



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**

REGION III  
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LISLE, IL 60532-4352

November 13, 2009

Mr. Charles G. Pardee  
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, INTEGRATED INSPECTION  
REPORT 05000456/2009004 AND 05000457/2009004**

Dear Mr. Pardee:

On September 30, 2009, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Braidwood Station, Units 1 and 2. The enclosed inspection report documents the inspection results, which were discussed on October 8, 2009, with Mr. A. Shahkarami, and other members of your staff.

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

Based on the results of this inspection, two NRC-identified and one self-revealed finding of very low safety significance were identified. The findings involved violations of NRC requirements. Additionally, a licensee-identified violation which was determined to be of very low safety significance is listed in this report. Because of the very low safety significances, and because the issues were entered into your corrective action program, the NRC is treating these findings as Non-Cited Violations (NCVs) in accordance with Section VI.A.1 of the NRC Enforcement Policy.

If you contest any NCV, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with copies to the Regional Administrator, U.S. Nuclear Regulatory Commission - Region III, 2443 Warrenville Road, Suite 210, Lisle, IL 60532-4352; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the Resident Inspector Office at the Braidwood Station. In addition, if you disagree with the characterization of any finding in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region III, and the Resident Inspector at the Braidwood Station. The information that you provide will be considered in accordance with Inspection Manual Chapter 0305.

C. Pardee

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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 (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Website at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

***/RA/***

Richard A. Skokowski, Chief  
Branch 3  
Division of Reactor Projects

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

Enclosure: Inspection Report 05000456/2009004; 05000457/2009004  
w/Attachment: Supplemental Information

cc w/encl: Distribution via ListServ

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Nos: 05000456; 05000457  
License Nos: NPF-72; NPF-77

Report No: 05000456/2009004 and 05000457/2009004

Licensee: Exelon Generation Company, LLC

Facility: Braidwood Station, Units 1 and 2

Location: Braceville, IL

Dates: July 1, 2009, through September 30, 2009

Inspectors: B. Dickson, Senior Resident Inspector  
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Observers: J. Gall, Nuclear Safety Professional Development Program

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Division of Reactor Projects

Enclosure

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## SUMMARY OF FINDINGS

IR 05000456/2009004, 05000457/2009004; 07/01/2009 - 09/30/2009; Braidwood Station, Units 1 & 2; Fire Protection; Maintenance Risk Assessments and Emergent Work Control.

This report covers a 3-month period of inspection by resident inspectors and announced baseline inspections by regional inspectors. Two Green findings were identified by the inspectors and one Green finding was self-revealed. 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). Cross-cutting aspects were determined using IMC 0305, "Operating Reactor Assessment Program." 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: Initiating Events**

- Green: The inspectors identified a NCV of Braidwood Operating License Condition 2.E, "Fire Protection Program," for the licensee's failure to take adequate compensatory measures following the failure of electronic supervision of a fire door. Specifically, when continuous electronic supervision of a fire door in an area with gaseous fire suppression failed, the licensee did not establish an hourly fire watch as required by Procedure BwAP 1110-1, "Fire Protection Program System Requirements." The inspectors determined that the licensee failed to take procedurally required compensatory measures for the loss of electronic fire door monitoring. Upon notification of these requirements by the inspectors, the licensee restored power to the system and entered the issue into the CAP as Issue Report (IR) 945777.

The inspectors determined the finding is more than minor because it is associated with the external events (fire) attribute of the Mitigating Systems Cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The inspectors determined the finding category was Fire Prevention and Administrative Controls and assigned a low degradation rating. Therefore, the finding screened as of very low safety significance. The cause of the finding is related to the work practices attribute of the cross-cutting element of Human Performance (H.4(b)). Specifically, procedures were in place that directed the appropriate compensatory measures for the loss of electronic monitoring of fire doors; however, the licensee did not implement those procedures. (Section 1R05.1.b.(1))

#### **Cornerstone: Mitigating Systems**

- Green: The inspectors identified a NCV of 10 CFR Part 50.65 (a)(4), due to the licensee's failure to properly assess and manage the risk associated with scheduled slave relay testing for the 2A Auxiliary Feedwater (AF) system. Specifically, the licensee declared the system inoperable but available. However, the system at the time could neither automatically respond to an event, nor was an operator "dedicated" as defined in the NRC endorsed industry guidance, Nuclear Management and Resources Council

(NUMARC) 93-01, to manually realign the system to perform its safety-related function for the system to be considered available. Corrective actions for this issue included assigning dedicated operators in accordance with NUMARC 93-01, Section 11. The inspectors did not identify a cross-cutting aspect for this issue.

The finding is more than minor because there was elevated plant risk associated with the 2A AF pump being unavailable that would have required the implementation of additional risk management actions (i.e., assigning dedicated operators and/or maintenance personnel in accordance with NUMARC 93-01, Section 11). The inspectors assessed the safety significance of this finding using IMC 0609, Appendix K, "Maintenance Risk Assessment and Risk Management Significance Determination Process." Using input from the licensee's risk assessment engineer, the inspectors determined that the actual risk deficit was  $1.5 \times 10^{-7}$ . The finding was determined to be of very low safety significance because the actual risk deficit was determined to be less than  $1 \times 10^{-6}$ . (Section 1R13.1.b)

### **Cornerstone: Barrier Integrity**

- Green: A NCV of 10 CFR 50, Appendix B, Criterion V, was self-revealed on September 22, 2009, when performance of a fire protection valve stroke procedure resulted in a trip of the B Train of the Main Control Room Ventilation System. Specifically, conflicting procedural guidance resulted in operators stroking the B Train Main Control Room Recirculation Charcoal Absorber deluge valve, which resulted in an unexpected trip of the safety-related B train of Main Control Room Ventilation and entry into Technical Specifications (TS) 3.7.10 and 3.7.11. The licensee conducted trainings and briefings to the operators to identify the potential error traps in procedures and entered this issue into the corrective action program (CAP) as IR 968717.

The finding is more than minor because it affected the procedure quality attribute of the Barrier Integrity Cornerstone objective to maintain the radiological barrier functionality of the control room. The inspectors answered 'No' to all questions in the Containment Barrier Column of IMC 0604, Attachment 4, Table 4a, "Characterization Worksheet for IE, MS, and BI Cornerstones," and the finding screened as having very low safety significance. This finding is associated with the cross-cutting attribute of decision making in the Human Performance cross-cutting component (H.1(a)). Specifically, when faced with uncertainty in procedural direction during performance of the fire protection valve surveillance, the licensee did not use a systematic process for decision making, which resulted in a trip of the B Train of Main Control Room Ventilation. (Section 1R05.1.b.(2))

### **B. Licensee-Identified Violations**

A violation of very low safety significance, which was identified by the licensee has been reviewed by the inspectors. Corrective actions taken or planned by the licensee has been entered into the licensee's corrective action program. This violation and corrective actions are listed in Section 4OA7 of this report.

## REPORT DETAILS

### Summary of Plant Status

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

Unit 2 operated at or near full power until July 30, 2009, when a reactor trip occurred due to a trip of the 2C Reactor Coolant Pump (RCP). The 2C RCP tripped on overcurrent following the initial loss of System Auxiliary Transformer (SAT) 242-1 on a sudden pressure relay (SPR) actuation and subsequent bus 258 transfer. Due to their design, both Unit 2 SATs tripped offline as a result of the SPR actuation. When the main generator tripped due to the reactor trip, both Unit Auxiliary Transformers (UATs) de-energized and this removed offsite power from Unit 2. The operators declared a Notification of Unusual Event due to the loss of offsite power to Unit 2. Offsite power was restored on August 2, 2009, and the Notification of Unusual Event was terminated. Unit startup occurred on August 4, 2009, with full power operations being reached on August 6, 2009. Unit 2 operated at or near full power for the remainder of the inspection period.

### **1. REACTOR SAFETY**

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

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

##### .1 External Flooding

##### a. Inspection Scope

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

This inspection constituted one external flooding sample as defined in Inspection Procedure (IP) 71111.01-05.

##### b. Findings

No findings of significance were identified.

## 1R04 Equipment Alignment (71111.04)

### .1 Quarterly Partial System Walkdowns

#### a. Inspection Scope

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

- 2A Residual Heat Removal (RH) subsystem during 2B RH subsystem work window;
- 2A Essential Service Water (SX) subsystem during 2B SX subsystem work window;
- 2B RH subsystem during 2A RH subsystem work window; and
- 2A Containment Spray (CS) subsystem during 2B CS subsystem work window.

The inspectors selected these systems based on their risk significance relative to the Reactor Safety Cornerstones at the time they were inspected. The inspectors attempted to identify any discrepancies that could impact the function of the system, and, therefore, potentially increase risk. The inspectors reviewed applicable operating procedures, system diagrams, UFSAR, TS requirements, outstanding work orders, 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 licensee CAP with the appropriate significance characterization. Documents reviewed are listed in the Attachment to this report.

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

#### b. Findings

No findings of significance were identified.

### .2 Semi-Annual Complete System Walkdown

#### a. Inspection Scope

On July 31, 2009, the inspectors performed a complete system alignment inspection of Unit 2 RH following a reactor trip prior to transition to the shutdown cooling mode of the RH system, to verify the functional capability of the system. This system was selected because it was considered both safety significant and risk significant in the licensee's probabilistic risk assessment. The inspectors walked down the system to review mechanical and electrical equipment line ups, electrical power availability, system pressure and temperature indications, as appropriate, 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 work orders 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 to this report.

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

b. Findings

No findings of significance were identified.

1R05 Fire Protection (71111.05)

.1 Routine Resident Inspector Tours (71111.05Q)

a. Inspection Scope

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

- 1A RH Heat Exchanger Room, Auxiliary Building Elevation 364’;
- 1B RH Heat Exchanger Room, Auxiliary Building Elevation 364’;
- 2A RH Heat Exchanger Room, Auxiliary Building Elevation 364’;
- 2B RH Heat Exchanger Room, Auxiliary Building Elevation 364’; and
- Unit 1 and 2 Diesel Oil Storage Tank Rooms, Turbine Building Elevation 383’.

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 to this report, 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.

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

b. Findings

(1) Failure to Provide Continuous Monitoring of a Fire Door

Introduction: The inspectors identified a finding of very low safety significance and an associated NCV of Braidwood Operating License Condition 2.E, "Fire Protection Program," for the failure to take adequate compensatory measures following the failure of electronic supervision of fire doors. Specifically, when continuous electronic supervision of fire doors in the cable spreading rooms (an area with gaseous fire suppression) failed, the licensee did not establish an hourly fire watch as required by Procedure BwAP 1110-1, "Fire Protection Program System Requirements."

Description: The Braidwood Fire Protection Report required that the cable spreading room fire doors be electrically supervised via an alarm in the control room. Following an electrical storm on July 25, 2009, the licensee identified that Fuse 1PM09J FU-4 had blown. This fuse supplies power to the transformer for the cable spreading room supervised doors alarm panel. The fuse was replaced and the new fuse immediately blew. Without power, the electronic supervision for several fire doors was disabled. As a compensatory action, the licensee added the cable spreading room doors to the unlocked fire door daily surveillance. The licensee determined this compensatory action using Procedure 0BwOS FP.7.2.D-1, "Unlocked Fire Door Daily Surveillance," Revision 11. Step E.4.b of that procedure required that normally supervised fire doors that are not capable of generating an alarm, but are capable of being closed and latched, are checked closed and latched on a daily basis.

The inspectors identified that operators did not enter Procedure BwAP 1110-1, "Fire Protection Program System Requirements," which covers compensatory actions to be taken on unavailable fire protection systems and equipment. Section E.7.a.1 required, in part, that all fire rated sealing devices in fire rated assembly penetrations (fire doors ...) shall be available. Step E.7.a.3 required that, with one or more of the required fire rated sealing devices unavailable, within 1 hour either establish a continuous firewatch on at least one side of the affected assembly, or verify the availability of the fire detectors on at least one side of the unavailable assembly and establish an hourly firewatch patrol. Step E.7.b.2 stated that the availability of the fire door verified by performing a trip actuating device operational test at least once per 31 days. With the blown fuse, the door would not pass this operational test. Thus, the required compensatory action would be a continuous fire watch or an hourly fire watch once all of the fire detectors were verified to be operational. Upon notification of these requirements by the inspectors, the licensee restored power to the system and entered the issue into the CAP as IR 945777.

Analysis: The inspectors determined that failure to take compensatory measures for malfunctioning electronic fire door monitoring was a performance deficiency. The finding was evaluated using IMC 0612, Appendix B, Issue Screening. The inspectors determined the finding is more than minor because it is associated with the external events (fire) attribute of the Mitigating Systems Cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences.

In accordance with IMC 0609, Attachment 4, Table 3b, "SDP Phase 1 Screening Worksheet for Initiating Events, Mitigating Systems, and Barriers Cornerstones," the

inspectors reviewed the significance of the issue through IMC 0609, Appendix F, "Fire Protection Significance Determination Process." Using IMC 0609, Appendix F, Attachment 1, "Part 1: Fire Protection SDP Phase 1 Worksheet," the inspectors determined the finding category was Fire Prevention and Administrative Controls and assigned a low degradation rating. Based on having a low degradation rating, the finding screened as one of very low safety significance (Green).

This finding is associated with the cross-cutting attribute of Work Practices in the Human Performance cross-cutting component. Specifically, procedures were in place that directed the appropriate compensatory measures for the loss of electronic monitoring of fire doors; however, the licensee did not implement those procedures. (H.4(b))

Enforcement: Braidwood Operating License Condition 2.E required the licensee to implement and maintain in effect all provisions of the approved Fire Protection Program, as described in the UFSAR for the facility, which are implemented, in part, through procedure BwAP 1110-1, "Fire Protection Program System Requirements." Contrary to the above, when a blown fuse removed the capability to electronically supervise fire doors in the cable spreading rooms the licensee did not implement the compensatory action (hourly fire watch) required by step E.7.a.3 of procedure BwAP 1110-1. Because this violation was of very low safety significance and was entered into the licensee's CAP, this violation is being treated as an NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy. (NCV 05000456/2009004-01; 05000457/2009004-01).

(2) Failure of Fire Protection Valve Stroke Procedure Results in Trip of B Train of Main Control Room Ventilation

Introduction: A Green finding and an associated NCV of 10 CFR 50, Appendix B, Criterion V, was self-revealed on September 22, 2009, when performance of a fire protection valve stroke procedure resulted in a trip of the B Train of the Main Control Room Ventilation System (VC). Specifically, conflicting procedural guidance resulted in operators stroking the B train of VC recirculation charcoal absorber deluge valve, which resulted in an unexpected trip of the safety-related B train of VC and entry into TSs 3.7.10 and 3.7.11.

Description: On September 22, 2009, the licensee was performing Procedure 0BwOS FP.2.1.A-1, "Fire Protection Valve Lubrication and Cycle Surveillance." Step F.2 stated, "PERFORM the following steps for each valve listed on the Data Sheets" (emphasis in the original). Step F.2.b further stated, "FULLY CYCLE the valve, returning it to its as found position, and INITIAL the Valve Cycled Column of the Data Sheet" (emphasis in the original). In addition, one of the acceptance criteria stated in Section G of the procedure is that "each accessible Fire Protection Valve has been successfully cycled through at least one complete cycle of full travel."

The Data Sheet attached to the procedure includes valve 0FP432B, Control Room Recirculation Charcoal Absorber 0VC02FB Deluge Valve. The Valve Cycled column on the Data Sheet for this valve is blacked out such that it cannot be initialed. When the local operator prepared to cycle this valve, the discrepancy between Step F.2 of the procedure and the blacked out boxes on the Data Sheet, as well as a question regarding the type of valve, were noted. The questions were brought to the unit supervisor by another field operator. The conclusion was to go forward with the procedure and that was communicated back to the other local operator. When the valve was cycled, the

B Train of VC supply fan tripped, which also tripped the return fan and resulted in entry into TS Limiting Condition for Operations 3.7.10 and 3.7.11. The trip of the B Train of VC was the designed response to cycling the deluge valve due to an interlock with the deluge valve position. Approximately seven minutes later, the valve was closed and the LCOs were exited. The licensee conducted trainings and briefings to the operators to identify the potential error traps in procedures and entered this issue into the CAP as IR 968717.

Analysis: The inspectors determined that the conflicting information in procedure 0BwOS FP.2.1.A-1 that resulted in an unexpected trip of the operating control room ventilation train represented a performance deficiency. The finding was evaluated in accordance with IMC 0612, Appendix B, Issue Screening, and was determined to be more than minor because it impacted the procedure quality attribute of the Barrier Integrity Cornerstone objective to maintain the radiological barrier functionality of the control room. The inspectors answered 'No' to all questions in the Containment Barrier Column of IMC 0609, Attachment 4, Table 4a, "Characterization Worksheet for IE, MS, and BI Cornerstones," and the finding screened as having very low safety significance (Green).

This finding is associated with the cross-cutting attribute of decision making in the Human Performance cross-cutting component. Specifically, when faced with uncertainty in procedural direction during performance of the fire protection valve surveillance, the licensee did not use a systematic process for decision making, which resulted in a trip of the B Train VC. (H.1(a))

Enforcement: 10 CFR 50, Appendix B, Criterion V, "Procedures, Instructions, and Drawings" requires, in part, that activities affecting quality shall be prescribed by documented procedures of a type appropriate to the circumstances and shall be accomplished in accordance with these procedures. Contrary to the above, Procedure 0BwOS FP.2.1.A-1 contained conflicting directions related to cycling the B Train of VC recirculation charcoal absorber deluge valve that resulted in the valve being cycled, which caused an unexpected trip of the safety-related B Train VC. Because this violation was of very low safety significance and was entered into the licensee's CAP, this violation is being treated as a NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy (NCV 05000456/2009004-02; 05000457/2009004-02).

## 1R06 Flooding (71111.06)

### .1 Internal Flooding

#### a. Inspection Scope

The inspectors reviewed selected risk important plant design features and licensee procedures intended to protect the plant and its safety-related equipment from internal flooding events. The inspectors reviewed flood analyses and design documents, including the UFSAR, engineering calculations, and abnormal operating procedures to identify licensee commitments. In addition, the inspectors reviewed licensee drawings to identify areas and equipment that may be affected by internal flooding caused by the failure or misalignment of nearby sources of water, such as the fire suppression or the circulating water systems. The inspectors also reviewed the licensee's corrective action documents with respect to past flood-related items identified in the CAP to verify the

adequacy of the corrective actions. The inspectors performed a walkdown of the following plant area to assess the adequacy of watertight doors and verify drains and sumps were clear of debris and were operable, and that the licensee complied with its commitments:

- Units 1B/2B SX pump room flood seal removed for 2B SX pump work.

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

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Regualification Program (71111.11)

.1 Resident Inspector Quarterly Review (71111.11Q)

a. Inspection Scope

On September 3, 2009, the inspectors observed a crew (Crew #5) of licensed operators in the plant's simulator during licensed operator requalification examinations to verify that operator performance was adequate, evaluators were identifying and documenting crew performance problems, and training was being conducted in accordance with licensee procedures. The inspectors evaluated the following areas:

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

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

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

b. Findings

No findings of significance were identified.

.2 Facility Operating History (71111.11B)

a. Inspection Scope

The inspectors reviewed the plant's operating history from January 2008 through July 2009 to identify operating experience that was expected to be addressed by the Licensed Operator Requalification Training (LORT) program. The inspector verified that the identified operating experience had been addressed by the facility licensee in accordance with the station's approved Systems Approach to Training (SAT) program to satisfy the requirements of 10 CFR 55.59(c). The documents reviewed during this inspection are listed in the Attachment to this report.

b. Findings

No findings of significance were identified.

.3 Licensee Administration of Requalification Examinations (71111.11B)

a. Inspection Scope

The inspectors observed the administration of a requalification operating test to assess the licensee's effectiveness in conducting the test to ensure compliance with 10 CFR 55.59(c)(4). The inspectors evaluated the performance of one crew in parallel with the facility evaluators during four dynamic simulator scenarios and evaluated various licensed crew members concurrently with facility evaluators during the administration of several job performance measures. The inspectors assessed the facility evaluators' ability to determine adequate crew and individual performance using objective, measurable standards. The inspectors observed the training staff personnel administer the operating test, including conducting pre-examination briefings, evaluations of operator performance, and individual and crew evaluations upon completion of the operating test. The inspectors evaluated the ability of the simulator to support the examinations. A specific evaluation of simulator performance was conducted and documented in the section below titled, "Conformance with Simulator Requirements Specified in 10 CFR 55.46." The documents reviewed during this inspection are listed in the Attachment to this report.

b. Findings

No findings of significance were identified.

.4 Examination Security (71111.11B)

a. Inspection Scope

The inspectors observed and reviewed the licensee's overall licensed operator requalification examination security program related to examination physical security (e.g., access restrictions and simulator considerations) and integrity (e.g., predictability and bias) to verify compliance with 10 CFR 55.49, "Integrity of Examinations and Tests." The inspectors also reviewed the facility licensee's examination security procedure, any corrective actions related to past or present examination security problems at the facility, and the implementation of security and integrity measures (e.g., security agreements,

sampling criteria, bank use, and test item repetition) throughout the examination process. The documents reviewed during this inspection are listed in the Attachment to this report.

b. Findings

No findings of significance were identified.

.5 Licensee Training Feedback System (71111.11B)

a. Inspection Scope

The inspectors assessed the methods and effectiveness of the licensee's processes for revising and maintaining its LORT Program up to date, including the use of feedback from plant events and industry experience information. The inspectors reviewed the licensee's quality assurance oversight activities, including licensee training department self-assessment reports. The inspectors evaluated the licensee's ability to assess the effectiveness of its LORT program and their ability to implement appropriate corrective actions. This evaluation was performed to verify compliance with 10 CFR 55.59(c) and the licensee's SAT program. The documents reviewed during this inspection are listed in the Attachment to this report.

b. Findings

No findings of significance were identified.

.6 Licensee Remedial Training Program (71111.11B)

a. Inspection Scope

The inspectors assessed the adequacy and effectiveness of the remedial training conducted since the previous biennial requalification examination and the training from the current examination cycle to ensure that they addressed weaknesses in licensed operator or crew performance identified during training and plant operations. The inspectors reviewed remedial training procedures and individual remedial training plans. This evaluation was performed in accordance with 10 CFR 55.59(c) and with respect to the licensee's SAT program. The documents reviewed during this inspection are listed in the Attachment to this report.

b. Findings

No findings of significance were identified.

.7 Conformance with Operator License Conditions (71111.11B)

a. Inspection Scope

The inspectors reviewed the facility and individual operator licensees' conformance with the requirements of 10 CFR Part 55. The inspectors reviewed the facility licensee's program for maintaining active operator licenses and to assess compliance with 10 CFR 55.53(e) and (f). The inspectors reviewed the procedural guidance and the

process for tracking on-shift hours for licensed operators and which control room positions were granted watch-standing credit for maintaining active operator licenses. The inspectors reviewed the facility licensee's LORT program to assess compliance with the requalification program requirements as described by 10 CFR 55.59(c). Additionally, medical records for eight licensed operators were reviewed for compliance with 10 CFR 55.53(l). The documents reviewed during this inspection are listed in the Attachment to this report.

b. Findings

No findings of significance were identified.

.8 Conformance with Simulator Requirements Specified in 10 CFR 55.46 (71111.11B)

a. Inspection Scope

The inspectors assessed the adequacy of the licensee's simulation facility (simulator) for use in operator licensing examinations and for satisfying experience requirements as prescribed in 10 CFR 55.46, "Simulation Facilities." The inspectors also reviewed a sample of simulator performance test records (i.e., transient tests, malfunction tests, steady state tests, and core performance tests), simulator discrepancies, and the process for ensuring continued assurance of simulator fidelity in accordance with 10 CFR 55.46. The inspectors reviewed and evaluated the discrepancy process to ensure that simulator fidelity was maintained. Open simulator discrepancies were reviewed for importance relative to the impact on 10 CFR 55.45 and 55.59 operator actions as well as on nuclear and thermal hydraulic operating characteristics. The inspectors conducted interviews with members of the licensee's simulator staff about the configuration control process and completed the IP 71111.11, Appendix C, checklist to evaluate whether or not the licensee's plant-referenced simulator was operating adequately as required by 10 CFR 55.46(c) and (d). The documents reviewed during this inspection are listed in the Attachment to this report.

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness (71111.12)

.1 Routine Quarterly Evaluations (71111.12Q)

a. Inspection Scope

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

- Unit 1 Containment Area Radiation Monitors;
- 125V Direct Current Power System; and
- Unit 1 Emergency Diesel generators (EDG).

The inspectors reviewed events where ineffective equipment maintenance had resulted in valid or invalid automatic actuations of engineered safeguards systems and



independently verified the licensee's actions to address system performance or condition problems in terms of the following:

- implementing appropriate work practices;
- identifying and addressing common cause failures;
- scoping of systems in accordance with 10 CFR 50.65(b) of the maintenance rule;
- characterizing system reliability issues for performance;
- charging unavailability for performance;
- trending key parameters for condition monitoring;
- ensuring 10 CFR 50.65(a)(1) or (a)(2) classification or re-classification; and
- verifying appropriate performance criteria for structures, systems, and components (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.

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

b. Findings

No findings of significance were identified.

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

.1 Maintenance Risk Assessments and Emergent Work Control

a. Inspection Scope

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

- Installation of 345 kV Jumpers around a Localized Hot Spot on the Main Power Transformer 'C' Phase Line;
- 1A Primary Containment Ventilation Chiller and Unit Common (0A) Control Room Ventilation System Chiller Issues;
- 2A Solid State Protection System Bi-monthly Surveillance Test;
- SAT 242-1 Restoration; and
- 1B EDG Planned 6-Year Maintenance Window.

These activities were selected based on their potential risk significance relative to the Reactor Safety Cornerstones. As applicable for each activity, the inspectors verified that risk assessments were performed as required by 10 CFR 50.65(a)(4) and were accurate and complete. When emergent work was performed, the inspectors verified that the plant risk was promptly reassessed and managed. The inspectors reviewed the scope of maintenance work, discussed the results of the assessment with the licensee's

probabilistic risk analyst or shift technical advisor, and verified plant conditions were consistent with the risk assessment. The inspectors also reviewed TS requirements and walked down portions of redundant safety systems, when applicable, to verify risk analysis assumptions were valid and applicable requirements were met.

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

b. Findings

No findings of significance were identified.

.2 Unresolved Item 05000456/2008005-02; 05000457/2008005-02: Failure of the Licensee's Staff to Properly Manage On-line Risk Associated with Testing of the 2A Auxiliary Feedwater Pump Slave Relays

Introduction: The inspectors identified a Green finding and an associated NCV of 10 CFR Part 50.65 (a)(4), due to the failure to properly assess and manage the risk associated with scheduled slave relay testing for the 2A AF system. Specifically, the licensee declared the system inoperable but available. However, the system at the time could neither automatically respond to an event, nor was an operator "dedicated" as defined in the NRC endorsed industry guidance, NUMARC 93-01, to manually realign the system to perform its safety-related function for the system to be considered available.

Discussion: On November 21, 2008, the operators performed Surveillance Test 2BwOSR 3.3.2.8-620A, "Unit Two Slave Relay Surveillance (Train A K620 and K633)." During the performance of this surveillance test, the K620 and the K633 relays failed to energize. Prior to the failure of the relays to energize, the operators declared the 2A AF system inoperable and entered TS LCO 3.7.5, Condition A, due to the system's test configuration. The licensee informed the inspectors that the system was considered available for online risk purposes because the system could be manually realigned to the correct configuration within 41 minutes. The licensee stated that according to the plant's probabilistic risk assessment, the AF system was not needed until 41 minutes following a design basis accident. The operators also informed the inspectors that this classification was in accordance with licensee's Procedure, WC-AA-101, "Online Work Control Process," Attachment 6, Case 4. Case 4 states that the system is available if the equipment could be "promptly restored to service." Additionally, in determining whether a system is available, Case 4 also states that restoration actions need not be proceduralized but must be documented and that the assessment may take into account time needed for restoration.

When questioned, the licensee stated that an equipment operator, who was in constant communication with the control room, had been assigned to realign the system if needed. The inspectors asked whether this equipment operator had been assigned any other duties and whether this equipment operator had been stationed locally in the plant at the valves that needed to be realigned. The licensee told the inspectors that the equipment operator was performing other tasks as part of his normal operator plant rounds and was not stationed locally at the valves.

The inspectors reviewed 2BwOSR 3.3.2.8-620A and noted that during portions of the surveillance test, contacts for both the K620 and K633 relays were jumpered to measure contact resistance. With these jumpers installed, an automatic start of the 2A AF pump would not occur on a "Lo-Lo" steam generator water level condition. Additionally, the AF system discharge test valve 2AF004A would not open automatically on that same signal. This valve is normally open; however, it is closed as part of the test configuration. Following the resistance reading, the jumpers are removed. This action restores the ability of the 2AF004A valve to automatically open on a steam generator "Lo-Lo" water level condition, if the K620 and K633 relays are functioning properly.

Prior to attempting to energize the K620 and K633 relays, by use of a test push button, the operators entered TS LCO Action Statement 3.3.2 Conditions A and J for the AF system SX suction valves, 2AF006A and 2AF017A. These action statements were entered because the test switch (S804) on test panel 1PAJ11, located outside the control room, was placed in TEST, which actuated a circuit blocking function. The SX suction valves would not automatically open on low water level signal coincident with a low AF pump suction pressure signal. With test switch S804 in TEST, an automatic start of the 2A AF pump on a steam generator "Lo-Lo" signal would also be blocked.

The inspectors also noted that Section 11.3.2.7 of NUMARC 93-01 states that "prompt restoration" of the out-of-service systems, structures, and components (SSC) is the criterion to determine whether the SSC is available or not.

Section E, "Limitation and Actions," of 2BwOSR 3.3.2.8-620A, Step 5, stated that if necessary to "emergency" exit this test, perform Subsection F.3.0. In reviewing all of the procedural steps in Section F.3.0, "Restoration and Final Conditions," of the Braidwood surveillance test procedure, the inspectors noted several operator actions (versus one single action) were needed to return the SSC to service. Other than the statement in the licensee risk assessment that the system could be manually realigned to the correct configuration within 41 minutes, the inspectors did not identify any discussion or considerations of risk management activities. No guidance was documented in the operator logs or in the surveillance test procedure regarding the operator actions for restoration, such as stationing maintenance or operation personnel at the locations needed for prompt restoration of the system. Additionally, when reviewing the risk assessment performed by the licensee, there was discussion regarding the likelihood of Operations and Maintenance departments coordinated response for this issue to be successful.

In addressing this concern, the licensee stated that discussion of risk management activities and considerations were provided by the Unit Supervisor while conducting a pre-job brief prior to the start of surveillance test activities. The licensee presented a print of an Excel spreadsheet that listed pre-job brief discussion topics for a number of TS required surveillance procedures. The inspectors reviewed this spreadsheet and noted concerns. The pre-job brief notes did not designate the electrical maintenance personnel who were responsible for removing installed jumpers as "dedicated." The notes only stated that the maintenance personnel must be in constant communications with the control room while the jumpers were installed. Limitations on what other activities the maintenance personnel could be engaged in were not discussed on the spreadsheet. When questioned, the licensee agreed that, based on the verbiage used on the spreadsheet, maintenance personnel assigned to remove the jumper did not have

to be stationed at the panel. According to the licensee, there were also no limitations on where the maintenance personnel could be staged for prompt response.

The inspectors discussed this issue with the Regional Senior Risk Analysts and ascertained that the guidance provided in NRC endorsed NUMARC 93-01, to have a dedicated operator and a single action were to support the assumption of the certainty that equipment would be available in lieu of automatic functions. If other assumptions were made, the uncertainty of the completion of the operators actions in lieu of automatic functions would have to be included in the licensee overall maintenance risk assessment performed by the licensee for the given plant configuration and maintenance activities. The inspectors' review of the licensee's risk assessment identified no adjustments for the uncertainty of the operator actions in lieu of the automatic functions lost during the maintenance performed.

Corrective actions for this issue included assigning dedicated operators in accordance with NUMARC 93-01, Section 11. Additionally, maintenance personnel responsible for removing installed jumper in response to an emergent condition would not only be constant communication with the control room but would also remain in close proximity of the location where the action needs to take place.

Analysis: Failure of perform an adequate risk assessment is a performance deficiency. The inspectors reviewed IMC 0612, Appendix E, "Examples of Minor Issues," and determined that the incorrect risk assessment was more than minor because there is elevated plant risk associated with the 2A AF pump being unavailable that would have required the implementation of additional risk management actions (i.e., assigning dedicated operators and/or maintenance personnel in accordance with NUMARC 93-01, Section 11). The inspectors assessed the safety significance of this finding using IMC 0609, Appendix K, "Maintenance Risk Assessment and Risk Management Significance Determination Process." Using input from the licensee's risk assessment engineer, the inspectors determined that the actual risk deficit (ICDPD) as  $1.5 \times 10^{-7}$ . The finding was determined to be of very low safety significance because the ICDPD was determined to be less than  $1 \times 10^{-6}$ .

The inspectors did not identify a cross-cutting aspect for this issue.

Enforcement: 10 CFR Part 50.65(a)(4) required, in part, that the licensee shall assess and manage the increase in risk that may be associated with performing maintenance activities prior to performing the maintenance. Contrary to the above, on November 21, 2008, the licensee failed to perform an adequate risk assessment associated with the scheduled performance of the 2A AF pump slave relay test. The risk assessment was inadequate because it assumed manual actions to restore the system to service were certain. The risk assessment failed to take into account that there was uncertainty associated with the manual actions due to not having a dedicated operator and having many steps involved in restoring equipment to in-service. Because this violation was of very low safety significance and the issue was entered into the CAP, the issue is being treated as an NCV consistent with Section VI.A.1 of the NRC Enforcement Policy. (NCV 05000456/2009004-03; 05000457/2009004-03). Unresolved Item 05000456/2008005-02; 05000457/2008005-02 is closed.

1R15 Operability Evaluations (71111.15)

.1 Operability Evaluations

a. Inspection Scope

The inspectors reviewed the following issues:

- Insulation Removed from 2A RH Piping Instead of 2B RH Piping;
- RCP Over-current Relays Outside of Preventive Maintenance Frequency;
- Foreign Material Exclusion (cylinder temperature probe) in 1B EDG following maintenance;
- 2A EDG Fuel Oil Pump Flange Leak; and
- Unit 1 Spent Fuel Cooling Pump Outboard Oiler Leak Results in Needing to be Refilled Daily.

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 also 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 to this report.

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

b. Findings

No findings of significance were identified.

1R19 Post-Maintenance Testing (71111.19)

.1 Post-Maintenance Testing

a. Inspection Scope

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

- 2A AF Slave Relay Replacement (K632) Following Relay Chattering Issue;
- 1A EDG Monthly Surveillance Test Following Fuel Oil Leak Repair;
- 1B EDG Jacket Water Heater Temperature Switch Replacement;
- 2A EDG Jacket Water Heater Temperature Switch Replacement; and
- 2A CS Suction Valve (2CS001A) Following Planned Maintenance (Stem Lube).

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

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

b. Findings

No findings of significance were identified.

1R20 Outage Activities (71111.20)

.1 Unit 2 Loss of Offsite Power Coincident with a Reactor Trip Due to Loss of 2C Reactor Coolant Pump

a. Inspection Scope

The inspectors evaluated outage activities for an unscheduled outage that began on July 30, 2009, and continued through August 5, 2009. The inspectors observed or reviewed the reactor shutdown and cooldown, outage equipment configuration and risk management, electrical lineups, selected clearances, control and monitoring of decay heat removal, control of containment activities, startup and heatup activities, and identification and resolution of problems associated with the outage. In addition, the inspectors reviewed the licensee's declaration of an Unusual Event, communications with the NRC, and verified that Emergency Operating Procedures were followed appropriately. This event is discussed in more detail in Section 4OA3 of this report.

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

b. Findings

No findings of significance were identified.

.2 New Fuel Receipt

a. Inspection Scope

On July 30, 2009, the inspectors observed new fuel receipt inspections in anticipation of the Unit 2 refueling outage, which was schedule to begin on October 11, 2009. The inspectors verified the licensee performed inspections in accordance with their procedures and that any issues were appropriately dispositioned.

This inspection did not constitute an outage sample as defined in IP 71111.20-05.

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing (71111.22)

.1 Surveillance Testing

a. Inspection Scope

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

- 2B T-average Over Temperature Delta Temperature Instrument Loop 18-month Calibration (Routine);
- 2B EDG Monthly Surveillance Test (Routine);
- 1B EDG 18-month Automatic Trip Bypass Surveillance Test (Routine);
- Unit 2 Chemical Volume Control System Quarterly Valve Stroke Surveillance Test (2CV8110 and 2CV8116) (Inservice Testing); and
- Unit 1 Reactor Coolant System Leakrate Surveillance Test (Reactor Coolant System Leakage).

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 were 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 in the test procedure;
- where applicable, actual conditions encountering high resistance electrical contacts were such that the intended safety function could still be accomplished;
- prior procedure changes had not provided an opportunity to identify problems encountered during the performance of the surveillance or calibration test;
- equipment was returned to a position or status required to support the performance of its safety functions; and
- all problems identified during the testing were appropriately documented and dispositioned in the CAP.

Documents reviewed are listed in the Attachment to this report. 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 of significance 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 preparedness drill on August 12, 2009, to identify any weaknesses and deficiencies in classification, notification, and protective action recommendation development activities. The scenario included a tornado on-site followed by an Anticipated Transient Without Scram and Loss of Coolant Accident. The inspectors observed emergency response operations in the Technical Support Center and Operations Support Center to determine whether the event classification, notifications, and protective action recommendations were performed in accordance with procedures. The inspectors also attended the licensee drill critique to compare any inspector-observed weakness with those identified by the



licensee staff in order to evaluate the critique and to verify whether the licensee staff was properly identifying weaknesses and entering them into the CAP. As part of the inspection, the inspectors reviewed the drill package.

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

b. Findings

No findings of significance were identified.

**2. RADIATION SAFETY**

**Cornerstone: Public Radiation Safety**

2PS1 Radioactive Gaseous And Liquid Effluent Treatment And Monitoring Systems (71122.01)

.1 Review of Blowdown Line Operations and Tritium Remediation Efforts

a. Inspection Scope

The inspectors continued to monitor the licensee's activities resulting from historical inadvertent leaks of tritiated liquid from the blowdown line. The inspectors continued to accompany licensee employees and contractors during their collection of water samples at 23 monitoring locations of interest. The inspectors verified by direct observation that the water samples were being taken from the locations specified, that proper sampling protocols were followed, and that split samples were properly obtained and labeled. The inspectors took direct custody of the split samples and maintained a chain of custody as the samples were sent to the NRC's contract laboratory. The inspectors also reviewed the results of March 10-11, 2009, split samples to ensure that the results from the licensee's and NRC's contract laboratories matched within normal statistical variance.

Documents reviewed are listed in the Attachment to this report.

This inspection does not constitute a sample as defined in IP 71122.01-5.

b. Findings

No findings of significance were identified.

2PS3 Radiological Environmental Monitoring Program And Radioactive Material Control Program (71122.03)

.1 Inspection Planning

a. Inspection Scope

The inspectors reviewed the most current Annual Environmental Monitoring Report and licensee assessment results to verify that the Radiological Environmental Monitoring Program was implemented as required by TSs and the Offsite Dose Calculation Manual (ODCM). The inspectors reviewed the report for changes to the ODCM with respect to environmental monitoring, commitments in terms of sampling locations, monitoring and

measurement frequencies, land use census, interlaboratory comparison program, and analysis of data. The inspectors reviewed the ODCM to identify environmental monitoring stations and reviewed licensee self-assessments, audits, Licensee Event Reports (LERs), and inter-laboratory comparison program results. The inspectors reviewed the UFSAR for information regarding the environmental monitoring program and meteorological monitoring instrumentation. The inspectors reviewed the scope of the licensee's audit program to verify that it met the requirements of 10 CFR 20.1101(c).

This inspection constituted one sample as defined in IP 71122.03-5. Documents reviewed are listed in the Attachment to this report.

b. Findings

No findings of significance were identified.

.2 Onsite Inspection

a. Inspection Scope

The inspectors walked-down thirty-percent of the air sampling stations and approximately 10 percent of the thermoluminescence dosimeter monitoring stations to determine whether they were located as described in the ODCM and to determine the equipment material condition.

This inspection constituted one sample as defined in IP 71122.03-5.

The inspectors observed the collection and preparation of a variety of environmental samples (e.g., ground, surface water, and soil) and verified that environmental sampling is representative of the release pathways as specified in the ODCM and that sampling techniques were in accordance with procedures.

This inspection constituted one sample as defined in IP 71122.03-5.

The inspectors verified that the meteorological instruments were operable, calibrated, and maintained in accordance with guidance contained in the UFSAR, NRC Safety Guide 23, and licensee procedures. The inspectors verified that the meteorological data readout and recording instruments in the control room and at the tower were operable. The inspectors compared readout data (i.e., wind speed, wind direction, and delta temperature) in the control room and at the meteorological tower to identify if there were any line loss differences.

This inspection constituted one sample as defined in IP 71122.03-5.

The inspectors reviewed each event documented in the Annual Environmental Monitoring Report which involved a missed sample, inoperable sampler, lost thermoluminescence dosimeter, or anomalous measurement for the cause and corrective actions. The inspectors conducted a review of the licensee's assessment of any positive sample results (i.e., licensed radioactive material detected above the lower limits of detection). The inspectors reviewed the associated radioactive effluent release data that was the likely source of the released material.

This inspection constituted one sample as defined in IP 71122.03-5.

The inspectors reviewed significant changes made by the licensee to the ODCM as the result of changes to the land census or sampler station modifications since the last inspection. The inspectors reviewed technical justifications for changed sampling locations. The inspectors verified that the licensee performed the reviews required to ensure that the changes did not affect its ability to monitor the impacts of radioactive effluent releases on the environment. There were no significant changes to the ODCM or the sampling locations.

This inspection constituted one sample as defined in IP 71122.03-5.

The inspectors reviewed the calibration and maintenance records for five air samplers and composite water samplers.

The inspectors reviewed the results of the radiological environmental monitoring program sample vendor's quality control program including the interlaboratory comparison program to verify the adequacy of the vendor's program and the corrective actions for any identified deficiencies. The inspectors reviewed audits and technical evaluations the licensee performed on the vendor's program. The inspectors reviewed audit results of the program to determine whether the licensee met the TS/ODCM requirements.

This inspection constituted one sample as defined in IP 71122.03-5.

Documents reviewed are listed in the Attachment to this report.

b. Findings

No findings of significance were identified.

.3 Unrestricted Release of Material from the Radiologically Controlled Area

a. Inspection Scope

The inspectors observed several locations where the licensee monitors potentially contaminated material leaving the Radiologically Controlled Area, and inspected the methods used for control, survey, and release from these areas. The inspectors observed the performance of personnel surveying and releasing material for unrestricted use to verify that the work was performed in accordance with plant procedures.

This inspection constituted one sample as defined in IP 71122.03-5. Documents reviewed are listed in the Attachment to this report.

The inspectors verified that the radiation monitoring instrumentation was appropriate for the radiation types present and was calibrated with appropriate radiation sources. The inspectors reviewed the licensee's criteria for the survey and release of potentially contaminated material and verified that there was guidance on how to respond to an alarm which indicates the presence of licensed radioactive material. The inspectors reviewed the licensee's equipment to ensure the radiation detection sensitivities were consistent with the NRC guidance contained in IE Circular 81-07 and IE Information

Notice 85-92 for surface contamination and HPPOS-221 for volumetrically contaminated material. The inspectors verified that the licensee performed radiation surveys to detect radionuclides that decay via electron capture. The inspectors reviewed the licensee's procedures and records to verify that the radiation detection instrumentation was used at its typical sensitivity level based on appropriate counting parameters (i.e., counting times and background radiation levels). The inspectors verified that the licensee had not established a "release limit" by altering the instrument's typical sensitivity through such methods as raising the energy discriminator level or locating the instrument in a high radiation background area.

This inspection constituted one sample as defined in IP 71122.03-5. Documents reviewed are listed in the Attachment to this report.

b. Findings

No findings of significance were identified.

.4 Identification and Resolution of Problems

a. Inspection Scope

The inspectors reviewed the licensee's self-assessments, audits, LERs, and Special Reports related to the radiological environmental monitoring program since the last inspection to determine if identified problems were entered into the CAP for resolution. The inspectors also verified that the licensee's self-assessment program was capable of identifying repetitive deficiencies or significant individual deficiencies in problem identification and resolution.

The inspectors also reviewed corrective action reports from the radioactive effluent treatment and monitoring program since the previous inspection, interviewed staff and reviewed documents to determine if the following activities were being conducted in an effective and timely manner commensurate with their importance to safety and risk:

- initial problem identification, characterization, and tracking;
- disposition of operability/reportability issues;
- evaluation of safety significance/risk and priority for resolution;
- identification of repetitive problems;
- identification of contributing causes;
- identification and implementation of effective corrective actions;
- resolution of NCVs tracked in the corrective action system; and
- implementation/consideration of risk significant operational experience feedback.

This inspection constituted one sample as defined in IP 71122.03-5. Documents reviewed are listed in the Attachment to this report.

b. Findings

No findings of significance were identified.

#### 4. OTHER ACTIVITIES

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

###### .1 Mitigating Systems Performance Index - High Pressure Injection Systems

###### a. Inspection Scope

The inspectors sampled licensee submittals for the Mitigating Systems Performance Index (MSPI) - High Pressure Injection Systems performance indicator (PI) for Units 1 and 2 for the period from the third quarter 2008 through the second quarter 2009. To determine the accuracy of the performance indicator data reported during those periods, PI definitions and guidance contained in the Nuclear Energy Institute (NEI) Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 5, was used. The inspectors reviewed the licensee's operator narrative logs, IRs, mitigating systems performance index derivation reports, event reports and NRC Integrated Inspection Reports for the period of July 2008 through June 2009 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, that the change was in accordance with applicable NEI guidance. The inspectors also reviewed the licensee's IR database to determine if any problems had been identified with the PI data collected or transmitted for this indicator and none were identified. Documents reviewed are listed in the Attachment to this report.

This inspection constituted two MSPI High Pressure Injection System sample as defined in IP 71151-05.

###### b. Findings

No findings of significance were identified.

###### .2 Mitigating Systems Performance Index - Heat Removal System

###### a. Inspection Scope

The inspectors sampled licensee submittals for the MSPI - Heat Removal System PI for Units 1 and 2 for the period from the third quarter 2008 through the second quarter 2009. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in the NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 5, was used. The inspectors reviewed the licensee's operator narrative logs, IRs, event reports, MSPI derivation reports, and NRC Integrated Inspection Reports for the period of July 2008 through June 2009 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, that the change was in accordance with applicable NEI guidance. The inspectors also reviewed the licensee's IR database to determine if any problems had been identified with the PI data collected or transmitted for this indicator and none were identified. Documents reviewed are listed in the Attachment to this report.

This inspection constituted two MSPI Heat Removal System samples as defined in IP 71151-05.

b. Findings

No findings of significance were identified.

.3 Reactor Coolant System Specific Activity

a. Inspection Scope

The inspectors sampled licensee submittals for the Reactor Coolant system Specific Activity PI for Braidwood Station Units 1 and 2 for the period from the third quarter 2008 through the second 2009. To determine the accuracy of the PI data reported during those periods, performance indicator definitions and guidance contained in the NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 5, was used. The inspectors reviewed the licensee's reactor coolant system chemistry samples, TS requirements, IRs, event reports and NRC Integrated Inspection Reports for the period of June 2008 through July 2009, to validate the accuracy of the submittals. The inspectors also reviewed the licensee's IR database to determine if any problems had been identified with the performance indicator data collected or transmitted for this indicator and none were identified. In addition to record reviews, the inspectors observed a chemistry technician obtain and analyze a reactor coolant system sample. Documents reviewed are listed in the Attachment to this report.

This inspection constituted two Reactor Coolant System Specific Activity samples as defined in IP 71151-05.

b. Findings

No findings of significance were identified.

.4 Reactor Coolant System Leakage

a. Inspection Scope

The inspectors sampled licensee submittals for the Reactor Coolant System Leakage PI for Units 1 and 2 for the period from the third quarter 2008 through the second quarter 2009. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in the NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 5, was used. The inspectors reviewed the licensee's operator logs, reactor coolant system leakage tracking data, IRs, event reports and NRC Integrated Inspection Reports for the period of July 2008 through June 2009 to validate the accuracy of the submittals. The inspectors also reviewed the licensee's IR database to determine if any problems had been identified with the performance indicator data collected or transmitted for this indicator and none were identified. Documents reviewed are listed in the Attachment to this report.

This inspection constituted two Reactor Coolant System Leakage samples as defined in IP 71151-05.

b. Findings

No findings of significance were identified.

.5 Occupational Exposure Control Effectiveness

a. Inspection Scope

The inspectors sampled licensee submittals for the Occupational Radiological Occurrences PI for the period from the third quarter 2008 through the second quarter 2009. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in the NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 5, was used. The inspectors reviewed the licensee's assessment of the performance indicator for occupational radiation safety to determine if indicator related data was adequately assessed and reported. To assess the adequacy of the licensee's PI data collection and analyses, the inspectors discussed with radiation protection staff, the scope and breadth of its data review, and the results of those reviews. The inspectors independently reviewed electronic dosimetry dose rate and accumulated dose alarm and dose reports and the dose assignments for any intakes that occurred during the time period reviewed to determine if there were potentially unrecognized occurrences. The inspectors also conducted walkdowns of numerous locked high and very high radiation area entrances to determine the adequacy of the controls in place for these areas. Documents reviewed are listed in the Attachment to this report.

This inspection constituted one Occupational Radiological Occurrences sample as defined in IP 71151-05.

b. Findings

No findings of significance were identified.

.6 Radiological Effluent TS/Offsite Dose Calculation Manual Radiological Effluent Occurrences

a. Inspection Scope

The inspectors sampled licensee submittals for the Radiological Effluent TS/ODCM radiological effluent occurrences performance indicator for the period of July 2008 through July 2009. The inspectors used PI definitions and guidance contained in the NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 5, to determine the accuracy of the PI data reported during those periods. The inspectors reviewed the licensee's IR database and selected individual reports generated since this indicator was last reviewed to identify any potential occurrences such as unmonitored, uncontrolled, or improperly calculated effluent releases that may have impacted offsite dose. The inspectors reviewed gaseous effluent summary data and the results of associated offsite dose calculations for selected dates between June 2008 and June 2009 to determine if indicator results were accurately reported. The inspectors also reviewed the licensee's methods for quantifying gaseous and liquid effluents and determining effluent dose. Documents reviewed are listed in the Attachment to this report.

This inspection constituted one Radiological Effluent TS/ODCM Radiological Effluent Occurrences sample as defined in IP 71151-05.

b. Findings

No findings of significance were identified.

4OA2 Identification and Resolution of Problems (71152)

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

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

a. Inspection Scope

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

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

b. Findings

No findings of significance were identified.

.2 Daily Corrective Action Program Reviews

a. Inspection Scope

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

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



b. Findings

No findings of significance were identified.

.3 Selected Issue Follow-Up Inspection: Human Performance and Regulatory Compliance in the Operations Department

a. Inspection Scope

During a review of items entered in the licensee's CAP, the inspectors recognized a corrective action item documenting the results of a common cause analysis of main control room standards. The corrective action document, IR 930409, assigned an apparent cause evaluation to the Operations department to address the conclusions of the common cause analysis (IR 909580).

The common cause analysis identified an adverse trend in main control room standards. The inspectors reviewed the common cause analysis and the apparent cause evaluation to ensure the evaluations were in-depth and focused on the correct areas. In addition, the inspectors discussed the results with Operations department management and main control room operators.

This review constituted one in-depth problem identification and resolution sample as defined in IP 71152-05.

b. Findings

No findings of significance were identified.

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

.1 (Closed) Licensee Event Report 05000457/2009-002-00: Unit 2 Loss of Offsite Power Coincident with a Reactor Trip Due to Loss of 2C Reactor Coolant Pump

a. Inspection Scope

On July 30, 2009, the Unit 2 reactor experienced an automatic reactor trip from full power due to a trip of the 2C RCP. The 2C RCP tripped on overcurrent following an automatic bus transfer due to the loss of SAT 242-1 on a sudden pressure relay actuation. Subsequent investigation identified the cause of the 2C RCP trip to be incorrect setpoints on the RCP overcurrent relays.

b. Findings

Introduction: An Unresolved Item (URI) was self-revealed when, on July 30, 2009, the Unit 2 reactor experienced an automatic reactor trip from full power due to a trip of the 2C RCP. The 2C RCP tripped on overcurrent following an automatic bus transfer due to the loss of SAT 242-1 on a SPR actuation.

Description: At 8:59 p.m. on July 30, 2009, Unit 2 received a SPR actuation on SAT 242-1. As a result, the feed breakers for SAT 242-1 and SAT 242-2 opened as designed, which de-energized the 6.9 kV Busses 258 and 259. Both busses

automatically transferred to UATs 241-1 and 241-2. Following the transfer of Bus 258 to UAT 241-2, the 2C RCP, which was powered by Bus 258, tripped unexpectedly on overcurrent. This resulted in a Unit 2 reactor trip due to less than four RCPs running at greater than 30 percent reactor power. The reactor trip resulted in a turbine-generator trip that caused UATs 241-1 and 241-2 to become de-energized, which in turn caused the remaining three RCPs to trip off due to loss of power to their buses. The loss of both SATs and both UATs resulted in a loss of offsite power to all Unit 2 emergency and non-emergency electrical buses. The licensee declared an Unusual Event due to a loss of offsite power greater than 15 minutes. The condition was reported to the NRC in Event Notification 45238 in accordance with 10 CFR 50.72(a)(1)(i) for declaration of the Unusual Event, 10 CFR 50.72(b)(2)(iv)(B) due to actuation of the reactor protection system while the reactor was critical, and 10 CFR 50.72(b)(3)(iv)(A) for valid actuation of the AF system.

Following the reactor trip, the 2A and 2B EDGs started and loaded 4 kV safety-related Busses 241 and 242 and the 2A and 2B AF pumps started. Since nonsafety-related equipment was not powered immediately following the reactor trip, operators were unable to use steam dump valves and the condenser for normal heat removal. Therefore, the operators used a "feed & bleed" method of cooling and depressurizing by pumping water into the steam generators with the AF pumps and removing the steam through steam generator power operated relief valves to the atmosphere. This process continued until the afternoon of July 31, 2009, when reactor coolant system pressure was low enough to place the RH system in the shutdown cooling mode.

The Unusual Event was terminated at 12:36 a.m. on August 2, 2009, when offsite power was restored to the safety-related 4 kV busses through SAT 242-2. Initial investigations by the licensee were unable to determine the cause of the SAT 242-1 SPR actuation. Though the plant normally operates with SATs 242-1 and 242-2 tied together, each is capable of powering Unit 2 alone. Therefore, the licensee manually disconnected SAT 242-1 from SAT 242-2 and started up Unit 2 using only SAT 242-2 on August 4, 2009. Unit 2 reached full power on August 6, 2009.

Further investigation by the licensee included a Root Cause Evaluation focused on why the 2C RCP unexpectedly tripped and a separate apparent cause evaluation focused on why the SPR actuated on SAT 242-1. The licensee completed both investigations but new information has raised questions about the results of the root cause evaluation.

At the conclusion of the inspection period, the licensee was reviewing the new information that may impact the completed Root Cause Evaluation. Pending the results of that review, this issue will remain open as an URI. (URI 05000457/2009004-04)

This LER was reviewed and determined to be completed in accordance with NRC regulations. This LER is closed.

This event follow-up review constituted one sample as defined in IP 71153-05. Documents reviewed are listed in the Attachment to this report.

.2 (Closed) Licensee Event Report 05000456/2009-002-00: Safety Injection System Containment Sump Isolation Valve 1SI8811B Failed to Stroke Full Open Due to Torque Switch Assembly Corrosion

On June 24, 2009, the licensee began a planned work window on the 1B RH train. Part of the planned work included an 18-month surveillance to stroke open the 1B containment emergency core cooling system (ECCS) sump suction valve, 1SI8811B. The 1SI8811B valve is a normally closed motor operated valve that also provides a containment isolation function. The valve is required to open to provide a suction source from the ECCS sump to the 1B RH train for the recirculation phase of emergency core cooling. During performance of the surveillance test the valve stopped moving at approximately 35 percent open and failed to stroke fully open. The licensee entered TS 3.6.3, Condition A, due to the inoperable containment isolation function and was already in TS 3.5.2 Condition A for the 1B RH train work. Initial troubleshooting activities identified a corroded torque switch as the cause of the stroke failure. The licensee replaced the torque switch and the limit switch, and performed several other planned preventive maintenance tasks and successfully tested the valve prior to returning the valve to service on June 26, 2009.

The licensee reported the valve stroke failure under 10 CFR 50.73(a)(2)(i)(B) and 10 CFR 50.73 (a)(2)(v)(B) due to interlocks with the RH to safety injection valve and CS sump suction valve that were not met. This issue was previously discussed and opened as an Unresolved Item (URI 05000456/2009003-04; 05000457/2009003-04) in Inspection Report 05000456/2009003; 05000457/2009003. Because the inspectors are continuing to review the events surrounding the failure of 1SI8811B to stroke, the URI will remain open.

The inspectors have completed their review of this LER and determined that it was completed in accordance with NRC regulations. This LER is closed.

This event follow-up review constituted one sample as defined in IP 71153-05. Documents reviewed as part of this inspection are listed in the Attachment to this report.

4OA6 Management Meetings

.1 Exit Meeting Summary

On October 8, 2009, the inspectors presented the inspection results to Mr. A. Shahkarami, and other members of the licensee staff. The licensee acknowledged the issues presented. The inspectors confirmed that none of the potential report input discussed was considered proprietary.

.2 Interim Exit Meetings

Interim exits were conducted for:

- The results of the Radiological Effluent TS/Offsite Dose Calculation Manual program inspection with the Acting Plant Manager, Mr. T. McCool, on July 24, 2009.
- The results of the Licensed Operator Requalification Training program inspection with the Plant Manager, L. Coyle, on August 17, 2009.

The inspectors confirmed that none of the potential report input discussed was considered proprietary.

40A7 Licensee-Identified Violations

The following violation of very low safety significance (Green) was identified by the licensee and is a violation of NRC requirements which meet the criteria of Section VI of the NRC Enforcement Policy, NUREG-1600, for being dispositioned as NCVs.

- T.S. 5.4.1, in part, requires that written procedures shall be established, implemented and maintained covering refueling and core alternation activities as recommended in Regulatory Guide 1.33, Revision 2. Procedure BwMP 3300-024, Revision 9, stated that "Polar crane hooks shall not be transferred over open reactor vessel..." Contrary to the above, on October 24, 2006, the polar crane operator moved the polar crane hook over the reactor vessel while there was fuel in the vessel and the head was removed. This finding was of very low safety significant since the licensee maintained an adequate mitigation capability and this event did not involve a loss of control during shutdown operation. The licensee entered this issue into their CAP as IR 548343, revised the procedure to provide better guidance and provided training to personnel on this issue.

ATTACHMENT: SUPPLEMENTAL INFORMATION

## SUPPLEMENTAL INFORMATION

### KEY POINTS OF CONTACT

#### Licensee

A. Shahkarami, Site Vice President  
L. Coyle, Plant Manager  
K. Aleshire, Emergency Preparedness Manager  
G. Bal, Engineering Program Manager  
L. Brooks, Senior Operations Supervisor  
G. Dudek, Site Training Manager  
R. Gadbois, Maintenance Manager  
D. Gullott, Regulatory Assurance Manager  
J. Knight, Nuclear Oversight Manager  
T. McCool, Operations Manager  
J. Moser, Radiation Protection Manager  
T. Schuster, Chemistry Manager  
M. Smith, Engineering Manager

#### Nuclear Regulatory Commission

R. Skokowski, Chief, Reactor Projects Branch 3

### LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

#### Opened

05000456/2009004-01; 05000457/2009004-01	NCV	Failure To Provide Continuous Monitoring Of A Fire Door (Section 1R05.1.b.(1))
05000456/2009004-02; 05000457/2009004-02	NCV	Failure of Fire Protection Valve Stroke Procedure Results in Trip of B Train of Main Control Room Ventilation (Section 1R05.1.b.(2))
05000456/2009004-03; 05000457/2009004-03	NCV	Failure of the Licensee's Staff to Properly Manage On-line Risk Associated with Testing of the 2A Auxiliary Feedwater Pump Slave Relays (Section 1R13.2)
05000457/2009004-04	URI	Reactor Trip Due to Trip of 2C Reactor Coolant Pump (Section 4OA3.1)

#### Closed

05000456/2009004-01; 05000457/2009004-01	NCV	Failure To Provide Continuous Monitoring Of A Fire Door (Section 1R05.2)
05000456/2009004-02; 05000457/2009004-02	NCV	Failure of Fire Protection Valve Stroke Procedure Results in Trip of B Train of Main Control Room Ventilation (Section 1R05.3)
05000456/2009004-03; 05000457/2009004-03	NCV	Failure of the Licensee's Staff to Properly Manage On-line Risk Associated with Testing of the 2A Auxiliary Feedwater Pump Slave Relays (Section 4OA3.3)

05000456/2008005-02; 05000457/2008005-02	URI	Evaluation of the Licensee Processes and Controls Regarding the Management of On-line Risk (Section 1R13.2)
05000456/2009-002-00	LER	Safety Injection System Containment sump Isolation Valve 1SI8811B Failed to Stroke Full Open due to Torque Switch Assembly Corrosion (Section 4OA3.2)
05000457/2009-002-00	LER	Unit 2 Loss of Offsite Power Coincident with a Reactor Trip Due to Loss of 2C Reactor Coolant Pump (Section 4OA3.1)

## LIST OF DOCUMENTS REVIEWED

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

### 1R04 Equipment Alignment

- BwOP RH-E2; electrical Lineup - Unit 2; Revision 4
- BwOP RH-M4; Operating Mechanical Lineup Unit 2B Train; Revision 6
- M-137 Diagram of Residual Heat Removal Unit 2

### 1R05 Fire Protection

- Braidwood Station Pre-Fire Plans 1D-11; Auxiliary building - General Area - Elevation 383'-0" (Fire Zone 11.4-0)
- Braidwood Station Pre-Fire Plans 1D-13; Radwaste and Remote Shutdown Control Room - Elevation 383'-0" (Fire Zone 11.4C-0)
- Braidwood Station Pre-Fire Plan Map; Figure 2.3-13, Plan at EL. 383'-0"
- NES-MS-04.1, Seismic Prequalified Scaffolds; Revision 5
- BWAP 1100-23; Seismic Housekeeping Requirements for the Temporary Storage of Materials in Category I Areas; Revision 3

### 1R11 Licensed Operator Requalification Program

- OP-AA-105-101; Administrative Process for NRC License and Medical Requirements Revision 11
- OP-AA-105-102; NRC Active License Maintenance Revision 9
- TQ-AA-201; Examination Security and Administration; Revision 12
- TQ-AA-150; Operator Training Programs; Revision 2
- TQ-AA-306; Simulator Management, Revision 0
- TQ-AA-306-F-05; Simulator Software Training Load Request; June 2009
- TQ-BR-302-0102; Braidwood Simulator Normal Operations Testing #1; December 15, 2005, December 5, 2006, November 18, 2008
- TQ-AA-306; PWR Moderator Temperature Coefficient of Reactivity; April 30, 2009
- TQ-BR-302-0103; Braidwood Simulator Steady State Testing SS-1; August 7, 2009
- TQ-BR-302-0106; Braidwood Simulator Transient Test TR-1, Manual Rx Trip; February 16, 2009
- TQ-BR-302-0111; Braidwood Simulator Transient Test TR-6, Turbine Trip w/o Rx Trip; February 16, 2009
- TQ-JA-150-03; JPM Briefing Job Aid, Revision 1
- TQ-JA-150-04; JPM Work Standard; Revision 0
- NOSPABW-07-3Q; Nuclear Oversight Quarterly Report
- NOSPABW-07-4Q; Nuclear Oversight Quarterly Report
- NOSPABW-08-1Q; Nuclear Oversight Quarterly Report
- NOSABRW-08-06; Training and Staffing Audit Report; July 23, 2008
- NOSCAPBW-09-03; Braidwood Operations Performance; March 13, 2009
- NOSCAPBW-09-06; Braidwood Training Performance Report; April 24, 2009
- EG01; Malfunction Test – Main Generator Auto Voltage Regulator Failure; April 21, 2009

- TH-08; Malfunction Test – RCS Fuel Element Failure; November 5, 2008
- TH-17; Malfunction Test – RCP Degraded Performance/Locked Rotor; September 23, 2005
- IA01; Malfunction Test – Loss of Instrument Air; June 20, 2008
- OP 07-008; Operability Evaluation 07-008, Steam Generator Overfill; July 27, 2007
- Braidwood Simulator Review Board Meeting Minutes; December 4, 2008, September 11, 2008, March 25, 2009, May 27, 2009
- Deferred Simulator Work Requests; August 14, 2009
- Open Simulator Work Requests; August 14, 2009
- LORT; 2009 Comprehensive Written Examinations; Various
- LORT; 2009 Operating Test Simulator Scenarios; Various
- LORT; 2009 Operating Test Week 2, JMPs (10)
- Braidwood Licensed Operator Requalification End-of-Cycle Reports Cycle 1-4, 2009
- Remedial Training Notification and Action on Failure; Various (2009 Forms)
- Self-Assessment: Braidwood Licensed Operator; May 11, 2009
- Requalification Training Pre NRC 71111.11 Inspection
- Curriculum Review Committee Meeting Minutes Cycle 1; October 24, 2009
- Curriculum Review Committee Meeting Minutes Cycle 2; January 16, 2009
- Curriculum Review Committee Meeting Minutes Cycle 3; March 4, 2009
- Curriculum Review Committee Meeting Minutes Cycle 4; May 17, 2009
- Topic Trainee Feedback Forms 2009 Cycle 1-4; Various
- Training Observation Forms 2009 Cycle 1-3; Various

#### 1R15 Operability Evaluations

- IR 902241; CV Full flow Testing Acceptance Criteria Issues (1CV01PA); April 3, 2009
- IR 902597; A1R14 - Anomaly Noted During SI System Full flow Testing; April 3, 2009
- IR 902815; SI Hot Leg ECCS Flow Trend; April 4, 2009
- IR 902725; Perform Valve 1SI8822A Inspection to Support Troubleshooting; April 3, 2009
- IR 910029; Long Term Fix to ECCS Throttle Valves Degradation; April 21, 2009
- IR 909535; NOS ID: NIRB Results for ECCS Flow Issue; April 20, 2009
- IR 910653; Possible SI System Siphoning to RWST; April 23, 2009
- Complex Troubleshooting Data Sheet; SI/CV Cold Leg Injection Lines Flow Inbalance.
- NFM0100126; Input to EDG Loading and Fuel Consumption Calculation; Seq. 0.
- EC Request 389963; Provide Bolt Torque Values on Aux Feedpump Bearing Housing and End Cover; April 17, 2009
- EC 375171; Evaluate the Acceptability of the Oil Leak at the 1A AF Pump Outboard Bearing Cover; Rev. 0
- Byron Station Design Information Transmittal; BYR-04-029, Safety Analysis AF System Mission Time and AF Pump Flow Profile; Rev. 2
- Work Order 1164186-10; MM-Repair Oil Leak at Outboard Bearing Cover; April 17, 2009
- Operability Evaluation 09-003; SI Pumps Discharge Pressure Indicating 1200 PSIG; Rev. 0

#### IR Resulted from NRC Inspection

- IR 909942; NRC Identified Discrepancy with 1A AF Pump Mission Time; April 21, 2009
- IR 910882; Question on Temp Leak Repair Permit Requirements; April 23, 2009

#### 1R19 Post-Maintenance Testing

- Work Request 311908; 1B DG Jacket Water Heater; August 19, 2009
- 2BwOSR 3.3.2.8-632A; Unit 2 ESFAS Instrumentation Save Relay Surveillance; Revision 6



## 1R22 Surveillance Testing

- BwOP DG-11; Diesel Generator Startup; Revision 36
- BwOP DG-11T1; Diesel Generator Start/Stop Log; Revision 7
- BwOP DG-11T2; Diesel Generator Operating Log; Revision 21
- BwOP DG-12; Diesel Generator shutdown; Revision 25
- BwOP DG-1; Diesel Generator Alignment to Standby condition; Revision 27
- BwOP VL-1; Laboratory HVAC System Startup; Revision 8
- 1BwOSR 3.8.1.13-2; 1B Diesel Generator Bypass Of Automatic Trips Surveillance; Revision 9
- Work Order 1073973; Comprehensive Inservice Testing (IST) Requirements for Unit 1 Charging Pumps and Safety Injection System Check Valve Stroke Test; April 2, 2009
- Work Order 1075542; Comprehensive Inservice Testing (IST) Requirements for Unit 1 Safety Injection Pumps and Safety Injection System Check Valve Stroke Test; April 2, 2009
- Work Order 1246422; IST-2B DG Operability Monthly; July 29, 2009
- IR 943829; DSA/WSA 7/13 Activities Impacted to Perform 2B Dt/TAVE; July 20, 2009
- IR 945234; Post-Job Critique of 2B Delta T/TAVG surveillance; July 23, 2009
- Drawing 20E-2-4030AN110A; Schematic Diagram Protection Cabinet II (2A02J) Channel Test Switch Logic T/TAVG, Pressurizer Pressure; March 5, 1995
- Drawing 20E-2-4031RC02A; Loop Schematic Diagram T/TAVG Protection II Loop "2B" Protection Cabinet II 2PA02J; March 6, 1995
- Drawing 20E-2-4031RC02B; Loop Schematic Diagram T/TAVG Protection II Loop "2B" Protection Cabinet II (2PA02J) Part 2 and 3 of 4; March 6, 1995

## 2PS1 Radioactive Gaseous And Liquid Effluent Treatment And Monitoring System

- ML09150643, Tritium Sample Results from American Radiation Services, Inc., May 21 and 26, 2009

## 2PS3 Radiological Environmental Monitoring Program And Radioactive Material Control Program

- NUPIC Audit of Teledyne Brown Engineering Environmental Services, Knoxville, Tennessee; November 18, 2008
- Annual 2008 Quality Assurance Report, Teledyne Brown Engineering Environmental Services; October 29, 2009
- RP-AA-300; Radiological Survey Program; Revisions 5
- RP-AA-503; Unconditional Release Survey Method; Revision 2
- Annual Report on the Meteorological Monitoring Program at the Braidwood Nuclear Power Station; 2007; May, 16, 2008
- Annual Report on the Meteorological Monitoring Program at the Braidwood Nuclear Power Station; 2007; May, 1, 2009
- AR 667834; Special Report Required By RETS 2.1-1A; September 3, 2007
- AR 670473, Cooling Water Blow Down Compositor Power Secured for 2 days without Notification; September 7, 2007
- AR 677310; Off Site Dose Calculation Manual REMP Job Familiarization Not Complete in Timely Fashion; September 28, 2007
- AR 680307; Cooling Water Blow Down Compositor Malfunction; October 1, 2007
- AR 677310; Offsite Dose Calculation Manual Radiological Environmental Monitoring Job Familiarization Not Complete in Timely Fashion; September 28, 2009
- AR 719181; Loss of Meteorological (MET) Tower Requires Unplanned Entry into TRM 3.3C; January 8, 2008

- AR 719274; Nuclear Oversight Audit Report of Chemistry, Radwaste, Effluent and Environmental Monitoring, April 2, 2008
- AR 723647; North Oil Separator Sample Results Higher Than Limit On Tritium; February 6, 2008
- AR 735181; List of 2007 Missed REMP Samples to Report in the Annual Radiological Environmental Operating Report; February 12, 2008
- AR 755289; Nuclear Oversight Identified Radiological Effluent Factors Not Trended for Offsite Dose Calculation Manual; March 27, 2008 AR 756032; REMP Samples Not Obtained for First Quarter 2008; March 28, 2008
- AR 775872; Challenge to Annual Liquid Release Curie Limit; May 15, 2008
- AR 810671, Nuclear Oversight Identifies Deficiency in Chemistry Focused Area Self-Assessment; August 25, 2008
- AR 826770; Radiological Environmental Monitoring Program and Radioactive Material Control Program Self-Assessment; April 30, 2009
- AR 826771; Check-in Self-Assessment RETS/ODCM Performance Indicator; April 21, 2009
- AR 914242; Document Results of Annual MET Tower Inspections; May 1, 2009
- AR 919241; Illinois Emergency Management Agency Identified Errors in Annual Radioactive Effluents Release Report; May 13, 2009
- AR 932715; MET Tower Lost Due to Lightning Strike; June 18, 2009

#### 4OA1 Performance Indicator Verification

- BW-CP-613-9; Chemical Volume Control Letdown Heat Exchanger Grab Sampling; Revision 4
- CY-AA-130-300; Gamma Spectroscopy; Revision 4

#### 4OA3 Follow-Up of Events and Notices of Enforcement Discretion

- EID 2AP04E-C-PR7A; RCP 2A Phase A: Overcurrent; Cubicle 3
- EID 2AP74E-E.-PR13A; RCP 2A Phase A: Overcurrent; Cubicle 5
- EID 2AP03E-G-PR17A; RCP 2A Phase A: Overcurrent; Cubicle 7
- Troubleshooting Log WO 1255272 for 2AP04EA and 2AP04EF; Revision 7
- Complex Troubleshooting Data sheet; IR 947908 for RC; Revision 7
- OP-AA-108-108; Engineering Start-Up Checklist; Revision 9
- OP-AA-108-111; Adverse Condition Monitoring and Contingency Plan; Revision 5
- OP-AA-108-114; Trip Report - PWR; Revision 5
- OP-AA-108-114; Post Transient Review; Revision 5
- Event Description: 2C Reactor Coolant Pump Trip Resulting in Unit 2 Reactor Trip Following Sudden Pressure Relay Actuation on SAT 242-1 Transformer
- A2F43 Outage Issues Tracking; August 2, 2009
- BwOP AP-32; Synchronizing a SAT to a Bus Being Fed by a DG; Revision 4
- Preliminary Analysis of Bus Transfers During the Braidwood Unit Trip Incident of July 20, 2009

## LIST OF ACRONYMS USED

ADAMS	Agencywide Document Access Management System
AF	Auxiliary Feedwater
CAP	Corrective Action Program
CFR	Code of Federal Regulations
CS	Containment Spray
ECCS	Emergency Core Cooling System
EDG	Emergency Diesel Generator
ICDPD	Incremental Core Damage Probability Deficit
IMC	Inspection Manual Chapter
IP	Inspection Procedure
IR	Issue Report
LCO	Limiting Condition for Operation
LER	Licensee Event Report
LORT	Licensed Operators Requalification Training
MSPI	Mitigating Systems Performance Index
NCV	Non-Cited Violation
NEI	Nuclear Energy Institute
NRC	U.S. Nuclear Regulatory Commission
NUMARC	Nuclear Management and Resources Council
ODCM	Offsite Dose Calculation Manual
PARS	Publicly Available Records
PI	Performance Indicator
RCP	Reactor Coolant Pump
RH	Residual Heat Removal
SAT	System Auxiliary Transformer or Systems Approach to Training
SDP	Significance Determination Process
SPR	Sudden Pressure Relay
SSC	Systems, Structures, and Components
SX	Essential Service Water
TS	Technical Specification
UAT	Unit Auxiliary Transformer
UFSAR	Updated Final Safety Analysis Report
URI	Unresolved Item
VC	Main Control Room Ventilation

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Sincerely,

**/RA/**

Richard A. Skokowski, Chief  
Branch 3  
Division of Reactor Projects

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

Enclosure: Inspection Report 05000456/2009004; 05000457/2009004  
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Letter to C. Pardee from R. Skokowski dated November 13, 2009

SUBJECT: BRAIDWOOD STATION, UNITS 1 AND 2, INTEGRATED INSPECTION  
REPORT 05000456/2009004 AND 05000457/2009004

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