



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**

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

May 8, 2012

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

**SUBJECT: BRAIDWOOD STATION, UNITS 1 AND 2, NUCLEAR REGULATORY  
COMMISSION INTEGRATED INSPECTION REPORT 05000456/2012002;  
05000457/2012002**

Dear Mr. Pacilio:

On March 31, 2012, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Braidwood Station, Units 1 and 2. The enclosed report documents the results of this inspection, which were discussed on April 4, 2012, with Mr. M. Kanavos and other members of your staff.

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

Four NRC-identified findings of very low safety significance (Green) were identified during this inspection period. All of the findings were determined to involve violations of NRC requirements. The NRC is treating these violations as Non-Cited Violations (NCVs) consistent with Section 2.3.2 of the Enforcement Policy.

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

If you disagree with a cross-cutting aspect assignment in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region III, and to the 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 Agencywide Document Access 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 and 50-457  
License Nos. NPF-72 and NPF-77

Enclosure: Inspection Report 05000456/2012002; 05000457/2012002  
w/Attachment: Supplemental Information

cc w/encl: Distribution via ListServ

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

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

Report No: 05000456/2012002; 05000457/2012002

Licensee: Exelon Generation Company, LLC

Facility: Braidwood Station, Units 1 and 2

Location: Braceville, IL

Dates: January 1, 2012, through March 31, 2012

Inspectors: J. Benjamin, Senior Resident Inspector  
A. Garmoe, Resident Inspector  
B. Jose, Senior Reactor Engineer  
J. Gilliam, Reactor Engineer  
M. Holmberg, Reactor Engineer  
M. Perry, Resident Inspector  
Illinois Emergency Management Agency

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

Enclosure

## TABLE OF CONTENTS

SUMMARY OF FINDINGS.....	1
REPORT DETAILS.....	4
Summary of Plant Status.....	4
1. REACTOR SAFETY.....	4
1R01 Adverse Weather Protection (71111.01).....	4
1R04 Equipment Alignment (71111.04).....	4
1R05 Fire Protection (71111.05).....	6
1R06 Flooding (71111.06).....	9
1R11 Licensed Operator Requalification Program (71111.11).....	13
1R12 Maintenance Effectiveness (71111.12).....	14
1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13).....	18
1R15 Operability Determinations and Functional Assessments (71111.15).....	18
1R18 Plant Modifications (71111.18).....	22
1R19 Post-Maintenance Testing (71111.19).....	23
1R22 Surveillance Testing (71111.22).....	24
1EP6 Drill Evaluation (71114.06).....	25
4. OTHER ACTIVITIES.....	26
4OA1 Performance Indicator Verification (71151).....	26
4OA2 Identification and Resolution of Problems (71152).....	27
4OA3 Followup of Events and Notices of Enforcement Discretion (71153).....	30
4OA5 Other Activities.....	31
4OA6 Management Meetings.....	33
SUPPLEMENTAL INFORMATION.....	1
Key Points of Contact.....	1
List of Items Opened, Closed and Discussed.....	2
List of Documents Reviewed.....	3
List of Acronyms Used.....	13

## SUMMARY OF FINDINGS

Inspection Report 05000456/2012002, 05000457/2012002; 01/01/2012 – 03/31/2012; Braidwood Station, Units 1 & 2; Fire Protection; Flood Protection Measures; Maintenance Effectiveness; Operability Determinations and Functional Assessments.

This report covers a 3-month period of inspection by resident inspectors and announced baseline inspections by regional inspectors. Four Green findings were identified by the inspectors. The findings 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

#### Cornerstone: Mitigating Systems

- Green. The inspectors identified a finding of very low safety significance and an associated NCV of License Condition 2.E when licensee personnel failed to adequately maintain the approved fire protection program after receiving information that adversely affected the qualification of fire dampers credited in the safe shutdown analysis. Specifically, the licensee inadvertently removed an action to secure ventilation upon the confirmation of a fire following a revision to the station's Pre-Fire Plans in 2010. This action was established after the licensee received NRC Information Notice (IN) 89-52, "Potential Fire Damper Operational Problems," which notified the licensee that these dampers were not qualified to shut with air flow through them. A significant contributor to this error was a failure of the licensee to adequately incorporate this action into the appropriate procedures and clearly document this requirement and basis for this requirement into the approved fire protection program. The licensee entered this issue into their corrective action program (CAP) as IR 1309949. Corrective actions included the implementation of Operations Standing Order 11-027 requiring manual operator action until a procedure change to the Fire Hazardous Materials Spill and/or Injury procedure (BwAP 1100-16), and Fire Response Guidelines (BwOP FP-100) was performed. Additionally, the licensee created an assignment to provide training to the fire brigade leaders for these planned procedure revisions.

The finding was determined to be more than minor because it was associated with the Design Control attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, the failure to ensure that ventilation systems were secured upon the confirmation of a fire could affect the ability of fire dampers to shut and perform their safety function. The inspectors evaluated this finding using the SDP in accordance with IMC 0609, "Significance Determination Process," Attachment 0609.04, "Phase I - Initial Screening and Characterization of Findings," Table 3b for the Mitigating Systems Cornerstone, which directed this finding be reviewed using IMC 0609, Appendix F, "Fire

Protection Significance Determination Process,” since the finding affected fire barriers. The inspectors assigned this issue a “low degradation” rating based upon the high likelihood that ventilation would be secured upon the onset of a fire due to numerous ionization detectors that automatically trip ventilation systems upon the detection of smoke. Based on this assigned rating, the inspectors determined that this finding was of very low safety significance (Green). The inspectors determined that the most significant causal factor related to this finding was a failure to adequately incorporate the requirement into the current licensing basis (CLB) in 1989, and therefore this finding was not indicative of current performance and a cross-cutting aspect was not assigned. (Section 1R05.1.b)

- Green. The inspectors identified a finding of very low safety significance and an associated NCV of 10 CFR Part 50, Appendix B, Criterion XVI, “Corrective Action,” when licensee personnel failed to promptly correct conditions adverse to quality. Specifically, from 2006 to 2011, licensee personnel failed to correct a poor material condition in the auxiliary building ventilation (VA) intake plenums that resulted in clogging of floor drains and water leakage into electrical penetration and cable spreading room areas; and from 2010 to 2012, the licensee failed to correct a degraded floor drain in the Unit 2 miscellaneous electrical equipment room (MEER) that was next to a safety shower adjacent to a safety-related direct current (DC) bus. The licensee entered this issue into their CAP as IRs 1291696 and 1332289. Corrective actions included cleaning and re-coating the VA intake plenums and routing out the floor drains in the MEERs.

The finding was determined to be more than minor because it was associated with the Design Control and Protection Against External Events attributes of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage.). Specifically, the licensee failed to promptly correct degraded and clogged auxiliary building floor drains or the poor material condition in the VA intake plenum. The inspectors evaluated this finding using the SDP in accordance with IMC 0609, “Significance Determination Process,” Attachment 0609.04, “Phase I - Initial Screening and Characterization of Findings,” and determined that the finding affected the Flood Protection Degraded Function of the Mitigating Systems Cornerstone, per Table 2. The inspectors answered ‘Yes’ to Question 5 in Table 4a, which directed the inspectors to Table 4b since the issue was related to flood protection. The inspectors answered ‘No’ to Question 2 of Table 4b because the floor drains were degraded, but the pooling water in the VA plenums or MEERs would not have likely resulted in a plant trip or transient. As a result, the issue screened as having very low safety significance (Green). This finding had a cross-cutting aspect in the Corrective Action Program component of the Problem Identification and Resolution cross-cutting area because the licensee failed to properly classify, prioritize, or evaluate conditions adverse to quality associated with auxiliary building floor drains and VA intake plenum such that the conditions were promptly corrected [P.1(c)]. (Section 1R06.1.b)

Green. The inspectors identified a finding of very low safety significance and an associated NCV of 10 CFR 50.65(a)(1), 10 CFR 50.65(a)(2), and 10 CFR 50.65(b) when licensee personnel failed to scope numerous high energy line break (HELB) hazard barrier dampers into the maintenance rule, as required. The function of these barriers was to protect safety-related equipment such as the emergency diesel

generators (EDGs) and safety-related alternating current (AC) and DC buses and cables from credited HELB sources in the turbine building. The licensee entered this issue into their CAP as IR 1310448. Corrective actions included scoping the dampers into the maintenance rule and assigning preventative maintenance performance monitoring criteria.

The finding was determined to be more than minor because it was associated with the Equipment Performance attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, the failure to monitor damper performance and establish performance goals could adversely affect the availability, reliability, and capability of safety-related structures, systems and components protected by the hazard barrier. The inspectors determined the finding could be evaluated using the SDP in accordance with IMC 0609, "Significance Determination Process," Attachment 4, "Phase I - Initial Screening and Characterization of Findings," Table 4a for the Mitigating Systems Cornerstone. The finding screened as having very low safety significance since it was not a design or qualification deficiency confirmed not to result in a loss of operability or functionality. This finding was not indicative of current performance since the scoping aspects were determined prior to the rule's effective date of July 10, 1996. As a result, a cross-cutting aspect was not assigned to this finding. (Section 1R12.1.b.1)

- Green. The inspectors identified a finding of very low safety significance and an associated NCV of 10 CFR 50.49(e) when licensee personnel failed to correctly classify the EDGs, essential switchgear (ESG), and MEERs containing electrical equipment important to safety. Specifically, the licensee's environmental qualification (EQ) program did not take into consideration the temperature and humidity changes expected for these rooms following a turbine building HELB and improperly classified these rooms as mild environments subjected to abnormal conditions instead of harsh environments. The licensee entered this issue into their CAP as IR 1288474. Corrective actions included an assignment for Corporate Engineering to provide a recommended environmental classification for the rooms where the abnormal conditions, due to a turbine building HELB event, were expected to occur.

The finding was determined to be more than minor because it was associated with the Equipment Performance attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). The inspectors determined the finding could be evaluated using the SDP in accordance with IMC 0609, "Significance Determination Process," Attachment 4, "Phase I - Initial Screening and Characterization of Findings," Table 4a for the Mitigating Systems Cornerstone. The finding screened as having very low safety significance since it was not a design or qualification deficiency confirmed not to result in a loss of operability or functionality. This finding was not indicative of current performance and therefore was not assigned a cross-cutting aspect because the EQ classification of the rooms was completed in 1992. (Section 1R15.1.b.1)

**B. Licensee-Identified Violations**

None.

## REPORT DETAILS

### Summary of Plant Status

Unit 1 operated at or near full power for the duration of the inspection period.

Unit 2 operated at or near full power for the duration of the inspection period.

### **1. REACTOR SAFETY**

#### **Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity**

#### 1R01 Adverse Weather Protection (71111.01)

##### .1 Readiness for Impending Adverse Weather – Heavy Snowfall Conditions

###### a. Inspection Scope

On February 23, 2012, a Winter Weather Advisory was issued by the National Weather Service for expected heavy wet snow and strong winds. The inspectors observed the licensee's preparations and planning for the significant winter weather potential. 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 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 adverse weather. The inspectors also reviewed 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 Inspection Procedure (IP) 71111.01-05.

###### b. Findings

No findings were identified.

#### 1R04 Equipment Alignment (71111.04)

##### .1 Quarterly Partial System Walkdowns

###### a. Inspection Scope

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

- Auxiliary Feedwater Safety-Related Suction Piping Voided Section;
- 1B Residual Heat Removal (RH) During 1A RH Work Window;

- 2A EDG with 2B EDG Out of Service for Maintenance; and
- 2B EDG with 2A EDG Out of Service for Maintenance.

The inspectors selected these systems based on their risk significance relative to the Reactor Safety Cornerstones at the time they were inspected. The inspectors attempted to identify any discrepancies that could impact the function of the system and, therefore, potentially increase risk. The inspectors reviewed applicable operating procedures, system diagrams, the Updated Final Safety analysis Report (UFSAR), Technical Specification (TS) requirements, outstanding work orders (WOs), 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 four partial system walkdown samples as defined in IP 71111.04-05.

b. Findings

No findings were identified.

.2 Semiannual Complete System Walkdown

a. Inspection Scope

On March 19, 2012, the inspectors performed a complete system alignment inspection of the Unit 1 Auxiliary Power 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 electrical equipment line-ups, electrical power availability, component labeling, component lubrication, component and equipment cooling, hangers and supports, operability of support systems, and to ensure that ancillary equipment or debris did not interfere with equipment operation. A review of a sample of past and outstanding WOs was performed to determine whether any deficiencies significantly affected the system function. In addition, the inspectors reviewed the CAP database to ensure that system equipment alignment problems were being identified and appropriately resolved. Documents reviewed are listed in the Attachment.

These activities constituted one complete system walkdown sample as defined in IP 71111.04-05.

b. Findings

No findings were identified.

1R05 Fire Protection (71111.05)

.1 Routine Resident Inspector Tours (71111.05Q)

a. Inspection Scope

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

- Fire Protection Dampers Along Turbine and Auxiliary Building L-Wall;
- Work Execution Center Office Spaces Near Main Control Room Entrance;
- Main Control Room and Lower Cable Spreading Room Penetration Area;
- Unit 1 Auxiliary Electrical Equipment Room;
- Unit 2 Auxiliary Electrical Equipment Room; and
- Diesel Driven Fire Pump Room.

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

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

b. Findings

.1 Failure to Scope Safety-Related High Energy Line Break Barriers Into the Maintenance Rule

Introduction: The inspectors identified a finding of very low safety significance (Green) and an associated NCV of License Condition 2.E when licensee personnel failed to adequately maintain the approved fire protection program after receiving information that adversely affected the qualification of fire dampers credited in the safe shutdown analysis. Specifically, the licensee inadvertently removed an action to secure ventilation upon the confirmation of a fire following a revision to the station's Pre-Fire Plans in 2010. This action was established after the licensee received NRC Information Notice

(IN) 89-52, "Potential Fire Damper Operational Problems," which notified the licensee that these dampers were not qualified to shut with air flow through them.

Description: NRC IN 89-52, "Potential Fire Damper Operational Problems," notified the licensee of potential problems affecting the closing reliability of Ruskin Manufacturing curtain-type fire dampers under ventilation system operational air flow conditions. This concern was based on a 10 CFR Part 21 notification provided by the manufacturer along with a number of instances in which multiple licensees reported various failures of the dampers to shut upon demand.

The IN notified the licensee that the industry standard governing the design, fabrication, and testing of fire dampers was Underwriters Laboratories, Inc. (UL) Standard 555, "Fire Damper and Ceiling Dampers." In the 1979 edition, the standard stated that the closing reliability of the fire dampers was evaluated on the basis that the ventilation systems were shutdown when a fire occurred. The standard, however, did not evaluate whether or not fire dampers would close under air flow conditions. Therefore, the UL fire damper rating only indicated whether a fire damper in the closed position would maintain its integrity under fire conditions for a specific time period. The IN informed the licensee that they should be aware that fire damper testing methods that did not simulate the actual total differential pressure at the damper (i.e., visual inspection or drop testing with duct access panels open) may not demonstrate operability under air flow conditions. Furthermore, if the licensee depended on the UL product listing and did not sufficiently model air flow during surveillance testing they could not be sure that the dampers would close fully when required unless air flow was first secured. The IN discussed that licensees who had adequately addressed this issue had either (1) type-tested "worse-case" air flow conditions of plant-specific fire damper configurations; (2) tested all dampers installed in required fire barriers; or (3) administratively shut down the ventilation systems to an area upon confirmation of a fire, through the addition of steps in plant emergency procedures.

The station reviewed IN 89-52 and identified numerous dampers applicable to the issue (NTS 456-103-89-052-00). The station responded to this information by updating the Pre-Fire plans to include a note which stated, "*Fire dampers may not close in the presence of air flow. Therefore, fixed ventilation systems may need to be shut down to ensure closure of fire dampers.*" This note was added to the beginning of each detection and suppression section of the Pre-Fire plans.

The inspectors identified that the precautionary note had been removed from the station Pre-Fire plans in 2010 during a major revision to the plans in order to improve overall quality and establish consistency throughout the Exelon fleet. The note had not been relocated in a separate procedure (e.g., Alarm Response or Fire Response procedures.) The licensee performed a causal evaluation in the form of a work group evaluation (Issue Report (IR) 1343862). This evaluation concluded that the cause for this issue was that the station's actions to address IN 89-52 was not well documented in 1990 when it was added to the Braidwood Pre-Fire plans and, as a result, it was not transferred to the revised Pre-Fire plans in 2010. The licensee's basis for this conclusion, in part, was that prior to the revision, the Pre-Fire plans were contained in an electronic file that was controlled by the Fire Marshall in response to errors or improvements identified. The licensee concluded that the front portion of the Pre-Fire plans (where this note was located) contained additional information that enhanced fire

response, but was not relied upon to execute the Braidwood Pre-Fire plans. The licensee provided other examples to illustrate this conclusion (purpose of a fire brigade, fire brigade leader, brigade members, expected response to a fire for particular areas, interfacing with offsite fire departments, and types of fires and preferred extinguishing agents). The Pre-Fire Plan also has a less stringent revision review process.

The inspector's reviewed the licensee's causal evaluation and concluded that the licensee had not adequately maintained the approved fire protection program in a manner that ensured the current licensing basis (CLB) was clearly documented in appropriate procedures and programs. The inspectors concluded that although the note should not have been removed from the Pre-Fire plans without the licensee understanding the note's origin and potential consequences, the most significant cause of the performance deficiency was related to how IN 89-52 was incorporated into the approved fire protection program and appropriate program procedures. The licensee entered this issue into their CAP as IR 1309949. Corrective actions included implementing Operations Standing Order 11-027 requiring actions to ensure ventilation was secured upon the confirmation of a fire until a change to the Fire Hazardous Materials Spill and/or Injury procedure (BwAP 1100-16), and the Fire Response Guidelines (BwOP FP-100) was performed. Additionally, the licensee created an assignment to provide training to the fire brigade leaders for these procedural revisions.

Analysis: The failure to maintain the approved fire protection program CLB regarding the qualification of fire dampers was a performance deficiency. Specifically, the licensee did not ensure that fire dampers credited in the safe shutdown analysis were adequately qualified since part of that qualification was to ensure that ventilation systems were secured upon the confirmation of a fire. The inspectors reviewed Inspection Manual Chapter (IMC) 0612, Appendix E, "Examples of Minor Issues," and could not reasonably conclude whether the issue was more than minor. Thus, the inspectors reviewed the minor questions in IMC 0612, Appendix B, "Issue Screening," and concluded that the finding was more than minor because it was associated with the Design Control attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage.) Specifically, the failure to ensure that fire dampers credited in the safe shutdown analysis were adequately qualified could affect the damper's ability to shut and perform its safety function. The inspectors evaluated this finding using the SDP in accordance with IMC 0609, "Significance Determination Process," Attachment 0609.04, "Phase I - Initial Screening and Characterization of Findings," Table 3b for the Mitigating Systems Cornerstone, which directed this finding be reviewed using IMC 0609, Appendix F, "Fire Protection Significance Determination Process", since the finding affected fire barriers. The inspectors assigned this issue a "low degradation" rating based upon the high likelihood that ventilation would be secured upon the onset of a fire due to numerous ionization detectors that automatically trip ventilation systems upon the detection of smoke. Based on this assigned rating, the inspectors determined that this finding was of very low safety significance (Green).

The inspectors determined that the most significant causal factor related to this finding was a failure to adequately incorporate the requirement into the CLB in 1989, and therefore this finding was not indicative of current performance and a cross-cutting aspect was not assigned.

**Enforcement:** Braidwood License Condition 2.E requires that, “The licensee shall implement and maintain in effect, all provisions of the approved fire protection program as described in the UFSAR, as supplemented and amended.”

Contrary to the above, upon the receipt of NRC Information Notice 89-52, “Potential Fire Damper Operational Problems” in 1989, and identification that Ruskin Manufacturing curtain-type fire dampers at the station were not qualified with nominal ventilation air flow conditions through them, the licensee failed to adequately maintain the approved fire protection program in a manner that adequately documented the method for how the dampers would be qualified during a licensing basis fire event. Corrective actions included implementing Operations Standing Order 11-027 requiring actions to ensure ventilation was secured upon the confirmation of a fire until a change to the Fire Hazardous Materials Spill and/or Injury procedure (BwAP 1100-16), and the Fire Response Guidelines (BwOP FP-100) was performed. Additionally, the licensee created an assignment to provide training to the fire brigade leaders for these procedural revisions. Because this violation was of very low safety significance and because this issue was entered into the licensee’s CAP as IR 1309949, this violation is being treated as a NCV consistent with Section 2.3.2 of the NRC Enforcement Policy.

**(NCV 05000456/2012002-01; 05000457/2012002-01, Failure to Maintain Approved Fire Protection Program Regarding Safe Shutdown Fire Damper Qualification)**

1R06 Flood Protection Measures (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:

- Miscellaneous Electrical Equipment Rooms.

Specific documents reviewed are listed in the Attachment. This inspection constituted one internal flooding sample as defined in IP 71111.06-05.

b. Findings

(Closed) Unresolved Item 05000456/2011004-02; 05000457/2011004-02, “Use of Mesh Strainer Bags in Auxiliary Building Floor Drains”

Introduction: The inspectors identified a finding of very low safety significance (Green) and an associated NCV of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," when licensee personnel failed to correct conditions adverse to quality. Specifically, from 2006 to 2011 licensee personnel failed to correct poor material condition in the auxiliary building ventilation system (VA) intake plenums that led to clogging of floor drains and water leakage into electrical penetration and cable spreading room areas, and from 2010 to 2012 licensee personnel failed to correct a degraded floor drain in the Unit 2 miscellaneous electrical equipment room (MEER) that was next to a safety shower adjacent to a safety-related Direct Current (DC) bus.

Description of Example 1: Through a routine review of CAP documents during summer 2011, the inspectors noted the following IRs documenting the pooling of water in the VA intake plenum areas:

- IR 1230829; Water in VA Inlet Plenum Following Storm; June 20, 2011;
- IR 1249503; Operations – Auxiliary Building Floor Drain Overflowing; August 9, 2011;
- IR 1259300; Area Evaluation Required After Water Exposure; September 4, 2011; and
- IR 1260053; Clogged Floor Drain Basket in 0VA01CC/CD Supply Plenum; September 7, 2011.

Water accumulates in the intake plenums when warm outside air passes over the chilled water coils, which results in condensation. By design, the condensation falls to the floor of the plenums and is removed through floor drains. The inspectors discussed the issue with the licensee and reviewed historical CAP documents regarding water accumulation in the VA intake plenums. The issue was initially identified by a vendor in 2006 (IRs 469055 and 469058) who questioned the material condition of the VA intake plenums with the system engineer, who recommended verifying the floor drains were functional, cleaning loose debris, and recoating the plenum surfaces. In total, the inspectors noted over 20 IRs related to the effects of poor material condition in the VA intake plenums, including the following:

- IR 0577835; Engineering Change Request to Address Water in VA Plenums During Summer; January 11, 2007;
- IR 0652030; Water Present in U2 LCSR [Lower Cable Spreading Room]; July 20, 2007;
- IR 0657432; U-2 Lower Cable Spreading Room Floor Drains Plugged, Water on Floor, Safety Issue; August 5, 2007; and
- IR 1076410; Backed Up Floor Drain Causes Water to Enter Electrical Cable Tray; June 3, 2010.

WOs 0907365 and 0910190 were created in March 2006 to improve the material condition of the Unit 1 and Unit 2 VA intake plenums. In June 2007 the licensee attempted to clean the Unit 1 VA intake plenum, but was unable to complete the work due to poor material condition and standing water in the plenum. Despite the work not being completed, WO 0910190 was revised to a completed status. This was later recognized and WO 1045973 was generated in its place. The open WOs were scheduled for fall 2009 but were then rescheduled to March 2010, January 2011, and

December 2011, despite clear documentation in the CAP that these WOs were scheduled to support summer readiness in both 2010 and 2011.

The inspectors reviewed the licensee's CAP procedures and concluded that the conditions in the VA plenums and the resulting pooling and leakage of water into other plant areas met the procedure LS-AA-125 definition of a deficiency, which was, "a condition or concern that does not meet specific requirements of procedures, policies, management expectations, or accepted industry standards." Procedure LS-AA-125 included deficiencies in the definition of a condition adverse to quality. The definitions in procedure LS-AA-125 also stated that a Corrective Action assignment type was "an action taken or planned that restores a condition adverse to quality to an acceptable condition or capability."

The inspectors concluded that in accordance with procedure LS-AA-125, the ongoing poor material condition of the VA intake plenum, such that water pooled in the plenums and leaked into lower elevations met the definition of a condition adverse to quality, and was not corrected in a timely manner.

Description of Example 2: While reviewing concerns regarding the material condition of the VA plenum described above, the inspectors identified that IR 1057855, which was generated by the licensee on April 17, 2010, documented concerns regarding clogged or undersized floor drains near safety showers in the Unit 1 and Unit 2 MEERs. Specifically, during routine safety shower testing, the equipment operator noticed that the floor drains did an extremely poor job draining water and the room would begin to flood if the shower was run for the minimum of 15 minutes if it were needed. The MEERs contained safety-related DC power busses that were located within 6 feet of the safety shower and 8 feet of the floor drain. Licensee Procedure 0BwOS TW-W1, "Emergency Eyewash Shower and Functional Surveillance," Revision 23, referenced American National Standards Institute (ANSI) Code Z358.1-1990, which required safety showers to provide at least 30 gallons per minute (gpm) at 30 pounds per square inch (psi) for 15 minutes; therefore the safety shower was anticipated to discharge greater than 450 gallons of water into the MEER upon activation. The IR was assigned a Significance Level 4 and a work request was created to check the floor drains and perform repairs as needed. However, the inspectors noted that the work request had been extended numerous times, had not been completed as of February 2012, and was currently due on June 28, 2012. The inspectors questioned the timeliness of investigating the condition of the floor drains. As a result, the licensee generated IR 1332289, "MEER Safety Shower Floor Drain Corrective Action Timeliness," and IR 332293, "Safety Shower Impact on AB [Auxiliary Building] Flooding Calculation," and the work request to clean the MEER floor drains was completed.

The inspectors reviewed the licensee's CAP procedures and concluded that degraded floor drains near safety-related equipment and a 450 gallon water source met the procedure LS-AA-125 definition of a deficiency.

The inspectors concluded that in accordance with LS-AA-125, the report in IR 1057855 of a degraded floor drain near safety-related equipment and a 450 gallon water source met the definition of a condition adverse to quality, which was not corrected in a timely manner.

Analysis: The inspectors determined that the failure to correct conditions adverse to quality in a prompt or timely manner was a performance deficiency. The inspectors reviewed IMC 0612, Appendix E, "Examples of Minor Issues", and could not reasonably conclude whether the issue was more than minor. Thus, the inspectors reviewed the minor questions in IMC 0612, Appendix B, "Issue Screening," and concluded that the finding was more than minor because it was associated with both the Design Control and Protection Against External Events attributes of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage.) Specifically, the licensee failed to correct the poor material condition of the VA plenum and the issues associated with floor drains near safety showers that resulted in actual and potential pooling and leakage of water near safety-related equipment. The inspectors evaluated this finding using the SDP in accordance with IMC 0609, "Significance Determination Process," Attachment 0609.04, "Phase I - Initial Screening and Characterization of Findings," and determined that the finding affected the Flood Protection Degraded Function of the Mitigating Systems Cornerstone, per Table 2. The inspectors answered 'No' to the first four Mitigating Systems questions in Table 4a but answered 'Yes' to Question 5, which directed the inspectors to Table 4b since the issue was related to flood protection. The inspectors answered 'Yes' to Question 1 and 'No' to Question 2 of Table 4b because the floor drains were degraded, but the pooling water in the VA plenums or MEERs would not have likely resulted in a plant trip or transient. As a result, the issue screened as having very low safety significance (Green).

This finding had a cross-cutting aspect in the Corrective Action Program component of the Problem Identification and Resolution cross-cutting area because the licensee failed to properly classify, prioritize, or evaluate conditions adverse to quality associated with auxiliary building floor drains such that the conditions were promptly corrected [P.1(c)].

Enforcement: Title 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requires, in part, that measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, defective material and equipment, and non-conformances are promptly identified and corrected. Contrary to the above, since 2006, the licensee failed to correct ongoing material condition issues associated with the VA intake plenum or degraded auxiliary floor drains, which were conditions adverse to quality. Specifically, from 2006 to 2011, the licensee failed to correct poor material conditions in the VA intake plenums that resulted in clogging of floor drains and water leakage to electrical penetration and cable spreading room areas, and from 2010 to 2012, the licensee failed to correct a degraded floor drain in the Unit 2 MEER that was a safety shower drain adjacent to a safety-related DC Bus. Corrective actions included cleaning and re-coating the VA intake plenums and routing out the floor drains in the MEERs. Because this violation was of very low safety significance and because this issue was entered into the licensee's CAP as IRs 1291696 and 1332289, this violation is being treated as a NCV consistent with Section 2.3.2 of the NRC Enforcement Policy. **(NCV 05000456/2012002-02; 05000457/2012002-02, Failure to Promptly Correct Conditions Adverse to Quality)**

URI 05000456/2011004-02; 05000457/2011004-02 is closed.

1R11 Licensed Operator Requalification Program (71111.11)

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

a. Inspection Scope

On March 23, 2012, the inspectors observed a crew of licensed operators in the plant's simulator during licensed operator requalification training to verify that operator performance was adequate, evaluators were identifying and documenting crew performance problems, and that 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 simulator sample as defined in IP 71111.11.

b. Findings

No findings were identified.

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

a. Inspection Scope

On January 18, 2012, the inspectors observed activities in the main control room during an unplanned 1 hour TS Action Statement (AS) due to the inoperability of the Unit 2 refueling water storage tank. Specifically, the heat trace circuit for the refueling water storage tank vent line failed and the vent line temperature indication dropped below 35 degrees Fahrenheit (F). As a result, TS AS 3.5.4, Condition B, required the refueling water storage tank to be operable within 1 hour or Unit 2 must be in Mode 3 within 6 hours and Mode 5 within 36 hours. The licensee was able to repair the heat trace circuit prior to shutting down the unit. This was an activity that required heightened awareness or was related to increased risk. 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 procedures;
- control board and equipment manipulations;
- oversight and direction from supervisors; and
- ability to identify and implement appropriate TS actions.

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

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

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12)

.1 Routine Quarterly Evaluations (71111.12Q)

a. Inspection Scope

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

- HELB Barrier Dampers; and
- Refueling Water Storage Tank Temperature Monitoring.

The inspectors reviewed events including those that involved ineffective equipment maintenance that resulted in valid or invalid automatic actuations of engineered safety feature (ESF) 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 (SSCs)/functions classified as (a)(2), or appropriate and adequate goals and corrective actions for systems classified as (a)(1).

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

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

b. Findings

.1 Failure to Scope Safety-Related High Energy Line Break Barriers Into the Maintenance Rule

Introduction: The inspectors identified a finding of very low safety significance (Green) and an associated NCV of 10 CFR 50.65(a)(1), 10 CFR 50.65(a)(2), and 10 CFR 50.65(b) when licensee personnel failed to scope safety-related HELB hazard barrier dampers into the maintenance rule, as required. The function of these barriers was to protect safety-related equipment such as the EDGs and safety-related AC and DC buses and cables from HELB sources in the turbine building.

Description: Sections 3.11 and 9.4.5 of the Braidwood UFSAR stated that fire dampers penetrating the fire wall between the ESF switchgear rooms, MEERs, and EDG rooms would close during a HELB. The station calculations of record that determined the peak and equilibrium room temperatures within the safety-related spaces credited these dampers to shut within a specific period of time.

The inspectors identified that HELB dampers separating various safety-related equipment rooms from postulated steam line breaks within the turbine building were not scoped within the licensee's maintenance rule program, as required.

The licensee entered this issue into their CAP as IR 1310448. On February 24, 2012, the licensee presented this issue to their maintenance rule expert panel and identified three ventilation systems that required new scoping criteria in accordance with maintenance rule requirements. On March 8, 2012, the licensee added these new functions to their respective systems to the maintenance rule program.

The systems affected by the inspector's issue included the following:

- Diesel Generator Room Ventilation System (VD);
- Miscellaneous Electrical Equipment Room Ventilation System (VE); and
- ESF Switchgear Room Ventilation System (VX).

The new functional area created for these systems was categorized by the licensee as a safety-related function of safety-related SSCs that were needed to ensure the capability to shutdown the reactor and maintain it in a safe shutdown condition.

Analysis: The inspectors identified that the failure to scope safety-related HELB hazard barrier dampers that met the 10 CFR 50.65 maintenance rule scoping requirements was a performance deficiency. The inspectors reviewed IMC 0612, Appendix E, "Examples of Minor Issues", and could not reasonably conclude whether the issue was more than minor. Thus, the inspectors reviewed the minor questions in IMC 0612, Appendix B, "Issue Screening," and concluded that the finding was more than minor because it was associated with the Design Control attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and

capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage.) Specifically, the failure to monitor damper performance and establish performance goals could adversely affect the availability, reliability, and capability of safety-related SSCs protected by the hazard barrier. The inspectors evaluated this finding using the SDP in accordance with IMC 0609, "Significance Determination Process," Attachment 4, "Phase I - Initial Screening and Characterization of Findings," Table 4a, Phase I Worksheet. This issue was of very low safety significance (Green) because it did not result in a loss of operability or functionality.

This finding was not indicative of current performance since the scoping aspects were determined prior to the maintenance rule's effective date of July 10, 1996. Therefore, a cross-cutting aspect was not assigned to this finding.

Enforcement: 10 CFR Part 50.65(a)(1) requires, in part, that licensees. . . shall monitor the performance or condition of structures, systems, and components [SSCs], against licensee-established goals, in a manner to provide reasonable assurance that these structures, systems, and components. . . are capable of fulfilling their intended functions.

10 CFR Part 50.65(a)(2) requires, in part, monitoring as specified in paragraph (a)(1) of this section is not required when it has been demonstrated that the performance or condition of a structure, system, or component is being effectively controlled through the performance of appropriate preventive maintenance.

10 CFR Part 50.65(b) requires, in part, that the scope of the monitoring program specified in paragraph (a)(1) of this section shall include safety-related and nonsafety-related SSCs, as follows: (1) safety-related SSCs that are relied upon to remain functional during and following design basis events to ensure the integrity of the reactor coolant pressure boundary, the capability to shutdown the reactor and maintain it in a safe shutdown condition, or the capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposure comparable to the guidelines in 10 CFR 50.34(a)(1), 50.67(b)(2), or 100.11 of this chapter, as applicable.

Contrary to the above, from initial maintenance rule scoping in 1996, the L-Wall HELB barrier dampers for the Diesel Generator Room Ventilation, Miscellaneous Electrical Equipment Room Ventilation, and ESF Switchgear Room Ventilation systems were not included in the scope of the (a)(1) or (a)(2) monitoring program specified in the maintenance rule. The inclusion of these barrier devices within the rule was required because failure of these dampers to function adequately could prevent multiple safety-related systems from fulfilling their safety-related functions.

Corrective actions included scoping the HELB barrier function for the Diesel Generator Room Ventilation, Miscellaneous Electrical Equipment Room Ventilation, and ESF Switchgear Room Ventilation systems into the maintenance rule program, and performing a review of past inspection results. Because this violation was of very low safety significance and because this issue was entered into the licensee's CAP as IR 1326237, this violation is being treated as a NCV consistent with Section 2.3.2 of the NRC Enforcement Policy. **(NCV 5000456/2012002-03; 05000457/2012002-03, Failure to Scope Safety-Related HELB Barriers into the Maintenance Rule)**

.2 Unresolved Item 05000456/2012002-04; 05000457/2012002-04, "Maintenance Rule Performance Monitoring of HELB Dampers"

Introduction: The inspectors reviewed the licensee's performance monitoring criteria for the dampers identified in NCV 0500456/2012002-03; 05000457/2012002-03 and identified an Unresolved Item (URI) pertaining to the licensee's decision to monitor HELB damper preventative maintenance performance by conducting a periodic 18-month visual inspection activity. Specifically, the inspectors questioned if it was appropriate and adequate to rely only on the visual inspection activities absent some level of periodic demand testing to provide reasonable assurance that HELB dampers would shut within required time limits.

Description: 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," required, in part:

- 10 CFR 50.65(a)(1), ... "Each holder of an operating license for a nuclear power plant under this part. . .shall monitor the performance or condition of structures, systems, or components against licensee-established goals, in a manner sufficient to provide reasonable assurance that the SSCs, as defined in paragraph (b) of this section, are capable of fulfilling their intended functions.
- 10 CFR 50.65(a)(2), ... "Monitoring as specified in (a)(1) of this section is not required where it has been demonstrated that the performance or condition of a structure, system, or component is being effectively controlled through the performance of appropriate preventative maintenance, such that the structure system, or component remains capable of performing its intended function."

For the associated HELB barrier dampers, the licensee selected performance criteria related to attributes of a periodic 18-month inspection activity. The inspection activity inspected the material condition of the damper, damper frame, and fusible links.

The inspectors questioned whether the licensee's performance criteria based only on conducting visual inspection preventative maintenance activities was acceptable based upon the following:

- The concern that the inspection activity may not have the capability to detect failures that were not visually observable (e.g., the amount the spring utilized in the dynamic dampers relax over time);
- The inability to inspect the damper's entire surface area in the closed position, and;
- The use of past damper performance reliability that was based in large part upon past inspections and not upon actual demand testing since the licensee had discontinued damper testing based upon a review of the station's Fire Protection program licensing requirements.

This URI will remain open pending the inspector's review of the licensee's performance monitoring criteria against the 10 CFR 50.65 maintenance rule requirements.

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:

- 1A RH Work Window – Planned Online Risk Yellow;
- 1B RH Work Window – Planned Online Risk Yellow;
- Unit 0 Component Cooling Heat Exchanger – Planned Online Risk Yellow for Both Units
- Switchyard Bus 7 Maintenance – Operational Risk Activity;
- 1B Essential Service Water Pump Work Window – Planned Online Risk Yellow;
- Switchyard Bus 1 Work with Impending Winter Weather – Operational Risk Activity; and
- High Wind Conditions with 2A EDG Out of Service for Planned Maintenance – Unplanned Online Risk 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. Documents reviewed are listed in the Attachment.

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

b. Findings

No findings were identified.

1R15 Operability Determinations and Functional Assessments (71111.15)

.1 Operability Evaluations

a. Inspection Scope

The inspectors reviewed the following issues:

- Non-Conservative Gaseous Effluent Radiation Monitor Setpoints;

- Generic Letter 96-06 Response Credits Air Operated Valves for Relief Function;
- Identification of White Substance in 2C and 2D Reactor Containment Fan Coolers;
- Safety-Related 4 kilovolt (kV) Undervoltage Protection Scheme; and
- Fuel Thermal Conductivity Analysis Errors.

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 sampling of corrective action documents to verify that the licensee was identifying and correcting any deficiencies associated with operability evaluations. Documents reviewed are listed in the Attachment.

This operability inspection constituted five samples as defined in IP 71111.15-05.

b. Findings

.1 Incorrect Classification of Environmental Qualification Zones

Introduction: The inspectors identified a finding of very low safety significance (Green) and an associated NCV of 10 CFR 50.49(e) when licensee personnel failed to correctly classify the EDG, essential switchgear (ESG), and MEERs containing electrical equipment important to safety. Specifically, the licensee's EQ Program did not take into consideration the temperature and humidity changes experienced by these rooms during a turbine building HELB and incorrectly classified these rooms as mild environments subjected to abnormal conditions, instead of harsh environments.

Description: During a review of the licensee's turbine building HELB analysis, the inspectors noted that various rooms housed important to safety electrical equipment that would potentially be affected by a turbine building HELB. These rooms included the EDG rooms (EQ Zone A6), ESG rooms (EQ Zone A3), and the MEERs (EQ Zone A3). According to the Braidwood UFSAR, Table 3.11-2, the normal maximum temperatures of these rooms were 132 degrees Fahrenheit (°F), 108°F, and 108 °F, respectively, and the normal relative humidity for all of the rooms was 8-70 percent. A turbine building HELB causes temporary failure of the ventilation systems in the EDG rooms, ESG rooms, and MEERs, which was expected to be restored within 2 hours. The turbine building HELB analysis evaluated the conditions of these rooms and showed maximum peak temperatures in the rooms of 167°F, 160°F, and 175°F, respectively, with 100 percent relative humidity. The licensee classified these rooms as mild environments that were subject to abnormal conditions in 1992, following discovery that these rooms would experience higher than normal temperatures and humidity due to a turbine building

HELB. This classification was based upon the determination that the effects of a turbine building HELB on these rooms would be short term.

Based on the analyzed changes in temperature and humidity in these rooms during a turbine building HELB, the inspectors questioned whether the rooms should have been classified as harsh environments. Additionally, the licensee's transient analysis assumed that the elevated temperature and humidity levels lasted for at least 2 hours, rather than for a short time period.

Title 10 CFR Part 50.49, "Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants," defined a mild environment as "an environment that would at no time be significantly more severe than the environment that would occur during normal plant operation, including anticipated operational occurrences." Licensee EQ Programs were required by 10 CFR 50.49(e) to consider temperature, pressure, humidity, chemical effects, radiation, aging, submergence, and synergistic effects when classifying EQ Zones. The environment in the EDG rooms (EQ Zone A6), ESG rooms (EQ Zone A3), and MEERs (EQ Zone A3) all become more severe during a turbine building HELB with respect to humidity and temperature. Therefore, the "important to safety equipment" in these EQ Zones should have been evaluated under 10 CFR 50.49 and the licensee's EQ Program.

The licensee's EQ Program ensured electrical equipment was qualified to perform its function during and following design basis events. Title 10 CFR Part 50.49(f) states, "Each item of electric equipment important to safety must be qualified by one of the following methods: (1) Testing an identical item of equipment under identical conditions or under similar conditions with a supporting analysis to show that the equipment to be qualified is acceptable; (2) Testing a similar item of equipment with a supporting analysis to show that the equipment to be qualified is acceptable; (3) Experience with identical or similar equipment under similar conditions with a supporting analysis to show that the equipment to be qualified is acceptable; and (4) Analysis in combination with partial type test data that supports the analytical assumptions and conclusions." Since the equipment in the EDG rooms, ESG rooms, and MEERs were not placed in the EQ program, they were not qualified for the harsh environment that the rooms would be subjected to during a turbine building HELB.

The licensee generated IR 1288474 on November 8, 2011, for Corporate Engineering to provide a recommended environmental classification for the rooms where the abnormal conditions, due to a turbine building HELB event, were expected to occur.

Analysis: The inspectors determined that the incorrect classification of the EDG rooms, ESG rooms, and MEERs was contrary to the requirements of 10 CFR 50.49(e) and was a performance deficiency. Specifically, the licensee did not consider the adverse effects of a turbine building HELB on temperature and humidity in the subject rooms when classifying these EQ Zones and qualifying important to safety electrical equipment. The inspectors reviewed IMC 0612, Appendix E, "Examples of Minor Issues," and could not reasonably conclude whether the issue was more than minor. Thus, the inspectors reviewed the minor questions in IMC 0612, Appendix B, "Issue Screening", and concluded that the finding was more than minor because it was associated with the Equipment Performance attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of

systems that respond to initiating events to prevent undesirable consequences (i.e., core damage.) Specifically, the incorrect classification of these rooms led to the EQ zones not being included in the licensee's EQ Program, which resulted in unqualified important to safety equipment that would be subjected to a harsh environment during a turbine building HELB. The inspectors determined the finding could be evaluated using the SDP in accordance with IMC 0609, "Significance Determination Process," Attachment 4, "Phase I - Initial Screening and Characterization of Findings," Table 4a for the Mitigating Systems Cornerstone. This finding was determined to be of very low safety significance (Green) because it did not result in a loss of operability or functionality for the electrical equipment housed in the rooms identified.

This finding was not associated with a cross-cutting aspect because the EQ classification of the rooms was completed in 1992 and was not representative of current licensee performance.

Enforcement: Title 10 CFR Part 50.49(e), requires, in part, that the electric equipment qualification program must include and be based on the following: (1) Temperature and pressure; (2) Humidity; (3) Chemical effects; (4) Radiation; (5) Aging; (6) Submergence; (7) Synergistic effects; and (8) Margins. This qualification was based upon the environmental conditions at the location where the equipment must perform its function. Contrary to the above, from 1992 until January 26, 2012, the licensee's electric equipment EQ Program did not include important to safety equipment in the EDG rooms, ESG rooms, and MEERs. Specifically, the licensee's EQ Program did not take into consideration the temperature and humidity changes experienced by these rooms during a turbine building HELB. Instead, the licensee classified the rooms as mild environments subjected to abnormal conditions instead of harsh environments. Corrective actions at the end of the inspection were indeterminate, but included a plan to evaluate this issue along with other related HELB L-Wall issues to ensure regulatory compliance. Because this violation was of very low safety significance and because this issue was entered into the licensee's CAP as IR 1288474, this violation is being treated as a NCV consistent with Section 2.3.2 of the NRC Enforcement Policy.

**(NCV 05000456/2012002-05; 05000457/2012002-05: Incorrect Classification of Environmental Qualification Zones)**

.2 Unresolved Item 05000456/2012-06; 05000457/2012-06, "Inadequate Safety-Related 4kV Undervoltage Protection"

Introduction: On January 30, 2012, Byron Unit 2 automatically tripped after a 345kV insulator failed in the station switchyard. The failed insulator resulted in an open "C" phase supplying a TS preferred power source to both safety-related 4kV buses. The open circuit, at Byron Unit 2, prevented safety-related equipment from operating due to an undervoltage condition experienced at the equipment. Additionally, the undervoltage protection scheme did not generate an automatic bus undervoltage signal due to the design of the protection logic. This design issue also existed at Braidwood Unit 1 and Unit 2. The inspectors identified a URI to determine whether the undervoltage and degraded voltage protection design vulnerability was within Braidwood's CLB.

Description: TS 3.3.5, "Loss of Power Diesel Generator Start Instrumentation," required that in Modes 1-4 two channels per bus of the loss of voltage (undervoltage) function and two channels per bus of the degraded voltage function shall be operable. In

addition, TS Surveillance Requirement 3.3.5.2 stated that the acceptable channel calibration values for the undervoltage setpoint was greater than 2730 volts with a time delay of less than or equal to 1.9 seconds; and for the degraded voltage setpoint, the value was greater than 3930 volts with a time delay of 310 plus or minus 30 seconds. Upon actuation of the undervoltage or degraded voltage function, the EDGs were designed to start and provide power to all engineered safety feature loads.

However, because the engineered safety feature undervoltage and degraded voltage protection schemes was comprised of two contacts in series that monitored differential voltages between the A-B and B-C phases, upon the loss of only the "A" or "C" phase, only one protective relay was actuated and therefore did not satisfy the coincidence logic necessary to initiate an undervoltage or degraded voltage protection signal.

The Byron and Braidwood licensee concluded that this event was not within the facility's CLB and that because the NRC had reviewed and approved the design, that the undervoltage protection design inadequacies did not impact operability and that the requirements of TS 3.3.5 were met. The licensee implemented compensatory actions consisting of a dedicated operator station for each operating unit in the main control room to ensure that manual action would be taken to separate the TS preferred power source following a loss of "A" or "C" phase to the station auxiliary transformers (SATs).

At the end of this inspection, a detailed review of the CLB was in progress. This URI will remain open pending the completion of this review and a determination of whether the undervoltage and degraded voltage protection design vulnerability was within the station's CLB. **(URI 05000456/2012002-06, 05000457/2012002-06, Inadequate Safety Related 4kV Undervoltage Protection)**

1R18 Plant Modifications (71111.18)

.1 Plant Modifications

a. Inspection Scope

The inspectors reviewed the following modifications:

- Unit 2 Refueling Water Storage Tank Vent Path Heating Temporary Modification; and;
- Essential Service Water Makeup to Component Cooling Water Surge Tanks Permanent Modification.

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 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 two plant modification samples as defined in IP 71111.18-05.

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19)

.1 Post-Maintenance Testing

a. Inspection Scope

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

- 1B RH Pump Following Work Window;
- 1A Safety Injection Pump Following Oil Replacement;
- 1A Containment Spray Pump Following Work Window;
  
- 2B EDG Following Work Window; and
- 2A EDG Following Work Window.

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

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

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22)

.1 Surveillance Testing

a. Inspection Scope

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

- Unit 1 Main Turbine Stop Valve and Intercept Valve Testing (Routine);
- Bus 142 Undervoltage and Degraded Voltage Surveillance (Routine);
- 1B EDG Monthly Surveillance (Routine)
- 1A Containment Spray Pump Quarterly Surveillance (Inservice Test);
- Reactor Coolant System (RCS) Unidentified Leakrate (RCS Leakrate);

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 TSs, 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 lifted leads 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, American Society of Mechanical Engineers 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 into 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 three routine surveillance testing samples, one inservice testing sample, and one reactor coolant system leak detection inspection sample as defined in IP 71111.22, Sections -02 and -05.

b. Findings

No findings were identified.

1EP6 Drill Evaluation (71114.06)

.1 Emergency Preparedness Drill Observation

a. Inspection Scope

The inspectors evaluated the conduct of a routine licensee emergency drill on February 1, 2012, to identify any weaknesses and deficiencies in classification, notification, and protective action recommendation development activities. The inspectors observed emergency response operations in the Technical Support Center to determine whether the event classifications, notifications, and protective action recommendations were performed in accordance with procedures. The inspectors also attended the licensee drill critique to compare any inspector-observed weakness with those identified by the licensee staff to evaluate the critique and to verify whether licensee staff was properly identifying weaknesses and entering them into the CAP. As part of the inspection, the inspectors reviewed the drill package and other documents listed in the Attachment.

This emergency preparedness drill inspection constituted one sample as defined in IP 71114.06-05.

b. Findings

No findings were identified.

#### 4. OTHER ACTIVITIES

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

#### 4OA1 Performance Indicator Verification (71151)

##### .1 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 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, was used. The inspectors reviewed the licensee's operator narrative logs, issue reports, maintenance rule records, event reports and NRC Integrated Inspection Reports from January through December 2011, 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 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, was 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 2011, 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 were identified.

.3 Mitigating Systems Performance Index - Emergency AC Power System

a. Inspection Scope

The inspectors sampled licensee submittals for the Mitigating Systems Performance Index (MSPI) - Emergency AC Power System 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, was used. The inspectors reviewed the licensee's operator narrative logs, MSPI derivation reports, issue reports, event reports and NRC Integrated Inspection Reports for the period from January 1 through December 2011 to validate the accuracy of the submittals. The inspectors reviewed the MSPI component risk coefficient to determine if it had changed by more than 25 percent in value since the previous inspection, and if so, whether the change was in accordance with applicable NEI guidance. The inspectors also reviewed the licensee's 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 MSPI emergency AC power system samples as defined in IP 71151-05.

b. Findings

No findings 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 whether identification of the problem was complete and accurate; whether timeliness was commensurate with the safety significance; whether evaluation and disposition of performance issues, generic implications, common causes, contributing factors, root causes, extent-of-condition reviews, and previous occurrences reviews were proper and adequate; and whether the classification, prioritization, focus, and timeliness of corrective actions were commensurate with safety and sufficient to prevent recurrence of the issue. Minor issues entered into the licensee's CAP as a result of the inspectors' observations are included in the Attachment.

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

b. Findings

No findings were identified.

.2 Daily Corrective Action 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 issue report packages.

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

b. Findings

No findings were identified.

.3 Selected Issue Followup Inspection: Implementation of the Operability/Functionality Process

a. Inspection Scope

During a review of items entered in the licensee's CAP, the inspectors recognized several corrective action items documenting conditions that appeared to represent degraded or non-conforming conditions, as defined in Part 9900 of the NRC Inspection Manual, "Operability Determinations & Functionality Assessments For Resolution Of Degraded Or Nonconforming Conditions Adverse To Quality Or Safety." Licensee procedure OP-AA-108-115, "Operability Determinations," used the same definitions.

One of the conditions reviewed was air-operated containment isolation valves that were credited for penetration overpressure relief to address issues communicated in Generic Letter 96-06, "Assurance of Equipment Operability and Containment Integrity During Design-Basis Accident Conditions" (IR 1257969). The licensee noted that although the credited pressure relief function of the valves was not tested, a calculation was performed to validate the function. Because the valve was not tested for the credited relief function, as required by the licensee's inservice testing program, the inspectors questioned whether this represented a non-conforming condition. The licensee subsequently entered this issue into their CAP as IR 1322584. The licensee reviewed the issue and agreed with the inspectors that not testing the credited relief function of the air-operated valves did, in fact, represent a non-conforming condition. The inspectors noted that, while the issue had not been tracked as a non-conforming condition, appropriate corrective actions were planned.

The second condition reviewed was the failure of the Unit 2 refueling water storage tank vent line heat trace circuitry, which rendered the Unit 2 refueling water storage tank inoperable due to vent line temperature indication dropping below 35 F. The licensee installed temporary heating blankets to maintain the vent line temperature above the minimum TS limits. The inspectors questioned whether the blankets should be formally tracked as a compensatory action to address a non-conforming condition. Based on discussions with the licensee, the licensee planned to monitor the installation of the temporary blankets and pursue a permanent resolution formally through the temporary change process.

This review constituted one in-depth problem identification and resolution sample as defined in IP 71152-05. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

.4 Selected Issue Followup Inspection: Transformer Secured Material Zone Review

a. Inspection Scope

During a review of items entered in the licensee's CAP, the inspectors recognized several corrective action items documenting loose material that was identified within the Unit 1 and Unit 2 transformer exclusion areas and secured material zones. The inspectors reviewed the licensee's corrective actions to prior NCVs related to loose material in these areas. The licensee had revised procedures and standards, planned to increase physical markings of the areas, and increased their attentiveness to material in the areas. The inspectors concluded that the licensee has been applying additional rigor in identifying and removing material from these areas, but continued to struggle with preventing materials from being staged in these areas. The inspectors planned to continue to monitor the effectiveness of existing and any additional corrective actions in preventing loose material in these areas, especially during times when adverse weather conditions were forecast or were imminent.

This review constituted one in-depth problem identification and resolution sample as defined in IP 71152-05. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

.5 Selected Issue Followup Inspection: Braidwood Response to Byron Undervoltage Condition

a. Inspection Scope

The inspectors became aware of an issue concerning electrical bus undervoltage protection based on an event that occurred at Byron on January 30, 2012. Additional information about the Byron event is available in Byron Inspection Report 05000455/2012008. The inspectors and licensee concluded that the Braidwood undervoltage protection scheme was of the same design as Byron and would operate in

the same manner under the same conditions. The inspectors reviewed compensatory actions that were put in place at Braidwood to mitigate the undervoltage protection scheme vulnerability. These actions included assigning designated control room operators to monitor for undervoltage conditions and manually separate the electrical safety buses from the power grid, if necessary, and a temporary modification to control room annunciator logic that resulted in more conservative logic for the Loss of Offsite Power annunciators. The inspectors also reviewed the licensee's progress in developing a permanent modification to the undervoltage protection scheme. At the end of the inspection period the licensee was continuing to evaluate design options in an effort to find a successful modification. This issue is related to the Unresolved Item opened in Section 1R15.1.b.3 of this inspection report.

This review constituted one in-depth problem identification and resolution sample as defined in IP 71152-05. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

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

.1 (Closed)(Withdrawal) 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

This Licensee Event Report (LER) was initially reported on October 25, 2010, and was reviewed by the inspectors in Section 4OA3 of Inspection Report 05000456/2011002; 05000457/2011002. Specifically, due to monitoring an incorrect flow instrument during valve adjustments, the licensee operated the essential service water system outside of its analyzed design. Subsequent analysis and flow modeling provided additional information which revealed that, while low essential service water flow would have been provided to multiple pieces of safety-related equipment, sufficient essential service water flow would have been provided to allow safety-related equipment to perform its safety function. Therefore, the licensee withdrew this LER.

Documents reviewed are listed in the Attachment. This LER is closed. This event followup review constituted one sample as defined in IP 71153-05.

.2 (Closed) Licensee Event Report 05000456/2011-001-00, Through Wall Crack on 1A Safety Injection Pump Discharge Line Due to Outside Diameter (Transgranular) Stress Corrosion Cracking Initiated at External Diameter of Pipe

This LER, which was reported on April 6, 2011, documented pressure boundary leakage due to stress corrosion cracking on the discharge piping of the 1A safety injection pump. The leakage was identified through observation of boric acid residue on February 25, 2011. The licensee declared the 1A safety injection train inoperable and entered the 7-day allowed outage time (AOT) in accordance with TS 3.5.2. The line was repaired and returned to service within the AOT. However, it was unknown when the pressure boundary leakage began and, thus, it may have existed for greater than the TS required 7-day AOT. As a result, the licensee conservatively submitted this LER in accordance

with 10 CFR 50.73(a)(2)(i)(B). Because the duration of the condition was not known and because the licensee entered the applicable TS AOT upon discovery, the inspectors did not identify a violation of regulatory requirements.

Documents reviewed are listed in the Attachment. This LER is closed. This event followup review constituted one sample as defined in IP 71153-05.

.3 (Closed) Licensee Event Report 05000456/2011-004-00; 05000457/2011-004-00, Historic Input Errors Identified in High Energy Line Break Analyses for Turbine Building Resulted in Potential Unanalyzed Condition

This LER, which was reported on December 22, 2011, documented potential consequences of identified non-conservatisms in the licensee's turbine building HELB analyses. The inspectors have previously reviewed other aspects of the non-conservative turbine building HELB analyses as documented in Section 1R15.1.b.2 of Braidwood Inspection Report 05000456/2011004; 05000457/2011004, and Sections 1R15.1.b, 1R15.2, and 4OA7 of Braidwood Inspection Report 05000456/2011005; 05000457/2011005.

This LER specifically documented instances where the roll-up doors to the Division 11 and Division 21 MEER rooms, which constituted turbine building HELB barriers, were opened for up to 18 minutes. Because the roll-up doors could not close fast enough upon a turbine building HELB to ensure protection of equipment in the MEER rooms, Instrument Busses 111 and 113, which were both part of ESF Division 11, and Instrument Busses 211 and 213, which were both part of ESF Division 21, were rendered inoperable during the time the roll-up doors were open. This resulted in two independent channels in a single system being rendered inoperable, which was reportable per 10 CFR 50.73(a)(2)(vii).

The inspectors previously documented a licensee-identified violation of the technical issue discussed in this LER in Section 4OA7 of Braidwood Inspection Report 05000456/2011005; 05000457/2011005. Documents reviewed are listed in the Attachment. This LER is closed.

This event followup review constituted one sample as defined in IP 71153-05.

4OA5 Other Activities

.1 World Association of Nuclear Operators Plant Assessment Report Review

a. Inspection Scope

The inspectors reviewed the results of a World Association of Nuclear Operators (WANO) evaluation and inspection completed on December 6, 2011. The inspection and evaluation activities did not identify any additional safety-significant or risk-significant issues not previously identified by the NRC or the licensee.

b. Findings

No findings were identified.

.2 Temporary Instruction 2515/182 - Review of the Industry Initiative to Control Degradation of Underground Piping and Tanks

a. Inspection Scope

Leakage from buried and underground piping has resulted in ground water contamination incidents with associated heightened NRC and public interest. The industry issued a guidance document, NEI 09-14, "Guideline for the Management of Buried Piping Integrity," (ADAMS Accession No. ML1030901420) to describe the goals and required actions (commitments made by the licensee) resulting from this underground piping and tank initiative. On December 31, 2010, NEI issued Revision 1 to NEI 09-14, "Guidance for the Management of Underground Piping and Tank Integrity," (ADAMS Accession No. ML110700122), with an expanded scope of components which included underground piping that was not in direct contact with the soil and underground tanks. On November 17, 2011, the NRC issued Temporary Instruction (TI) 2515/182, "Review of the Industry Initiative to Control Degradation of Underground Piping and Tanks," to gather information related to the industry's implementation of this initiative.

The inspectors reviewed the licensee's programs for buried piping, underground piping and tanks in accordance with TI 2515/182 to determine if the program attributes and completion dates identified in Sections 3.3 A and 3.3 B of NEI 09-14, Revision 1, were contained in the licensee's program and implementing procedures. For the buried piping and underground piping program attributes with completion dates that had passed, the inspectors reviewed records to determine if the attribute was, in fact, complete and to determine if the attribute was accomplished in a manner which reflected good or poor practices in program management.

Based upon the scope of the review described above, Phase I of TI-2515/182 was completed.

b. Observations

The licensee's buried piping and underground piping and tanks program was inspected in accordance with paragraphs 03.01.a through 03.01.c of TI-2515/182 and was found to meet all applicable aspects of NEI 09-14, Revision 1, as set forth in Table 1 of the TI.

c. Findings

No findings were identified.

.3 (Update) Verification of Margin-to-Overfill Backfit Corrective Actions and Extent of Condition Review: (VIOLATION 05000456/2011010-01; 05000457/2011010-01, Restoring Compliance with Respect to Single Failures)

On February 1, 2011, the NRC issued IR 05000456/2011009; 05000457/2011009, and notified the licensee of the agency's decision to issue a compliance backfit in order to address the Steam Generator Tube Rupture (SGTR) Margin-to-Overfill (MTO) issue documented in URI 05000456/2011009-01; 05000457/2011009-01. The report listed the licensee's initial corrective actions and requested the licensee provide a written response within 30 days of their assessment of the issue and a description of their

intended actions to address the non-compliance, including a proposed schedule to complete those actions and an assessment of the extent of condition of this issue.

As documented in IR 05000456/2011010; 05000457/2011010, the licensee responded by letter dated March 2, 2011, and committed to the following:

1. The power supplies to the Steam Generators' Power-Operated Relief Valves (PORVs) will be modified with a safety-related battery backup.
2. The licensee will issue a supplement to their March 2, 2011, response letter, in order to communicate any revisions to the modification installation schedule based on the online/outage determination.
3. An extent of condition review will be conducted of other transients and accidents outlined in Chapter 15 of the Braidwood UFSAR to identify similar discrepancies with respect to the inappropriate reliance or assumption of single active failure. The identified discrepancies, if any, would be resolved within the CAP and communicated to the NRC Region III Regional Administrator.

The technical issue was considered open pending completion of the corrective actions.

During this inspection, the inspectors reviewed the licensee's extent of condition review, UFSAR Chapter 15 accident analysis and Reactor Protection System (RPS) description, logic diagrams, and schematic and wiring drawings. The inspectors determined the extent of condition was adequately scoped and involved a multi-discipline review. Concerns identified during the effort were entered into the CAP. No additional single failure vulnerabilities were identified. The inspectors had no concerns with the extent of condition review. The inspectors also performed an independent review of the RPS system because the term, "single active failure" was used several times in the UFSAR and other licensing documents. The inspectors did not identify any concerns with single failure vulnerabilities during this review.

Based on the above review, the inspectors concluded the licensee's extent of condition review appeared to be adequate. This issue will remain open pending verification that the proposed PORV power supply modifications were successfully completed (VIO 05000456/2011010-01; 05000457/2011010-01, Restoring Compliance with Respect to Single Failures).

Documents reviewed are listed in the Attachment.

#### 4OA6 Management Meetings

##### .1 Exit Meeting Summary

On April 4, 2012, the inspectors presented the inspection results to the Plant Manager, Mr. M. Kanavos, and other members of the licensee's staff. The licensee acknowledged the issues presented. The inspectors confirmed that none of the potential report input discussed was considered proprietary.

.2 Interim Exit Meetings

Interim exits were conducted for:

- The results of TI 2515/182, "Review of the Industry Initiative to Control Degradation of Underground Piping and Tanks," with the Site Vice President, Mr. Dan Enright, and other members of the licensee's staff on February 29, 2012; and
- The results of the Verification of Margin-to-Overfill Backfit Corrective Actions and Extent of Condition Review with Mr. Dan Enright and other members of the licensee's staff on April 13, 2012.

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

ATTACHMENT: SUPPLEMENTAL INFORMATION

## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### Licensee

D. Enright, Site Vice President  
M. Kanavos, Plant Manager  
P. Boyle, Maintenance Director  
A. Ferko, Engineering Director  
B. Finlay, Security Manager  
J. Gerrity, Emergency Preparedness Manager  
M. Kramer, Business Manager  
R. Leasure, Radiation Protection Manager  
M. Marchionda-Palmer, Operations Director  
J. Odeen, Project Management Manager  
D. Palmer, Radiation Protection Superintendent  
J. Rappeport, Chemistry Manager  
D. Stiles, Operations Training Manager  
M. Trusheim, Outage Manager  
C. VanDenburg, Regulatory Assurance Manager  
R. Radulovich, Acting Regulatory Assurance Manager

#### Nuclear Regulatory Commission

E. Duncan, Chief, Reactor Projects Branch 3

## LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

### Opened and Closed

05000456/2012002-01 05000457/2012002-01	NCV	Failure to Maintain Approved Fire Protection Program Regarding Safe Shutdown Fire Damper Qualification (Section 1R05.1.b)
05000456/2012002-02 05000457/2012002-02	NCV	Failure to Promptly Correct Conditions Adverse to Quality (Section 1R06.1.b)
05000456/2012002-03 05000457/2012002-03	NCV	Failure to Scope Safety-Related HELB Barriers Into the Maintenance Rule (Section 1R12.1.b.1)
05000456/2012002-05 05000457/2012002-05	NCV	Incorrect Classification of Environmental Qualification Zones (Section 1R15.1.b.1)

### Opened

05000456/2012002-04 05000457/2012002-04	URI	Maintenance Rule Performance Monitoring of HELB Dampers (Section 1R12.1.b.2)
05000456/2012002-06 05000457/2012002-06	URI	Inadequate Safety-Related 4kV Undervoltage Protection (Section 1R15.1.b.2)

### Closed

05000456/2011004-02 05000457/2011004-02	URI	Use of Mesh Strainer Bags in Auxiliary Building Floor Drains (Section 1R06.1.b)
05000457/2010-004-00	LER	Unplanned Limiting Condition for Operation Entry Due to Low Header Pressure on the 2B Essential Service Water Pump (Section 4OA3.1)
05000456/2011-001-00	LER	Through Wall Crack on 1A Safety Injection Pump Discharge Line Due to Outside Diameter (Transgranular) Stress Corrosion Cracking Initiated at External Diameter of Pipe (Section 4OA3.2)
05000456/2011-004-00 05000457/2011-004-00	LER	Historic Input Errors Identified in High Energy Line Break Analyses for Turbine Building Results in Potential Unanalyzed Condition (Section 4OA3.3)

### Discussed

05000456/2011010-01; 05000457/2011010-01	VIO	Restoring Compliance with Respect to Single Failures (4OA5.3)
---	-----	---

## 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 1325467; NRC Question Regarding Loss of Single SAT Phase; February 10, 2012
- IR 13207418; Shift Staffing Below BwAP 320-1 Desired Staffing; February 14, 2012
- IR 1330245; Issues Encountered During 2B DG Speed Module Replacement; February 22, 2012
- IR 1330432; Nuclear Radwaste Meeting Action; February 22, 2012
- IR 1331376; 2CW097B Trip Leads to Operator Work Around; February 23, 2012
- IR 1332554; U2 Containment Sump Channel Trend Deviations; February 27, 2012
- IR 1332622; Person in Possession of DLR After Nuclear Medicine Test; February 27, 2012
- IR 1332785; Part 21 for Rosemount Model 1154 Series H Transmitters; February 27, 2012
- IR 1332835; North Oil Separator Tritium > 1150 PCI/L; February 27, 2012
- IR 1332901; B.5.B Response Time Fix; February 27, 2012
- IR 1332925; Document Results of A1R16 SSMP Risk Review; February 27, 2012
- IR 1332990; 2PI-OG085 Pegged at Greater Than 30" HG; February 27, 2012
- IR 1333018; Video Capture Not Functioning; February 27, 2012
- IR 1332783; OIO BMRK: TCC Process – Dresden Informal Benchmarking; February 27, 2012
- IR 1333079; 2MS004M Did Not Go Full Open When Demanded; February 27, 2012
- Braidwood 2012 Pre-Exercise Evaluation Report; February 1, 2012
- Nuclear Safety Review Board – Braidwood Station; February 29, 2012
- Operability Evaluation #12-002; Peak Cladding Temperature Concerns; Revision 0
- Braidwood Look Ahead Schedule; 1209HB Train B; Execution Week February 20, 2012; E-3 Schedule; February 1, 2012
- National Weather Service Warning; February 23, 2012
- Exelon's Response to Groups Claim that Water Supply is in Danger; February 14, 2012
- Technical Human Performance Activities; THU Summary #1 for T&S Test Group and SSC; WO 1473777-01 DME Upgrade Line 0104 System 2 Relays

### 1R04Q Equipment Alignment

- IR 1162375; Vibration Concern on 2A DG Attached Lube Oil Pump (2DG01KA-Z); January 13, 2011
- IR 1172963; 2A DG Normal Shutdown Due to Vent Fan Trip on Ionization; February 9, 2011
- IR 1172998; 2A DG JW Lower Cooler Leaking – 2DG01KA-X2 (SX); February 9, 2011
- IR 1178655; Replace JW Couplings to Turbocharger 2A DG; February 18, 2011
- IR 1292337; Piping Between 2AF006B and 2AF017B Found Not Full; November 18, 2011
- IR 1295760; UT Identified Void in 2B AF PP SX Suction Piping; November 29, 2011
- IR 1296819; SX/AF Suction Void; December 1, 2011
- IR 1307393; U2 RWST Vent Path Temp is 50F; December 28, 2011
- IR 1337021; NRC and IEMA Identified Error in BwOP DG-M4; March 6, 2012
- IR 1311380; NRC and IEMA Report of Discrepancies; January 9, 2012
- BOP AF-3; Byron Units 1&2 Filling and Venting the Auxiliary Feedwater System; Revision 4
- BwOP DG-1; Diesel Generator Alignment to Standby Condition; Revision 29

- BwOP DG-M4; Operating Mechanical Lineup Unit 2 2B DG; Revision 15
- BwOP RH-M2; Operating Mechanical Lineup Unit 1B Train; Revision 8
- 2BwOSR 3.6.3.5.AF-1A; Train A Auxiliary Feedwater Valve Stroke Surveillance; Revision 12
- 2BwOSR 5.5.8.AF-2A; Train A Auxiliary Feedwater Valves Indication Test Surveillance; Revision 8
- EC 383229; Fill Empty Pipe Between 1AF006A and 1AF017A, Close Drain Valve 1AF018A, and Throttle Open Vent Valve 1AF030A; February 14, 2011
- EC 383308; Op Eval 11-003, Small Voids in 2A & 2B SX to AF Suction Piping; February 21, 2011
- OP-AA-102-104; 1B./2B AF PP SX Suction Piping; Revision 1
- Braidwood Plan of the Day; December 27, 2011
- Drawing M2548A; Waste Disposal El. 393' Byron Unit 1 & 2; June 4, 1984

#### 1R04S Equipment Alignment

- BwOP AP-E1; Electrical Lineup - Unit 1 Operating Lineup for the 6900V Busses; Revision 2E1
- BwOP AP-E2; Electrical Lineup - Unit 1 Operating Lineup for the Safety-Related 4160V Busses, 480V Switchgear Busses, and 480V MCCs; Revision 3E2
- BwOP AP-E3; Electrical Lineup - Unit 1 Operating Lineup for the Nonsafety-Related 4160V Busses, 480V Switchgear Busses, and 480V MCCs; Revision 15
- BwOP AP-E4; Electrical Lineup - Unit 1 Operational Lineup for the System Auxiliary Transformer Cooling System; Revision 3
- BwOP AP-E5; Electrical Lineup - Unit 1 Operating Lineup for the 480V Switchgear Busses and 480V MCCs Powered from Unit 1 or Unit 2; Revision 8

#### 1R05 Fire Protection

- IR 1309949; NRC Identified Pre-Fire Plan Deficiency – Dampers; January 4, 2012
- UFSAR Section 2.3.5.9; Unit 1 Auxiliary Electrical Equipment Room (Fire Area 5.5-1); Amendment 24
- CC-AA-211; Fire Protection Program; Revision 4
- BwAP 1110-1; Fire Protection Program System Requirements; Revision 31
- OP-MW-201-007; Fire Protection System Impairment Control; Revision 7
- IN 89-52; Potential Fire Damper Operational Problems; June 8, 1989
- NFPA 90A; Standard for the Installation of Air-Conditioning and Ventilating Systems; 1999 Edition
- NRC & NOS Inquiry – HELB Response (2011) Issue 002-00; Braidwood Stopped Periodic Stroking of Dampers Several Years Ago. Fire Dampers are Credited in HELB Analysis and This Op-Eval, But Their Reliability Has Not Been Periodically Demonstrated; July 20, 2011

#### 1R06 Flooding

- IR 0469055; Unit 1 VA Intake Plenum Needs Attention; March 21, 2006
- IR 0469058; Unit 2 VA Intake Plenum Needs Attention; March 21, 2006
- IR 0501826; Water on Floor in Plenum - Safety Issue; June 20, 2006
- IR 0510737; ½ Inch Deep Water on Floor in Outer Plenum Room; July 18, 2006
- IR 0515170; Water Exiting the VA Plenum and Going to WF Drains; July 31, 2006
- IR 0519023; Lower Cable Spreading Room Floor Drain Plugged; August 11, 2006
- IR 0521586; Water in the U1 and U2 Aux Building VA Supply Fan Rooms; August 18, 2006
- IR 0521770; Condensation From VA WO Coils is Draining to WF; August 18, 2006

- IR 0522177; Work Request to Address Water in U1/U2 VA Supply Fan Rooms; August 21, 2006
- IR 0524249; 439' U2 LCSR Floor Drain Overflowing; August 26, 2006
- IR 0577835; ECR to Address Water in VA Plenums During Summer; January 11, 2007
- IR 0588165; Water Dripping Out of Non-Filtered Vent Piping; February 6, 2007
- IR 0652030; Water Present in U2 LCSR; July 20, 2007
- IR 0657432; U2 LCSR Floor Drains Plugged, Water on Floor, Safety Issue; August 5, 2007
- IR 1057855; Floor Drains Undersized; April 17, 2010
- IR 1076410; Backed up Floor Drain Causes Water to Enter Elec. Cable Tray; June 3, 2010
- IR 1092727; Excessive Water in VA Plenum - 0VA01AB; July 20, 2010
- IR 1113423; Remove Non-Documented Berms from VA Supply Plenums; June 3, 2010
- IR 1230829; Water in VA Inlet Plenum Following Storm; June 20, 2011
- IR 1249503; Ops - Aux Building Floor Drain Overflowing; August 9, 2011
- IR 1259300; Area Evaluation Required After Water Exposure; September 4, 2011
- IR 1260053; Clogged Floor Drain Basket in 0VA01CC/CD Supply Plenum; September 7, 2011
- IR 1263296; Need to Repair Floor Penetrations in Unit 1 VA Supply Plenum; September 14, 2011
- IR 1263297; Need to Repair Floor Penetrations in Unit 2 VA Supply Plenum; September 14, 2011
- IR 1264201; Incorrect Floor Drains Classification in BwMS 3350-009A2; September 14, 2011
- IR 1290617; Inaccuracies in Flood Level Calculation for Flood Zone G9-1; November 14, 2011
- IR 1317929; Unevaluated T-Drain Installed on 1SX005 Limit Switch Housing; January 25, 2012
- IR 1334544; Drains No Longer Labeled in VA Supply Plenum; March 1, 2012
- WO 00907365; MM-Improve Material Condition of Unit 2 VA Intake Plenum; September 30, 2011
- WO 01043396; CDBI-Basket Strainers May Adversely Affect Some Floor Drains; March 19, 2010
- WO 01045973; MM-Need to Apply Coating Inside Plenum During Winter Months; July 2, 2007
- WO 01076410; Backed Up Floor Drain Causes Water to Enter Elec. Cable Tray; Jun 25, 2020
- BwMS 3350-009; Auxiliary Building Floor Drain Strainer Basket Surveillance; Revision 9
- BwMS 3350-009A1; Critical Floor Drain Strainer Basket Locations; Revision 4
- 0BwOS TW-W1; Emergency Eyewash and Shower Functional Surveillance; Revision 23
- LS-AA-125-1003; Extent of Condition/Extent of Cause; Revision 10
- Sargent & Lundy Calc. No. 3C8-0685-002; Auxiliary Building Flood Level Calculations; Revision 3
- Sargent & Lundy Calc. No. 3C8-1281-001; Auxiliary Building Flood Level Calculations; Revision 3
- Drawing M-72; Diagram of Station Heating System Auxiliary & Fuel Handling Buildings Units 1 & 2; December 19, 1977
- Drawing M-95; Auxiliary Building System (VA) Diagram; November 15, 1977
- Drawing A270; Auxiliary Building Main Floor Plan El. 451' Area 5; April 26, 1977
- Drawing A-271; Auxiliary Building Main Floor Plan Area 6 Units 1 & 2; February 18, 1977
- Drawing A-272; Auxiliary Building Main Floor Plan El. 451'; November 26, 1985
- Drawing M-551; Aux. Bldg El. 401' & 426' Non Essential Service Water System; July 12, 2011
- Drawing M1317; Auxiliary Building HVAC Equipment Room Plan El. 451'; August 8, 1978
- Drawing M1328; Auxiliary Building Plenum Sections & Details; Revision F
- Drawing M-1382; Containment Purge Vent System Equipment Room Area 7 Plan El. 467'; Revision AJ

- M1384; Containment Purge Vent. System Equip. Rm. El. 451'; Revision AS
- Braidwood Station Regulatory Assurance Weekly Report; November 9, 2011

#### 1R11 Licensed Operator Requalification Program

- LORT; Outage DLA for SOER 09-1, Scenario 1227DLA; February 21, 2012

#### 1R12 Maintenance Effectiveness

- IR 1309949; NRC Identified Pre-Fire Plan Deficiency – Dampers; January 4, 2012
- IR 1313605; Need TRP and Calibrate Unit 2 RWST Temp Controller 2HT124EA; January 14, 2012
- IR 1313924; Obsolete Temperature Indicating Controller (Thermon); January 16, 2012
- IR 1314505; Calibration Results of U2 RWST Temp Controller 2HT124EA; January 17, 2012
- IR 1314934; 4.0 Critique For Entry Into Tech Spec Shutdown Action; January 18, 2012
- IR 1314951; VA Access Door Interference with New MOV Installation Per EC; January 12, 2012
- IR 1316492; Wrong Revision on Mode 4 Rounds for U2 RWST Changes; January 22, 2012
- IR 1326237; Maintenance Rule Monitoring for HELB Function; February 13, 2012
- EC 387316; Technical Evaluation for Temporarily Installing Heat Wraps on U2 RWST Vent Line 2VF81A-6; Revision 001
- BwAP 1110-1; Fire Protection Program System Requirements; Revision 31
- 1BwOA ELEC-2; Loss of Instrument Bus Unit 1; Revision 105
- BwOP IS-5; Security and Technical Support Center (TSC) Diesel Generator Automatic Startup/Shutdown, Emergency Operation and Normal Power Restoration; Revision 9
- 2BwOS 3.3.1.2-1; Unit Two Power Range High Flux Setpoint Daily Channel Calibration (Computer Calorimetric); Revision 13
- CC-AA-103-2001; Appendix B, Exelon Position on the Inclusion of Instrument Accuracy in Technical Specification Surveillance Acceptance Criteria; Revision 3
- CC-AA-211; Fire Protection Program; Revision 4
- OP-MW-201-007; Fire Protection System Impairment Control; Revision 7
- IN 89-52; Potential Fire Damper Operational Problems; June 8, 1989
- NFPA 90A; Standard for the Installation of Air-Conditioning and Ventilating Systems; 1999 Edition
- NRC & NOS Inquiry – HELB Response (2011) Issue 002-00; Braidwood Stopped Periodic Stroking of Dampers Several Years Ago. Fire Dampers are Credited in HELB Analysis and This Op-Eval, But Their Reliability Has Not Been Periodically Demonstrated; July 20, 2011
- BRW Scoping and Risk Significance; FP-05; Provide Active (Fire Damper) Fire Isolation Functions
- Calculation No. HVAC-40; Evaluation of Ruskin Fire Dampers to Close Under Air Flow; March 19, 1987
- NUMARC 93-01; Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants; April 1996
- Regulatory Guide 1.160; Monitoring the Effectiveness of Maintenance at Nuclear Power Plants; Revision 2; March 1997
- NES-EIC-20.04; Analysis of Instrument Channel Setpoint Error and Instrument Loop Accuracy; Revision 4
- Instruction for Installation of 10" Diameter Heated Pipe Wraps - Power Blankets; January 18, 2012
- NRC Letter to ComEd; Enforcement Discretion on Braidwood Unit 2 RWST Vent Temperature Requirements; December 26, 1989

- ComEd Letter to NRC RIII; Conformation of Enforcement Discretion TS 3/4.5.4 - RWST; December 23, 1989

#### 1R13 Maintenance Risk Assessments and Emergent Work Control

- IR 1317513; NRC Concern Regarding Protected Equipment Postings; January 24, 2012
- IR 1323491; NRC and IEMA Report of Discrepancies; February 6, 2012
- IR 1332464; 0BWOA Env-1 Enhancements; February 26, 2012;
- IR 1337210; Unit 2 Online Risk Orange Due to High Winds and DG OOS; March 6, 2012
- IR 1337316; Entered 0BWOA ENV-1, 1BWOA ENV-1, and 2BWOA ENV-1; March 6, 2012
- BwOP AF-M2; Operating Mechanical Lineup, Auxiliary Feedwater, Unit 2; Revision 14
- BwOP DG-E4; Electrical Lineup – Unit 2B Diesel Generator; Revision 7
- BwOP SY-11; Removing a 345KV Bus From Service; Revision 17
- OP-AA-108-117; Protected Equipment Program; Revision 2
- 1B SX WPump Work Window - February 2012
- SPOG: 5-4; Operating Steps to Reduce the Impact of Geomagnetic Disturbances; April 15, 2010; Revision 2
- 2DG01KA OOS - March 2012; Additional Protected Equipment Due to 0/1/2BWOA ENV-1 Entry - March 6, 2012
- ER-AA-600-1042; Online Risk Management; Revision 7
- Unit 0 HX Unavailable - 2/12; U0 CC HX Work Window Safety System Status Yellow
- 1B RH Pump Work Window - January 2012; Major Activities 1RH01PB

#### 1R15 Operability Evaluations

- IR 1185022; Generic Letter 96-06 Analyses Non-Conservatism
- IR 1257969; Calculations Use AOVS as a Relief Valve; October 27, 1999
- IR 1288474, Potential Green NCV - Classification of EQ Zones from HELB
- IR 1302586; Non-Conservative Setpoints Found for TRM Rad Monitors; December 14, 2011
- IR 1303890; Difference ID Between BRW and BYR ODCM Vent Release Limits; December 16, 2011
- IR 1309959; Non-Conservative Gaseous Effluent Rad Monitor Setpoints; January 5, 2012
- IR 1313009; 2VP01AC, Evidence of Boric Acid Residues Inside; January 12, 2012
- IR 1316027; 2VP01AD (Suspect Substance Identified in Unit and on Coils); January 20, 2012
- IR 1318646; A1R16 (1VP01AC) Remove Additional Covers for BACC Inspection; January 26, 2012
- IR 1319824; Documentation of NRC Questions Regarding IR 1257969; January 13, 2012
- IR 1322584; If Nonconforming Condition Does Exist Related to IR 1257969 & 13122584, Determine Whether Any of Actions Require CAs Vice ACITs; February 17, 2012
- IR 1325467; NRC Question Regarding Loss of Single SAT Phase; February 10, 2012
- IR 1322584; Determine if IR1257969 Identified a Non-conforming Condition; February 2, 2012
- IR 1328107; NRC Request Related to Thermal Conductivity Degradation; February 16, 2012
- IR 1328474; Insufficient Information to Perform Op Eval; February 17, 2012
- IR 1328475; Request QHPI for Failure to Request Op Eval; December 14, 2011
- IR 1329443; Fuel Thermal Conductivity Impact on Non-LB LOCA Accidents; February 20, 2012
- IR 1329971; Extension Request for Op Eval 1328107; February 21, 2012
- IR 1330258; U2 S/U FW Pump is Accumulating Unavailability Due to CV Sys; February 22, 2012
- IR 1330308; Create WO to Process MPC 32-243; February 22, 2012
- IR 1330432; Nuclear Radwaste Meeting Action; February 22, 2012

- IR 1330438; Scheduled Training Not Supported Adequately; February 22, 2012
- IR 1330439; Visual Inspection Verbiage in BwMS 3350-002 is Contradictory; February 22, 2012
- IR 1330482; Safety: First Aid Event at Braidwood Station; February 22, 2012
- IR 1330532; EP Pre-Exercise Exercise Mgmt & Control Issues; February 1, 2012
- IR 1330534; EP Pre-Exercise Facilities & Equip Issues; February 1, 2012
- IR 1330537; EP Pre-Exercise Procedure Quality Issues; February 1, 2012
- IR 1330539; EP Pre-Exercise TSC Performance Issues; February 1, 2012
- IR 1330542; EP Pre-Exercise OSC Performance Issues; February 1, 2012
- IR 1330553; Erratic Indications During 2B Diesel Generator Start; February 22, 2012
- IR 1330653; Found Sealtite Damaged on 2WO006A; February 22, 2012
- IR 1330665; OPS ID: 2RE9163 "Closed" Indication Socket Bad; February 23, 2012
- IR 1330697; Flexible Conduit is Broken; February 22, 2012
- IR 1330740; Adverse Trend in EMD Daily Schedule Adherence; February 23, 2012
- IR 1330747; NOS ID Housekeeping Issue 426' Aux; February 22, 2012
- BwAP 335-1T1; Shift Manager Turnover; Revision 11
- Generic Letter 96-06; Assurance of Equipment Operability and Containment Integrity During Design-Basis Accident Conditions; September 30, 1996
- Generic Letter 96-06, Supplement 1; Assurance of Equipment Operability and Containment Integrity During Design-Basis Accident Conditions; November 13, 1997
- EC 383610; Generic Letter 96-06 Analyses Non-Conservatisms; Revision 1
- EC 387607; Evaluation the Impact of Additional Delay in ECCS, AFW, RCFC and Containment Spray Actuation for Byron/Braidwood Unit 1 & 2; February 7, 2012
- EC 387612; Accident Analysis Allowed Delays Due to Compensatory Actions for Imbalanced Voltage Issue in Switchyard LOCA M&E, SLB M&E; February 5, 2012
- OpEval 11-006, Turbine Building HELB Analysis Input Errors
- OpEval #12-002; Peak Cladding Temperature Concerns; Revision 0
- OP-AA-102-104; Degraded Voltage Compensatory Actions; Revision 1
- OP-AA-108-115; Operability Determinations (CM-1); Revision 0
- OP-AA-108-115; Operability Determinations (CM-1); Revision 10
- OP-AA-108-115; Operability Evaluation 12-001; Attachment 1; Potential Design Vulnerability in Switchyard Single Open Phase Detection; IR#: 1322211, 1322804; Revision 90
- EC 385208, Susceptibility of Safety-Related Equipment and Components in the Following Locations to a Postulated High Energy Line Break (HELB)
- Engineering Training Certification Guide for N-AN-ENG-CERT-SM08 Operability Evaluations; Revision 0
- Westinghouse Proprietary Class 2; Transmittal of LOCA, CRA, and TA Analyses in Support of the Byron 2 Startup; February 4, 2012
- Westinghouse Proprietary Class 2; Delays in ESF Response with Regard to Design Basis SBLOCA Transient for Byron/Braidwood Units 1 and 2; February 4, 2012
- Westinghouse Proprietary Class 2; Emergency Exelon Assessment for Byron/Braidwood Units 1 & 2 – Steam Line Break Mass & Energy Releases and Containment/Compartment Responses; February 4, 2012
- On-Shift Excellence Training Operability Determinations; Revision I
- Byron/Braidwood UFSAR; 3.1, 3.2, 3.5, and 8.3
- NRR Letter to Exelon; Braidwood Unit 2 and Byron Unit 2 Information Request Pursuant to 50.54(f) Related to the Estimated Effect on Peak Cladding Temperature Resulting from Thermal Conductivity Degradation in the Westinghouse Furnished Realistic Emergency Core Cooling System Evaluation; February 16, 2012

- NRC Letter to Kewaunee NPP; Completion of Licensing Action for GL 96-06, "Assurance of Equipment Operability and Containment Integrity During Design-Basis Accident Conditions"; September 22, 2004
- ComEd Letter to NRC; Supplemental Information Regarding a Request for Additional Information Related to NRC GL 96-06; October 27, 1999
- NRC Letter to Virginia Electric and Power Company; Closeout for GL 96-06, "Assurance of Equipment Operability and Containment Integrity During Design-Basis Accident Conditions," North Anna Power Station, Units 1 & 2 and Surry Power Station, Units 1&2; September 13, 2000
- Niagara Mohawk Letter to NRC; LER 96-13, Supplement 2; Potential Over-Pressurization of Containment Penetrations Due to Thermal Expansion; June 28, 2000
- Duke Power Company Letter to NRC; McGuire Nuclear Station Units 1&2 Third Ten-Year Inservice Testing Interval IST Program, Revision 27; August 12, 2004
- Ginna Station Inservice Testing Program; Cold Shutdown Justification - CS-08; Revision 0
- Kewaunee NPP Inservice Testing Program; Refueling Outage Test Justification - ROJ-01; Revision DRAFT
- Drawing M-64; Diagram of Chemical & Volume Control & Boron Thermal Regeneration Unit 1; Sheets 3B & 5

#### 1R18 Permanent and Temporary Plant Modifications

- IR 1344834; QV Reject Nonconforming Safety-Related Welds; March 23, 2012
- EC 380047; SFTR Margin to Overfill (SGTR MTO) - PORV UPS Mod Main Steam System 1MS018J(C&D); Revision 000
- EC384564; SX Safety-Related Makeup to the CC System - Unit 2; Revision 000

#### 1R19 Post-Maintenance Testing

- IR 1318104; 1RH611 Declutch Lever PMT Failure; January 25, 2012
- IR 1323889; 1A SI Pump Motor Space Heater Breaker Would Not Close; February 7, 2012
- IR 1325095; 1CS009A Control Power Fuse Blown; February 10, 2012
- IR 1325533; 1CS040A Limit Switch Prevents Test Start of 1A CS Pump; February 10, 2012
- IR 1330553; Erratic Indications During 2B DG Start; February 22, 2012
- IR 1338991; High D/P 2A DG Room Supply Fan - 2PDS-VD044; March 9, 2012
- IR 1339036; DG - Abnormal Indications Noted During Functional Testing; March 9, 2012
- IR 1339092; Current Stroke for 2A DG Outside Air Intake Dampers; March 9, 2012
- IR 1339272; 9R Cylinder Appears to have Intake Valve Leak; March 10, 2012
- IR 1339529; 4DPM SX Leak From DG 2A Lower Jacket Water Cooler; March 11, 2012
- IR 1339572; LaSalle Outage Learnings; March 12, 2012
- IR 1339891; 2A DG 9R Cylinder with Excessive Lifter Noise; March 12, 2012
- IR 1339992; 2A DG Annunciator Power Supply Humming Noise; March 12, 2012
- IR 1340004; 2A DG Tripped Due to a Turbo Lube Oil Pressure Alarm; March 12, 2012
- IR 1340016; AMOT 2DG5218A Source of Air Leak on 2A DG; March 12, 2012
- IR 1340051; Regulator 2DG5231A Does Not Function; March 13, 2012
- IR 1340078; 2A DG Shutdown Sequence Too Short; March 13, 2012
- IR 1340647; 2A DG Turbo Charger Inlet Temp Spiking; March 13, 2012
- WO 1488905 01; IST – 1RH01PB ASME Group A Test & CC-1SI8958B; January 25, 2012
- WO 1495890 01; IST - For 1CS003A/11A-U1 ASME Surveillance Requirements for 1CS01PA & Check Valve; February 3, 2012
- BwOP SI-1; Safety Injection System Startup; Revision 21

- 1BwOSR 5.5.8.CS-3A; Comprehensive Full Flow Test for 1A Containment Spray Pump (1CS01PA) and Check Valves 1CS003A, 1CS011A; Revision 9
- 2BwOSR 3.8.1.2-2; 2B DG Operability Surveillance; Revision 30

#### 1R22 Surveillance Testing

- 1BwOS TRM 3.3.g.3; Turbine Overspeed Protection Systems Valve Stem Freedom Checks (RV-IV Cycling); Revision 17
- 1BwOSR 3.3.5.1-2; Bus 142 Undervoltage Protection Monthly Surveillance; Revision 2
- 1BwOSR 3.8.1.2-2; 1B Diesel Generator Operability Surveillance; Revision 31
- 1BwOSR 5.5.8 CS3-A, Comprehensive Full Flow Test for 1A Containment Spray Pump (1CS01PA) and Check Valve 1CS003A, 1CS011A, Revision 009
- 1BwOS TRM 3.3.g.3; Unit One Turbine Overspeed Protection Systems Valve Stem Freedom Checks (RV-IV Cycling); Revision 17

#### 1EP6 Drill Evaluation

Braidwood 2012 Pre-Exercise Report; CR/SIM, TSC, OSC, EOF, JIC, FMT, NDO; February 1, 2012

EP-MW-11R-100-F-01; Nuclear Accident Reporting System Form; Revision F

#### 4OA1 Performance Indicator Verification

- Licensee PI Submittals
- CAP Database

#### 4OA2 Identification and Resolutions of Problems

- IR 1308438; WEC Secured to Support Supervisor Illness; January 1, 2012
- IR 1308502; Recurring Reactor Services Outage Activities from RCR 263845; January 2, 2012
- IR 1308569; Unplanned LCO 1SD002C Failed Operability Time Stroke Closed; January 2, 2012
- IR 1308577; Unplanned LCO 1SD002E Failed to Indicate Closed; January 2, 2012
- IR 1308580; OPS Identified – Work Areas Staged Beyond Removal Date; January 2, 2012
- IR 1308754; Barrier Arm at Bollards Needed to Raise to Allow Traffic; January 3, 2012
- IR 1308823; Review of OE34965 – Unexpected Battery Capacity Degradation; January 3, 2012
- IR 1309023; IEMA Question Regarding Fire Proofing; January 3, 2012
- IR 1309056; Schedule Adherence; January 3, 2012
- IR 1309100; Day in Plant Observation – Gravel for U2 Transformer Yard; January 3, 2012
- IR 1309166; Recurring ATI: Inventory Unit 1 CAF/Cargo container Area; January 4, 2012
- IR 1309169; Recurring ATI Weekly FLS Observation – Work Package Documentation; January 4, 2012
- IR 1309185; Computer Inverter DC Input Voltage Reading High; January 4, 2012
- IR 1309212; Procedure Changes Requested; January 4, 2012
- IR 1309221; Security Allowed Vehicles to Process Through Bollards; January 4, 2012
- IR 1309225; 2B Circ Water Pump Shaft Guard Problems; January 4, 2012
- IR 1309226; 0VA089YA OC Accessible Plenum Isolation Damper Failed PMT; January 4, 2012
- IR 1309231; No Equipment Deficiency Tags in the Plant; January 4, 2012
- IR 1309235; LSH Housekeeping Not Up to Standards; January 4, 2012

- IR 1309254; Security Individual Loses Badge in OCA; January 4, 2012
- IR 1309959; Non-Conservative Gaseous Effluent Rad Monitor Setpoints; January 5, 2012
- IR 1310075; Heavy Loads Staged on Degraded Trailers; January 5, 2012
- IR 1310078; NOS ID: Maintenance Rule Reviews for DCPS Not Consistent; January 5, 2012
- IR 1310104; December 2011 SX-CC Makeup Modification Installation Delays; January 5, 2012
- IR 1310150; NRC Buried Pipe Inspection Preparation; January 5, 2012
- IR 1310165; OPS Utility Vehicles Need to Be Retired; January 5, 2012
- IR 1310176; ASME/IST Procedures Need Updating for New Vib Meter; January 5, 2012
- IR 1310188; Procedure Enhancement: VT-2S for AF Cross-Tie Piping; January 5, 2012
- IR 1310194; ZMP02C-M: Vibration Analysis; January 5, 2012
- IR 1310210; Project Management Not Notified of Work Shut Down; January 4, 2012
- IR 1310216; Unit 2 Bus Duct Cooling Fan Work Windows; January 4, 2012
- IR 1310232; Recurring ATI – Common Braidwood/Byron Work Control Functions; January 6, 2012
- IR 1310237; Recurring ATI: Collect Data During Weekly DG Run; January 6, 2012
- IR 1310242; Perform Biweekly Review of FME Cabinets; January 6, 2012
- IR 1310149; Process Computer Point/Level Meter Disagree; January 5, 2012
- IR 1310258; WO 01501247-01 Not Performed Per Schedule; January 5, 2012
- IR 1310277; Individual Did Not Notify Security Prior to LSH Entry/Exit; January 5, 2012
- IR 1334277; 4 KV ESF Voltage Setpoint Questions; February 29, 2012
- IR 1338187; LAPP Insulators Located in Braidwood Switchyard; March 8, 2012

#### 4OA3 Followup of Events & Notices of Enforcement Discretion

- IR 1296015; Past Operability Division 11P (HELB) Division 12 Impact; March 16, 2009
- 1BwOA ELEC-2; Loss of Instrument Bus Unit 1; Revision 105
- OP-AA-108-111; Adverse Condition Monitoring and Contingency Plan; Revision 9
- Plant Operations Review Committee; NOED; January 18, 2012

#### 4OA5 Other Activities

- IR 1132531; Sink Hole Near MUDS Building; October 29, 2010
- IR 1331785; Buried Pipe Identified, Not in Program; February 24, 2012
- IR 1059062; Buried Pipe 1CD19A-20" Doesn't Meet 87.5 Percent; April 20, 2010
- IR 1059064; Buried Pipe 2CD19A-20" Doesn't Meet 87.5 Percent; April 20, 2010
- Braidwood Station Buried Piping and Raw Water Program Basis Document; Revision 0
- Buried Pipe Inspection Plan; June 29, 2011
- Buried Pipe and Raw Water Systems Long Term Asset Management Strategy; Revision 4
- Buried Pipe and Raw Water Program Health Report; 4th Quarter 2011
- EC 384417; Justify Deferral of Mitigation Plan for Buried CD Piping; Revision 0.ER-AA-5400; Buried Piping and Raw Water Corrosion Program Guide; Revision 5
- ER-AA-5400-1002; Buried Pipe Examination Guide; Revision 4
- ER-AA-5400-1003; Buried Piping and Raw Water Corrosion Performance Indicators; Revision 4
- NES-MS-15.2; Guidance for Determining Reasonable Assurance for Structural and/or Leakage Integrity for Buried Piping; Revision 0EC 383870; Extent of Condition Review of UFSAR Chapter 15 Accidents Related to Passive Electrical Failures; Revision 0
- 20E-1-4026C; Block Diagram Reactor Trip Protection Part 1; Revision B
- 20E-1-4026D; Block Diagram Reactor Trip Protection Part 2; Revision D
- 20E-1-4029 EF03; Logic Diagram Reactor Protection Part 1 Train A and B; Revision E
- 20E-1-4029 EF04; Logic Diagram Reactor Protection Part 2 Train A and B; Revision D

- 20E-1-4029 EF05; Logic Diagram Reactor Protection Part 3 Train A and B; Revision D
- 20E-1-4029 EF06; Logic Diagram Reactor Protection Part 4 Train A and B; Revision D
- 20E-1-4029 EF07; Logic Diagram Reactor Protection Part 5 Train A and B; Revision A
- 1BwOSR 3.3.1.4-1 Unit 1, Train A, Solid State Protection System Surveillance; Revision 30
- 1BwOSR 3.3.1.4-2 Unit 1, Train B, Solid State Protection System Surveillance; Revision 33
- 20E-1-4030EF01; Schematic Diagram ESF Sequencing and Actuation Cabinet, Unit 1, Train A; Revision V
- 20E-1-4030EF02; Schematic Diagram ESF Sequencing and Actuation Cabinet, Unit 1, Train B; Revision U

## LIST OF ACRONYMS USED

AC	Alternating Current
ADAMS	Agencywide Document Access Management System
AOT	Allowed Outage Time
AS	Action Statement
CAP	Corrective Action Program
CFR	Code of Federal Regulations
CLB	Current Licensing Basis
DC	Direct Current
EDG	Emergency Diesel Generator
ESF	Engineered Safety Feature
ESG	Essential Switchgear
EQ	Environmental Qualifications
°F	Degree Fahrenheit
HELB	High Energy Line Break
IMC	Inspection Manual Chapter
IN	Information Notice
IP	Inspection Procedure
IR	Issue Report
kV	Kilovolt
LCSR	Lower Cable Spreading Room
LER	Licensee Event Report
MEER	Miscellaneous Electrical Equipment Room
MSPI	Mitigating System Performance Index
NCV	Non-Cited Violation
NEI	Nuclear Energy Institute
NRC	U.S. Nuclear Regulatory Commission
PARS	Publicly Available Records System
PI	Performance Indicator
PORV	Power Operated Relief Valve
RCS	Reactor Coolant System
RH	Residual Heat Removal
RPS	Reactor Protection System
SSC	Structure, System, and/or Component
SDP	Significance Determination Process
TI	Temporary Instruction
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
UL	Underwriters Laboratories, Inc.
URI	Unresolved Item
VA	Auxiliary Building Ventilation System
VIO	Violation
WO	Work Order

M. Pacilio

-2-

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records System (PARS) component of NRC's Agencywide Document Access 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 and 50-457  
License Nos. NPF-72 and NPF-77

Enclosure: Inspection Report 05000456/2012002; 05000457/2012002  
w/Attachment: Supplemental Information

cc w/encl: Distribution via ListServ

DOCUMENT NAME: G:\DRPIII\BRAIN\Braidwood 2012 002.docx

Publicly Available     Non-Publicly Available     Sensitive     Non-Sensitive

To receive a copy of this document, indicate in the concurrence box "C" = Copy without attach/encl "E" = Copy with attach/encl "N" = No copy

OFFICE	RIII	RIII	RIII		
NAME	Ng:dtp	Orth*JHeller for Section 1R06.1b	Duncan		
DATE	5/07/12	5/08/12	5/08/12		

**OFFICIAL RECORD COPY**

Letter to M. Pacilio from E. Duncan dated May 8, 2012.

SUBJECT: BRAIDWOOD STATION, UNITS 1 AND 2, NUCLEAR REGULATORY  
COMMISSION INTEGRATED INSPECTION REPORT 05000456/2012002;  
05000457/2012002

DISTRIBUTION:

RidsNrrDorLp3-2 Resource

Shawn Williams

RidsNrrPMBraidwood Resource

RidsNrrDirslrib Resource

Chuck Casto

Cynthia Pederson

Jennifer Uhle

Steven Orth

Jared Heck

Allan Barker

DRPIII

DRSIII

Carole Ariano

Linda Linn

Patricia Buckley

Tammy Tomczak

[ROPreports.Resource@nrc.gov](mailto:ROPreports.Resource@nrc.gov)