entered into the licensee's corrective action program as IR 1189277, this violation is being treated as a Non-Cited Violation, consistent with Section 2.3.2 of the NRC Enforcement Policy **(NCV 05000456/2011002-04; 05000457/2011002-04, Failure to Evaluate the Effects of Dynamic Loads at the Containment Spray Discharge Piping)**.

4OA6 Management Meetings

.1 Exit Meeting Summary

On April 6, 2011, the inspectors presented the inspection results to Mr. D. Enright, and other members of the licensee staff. The licensee acknowledged the issues presented. The inspectors confirmed that none of the potential report input discussed was considered proprietary.

.2 Interim Exit Meetings

Interim exits were conducted for:

- The results of an Emergency Preparedness program inspection with Mr. L. Coyle on February 4, 2011.
- The results of a TI-177 inspection with Mr. D. Enright on March 18, 2011.

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

4OA7 Licensee-Identified Violations

The following violation of very low safety significance (Green) was identified by the licensee and is a violation of NRC requirements which meets the criteria of Section VI.A.1 of the NRC Enforcement Policy for being dispositioned as an NCV.

A finding of very low safety significance (Green) and associated Non-Cited Violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," was identified by the licensee for the failure to ensure that the ECCS mode of operation of RHR would be capable of performing its mitigating function at Mode 4 following RHR realignment from its DHR mode of operation. Specifically, the operability requirements of RHR in Mode 4 defined by TS 3.5.3 were not translated into applicable procedures or specifications of the system in that neither the procedures nor design prevented the conditions that would

lead to steam void formation during a LOCA that initiates at this Mode resulting in steam binding of the system pumps and/or an adverse waterhammer. The performance deficiency was determined to be more than minor because it was associated with the Mitigating Systems cornerstone attribute of Equipment Performance and affected the cornerstone objective of ensuring the capability of systems that respond to initiating events to prevent undesirable consequences. An SDP Phase II evaluation concluded that the finding was of very low safety significance. The licensee entered this concern in its CAP as IR 1073616.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

D. Enright, Site Vice President
M. Kanavos, Plant Manager
P. Boyle, Maintenance
P. Daly, Radiation Protection Manager
A. Ferko, Engineering Director
B. Finlay, Security Manager
G. Galloway, Work Control Manager
J. Gerrity, Regulatory Assurance
M. Marchionda, Operations Manager
S. McKinney, Emergency Preparedness Coordinator
J. Mumford, Engineering
R. Radulovich, Nuclear Oversight Manager
J. Rappeport, Chemistry/Environmental Manager
C. VanDenburgh, Regulatory Assurance Manager
W. Waznis, Nuclear Oversight

Nuclear Regulatory Commission

E. Duncan, Chief, Branch 3, Division of Reactor Projects

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened

05000457/2011002-01	NCV	Failure to Provide Complete and Accurate Information in an LER (Section 4OA3.1)
05000456/2011002-02; 05000457/2011002-02	NCV	Failure to Account for Vortexing When Calculating the Maximum Available Time to Secure the Containment Spray Additive Tank (Section 4OA5.2.c(1))
05000456/2011002-03; 05000457/2011002-03	NCV	Inadequate Instructions for Measuring ECCS Voids (Section 4OA5.2.c(2))
05000456/2011002-04; 05000457/2011002-04	NCV	Failure To Evaluate The Effects Of Dynamic Loads At The Containment Spray Discharge Piping (Section 4OA5.2.c(3))

Closed

05000457/2011002-01	NCV	Failure to Provide Complete and Accurate Information in an LER (Section 4OA3.1)
05000456/2011002-02; 05000457/2011002-02	NCV	Failure to Account for Vortexing When Calculating the Maximum Available Time to Secure the Containment Spray Additive Tank (Section 4OA5.2.c(1))

05000456/2011002-03; 05000457/2011002-03	NCV	Inadequate Instructions for Measuring ECCS Voids (Section OA5.2.c(2))
05000456/2011002-04; 05000457/2011002-04	NCV	Failure To Evaluate The Effects Of Dynamic Loads At The Containment Spray Discharge Piping (Section 4OA5.2.c(3))
05000456/2010004-04; 05000457/2010004-04	URI	Potentially Inadequate Licensee EP Critique (Section 4OA5.1)
05000457/2010-004-00	LER	Unplanned LCO Entry Due to Low Pressure on 2B Essential Service Water Pump (Section 4OA3.1)

Discussed
None

LIST OF DOCUMENTS REVIEWED

The following is a partial list of documents reviewed during the inspection. Inclusion on this list does not imply that the NRC inspector reviewed the documents in their entirety, but rather that selected sections or portions of the documents were evaluated as part of the overall inspection effort. Inclusion of a document on this list does not imply NRC acceptance of the document or any part of it, unless this is stated in the body of the inspection report.

1R01 Adverse Weather Protection

- IR 1171251; Lessons Learned Entering 1A DG Work Window; January 30, 2011
- BwAP 340-1; Use of Procedures for Operating Department; Revision 24
- 0BwOA ENV-1; Adverse Weather Conditions; Revision 110
- 1BwEP-0; Reactor Trip or Safety Injection Unit 1; Revision 201
- 1BwEP ES-0.1; Reactor Trip Response Unit 1; Revision 201
- 1BwOA ELEC-4; Loss of Offsite Power Unit 1; Revision 104
- ER-AA-600-1042; Online Risk Management; Revision 7
- LS-AA-125-1003; Continuing Work on 1A EDG Decision Led to Orange Online Risk Condition; Revision 0
- LS-LG-1000; Surveillance Frequency Control Program List of Surveillance Frequencies Change Process – Training and Reference Material; Revision 0
- OP-AA-106-101-1002; Exelon Nuclear Issues Management; Revision 8
- OP-AA-101-113-1004; 1A DG Tripped Unexpectedly During a Planned Post-Maintenance Test; Revision 18
- OP-AA-108-111-1001; Severe Weather and Natural Disaster Guidelines; Revision 5
- OP-AA-108-117; Protected Equipment Program; Revision 1
- WC-AA-101; High Risk Evolution Determination; Revision 17
- Regulatory Guide 1.174; An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis; July 1998
- Officer of Governor Pat Quinn News; Governor Mobilizes Additional Illinois National Guard Assets; February 2, 2011

1R04 Equipment Alignment

- IR 1021024; 1FI-AF017A 1D S/G AF Flow Indication on Low Peg; January 25, 2010
- IR1029397; Machine Guarding Issue on 1AF01PA; February 12, 2010
- IR 1059528; MSOPS 55: Auxiliary Feed Water System MSO Overview; April 21, 2010
- IR 1059529; MSOPS 27: Spurious Closure of AFW Pump Discharge; April 21, 2010
- IR 1059546; MSOPS 28: Potential Failure of Diesel Driven AFW Pump; April 21, 2010
- IR 1073792; Train A AF PM Activity Review for Online Performance; May 26, 2010
- IR 1084268; New Label Needed for 1AF005E-I/A; June 25, 2010
- IR 1087792; 1A AF Pump – Work Building; July 5, 2010
- IR 1120988; AF005A Dual Indication After 1BWOSR 5.5.8.AF-4A; October 1, 2010
- 1B RH Pump Work Window; January 24, 2011
- 1B RH Pump Work Window; Protected Equipment; January 24, 2011
- 1A RCFC Train OOS; Protected Equipment
- Unit 0, 1 Risk Assessment; January 24, 2011
- BwOP AF-E2; Electrical Lineup Unit 2 Auxiliary Feedwater; Revision 9
- BwOP AF-M; Operating Mechanical Lineup Unit 2; Revision 14
- BwOP CS-M1; Operating Mechanical Lineup Unit 1; Revision 9
- BwOP DG-E3; Electrical Lineup – 2A Diesel Generator; Revision 7

- BwOP DG-M3; Operating Mechanical Lineup 2A DG; Revision 14
- BwOP RH-M1; Operating Mechanical Lineup 1A RH Train; Revision 12
- BwOP CS-M1; Operating Mechanical Lineup, Revision 9
- BwOP CS-E1; Electrical Lineup – Unit 1 Containment Spray System Electrical Lineup, Revision 3

1R05 Fire Protection

- Braidwood Generating Station Pre-Fire Plan #101; AB 346' Unit 2 Auxiliary Building General Area (South); Fire Zone 11.2-0
- Braidwood Generating Station Pre-Fire Plan #100; AB 346' Unit 1, Auxiliary Building General (NE); Fire Zone 11.2-1
- Braidwood Generating Station Pre-Fire Plan #102; AB 346' Auxiliary Building General Area (SE); Fire Zone 11.2-0
- Braidwood Generating Station Pre-Fire Plan #100; AB 346' Unit 1, Auxiliary Building General Area (NE); Fire Zone 11.2-1
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- Braidwood Generating Station Pre-Fire Plan #102; 1A Safety Injection Pump, Fire Zone 11.3A-1
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1R06 Flood Protection Measures

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- IR 1179406; Flood Seal Work Packages Need Improvement, February 24, 2011
- IR 1179677; Inspect 1SX001B For Extent of Condition of IR 1177822; February 24, 2011
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1R11 Licensed Operator Requalification Program

- IR 1171251; Lessons Learned Entering 1A DG Work Window; January 30, 2011
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- 0BwOA ENV-1; Adverse Weather Conditions Unit 0; Revision 110
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- Letter from ComEd to NRC; Completion of Modifications to Support Implementation of Amendment 108 for Braidwood; November 17, 2000
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1R12 Maintenance Effectiveness

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- IR 0785925; 1AF004A Failed PMT WO#1089680; June 12, 2008
- IR 0896135; Banana Jack Not Installed to Bypass Interlock per BwOP SX-1; March 22, 2009
- IR 0905948; Aux Feed Cross-Tie Modification Piping Tolerances; April 10, 2009
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- IR 0909942; NRC Identified Discrepancy with 1A AF Pump Mission Time; April 21, 2009
- IR 0916371; SX System Maintenance Rule at Risk; May 6, 2009
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- IR 1087792; 1A AF Pump – Work Bundling; July 5, 2010
- IR 1005904; SX Flow Balance Question; December 17, 2009
- IR 1010385; Banana Jacks – 2B SX Pump – BwOP SX-1; December 29, 2009
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- IR 1018363; 2A SX to Potentially Exceed MRule A(1) Unavailability Limits; January 19, 2010
- IR 1021681; Unplanned LCO Entries Due to Low SX Flow to Cubicle Coolers; January 26, 2010
- IR 1026660; Receipt of NRC NCV – SX Water Hammer Event; February 4, 2010
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- IR 1066482; Question Regarding Required SX System Configuration; May 6, 2010
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- IR 1088364; Potential Design Vulnerability on Auxiliary Feedwater System; July 7, 2010
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- IR 1171355; Lessons Learned from Blizzard Plan; February 4, 2011
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- Expert Panel Meeting; Essential Service Water; May 3, 2010
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- System Health Report; Unit 1 Auxiliary Feedwater; October 1 through December 31, 2010
- Performance Monitoring – Unavailability; Auxiliary Feedwater A Train Channel
- Diagram of Auxiliary Feedwater Unit 1M-37; July 23, 1975

1R13 Maintenance Risk Assessments and Emergent Work Control

- IR 1172963; 2A DG Normal Shutdown Due to Vent Fan Trip on Ionization; February 9, 2011
- IR 1181689; Radiographic Inspection Exceeds ASME Code Acceptance Criteria; March 1, 2011
- IR 1183065; Post-Maintenance Gas Void in SI System; March 3, 2011
- IR 1183108; LL 1A SI Emergent Work Window; March 3, 2011
- IR 1183155; Radiography for 1A SI Leak Repair; March 4, 2011
- 2B DG Work Window – Protected Equipment 2DG01KA, 2VD01CA; February 13, 2011
- EC 383435; Evaluation of Restraints for 1SI03AA-4 Repairs; February 26, 2011

- ER-AA-335-005; Radiographic Examination Interpretation Report – 1A-SI-11; March 3, 2011
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- Prompt Investigation Report; Radiographic Inspection of Two Field Welds Determined That The Welds Contained Defects That Exceeded ASME Section III Acceptance Criteria; February 28, 2011
- Prompt Investigation Report; 1A SI Pump Discharge (Dry Boric Acid Residue on 1SI03AA); March 3, 2011

1R15 Operability Evaluations

- IR 1064845; Relay Flag Failed to Drop; May 3, 2010
- IR 1166336; Inaccurate Information Contained in LER 2010-004; January 21, 2011
- IR 1183581; Bus 141 Degraded Volt Relay Apparent Cause Evaluation; March 4, 2011
- IR 0903368; Out of Tolerance – Bus 141 Phase A-B Degraded UV Relay; April 5, 2009
- IR 0855296; CC System Design for Post-LOCA Passive Failure; December 11, 2008
- IR 0880654; Design Vulnerability in CC Surge Tank Makeup; February 13, 2009
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- IR 1093178; ASME Class Breaks at CC to 1/2PS29J are Inadequate; July 22, 2010
- IR 1100061; Applicability of Byron IRS on CC System Design Concerns; August 10, 2010
- IR 1123610; 1RY8047 Failed As Found LLRT; October 7, 2010
- IR 1139618; Potential Non-Conservative TS for CC and RH; November 12, 2010
- IR 1144126; Temporary Power Cable Needs to be Removed; November 23, 2010
- IR 1143834; NOS Id Incorrect Routing of Temporary Cabling; November 22, 2010
- IR 1146459; NOS Id Unneeded Temp Power Cabling Still Installed; November 30, 2010
- IR 1159028; IR to Document Threat from NP Energy Resin Vendor; December 31, 2010
- IR 1162088; Dose Recorded on Area TLD in MMD Shop Weld Area; January 13, 2011
- IR 1166358; Follow Up Actions to IR 1140482 Regulatory Analysis; January 24, 2011
- IR 1166359; U1 Calorimetric Power Rising; January 24, 2011
- IR 1166385; U1 Leakrate Action Level Two (Exceeded); January 24, 2011
- IR 1166795; 2CV8409 Piping (Boric Acid Accum, Investigate Source); January 25, 2011
- IR 1167493; RCS Pressure Boundary Leakage Clarification; January 25, 2011
- IR 1168024; NOS Ids Prompt Action not Taken to Identify RCS Leakage; January 28, 2011
- IR 1168350; NRC Question on OPS RCS Leak Rate Procedure Attachment; January 28, 2011
- IR 1172938; Voided SX to AF Suction Piping; January 31, 2011
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- IR 1173517; AF Voided Section of SX to AF Piping AF Pump Suction; February 10, 2011
- IR 1174764; Impact of Voids in SI Accumulator Lines not Accounted for IN; February 14, 2011
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- AT 1139610; Non-Conservative TS for Component Cooling; Revision 0
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- 1BwOA PRI-1; Excessive Primary Plant Leakage Unit 1; Revision 104
- BwOP CC-M1; Operating Mechanical Lineup Unit 1; Revision 16
- BwOP CV-17; Establishing and Securing Normal and RH Letdown Flow; Revision 37
- Technical Specification 3/4.4.10; Structural Integrity
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- CC-AA-404; Request Temporary Leak Repair; Revision 8
- EC 377882, 377883, 377884; Design Vulnerabilities Associated with CC Surge Tank Makeup Lines; Revision 000
- 383328; Vacuum Filling the Pipe Segment Between the Two SX Crosstie Valves to the AF Pumps; Revision 0
- HU-AA-1211; 2MS037C Line Assembly Repair - Strongback and Leak Sealing Device; Revision 7
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- OP-AA-102-104; Component Cooling and Residual Heat Removal Administrative Controls; Revision 1
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- OP-AA-108-111; Adverse Condition Monitoring and Contingency Plan; Revision 6
- OP-AA-108-115; Voided Section of SX to AF Piping – AF Pump Suction; Revision 10
- SY-AA-101-117; Escorting Vehicles in the Protected Area; Revision 18
- TQ-AA-224-F020; RH & CC System Administrative Controls; Revision 0
- WC-AA-104; Fabricate, Install Strongback and Leak Sealing Device; Revision 17
- Activity Table View; BRWP 1B; Version 26, 27, 28, and 29 of UBRWRL
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- Letter RS-01-112 from Exelon to NRC; Thirty-Day Report of ECCS Evaluation Model Changes and Errors Required by 10 CFR 50.46; June 11, 2001
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- Drawing CV-1, CVCS; November 18, 2009; Revision 13
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- IR 1181341; Degradation Found on Pressurizer Heater Stab Assembly; February 28, 2011;
- IR 1181927; Issue Encountered During RY Breaker Maintenance; March 1, 2011;
- IR 1187365; Degradation Noted During Inspections- 2RY03EB, Cub A2; March 14, 2011;
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- IR 1183006; Field Leads from Breaker are Showing Signs of Heat Stress; March 3, 2011;
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1R18 Plant Modifications

- IR 1174385; 2MS037C Steam Leak; February 12, 2011
- BwOP SI-1; Safety Injection System Startup; Revision 21
- BwOP SI-3; Fill and Vent of the Safety Injection System; Revision 31
- EC 371695; SI System GL 08-01 Design Evaluation; Revision 0
- EC 382805; Install a Phase-Sensing Transformer in Rod Drive Cabinet 1RD04J; January 11, 2011
- EC 383301; Install Vent Valves in Pipe 2AF03AA-6 Between Valves 2AF006A and 2AF017A; Revision 000
- EC 383328; Vacuum Filling Pipe Segment Between Two SX Crosstie Valves to AF Pumps; Revision 0
- CC-AA-103; Install Vent Valves in Pipe 2AF03AA-6 Between Valves 2AF006A and 2AF017A; Revision 21
- OP-AA-106-101-1006; Main Control Room Received Unexpected Annunciator 1-10-C6, Rod Control Urgent Failure; January 10, 2011
- WO 1251229-06; Install TCCP/EC 382805 into 1RD04J Due to Failed T2 Phase Sensing Transformer
- Technical Specifications Task Force; Discussion of Appropriate Regulatory Mechanism to Capture On-Going Requirements of Generic Letter 2008-01; January 12, 2010
- Drawing M-61; Diagram of Safety Injection Unit 1; Sheets 1A and 3

1R19 Post-Maintenance Testing

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- WO 1240290; OP PMT 1RH01PB Functional Run and Oil Leak Check; January 25, 2011
- 2BwOL 3.8.1; 2B DG Closeout; February 20, 2011
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- 1BwOSR 3.8.1.2-1; 1B Diesel Generator Operability Surveillance; March 16, 2011
- 1BwOSR 3.8.1.2-2; 1B Diesel Generator Operability Surveillance; March 16, 2011; Revision 30
- 1BwOSR 3.8.1.15-2; 1B Diesel Generator Hot Restart Test; March 16, 2011; Revision 4
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- EP-AA-1000; Exelon Nuclear Standardized Radiological Emergency Plan; Revision 20
- EP-AA-1001; Radiological Emergency Plan Annex for Braidwood Station; Revision 25
- EP-MW-121-1006; Contracted Siren Maintenance Oversight; Revision 1
- EP-MW-121-1005; Siren Outage Reporting and Monitoring; Revision 3

- Off-Site Emergency Plan Alert and Notification Addendum; November 2009
- Warning System Maintenance and Operational Reports 2009 - 2010
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1EP3 Emergency Response Organization Staffing and Augmentation System

- EP-AA-112-100-F-06; Midwest ERO Notification or Augmentation; Revision N
- EP-AA-125-1003; ERO Readiness - Performance Indicators Guidance; Revision 7
- TQ-AA-113; ERO Training and Qualification; Revision 17
- Braidwood Station ERO Roster, January 2011
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1EP5 Correction of Emergency Preparedness Weaknesses

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- Check-In Self-Assessment Report 1071462-02; Braidwood Station 2011 NRC Baseline Program Inspection Readiness Assessment; November 30, 2010
- Braidwood Station 2011 NRC Baseline Program Inspection Readiness Assessment; November 29, 2011
- Braidwood January 9, 2010, Unusual Event Report; June 17, 2010
- Braidwood Event Summary Report for January 9, 2010 Unusual Event; January 10, 2010
- Root Cause AR 01014680; Untimely Classification of Unusual Event HU6 Due to Inadequate Communication Between Emergency Planning and Operations Training; March 10, 2010
- IR 01141341; Drill and Exercise Performance Adverse Trend; November 16, 2010
- IR 01091173; Electrical Maintenance Respiratory Qualifications; July 15, 2010
- IR 01057651; Clinton EP NCV May Be Applicable to Braidwood; April 16, 2010
- IR 01056922; Classification and Notification Performance Indicators Turned Red; April 5, 2010
- IR 01035754; Regulatory Review of Public Address Speaker Compensatory Measures; February 25, 2010
- IR 01015761; Untimely Emergency Event Classification; January 10, 2010
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1EP6 Drill Evaluation

- March 9, 2011 Crew Training Scenario

4OA1 Performance Indicator Verification

- LS-AA-2110; Monthly Data Elements for NRC Emergency Response Organization (ERO) Drill Participation; March - December 2010
- LS-AA-2120; Monthly Data Elements for NRC Drill and Exercise Performance; January - December 2010
- LS-AA-2130; Monthly Data Elements for NRC Alert and Notification System (ANS) Reliability; January – December 2010
- OP-AA-108-115; RHR 1FIS-0610, 1FIS-0611, 2FIS-0610 and 2FIS-0611; Revision 10
- Key ERO Participation and Stability Monthly Data Reporting Elements; March 2010 - December 2010
- NEI 99-02, Regulatory Assessment Performance Indicator Guideline, Revision 6

4OA2 Identification and Resolutions of Problems

- IR 0237657; 2CV121 Limit Switch Pickup Needs Adjustment; July 21, 2004
- IR 0237705; 2CV-121 (CV Pump Flow Control Valve) was Full Open; July 21, 2004
- IR 0318044; 2CV121 Worked Erratically in Auto After Unit 2 Reactor Trip; Marcy 28, 2005
- IR 0648427; 1CV121 Control Problems; July 9, 2007
- IR 0786556; Seal Injection Flow Issues on U2; June 14, 2008
- IR 0798384; Higher Demand Than Expected on 2CV121; July 20, 2008
- IR 0906323; U2 Seal Injection Flow Shift on all 4 Pumps; April 10, 2009
- IR 0908425; Multiple 2A RCP Seal Injection Flow Low Alarms; April 16, 2009
- IR 0909802; Problems Maintaining PZR Level on Unit 2; April 21, 2009
- IR 0911478; Fluctuating Output on 2CV121 After RX Trip; April 24, 2009
- IR 1019219; 2CV121 Operation; January 21, 2010
- IR 1102032; Valve, 2CV121, Not Controlling Properly in Auto During Trip; August 16, 2010
- IR 1106760; Review 2CV121 Performance from Unit 2 Trip; August 16, 2010
- IR 1154522; Screen 2CV121 for Operator Work-Around/Challenge; December 20, 2010
- IR 1173176; Westinghouse Software Issue Impacts Containment Analysis; February 9, 2011
- LS-AA-125-1002; Review of NCVs and Similar Issues Involving Processes Not Followed for Decision-Making; February 21, 2011
- OP-AA-102-103; Operator Work-Around Program; Revision 3
- OP-AA-108-105; Equipment Deficiency Identification and Documentation; Revision 7
- OP-AA-108-115; Primary Containment; Revision 10
- OP-AA-108-117; Protected Equipment Program; Revision 0
- OP-AA-115-101; Operator Aid Postings; Revision 2
- Braidwood-FPR; Amendment 24
- Braidwood Generating Station Pre-Fire Plan #101; Fire Zone 11.2-0; AB 346' Unit 2 Aux. Bldg. General Area (South); Revision 0
- Braidwood Generating Station Pre-Fire Plan #100; Fire Zone 11.2-0; AB 346' Unit 2 Aux. Bldg. General Area (NE); Revision 0
- Braidwood Generating Station Pre-Fire Plan #102; Fire Zone 11.2-0; AB 346' Unit 2 Aux. Bldg. General Area (SE); Revision 0
- IR 1168386; Braidwood Lake Alkalinity Control; January 28, 2011
- IR 1168435; Seismic Monitoring Panel Battery Light Lit (0PA021); January 28, 2011
- IR 1168531; Delivery Vehicle Left; January 28, 2011
- IR 1168677; Security Vehicle Barrier System Will Not Function; January 30, 2011
- IR 1168766; 2BwOSR 3.6.6.2 Needs Improvement; January 28, 2011
- IR 1168773; Unplanned Dose for U1 Leak Rate Investigation; January 30, 2011
- IR 1164244; Diamond Plates Temporarily Attached to FHB East Wall; January 13, 2011
- IR 1164964; NOS Id Lack of Awareness and Control of Plant Modification; January 20, 2011
- IR 1165805; Security Runs with no Field Supervisor; January 22, 2011
- IR 1166010; Safety: Excessive Mold Growth in Mixed Waste Building; January 21, 2011
- WO 1410221 01; Steam Leak – Temporary Repair; February 15, 2011

4OA3 Followup of Events & Notices of Enforcement Discretion

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- IR 1147181; Potential Missed Issue in Prior West NSAI Site Review; December 1, 2010
- IR 1139383; Noble Gas Channel Setpoint For Control Room Intake Incorrect; December 8, 1999
- IR 1166336; Inaccurate Information Contained in LER 2010-004; January 21, 2011
- IR 1173176; Westinghouse Software Issue Impacts Containment Analysis; February 9, 2011

- IR 1191669, Unexpected Impact of C/O on U-2 Annunciators; March 24, 2011
- IR 1192556, 1PA19J Clock Failure Not Wired Properly; March 25, 2011
- IR 1192465, Wiring Discrepancy in Annunciator CAB 2PA-19J-V7; March 25, 2011
- LER 2010-004-00; Unplanned Limiting Conditioning for Operation Entry Due to Low Header Pressure on the 2B Essential Service Water Pump; August 24, 2010
- LER 2010-005-00; Incorrect Methodology Used in Calculations in 1999 Resulted in Non-Conservative Control Room Outside Air Intake Monitor Alarm Setpoints; November 12, 2010
- LER 2010-006-00; TS Allowed Outage Time Extension Request for CCS Contained Inaccurate Design Information that Significantly Impacted the Technical Justification; November 12, 2010
- NRC Event 46203; Essential Service Water Placed in a Line-up that May Have Prevented Its Safety Function; August 24, 2010
- Root Cause Investigation Report; Unit 1 Trip Caused by Failed Zener Diode on Universal Logic Card; September 20, 2010
- Failure Analysis Report; Diode CR9 Failed with Resistive Leakage; October 1, 2010
- LS-AA-125-1001; Root Cause Investigation Report; Revision 7
- CC-AA-309-1001; Design Analysis Minor Revision Cover Sheet; Revision 6
- EC 381192; Evaluation of the Low SX Header Pressure Event of Aug 24, 2010
- NRC Form 361; EN46414; Radiation Protection Determined Setpoints for Control Room
- OP-AA-108-115; Primary Containment; Revision 10
- Outside Air Intake Noble Gas Channels are Non-conservative; November 12, 2010
- NEI 99-02; Mitigating Systems Cornerstone; Revision 6
- NUREG-1022; Degraded or Unanalyzed Condition; Revision 2
- Braidwood Event Report 46694, Notice of Unsual Event Report for March 24, 2011 Loss of Unit 2 Control Room Annunciators

4OA5 Other Activities

- EP-AA-1001; Braidwood Annex, Revision 24 (May 2010)
- IR1096984; Failed DEP in July 21 PI Drill due to Scenario Control Issue; August 2, 2010, with completed action items
- CT-2 Training Material Updated for OPEX (December 2010)
- Team A July Mini-Drill Findings and Observation Report; August 11, 2010
- Player Logs from Mini-Drill; July 21, 2010
- Evaluator Logs from Mini-Drill; July 21, 2010
- EP-AA-122; Drills & Exercises; Revision 10
- EP-AA-111-F-01; Drill & Exercise Evaluation Criteria; Revision G
- EP-AA-112-200; TSC Activation and Operation; Revision 7
- IR833259; Commitments from 9-month Response to GL 2008-01; October 20, 2008
- IR913349; NRC Commitment May Not be Met due to Lack of Engr Resources; April 29, 2009
- IR1005108; Commitment Annotation Enhancement in 1/2BWOSR 3.5.2.2-2; December 14, 2009
- IR992445; Westinghouse Issued NSAL-09-08 for Vapor in ECCS/RH; November 12, 2009
- IR844176; Future Online Work Windows for 1B, 2A, and 2B CS in Question; November 12, 2008
- IR842881; RTS OF 1A CS Pump has Potential to Inop all ECCS; November 10, 2008
- IR371380; GL 2008-01 CS System Evaluation; 10/9/2008
- IR771679; Ultrasonic Exam for Water Solid Verification Detects Void; May 5, 2008

- IR833251; Commitments from 9-month Response to GL 2008-01, RS-08-131; October 20, 2008
- IR794251; Commitments from the 3-Month Response to GL 08-01- RS-08-050; July 8, 2008
- IR999656; NRC GL 2008-01 Check-in Deficiencies; November 30, 2009
- IR1142632; Procedure Enhancement for 1/2BWVSR 3.5.2.3.1; November 19, 2010
- IR1142820; Procedure Enhancement for 1/2BwOSR 3.5.2.2-2; November 19, 2010
- IR1141813; Revision to BWOP CCS-3 Needed; November 17, 2010
- IR1141710; Procedure Enhancement for BWOP SI-3; November 17, 2010
- IR1119612; Gas Void Found During UT Inspection on CS System; September 29, 2010
- IR924568; ECCS UT Locations Need Improvement; May 27, 2009
- IR176233; 1B CS NaOH Header Found with Air in Line; September 17, 2003
- IR997465; 1SI059A Required 15 Second Vent; November 23, 2010
- IR321153; INPO SER 2-05; April 5, 2005
- IR1073616; RH System Issue Associated with NSAL 09-08; May 26, 2010
- EC371381; GL 2008-01 RH System Evaluation; June 17, 2009
- EC371697; RH System Gas Void - Design Evaluation; February 24, 2009
- EC343684; Evaluation of Voiding in CS Pump Eductor Line;, Revision 0
- EC371534; Technical Evaluation of Potential Gas Voids in CS; Revision 0
- EC371382; GL08-01 SI Evaluation; Revision 2
- EC371380; GL08-01 CS Evaluation; Revision 0
- EC371381; GL08-01 RH Evaluation; Revision 1
- EC379707; Perform Review of Westinghouse NSAL 09-08; Revision 0
- EC371695; GL08-01 Design Evaluation; Revision 0
- EC375868; ECCS – SI8818 Vent Installation; Revision 0
- EC378161; Revise the Design Bases to Accept Potential Voided Piping Downstream of the 2CS009A Valves and the 1/2SI8811A/B Valves; October 22, 2010
- BRW-97-0274; CS Additive Tank Level Switch LO-2 Setpoint Analysis; October 30, 1998
- NAI-1459-001; “Comparison of GOTHIC Gas Transport Calculations with Test Data”; Revision 1
- BRW-09-0102-M; Evaluation of Gas Voids Downstream of Valves 1/2CS009A and Valves 1/2SI8811A/B; April 16, 2010
- BRW-09-0101-M, Void Volume and Froude Number for Potential Voids Downstream of Valves 1/2SI8811A/B; April 16, 2010
- BRW-09-0111-M; Void Volume and Froude Number for Potential Voids Downstream of Valves 1/2CS009A; April 16, 2010
- U1 GL 2008-01 Trending; 8/20/2009-Octobeer 23, 2010
- U2 GL 2008-01 Trending; 6/18/2009-September 16, 2010
- TQ-AA-233-F070; Braidwood Engineering Training GL 2008-01; November 13, 2009
- WO1353738; U2 ECCS Piping UT Exam; November 10, 2010
- WO1353739; U1 ECCS Piping UT Exam; November 10, 2010
- Drawing M-2539C; Safety Injection Containment Building Elevation 401’-0” Revision C
- Drawing PG-2539C-202; Safety Injection Containment Building; Revision C
- Drawing PG-2539C-201; Safety Injection Containment Building; Revision H
- Drawing PG-2539C-220; Safety Injection Containment Building; Revision C
- Drawing 1A-SI-7; Safety Injection System Auxiliary Building; Revision 1
- Drawing PG-2539C-17; Safety Injection; Revision E
- Drawing 1A-SI-43; Safety Injection System; Revision C
- Drawing 1A-SI-11; Safety Injection System; Revision C
- Drawing PG-2539C-41; Safety Injection Containment Building; Revision H
- 1BwOSR 3.5.2.2-2; Unit One ECCS Venting and Valve Alignment Surveillance; Revision 24
- 2BwOSR 3.5.2.2-2; Unit Two ECCS Venting and Valve Alignment Surveillance; Revision 17

- 1BwBVSR 3.5.2.3.1; Unit 1 Periodic Monitoring and Trending of Containment Spray and Emergency Core Cooling Systems for Gas Accumulation; Revision 2
- 2BwBVSR 3.5.2.3.1; Unit 2 Periodic Monitoring and Trending of Containment Spray and Emergency Core Cooling Systems for Gas Accumulation; Revision 2.
- 2BwVSR 3.5.3.1; Ultrasonic Examination of Unit 2 ECCS Piping in Mode 4 or Mode 5 and Post-Maintenance to Verify Water Solid Conditions; Revision 1
- BWOP- CS-3; Filling and Venting the Containment Spray System; Revision 30
- BWOP- SI-3; Filling and Venting the Safety Injection System; Revision 30
- 1BwVSR 3.5.3.1; Ultrasonic Examination of Unit 1 ECCS Piping in Mode 4 or Mode 5 and Post-Maintenance to Verify Solid Water Conditions; Revision 1
- ER-AA-2009; Managing Gas Accumulation; Revision 1
- 1BwVSR 3.5.2.3.1; Attachment 2 Braidwood Unit 1 Gas Void Monitoring Refueling Outage-Prior to Mode 4; dated November 4, 2010
- 2BwVSR 3.5.2.3.1; Attachment 1 Braidwood Unit 2 Gas Void Monitoring Refueling Outage-Prior to Mode 4; dated October 30, 2009
- ER-AA-335-007; Ultrasonic Inspection for Determination of Sedimentation in Piping Systems or Components and Fluid Level Measurements; Revision 2
- BwAR 1-3-B3; Spray Additive Tank Level LO-2; Revision 1
- 1BwGP 100-1; Plant Heatup; Revision 26
- 2BwGP 100-1; Plant Heatup; Revision 28
- BwOP RH-11; Securing the RH System from Shutdown Cooling; Revision 23
- BwOP RH-6; Placing the RH System in Shutdown Cooling; Revision 40
- 2BwOA S/D-2; Shutdown LOCA – Unit 2; Revision 104
- 1BwOA S/D-2; Shutdown LOCA – Unit 1; Revision 103
- 1BwGP 100-5; Plant Shutdown and Cooldown; Revision 40
- 2BwGP 100-5; Plant Shutdown and Cooldown; Revision 36
- 1BwOA PRI-6; Component Cooling Malfunction – Unit 1; Revision 101
- 1BwOA ELEC-2; Loss of Instrument Bus – Unit 1; Revision 104
- 2BwOA PRI-6; Component Cooling Malfunction – Unit 2; Revision 102
- 2BwOA ELEC-2; Loss of Instrument Bus – Unit 2; Revision 105
- CC-AA-102; Design Input and Configuration Change Impact Screening; Revision 19

Corrective Action Program Documents Generated as a Result of the Inspection

- IR1147042; GL 08-01 Procedure Enhancement for 1/2BwOSR 3.5.2.2-2; 12/1/2010
- IR1141819; GL08-01 Inspection – Concern with Wording in EC 379707; 11/17/2010
- IR1146838; NRC ID – Revise Calc to Show Disposition of Vortex in CSAT; 12/1/2010
- IR1142632; GL08-01: Procedure Enhancement for 1/2BWVSR3.5.2.3.1; 11/19/2010
- IR1142969; Potential NRC Violation from GL08-01 Inspection; 11/19/2010
- IR1147872; GL08-01: Procedure Enhancement for 1/2BWOSR3.5.2.2-2; 12/3/2010
- IR1141710; GL08-01: Procedure Enhancement for BWOP SI-3; 11/17/2010
- IR1141813; GL08-01 NRC Inspection – Revision to BWOP CS-3 Needed; 11/17/2010
- IR1142238; 2B SI PP Vent Casing Sightglass Needs Cleaning; 11/18/2010
- IR1142409; NRC GL08-01 – 2CS084B Not Shown on Isometric Drawing 2CS-06; 11/18/2010
- IR1142820; GL08-01: Procedure Enhancement for 1/2BWOSR3.5.2.2-2; 11/19/2010
- IR1146835; GL08-01: Procedure Enhancement for 2BWOSR3.5.2.2-2; 12/1/2010
- IR1189285; NRC Identified Minor Violation; 03/18/2011
- IR1189277, Potential NRC Violation from GL 08-01 Inspection; 03/18/2011

LIST OF ACRONYMS USED

ADAMS	Agencywide Document Access Management System
ANS	Alert and Notification System
AOT	Allowed Outage Time
ASME	American Society of Mechanical Engineers
CAP	Corrective Action Program
CFR	Code of Federal Regulations
CC	Component Cooling
DEP	Drill and Exercise Performance
DG	Diesel Generator
DHR	Decay Heat Removal
DRP	Division of Reactor Projects
EAL	Emergency Action Level
ECCS	Emergency Core Cooling System
EDG	Emergency Diesel Generator
ENS	Event Notification System
EP	Emergency Preparedness
ERO	Emergency Response Organization
ESF	Engineered Safety Feature
GL	Generic Letter
IMC	Inspection Manual Chapter
IR	Inspection Report
IR	Issue Report
ISI	Inservice Inspection
IST	Inservice Testing
LCO	Limiting Condition for Operation
LER	Licensee Event Report
LOCA	Loss-of-Coolant-Accident
NCV	Non-Cited Violation
NEI	Nuclear Energy Institute
NRR	Office of Nuclear Reactor Regulation
OWA	Operator Workaround
P&ID	Piping and Instrumentation Diagram
PARS	Publicly Available Records System
PI	Performance Indicator
psig	Pounds Per Square Inch Gauge
RCS	Reactor Coolant System
RHR	Residual Heat Removal
ROP	Reactor Oversight Process
RWST	Refueling Water Storage Tank
SDP	Significance Determination Process
SI	Safety Injection
SX	Essential Service Water
TI	Temporary Instruction
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
URI	Unresolved Item
UT	Ultrasonic Testing
WO	Work Order

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Sincerely,

/RA/

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

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

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Letter to M. Pacilio from E. Duncan dated May 2, 2011.

SUBJECT: BRAIDWOOD STATION, UNITS 1 AND 2, NRC INTEGRATED INSPECTION REPORT 05000456/2011002; 05000457/2011002

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