



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**

REGION III  
2443 WARRENVILLE RD. SUITE 210  
LISLE, ILLINOIS 60532-4352

October 31, 2018

Mr. Bryan C. Hanson  
Senior VP, Exelon Generation Company, LLC  
President and CNO, Exelon Nuclear  
4300 Winfield Road  
Warrenville, IL 60555

**SUBJECT: BRAIDWOOD STATION, UNITS 1 AND 2—NRC INTEGRATED INSPECTION  
REPORT 05000456/2018003 AND 05000457/2018003**

Dear Mr. Hanson:

On September 30, 2018, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Braidwood Station, Units 1 and 2. On October 16, 2018, the NRC inspectors discussed the results of this inspection with Site Vice President, Ms. M. Marchionda, and other members of your staff. The results of this inspection are documented in the enclosed report.

Based on the results of this inspection, the NRC has identified one issue that was evaluated under the risk significance determination process as having very low safety significance (Green). The NRC has also determined that a violation is associated with this issue. Because issue reports were initiated to address this issue, this violation is being treated as a Non-Cited Violation (NCV), consistent with Section 2.3.2 of the Enforcement Policy. This NCV is described in the subject inspection report.

If you contest the violation or significance of the 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, Region III; the Director, Office of Enforcement; and the NRC Resident Inspector's Office at the Braidwood Station.

If you disagree with a cross-cutting aspect assignment or a finding not associated with a regulatory requirement 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 U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region III; and the NRC Resident Inspectors' Office at Braidwood Station.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at <http://www.nrc.gov/reading-rm/adams.html> and at the NRC Public Document Room in accordance with 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

*/RA/*

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

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

Enclosure:  
IR 05000456/2018003; 05000457/2018003

cc: Distribution via LISTSERV®

Letter to Bryan C. Hanson from Eric R. Duncan dated October 31, 2018

SUBJECT: BRAIDWOOD STATION, UNITS 1 AND 2—NRC INTEGRATED INSPECTION  
REPORT 05000456/2018003 AND 05000457/2018003

DISTRIBUTION:

Christopher Cook  
RidsNrrDorLpl3  
RidsNrrPMBraidwood Resource  
RidsNrrDirslrib Resource  
Steven West  
Darrell Roberts  
Jamnes Cameron  
Allan Barker  
DRPIII  
DRSIII  
[ROPreports.Resource@nrc.gov](mailto:ROPreports.Resource@nrc.gov)

ADAMS Accession Number: ML18304A205

OFFICE	RIII						
NAME	EDuncan:lg						
DATE	10/31/18						

**OFFICIAL RECORD COPY**

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Numbers: 50-456; 50-457

License Numbers: NPF-72; NPF-77

Report Numbers: 05000456/2018003; 05000457/2018003

Enterprise Identifier: I-2018-003-0020

Licensee: Exelon Generation Company, LLC

Facility: Braidwood Station, Units 1 and 2

Location: Braceville, IL

Dates: July 1 through September 30, 2018

Inspectors: D. Kimble, Senior Resident Inspector  
D. Betancourt, Resident Inspector  
R. Baker, Senior Operations Engineer  
K. Barclay, Resident Inspector – Point Beach  
J. Cassidy, Senior Health Physicist  
T. Go, Health Physicist  
K. Pusateri, Reactor Engineer  
M. Porfirio, Illinois Emergency Management Agency

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

## SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring licensee performance by conducting an integrated quarterly inspection at Braidwood Station, Units 1 and 2, in accordance with the Reactor Oversight Process. The Reactor Oversight Process is the NRC’s program for overseeing the safe operation of commercial nuclear power reactors. Refer to <https://www.nrc.gov/reactors/operating/oversight.html> for more information. Findings and violations being considered in the NRC’s assessment are summarized in the table below.

### List of Findings and Violations

Inadequate Detail in Maintenance Procedure for Emergency Diesel Generator 2-Year Inspection Contributed to 1A Emergency Diesel Generator Fuel Rack Binding			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000456/2018003-01 Opened/Closed	[H.7] – Documentation	71153
<p>A self-revealed finding of very low safety significance (i.e., Green) and an associated Non-Cited Violation (NCV) of 10 CFR Part 50, Appendix B, Criterion V, “Instructions, Procedures, and Drawings,” was identified for the licensee’s failure to include adequate detail within their maintenance procedures to enable proper lubrication of the emergency diesel generator (EDG) fuel rack control linkage. Specifically, the preventative maintenance template for the fuel rack control linkage required that the manual fuel trip lever and associated linkage be lubricated every 2 years. However, the licensee’s implementing 2-year maintenance procedure failed to include specific instructions to disassemble the lever assembly for lubrication. This lack of lubrication contributed to the mechanical binding of the emergency diesel generator fuel rack and failure of the 1A EDG during surveillance testing on April 22, 2018.</p>			

### Additional Tracking Items

Type	Issue Number	Title	Report Section	Status
LER	05000456/2018-001-00	1A Emergency Diesel Generator Lost Voltage During a Surveillance Due to a Failed Exciter Diode, Which Resulted in an Unplanned Actuation of Bus 141 Undervoltage Relay	71153	Closed
LER	05000456/2018-002-00	1B Emergency Diesel Generator Tripped on Overspeed During Testing Due to Broken Close-Assist Springs on the Turbocharger Inlet Butterfly Valve while the 1A Emergency Diesel Generator was Inoperable	71153	Closed
LER	05000456/2018-004-00	1A Emergency Diesel Generator Output Breaker Opened During a Surveillance Which Resulted in Unplanned Actuators of Bus 141 Undervoltage Relay	71153	Closed

## PLANT STATUS

Unit 1 began the inspection period operating at full power. With the exception of minor reductions in power to support scheduled testing activities or small load changes requested by the transmission system dispatcher, the unit remained operating at or near full power for the entire inspection period.

Unit 2 began the inspection period operating at full power. On September 15, 2018, the unit reached the end of the nuclear fuel cycle and entered planned power coast down operations in preparation for the 20th refueling outage. The unit was at approximately 91 percent power at the end of the inspection period with power coast down operations continuing.

## INSPECTION SCOPES

Inspections were conducted using the appropriate portions of the inspection procedures (IPs) in effect at the beginning of the inspection unless otherwise noted. Currently approved IPs with their attached revision histories are located on the public website at <http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/index.html>. Samples were declared complete when the IP requirements most appropriate to the inspection activity were met consistent with Inspection Manual Chapter (IMC) 2515, "Light-Water Reactor Inspection Program - Operations Phase." The inspectors performed plant status activities described in IMC 2515 Appendix D, "Plant Status" and conducted routine reviews using IP 71152, "Problem Identification and Resolution." The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel to assess licensee performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards.

## REACTOR SAFETY

### 71111.01—Adverse Weather Protection

#### External Flooding (1 Sample)

The inspectors evaluated the site's readiness to cope with external flooding during the weeks ending August 11 through September 22, 2018.

### 71111.04—Equipment Alignment

#### Partial Walkdown (2 Samples)

The inspectors evaluated system configurations during partial walkdowns of the following systems/trains:

- (1) 1B Emergency Diesel Generator (EDG) during the week ending July 28, 2018; and
- (2) 2B Containment Spray (CS) with 2A CS out of service for maintenance during the week ending September 1, 2018.

#### Complete Walkdown (1 Sample)

The inspectors evaluated system configurations during a complete walkdown of the 1A Residual Heat Removal (RHR) system during the weeks ending July 28 through September 15, 2018:

## 71111.05AQ—Fire Protection Annual/Quarterly

### Quarterly Inspection (4 Samples)

The inspectors evaluated fire protection program implementation in the following selected areas:

- (1) Fire Zone 11.4–0, Auxiliary Building Elevation 383', General Area, during the week ending July 21, 2018;
- (2) Fire Zone 11.4A–1, Unit 1 Auxiliary Feedwater (AF) Pump Diesel Room, during the week ending July 21, 2018;
- (3) Fire Zone 11.4A–2, Unit 2 AF Pump Diesel Room, during the week ending July 21, 2018; and
- (4) Fire Zone 11.1A–0, Auxiliary Building Basement, Elevation 330', 1A/2A Essential Service Water (SX) Pump Room, during the week ending July 21, 2018.

## 71111.06—Flood Protection Measures

### Internal Flooding (2 Samples)

The inspectors evaluated internal flooding mitigation protections in the following selected areas:

- (1) Unit 1 Component Cooling Water (CC) System Area, Auxiliary Building, 364' Elevation, during the weeks ending August 11 through September 22, 2018; and
- (2) Unit 2 CC Area, Auxiliary Building, 364' Elevation, during the weeks ending August 11 through September 22, 2018.

## 71111.11—Licensed Operator Requalification Program and Licensed Operator Performance

### Operator Requalification (1 Sample)

The inspectors observed and evaluated a graded simulator event scenario during a crew's annual NRC requalification simulator examination on August 28, 2018.

### Operator Performance (1 Sample)

The inspectors observed and evaluated various control room activities during periods of heightened plant risk or elevated operating tempo during the weeks ending September 22 and September 29, 2018.

### Operator Exams (1 Sample)

The inspectors reviewed and evaluated requalification examination results.

## 71111.12—Maintenance Effectiveness

### Routine Maintenance Effectiveness (2 Samples)

The inspectors evaluated the effectiveness of routine maintenance activities associated with the following equipment and/or safety significant functions:

- (1) 1CW01PB Pump trips, during the weeks ending September 15 and September 22, 2018; and
- (2) Unit 2 Containment Ventilation (VQ) system with continuous containment release, during the week ending September 22, 2018.

#### 71111.13—Maintenance Risk Assessments and Emergent Work Control (3 Samples)

The inspectors evaluated the risk assessments for the following planned and emergent work activities:

- (1) 0CW071 – Remove Cover, Investigate Leak, and Repair, as documented in Work Order (WO) 4815080, during the week ending August 11, 2018;
- (2) Trip of 2TO10C, as documented in Issue Report (IR) 4169985, during the week ending September 8, 2018; and
- (3) Efforts to Clear 1A CS Train Voids, as documented in WO 4802253, during the weeks ending September 8 and September 15, 2018.

#### 71111.15—Operability Determinations and Functionality Assessments (5 Samples)

The inspectors evaluated the following operability determinations and functionality assessments:

- (1) Assessment of a sink hole near the Unit 2 Condensate Storage Tank, as documented in IR 4148595;
- (2) Assessment of the potential inventory loss from the ultimate heat sink, as documented in IR 4156368;
- (3) Assessment of the fuel pool temperature at the upper operations rounds limit, as documented in IR 4154445;
- (4) Assessment of the 1FW079B check valve being further closed than 1FW079A, C, and D check valves, as documented in IR 4165777; and
- (5) Assessment of 2RH611 having no main control room light indication, as documented in IR 4177066.

#### 71111.19—Post Maintenance Testing (2 Samples)

The inspectors evaluated the following post maintenance tests:

- (1) 0C Auxiliary Building Nonaccessible Ventilation Plenum total bypass leakage test following scheduled system maintenance, as documented in WO 4594372, during the week ending August 11, 2018; and
- (2) 0B Diesel Fire Pump flow and pressure testing following scheduled maintenance, as documented in WO 4586399, during the week ending September 22, 2018.

#### 71111.22—Surveillance Testing

The inspectors evaluated the following surveillance tests:

##### Routine (2 Samples)

- (1) Changes to Technical Specification (TS) surveillance frequency for TS 3.3.1.7 and TS 3.3.1.8 during the weeks ending August 25 through September 29, 2018; and



- (2) 1BwOSR 3.8.1.2-2: 1B EDG Semiannual Surveillance, during the week ending September 15, 2018.

71114.06—Drill Evaluation

Drill/Training Evolution (2 Samples)

The inspectors observed and evaluated the following operations crew simulator scenarios involving declared emergency events:

- (1) An evaluated operations crew simulator scenario on July 17, 2018; and  
(2) An evaluated operations crew simulator scenario on August 28, 2018.

**RADIATION SAFETY**

71124.06—Radioactive Gaseous and Liquid Effluent Treatment

Walk Downs and Observations (1 Sample)

The inspectors evaluated the licensee's radioactive gaseous and liquid effluent treatment systems during plant walkdowns during the week ending August 18, 2018.

Calibration and Testing Program (Process and Effluent Monitors) (1 Sample)

The inspectors evaluated the licensee's gaseous and liquid effluent monitor instrument calibration and testing during the week ending August 18, 2018.

Sampling and Analyses (1 Sample)

The inspectors evaluated radioactive effluent sampling and analysis activities during the week ending August 18, 2018.

Dose Calculations (1 Sample)

The inspectors evaluated dose calculations during the week ending August 18, 2018.

71124.07—Radiological Environmental Monitoring Program

Site Inspection (1 Sample)

The inspectors evaluated the licensee's radiological environmental monitoring program during the week ending August 18, 2018.

Groundwater Protection Initiative Implementation (1 Sample)

The inspectors evaluated the licensee's groundwater monitoring program during the week ending August 18, 2018.

**OTHER ACTIVITIES – BASELINE**

71151—Performance Indicator Verification (7 Samples)

The inspectors verified the licensee performance indicators submittals listed below:

- (1) MS08: Heat Removal Systems – 2 Samples from July 1, 2017, through June 30, 2018;
- (2) MS09: Residual Heat Removal Systems – 2 Samples from July 1, 2017 through June 30, 2018;
- (3) MS10: Cooling Water Support Systems – 2 Samples from July 1, 2017 through June 30, 2018; and
- (4) PR01: Radiological Effluent Technical Specifications/Offsite Dose Calculation Manual Radiological Effluent Occurrences (RETS/ODCM) Radiological Effluent Occurrences – 1 Sample from January 1, 2017 through May 31, 2018.

#### 71152—Problem Identification and Resolution

##### Annual Follow-Up of Selected Issues (3 Samples)

The inspectors reviewed the licensee’s implementation of their corrective action program related to the following issues:

- (1) The 1B AF Pump bearing oil deflector being partially backed out, as documented in IR 4163979, during the weeks ending August 11 through September 29, 2018;
- (2) The licensee’s circulating water blowdown line asset management ongoing plan, during the weeks ending September 1 through September 22, 2018; and
- (3) Ongoing issues with the site’s north oil separator and tritium recapture, during the week ending September 22, 2018.

#### 71153—Follow-Up of Events and Notices of Enforcement Discretion

##### Licensee Event Reports (3 Samples)

The inspectors evaluated the following licensee event reports which can be accessed at <https://lersearch.inl.gov/LERSearchCriteria.aspx>:

- (1) Licensee Event Report (LER) 05000456/2018–001–00, 1A Emergency Diesel Generator Lost Voltage During a Surveillance Due to a Failed Exciter Diode, Which Resulted in an Unplanned Actuation of Bus 141 Undervoltage Relay. The inspectors reviewed the LER during the weeks ending September 1 through September 29, 2018, and determined there were no associated findings or violations. This LER is closed.
- (2) LER 05000456/2018–002–00, 1B Emergency Diesel Generator Tripped on Overspeed During Testing Due to Broken Close-Assist Springs on the Turbocharger Inlet Butterfly Valve while the 1A Emergency Diesel Generator was Inoperable. The inspectors reviewed the LER during the weeks ending September 1 through September 29, 2018, and determined there were no associated findings or violations. This LER is closed.
- (3) LER 05000456/2018–004–00, 1A Emergency Diesel Generator Output Breaker Opened During a Surveillance Which Resulted in Unplanned Actuators of Bus 141 Undervoltage Relay. The inspectors reviewed the LER during the weeks ending September 1 through September 29, 2018. A finding of very low safety significance (i.e., Green) and an associated non-cited violation (NCV 05000456/2018003–01) is documented in Section 71153 of this report. A minor violation was also identified. This LER is closed.

## INSPECTION RESULTS

### 71152—Problem Identification and Resolution

Observation: 1B AF Pump Bearing Oil Deflector Ring	71152—Annual Sample Review
<p>The inspectors performed a detailed review of IR 4163979, which identified that the diesel driven 1B AF Pump inboard bearing deflector ring was discovered to be slightly out of position during routine maintenance activities. In particular, the deflector ring was found partially backed out of the bearing housing. This ring, in conjunction with the labyrinth seal, functions to minimize oil leakage from the bearing housing.</p> <p>During their review, the inspectors noted that there were at least two previously documented instances where the deflector ring had been found to have shifted. One instance occurred in 2015 (IR 2510222), and a second instance occurred in 2016 (WO 1837682). On both occasions the deflector ring was restored to its original position and the condition did not adversely impact pump operability. To better understand the reason for the issues involving movement of the deflector ring, the inspectors reviewed the maintenance history and the function of the deflector ring. During these reviews the inspectors noted that the deflector ring was not classified as safety-related, although it appeared to perform a safety-related function. The licensee agreed with the inspectors' assessment, and generated IR 4163979 to address the issue. This misclassification was determined to be of only minor safety significance since it did not directly impact the availability or reliability of the AF pump.</p>	
Observation: Circulating Water Blowdown Line Asset Management Plan	71152—Annual Sample Review
<p>The inspectors performed a review of the licensee's vendor inspections and analyses of the condition of the circulating water blowdown line. This review was performed as a follow-up to the inspections documented in Section 4OA2.4 of NRC Integrated Inspection Report 05000456/2017004;05000457/2017004 (ADAMS Accession Number ML18046A083).</p> <p>The inspectors noted that licensee had, with considerable vendor support, conducted extensive examinations and reviews of the condition of the circulating water blowdown line and concluded that the condition of the line would support continued operation until a permanent life extension option could be implemented. The inspectors had no immediate concerns with the licensee's asset management strategy.</p>	
Observation: North Oil Separator and Tritium Recapture	71152—Annual Sample Review
<p>The inspectors performed a review of tritium recapture at the site's north oil separator as documented in IR 4104421. During their review, the inspectors noted that the licensee's assessment of the issue was comprehensive and explanatory. No performance deficiencies or other issues were identified.</p>	

71153—Follow-Up of Events and Notices of Enforcement Discretion

Inadequate Detail in Maintenance Procedure for Emergency Diesel Generator 2-Year Inspection Contributed to 1A Emergency Diesel Generator Fuel Rack Binding			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000456/2018003-01 Opened/Closed	[H.7] – Documentation	71153
<p>A self-revealed finding of very low safety significance (i.e., Green) and an associated NCV of 10 CFR Part 50, Appendix B, Criterion V, “Instructions, Procedures, and Drawings,” was identified for the licensee’s failure to have adequate detail within their maintenance procedures to enable proper lubrication of the EDG fuel rack control linkage. Specifically, the preventative maintenance template required that the manual fuel trip lever and associated linkage be lubricated every 2 years. However the licensee’s implementing 2-year maintenance procedure failed to contain specific direction to disassemble the lever assembly for lubrication. This lack of lubrication contributed to the mechanical binding of the EDG fuel rack and failure of the 1A EDG during planned surveillance testing on April 22, 2018.</p>			
<p><u>Description:</u></p> <p>On April 22, 2018, during a planned Unit 1 refueling outage, the 1A EDG output breaker tripped open on under frequency during performance of a pre-planned 1A EDG surveillance test. Although the 1A EDG was not required to be operable at the time since Unit 1 was in Mode 6, the resulting electrical transient caused multiple unplanned actuations of the safety-related Bus 141 undervoltage relay. The fuel supply was secured to the 1A DG and the engine was shut down. Subsequently, control room operators restored power to Bus 141 from the normal Unit 1 offsite power source.</p> <p>The licensee investigated the failure and identified several contributing causes. One of these contributing causes was fuel rack binding. The existing maintenance template for the EDGs required that the manual fuel trip lever be lubricated every 2 years. In accordance with the implementing maintenance procedure, BwMP 3100-022, “Diesel Generator 2 Year Inspection,” the fuel control linkage, including all bearings and fittings, was required to be lubricated with a high performance industrial grease. However, the location where the binding occurred did not provide a bearing or a fitting to perform the lubrication, nor did BwMP 3100-022 contain instructions to disassemble the lever assembly for lubrication. The licensee concluded, therefore, that it was unlikely that sufficient lubrication had ever been applied to the manual fuel trip lever.</p> <p>Corrective Actions: The licensee removed the 1A EDG from service and repaired all deficiencies, including the manual fuel trip lever and associated linkage. The 1A EDG was successfully tested and returned to service on April 27, 2018. Maintenance procedure BwMP 3100-022 was also revised to include specific detailed instructions to disassemble the fuel rack trip lever assembly for proper lubrication.</p> <p>Corrective Action Reference: The licensee entered this issue into their CAP as IRs 4129712 and 4130140. The licensee completed a root cause evaluation for this event as part of IR 4128714.</p>			

Performance Assessment:

Performance Deficiency: The failure to include appropriate details in maintenance procedure BwMP 3100–022, “Diesel Generator 2 Year Inspection,” to facilitate adequate periodic lubrication of the 1A EDG manual fuel trip lever and associated linkage was a performance deficiency.

Screening: The inspectors determined that the performance deficiency was more than minor because it was associated with the Procedures attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the licensee’s planned periodic maintenance on the 1A EDG, as set forth in their 2 year diesel inspection procedure, BwMP 3100–022, had not properly lubricated the manual fuel trip lever and associated linkage, which contributed to mechanical binding of the trip lever and failure of the EDG on April 22, 2018, during surveillance testing.

Significance: The inspectors assessed the significance of the finding using IMC 0609, Attachment 4, “Initial Characterization of Findings,” dated October 7, 2016; and IMC 0609, Appendix G, “Shutdown Operations Significance Determination Process,” dated May 9, 2014. The inspectors determined that the finding pertained to the shutdown safety function of Inventory Control, as described in IMC 0609, Appendix G, Attachment 1, “Shutdown Operations Significance Determination Process Phase 1 Initial Screening and Characterization of Findings.” Using Exhibit 3, “Mitigating Systems Screening Questions,” the inspectors answered “No” to all the screening questions and determined that the finding was of very low safety significance (i.e., Green).

Cross-Cutting Aspect: The inspectors determined that the finding involved the cross-cutting aspect of Documentation under the area of Human Performance. In their evaluation of the issue, the licensee noted that implementing maintenance procedure BwMP 3100–022 had never contained any specific detailed instructions for the disassembly of the manual fuel trip lever and associated linkage to permit adequate lubrication of the component. [H.7]

Enforcement:

Violation: Appendix B to 10 CFR Part 50, Criterion V, “Instructions, Procedures, and Drawings,” requires that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. Instructions, procedures, or drawings shall include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished.

Contrary to the above, the licensee’s periodic maintenance and inspection procedure for the 1A EDG, BwMP 3100–022, “Diesel Generator 2 Year Inspection,” which was a procedure affecting quality, failed to contain instructions that were appropriate to the circumstances from its inception until Revision 37 of the procedure was issued on August 3, 2018, as part of the corrective actions for this issue. Specifically, BwMP 3100–022 failed to include instructions to disassemble the EDG manual fuel trip lever assembly for lubrication.

Disposition: This violation is being treated as a NCV consistent with Section 2.3.2 of the Enforcement Policy.

Minor Violation—LER 05000456/2018-004-00, 1A Emergency Diesel Generator Output Breaker Opened During a Surveillance Which Resulted in Unplanned Actuations of Bus 141 Undervoltage Relay.	71153
<p>Minor Violation: All Braidwood Station EDG governors were replaced during the late 1990s. During design testing, the licensee noted that the historical EDG frequency response had changed slightly due to installation of new electronic governors. Prior to these governor replacements, EDG frequency was always above 57 hertz (Hz) during load sequencing. However, with the newly installed electronic governors, 1A and 2A EDG frequency was observed to dip below the 57 Hz under frequency relay setpoint following start of the 1A and 2A motor-driven AF pumps. (Note that because the 1B and 2B AF pumps are diesel-driven, there is no corresponding impact on the 1B or 2B EDGs.) As a result, an external 2-second time delay, provided by an Agastat time delay relay, was incorporated into the under frequency trip logic for the 1A and 2A EDGs to provide an additional margin for frequency recovery following motor-driven AF pump load starts. The Braidwood governor modification was installed in 1998, with the external time delay added to the 1A and 2A EDGs as part of the design changes to prevent inadvertent actuations of the under frequency logic.</p> <p>During the licensee’s investigation into the issue discussed in the subject LER, it was identified that the external Agastat time delay was installed incorrectly on the 1A EDG. Specifically, the original trip logic wiring had not been properly removed, which permitted the actuation of the under frequency trip after the original 0.5 second internal time delay through the bypassing of the additional 2.0 second external time delay. The wiring error was introduced during the original modification installation in October 1998.</p> <p>Screening: The inspectors determined that the error was of minor safety significance. Absent the mechanical binding of the manual fuel trip lever and associated linkage, as discussed in NCV 05000456/2018003–01 in this report, the 1A EDG had performed reliably and satisfactorily during surveillance testing prior to the Unit 1 refueling outage testing in April of 2018. Additionally, the inspectors determined that the error, having occurred some 20 years ago, was not indicative of current licensee performance.</p> <p>Violation: This failure to comply with the requirements of 10 CFR Part 50, Appendix B, Criterion III, “Design Control,” constitutes a minor violation that is not subject to enforcement action in accordance with the NRC’s Enforcement Policy.</p>	

## EXIT MEETINGS AND DEBRIEFS

The inspectors confirmed that proprietary information was controlled to protect it from public disclosure. No proprietary information was documented in this report.

- On August 17, 2018, the inspectors presented the results from baseline radiation protection program inspections to Ms. M. Marchionda, Site Vice President, and other members of the licensee staff.
- On September 26, 2018, the inspectors discussed the completed 2018 licensed operator requalification program annual operating test and biennial written examination inspection results with Mr. D. Rush, Operations Continuing Training Supervisor, via telephone.
- On October 16, 2018, the inspectors presented the quarterly integrated inspection results to Ms. M. Marchionda, Site Vice President, and other members of the licensee staff.

## DOCUMENTS REVIEWED

### 71111.01—Adverse Weather Protection

#### Procedures:

- 0BwOA ENV-1; Adverse Weather Conditions Unit 0; Revision 123
- OP-AA-102-102; General Area Checks and Operator Field Rounds; Revision 15
- OP-AA-108-107-1001; Station Response to Grid Capacity Conditions; Revision 7
- OP-AA-108-111-1001; Severe Weather and Natural Disaster Guidelines; Revision 17
- OP-BR-102-102-1001; Augmented Operator Field Rounds; Revision 3
- WC-AA-107; Seasonal Readiness; Revision 20

### 71111.04—Equipment Alignment

#### Procedures:

- BwOP CS-E2; Electrical Lineup Unit 2; Revision 0E2
- BwOP CS-M2; Operating Mechanical Lineup – Unit 2, Revision 11
- BwOP RH-E1; Electrical Lineup – Unit 1; Revision 9
- BwOP RH-M1; Operating Mechanical Lineup Unit 1; Revision 14

### 71111.05—Fire Protection

#### Procedures:

- BwAP 1110-1; Fire Protection Program System Requirements; Revision 41
- BwAP 1110-1A3; GOCAR Action Chart Fire Protection Water Suppression Systems; Revision 8
- BwAP 1110-1A4; GOCAR Required Compensatory Measures Action Response Carbon Dioxide Fire Suppression Systems; Revision 10
- BwAP 1110-1A5; GOCAR Required Compensatory Measures Action Response Halon Fire Suppression Systems; Revision 5
- BwAP 1110-3; Plant Barrier Impairment Program; Revision 38
- BwMP 3300-052; Visual Inspection of All Safety Related Fire Dampers; Revision 15
- BwMS 3350-002; Semi-Annual Inspection of Fire Protection Program Required Fire Doors; Revision 13
- BwOP PBI-1; Plant Barrier Impairment Program Pre-Evaluated Barrier Matrix; Revision 2
- CC-AA-201; Plant Barrier Control Program; Revision 12
- ER-AA-600-1069; High Risk Fire Area Identification; Revision 4
- ER-BR-600-1069; Site List of High Risk Fire Areas – Braidwood Unit 1 and Unit 2; Revision 0
- MA-BR-EM-5-00008; Fire Barrier Penetration Visual Inspection; Revision 8
- OP-AA-201-003; Fire Drill Performance; Revision 16
- OP-AA-201-004; Fire Prevention for Hot Work; Revision 15
- OP-AA-201-005; Fire Brigade Qualification; Revision 9
- OP-AA-201-008; Pre-Fire Plan Manual; Revision 4
- OP-AA-201-009; Control of Transient Combustible Material; Revision 20
- OP-MW-201-007; Fire Protection System Impairment Control; Revision 7

#### Pre-Fire Plans:

- No. 96, Fire Zone 11.1A-0; Auxiliary Building 330' Elevation, Unit 1 Auxiliary Building Basement (1A2A SX); Revision 0
- No. 132, Fire Zone 11.4-0; Auxiliary Building 383' Elevation, Unit 2 Auxiliary Building General Area (Center); Revision 0

- No. 133, Fire Zone 11.4-0; Auxiliary Building 383' Elevation, Unit 1 Auxiliary Building General Area (North); Revision 0
- No. 134, Fire Zone 11.4-0; Auxiliary Building 383' Elevation, Unit 2 Auxiliary Building General Area (South); Revision 1
- No. 137, Fire Zone 11.4A-1; Auxiliary Building 383' Elevation, Unit 1 Auxiliary Feedwater Pump Diesel Room; Revision 1
- No. 138, Fire Zone 11.4A-2; Auxiliary Building 383' Elevation, Unit 2 Auxiliary Feedwater Pump Diesel Room; Revision 0

Work Orders:

- 1659699; Mechanical Maintenance Visual Inspection of Safety-Related Fire Dampers; 03/24/2018

71111.06—Flood Protection Measures

Action Requests/Issue Reports:

- 4163095; Cable Vault 1K High Level Alarm Actuated; 08/09/2018
- 4163390; Floor Drains Plugged; 08/10/2018
- 4167686; Continuous 3 – 7 gpm Input to 2C Cable Vault with High Level; 08/28/2018
- 4170993; 2B Cable Vault Alarming; 09/08/2018

Procedures:

- 0BwOA PRI-8; Auxiliary Building Flooding Unit 0; Revision 9
- BwAP 1110-3; Plant Barrier Impairment Program; Revision 38
- BwOP PBI-1; Plant Barrier Impairment Program Pre-Evaluated Barrier Matrix; Revision 2
- BwOP WX-902; Use of Portable Sump Pumps for Non-Installed Sump Pump Application; Revision 3
- CC-AA-201; Plant Barrier Control Program; Revision 12
- ER-AA-300-150; Cable Condition Monitoring Program; Revision 5

71111.11—Licensed Operator Requalification Program

Action Requests/Issue Reports:

- 4173301; Training: NRC Biennial Exam Answer Choice Distribution; 09/14/2018

Procedures:

- ER-AP-331-1003; RCS Leakage Monitoring and Action Plan; Revision 10
- OP-AA-101-111-1001; Operations Standards and Expectations; Revision 20
- OP-AA-101-113; Operator Fundamentals; Revision 11
- OP-AA-101-113-1006; 4.0 Crew Critique Guidelines; Revision 9
- OP-AA-103-102; Watch-Standing Practices; Revision 18
- OP-AA-103-102-1001; Strategies for Successful Transient Mitigation; Revision 2
- OP-AA-103-103; Operation of Plant Equipment; Revision 1
- OP-AA-104-101; Communications; Revision 3
- OP-AA-108-107-1002; Interface Procedure Between BGE/COMED/PECO and Exelon Generation (Nuclear/Power) for Transmission Operations; Revision 11
- OP-AA-111-101; Operating Narrative Logs and Records; Revision 13
- OP-AA-300; Reactivity Management; Revision 12
- TQ-AA-10; Systematic Approach to Training Process Description; Revision 5
- TQ-AA-150; Operator Training Programs; Revision 16
- TQ-AA-155; Conduct of Simulator Training and Evaluation; Revision 8
- TQ-AA-201; Examination Security and Administration; Revision 17



- TQ-AA-306; Simulator Management; Revision 9
- TQ-BR-201-0113; Braidwood Training Department Simulator Examination Security Actions; Revision 21

#### 71111.12—Maintenance Effectiveness

##### Action Requests/Issue Reports:

- 4125460; OSP-A 1B Circulating Water Motor Cable Tan Delta Failed A and B Phase; 04/11/2018
- 4130473; 1B Circulating Water Pump “A” Phase Overcurrent Relay (PR26A) Found Out-of-Tolerance; 04/10/2018
- 4132340; 1B Circulating Water Pump Manually Tripped After Oscillating Amps Observed; 04/30/2018
- 4132455; 1B Circulating Water Pump Trip During Start; 04/30/2018
- 4133655; 1CW01PB Trip; 05/02/2018
- 4134288; Extended Containment Release Practice Evaluation Needed; 05/04/2018
- 4159987; Extent of Condition on Unit 1: 1CW01PB Trip (IR 4133655); 07/30/2018
- 4159989; Extent of Condition on Unit 2: 1CW01PB Trip (IR 4133655); 07/30/2018

##### Procedures:

- ER-AA-310; Implementation of the Maintenance Rule; Revision 11
- ER-AA-310-1001; Maintenance Rule – Scoping; Revision 4
- ER-AA-310-1002; Maintenance Rule Functions – Safety Significant Classification; Revision 3
- ER-AA-310-1003; Maintenance Rule – Performance Criteria Selection; Revision 5
- ER-AA-310-1004; Maintenance Rule – Performance Monitoring; Revision 14

#### 71111.13—Maintenance Risk Assessments and Emergent Work Control

##### Action Requests/Issue Reports:

- 4161799; Vacuum Breaker No. 1 Sodium Bisulfite Leak; 08/04/2018
- 4169985; Trip of the 2TO10C; 09/04/2018
- 4170347; 1A Containment Spray Pump Differential Pressure Low But Acceptable; 09/05/2018
- 4170376; Engineering Evaluation Required for Void Near 1CS009A; 09/05/2018

##### Procedures:

- ER-AA-330-009; ASME Section XI Repair/Replacement Program; Revision 14
- ER-AA-335-015-2003; VT-2 Visual Examination in Accordance with ASME 2001 Edition, 2003 Addenda; Revision 2
- ER-AA-600; Risk Management; Revision 7
- ER-AA-600-1042; On-Line Risk Management; Revision 11
- OP-AA-108-117; Protected Equipment Program; Revision 5
- WC-AA-101-1006; On-Line Risk Management and Assessment; Revision 2
- WC-AA-104; Integrated Risk Management; Revision 25

##### Work Orders:

- 4815080; Mechanical Maintenance – 0CW071 Remove Cover, Investigate Leak and Repair; 08/06/2018
- 4802253; Operations ASME Surveillance on Unit 1 Train A Containment Spray (1CS01PA); 09/05/2018

##### Drawings/Prints:

- M-44, Sheet 3A; Circulating Water Make-Up, Units 1 and 2; Revision AX

- M-900, Sheet 8; Outdoor Piping Arrangement – Chemical Injection Tap Details; Revision A

#### 71111.15—Operability Evaluations and Functionality Assessments

##### Action Requests/Issue Reports:

- 0699328; 1FW079B Check Valve Further Closed than Expected; 11/14/2007
- 4033543; Fuel Pool Temperature Exceeding Rounds Setpoint; 07/20/2017
- 4143932; 2 Sink Holes Near Unit 2 Condensate Storage Tank (Duplicate); 06/04/2018
- 4143961; 2 Sink Holes Near Unit 2 Condensate Storage Tank; 06/04/2018
- 4148595; Sink Hole Near Unit 2 Condensate Storage Tank; 06/19/2018
- 4154445; Fuel Pool Temperature at Upper Rounds Limit; 07/10/2018
- 4165777; 1FW079B Check Valve Further Closed than 1FW079A, C, and D; 08/20/2018

##### Procedures:

- ER-AA-321; Administrative Requirements for Inservice Testing; Revision 12
- ER-AA-600-1012; Risk Management Documentation; Revision 14
- ER-AA-600-1045; Risk Assessments of Missed or Deficient Surveillances; Revision 7
- OP-AA-106-101-1006; Operational Decision Making Process; Revision 19
- OP-AA-108-111; Adverse Condition Monitoring Program; Revision 11
- OP-AA-108-115; Operability Determinations (CM-1); Revision 21

##### Engineering Changes/Technical Evaluations:

- 368412; Evaluation of Feedwater Check Valve FW079 Failure to Close for Braidwood Unit 1; 11/20/2007

##### Calculations:

- BRW-00-0010-M; Byron/Braidwood Uprate Project – Spent Fuel Pool Temperature Analysis; Revision 000Y

#### 71111.19—Post-Maintenance Testing

##### Action Requests/Issue Reports:

- 4174609; 0B Fire Pump Tank Level Gauge Suspect; 09/18/2018
- 4174616; 0B Fire Pump Outside Acceptance Criteria; 09/18/2018

##### Procedures:

- 0BwVS FP.2.1.E-1b; 0B Fire Protection Pump Flow and Pressure Test; Revision 5
- 0BwVS FP.2.2.M-2; Diesel Driven Fire Pump Surveillance; Revision 15
- BwISR 5.5.11.e-1c; Auxiliary Building Non-Accessible Filter Plenum System Total Bypass Leakage Test – Plenum 'C'; Revision 8

##### Work Orders:

- 4586399; 0B Fire Protection Pump Flow and Pressure Test; 09/18/2018
- 4594372; 0C Non-Accessible Plenum Total Bypass Leakage Test; 07/31/2018

##### Engineering Changes/Technical Evaluations:

- 625629; Technical Evaluation of Diesel Driven Fire Pump Performance Acceptability; 09/20/2018

### 71111.22—Surveillance Testing

#### Procedures:

- 1BwOSR 3.8.1.2-2; 1B Diesel Generator Operability Surveillance; Revision 42
- BwOP DG-1; Diesel Generator Alignment to Standby Condition; Revision 30
- BwOP DG-11; Diesel Generator Startup and Operation; Revision 49
- BwOP DG-12; Diesel Generator Shutdown; Revision 30

#### Work Orders:

- 4793086; 1B Diesel Generator Operability Semiannual Surveillance; 09/12/2018
- 4825182; IST – 1B Diesel Generator Operability Monthly; 09/12/2018

### 71114.06—Drill Evaluation

#### Action Requests/Issue Reports:

- 4114638; Training: Performance EP Failure (DEP); 03/14/2018

### 71124.06—Radioactive Gaseous and Liquid Effluent Treatment

#### Action Requests/Issue Reports:

- 4165218; NRC Radiation Protection Inspection Information Request on Accident Range Effluent Monitors; 08/17/2018
- 4114068; Pre-NRC Inspection: Radioactive Gaseous Effluent Treatment (RETS) (IP 71124.06) and Radiological Environmental Monitoring Program (REMP) (IP 71124.07); 06/25/2018
- 4120710; NOS ID Transposition Error in the BRW Emergency Action Level Calculation; 03/29/2018
- 4164990; NRC ID – Potential Wide Range Gas Monitor Calibration Error; 08/16/2018
- 4165169; Air Sample Collection Area vs. Calibration Area; 08/17/2018
- 4165171; Dose Estimate and Transport Plan for Post Accident Sampling; 08/17/2018

#### Procedures:

- CY-BR-170-301; Offsite Dose Calculation Manual (ODCM) Radiological Environmental Monitoring Program; Revision 9
- CY-BR-170-3001; Plant Effluent Dose Projections; Revision 2
- EP-EAL-0601; Criteria for Choosing Radiological Gaseous Effluent Emergency Action Level; Revision 1
- EP-EAL-0601; Criteria for Choosing Radiological Gaseous Effluent Emergency Action Level; Revision 3
- RP-BR-928; 1/2RE-PR028J Radiation Monitor; Revision 7

#### Work Orders:

- 1937904; LR-1PR30J Calibration of Auxiliary Building Vent Stack Wide Range Gas Radiation Monitor; 05/11/2018
- 1946067; 0PR02J Calibration of Effluent Gaseous Radiation Monitors (Gas Decay Tank System); 02/02/2018
- 1821314; 0PR01J Calibration of Liquid Effluent Radiation Monitors; 12/13/2016

#### Engineering Changes/Technical Evaluations:

- 405741; Engineering Evaluation; U2 Diesel Auxiliary Feedwater Pump Air Intake Modification; Revision 0
- 405741; Design Consideration Summary; Revision 0

Other:

- 2016 Radioactive Effluent Release Report; Braidwood Station, Units 1 and 2; 05/12/2017
- 2017 Radioactive Effluent Release Report; Braidwood Station, Units 1 and 2; 04/27/2018
- Gas Permit Post-Release Data; Permit Number G-20180720-788-B; 08/15/2018
- Liquid Permit Post-Release Data; Permit Number 21L-20180809-252-B; 08/17/2018
- NUCON Project/Report 13BRAID8288/1; Radioiodine Test Report; System ID 0VA05FD; 06/14/2018
- NUCON Project/Report 13BRAID8289/1; Radioiodine Test Report; System ID 0VA05FF; 06/14/2018
- NUCON Project/Report 13BRAID8290/1; Radioiodine Test Report; System ID 0VA05FE; 06/14/2018
- NUCON Project/Report 13BRAID8389/1; Radioiodine Test Report; System ID VA ABVS-FB; 07/05/2018
- NUCON Project/Report 13BRAID8390/1; Radioiodine Test Report; System ID VA ABVS-FA; 07/05/2018
- NUCON Project/Report 13BRAID8391/1; Radioiodine Test Report; System ID VA ABVS-FC; 07/05/2018

71124.07—Radiological Environmental Monitoring Program

Action Requests/Issue Reports:

- 4004215; 2017 First Quarter REMP Anomalies and Missed Samples; 04/29/2017
- 4033938; Second Quarter REMP Sample Anomalies and Missed Samples; 07/20/2017
- 4087682; November-December 2017 REMP Sample Anomalies and Missed Sample; 12/27/2017
- 4158666; Notification of REMP Milk Indicator BD-17 will Discontinue; 07/25/2018

Procedures:

- CY-BR-170-301; Offsite Dose Calculation Manual (ODCM) Radiological Environmental Monitoring Program; Revisions 9 and 10

Other:

- Annual Radiological Groundwater Protection Program Report From January through December 2017
- Biennial Review Braidwood Radiological Spills and Unusual Occurrences per 10 CFR 50.75(g) and 10 CFR 72.30(d) Index 03/22/2018
- Braidwood Station, Unit 1 and 2; 2017 Annual Radiological Environmental Operating Report; 05/15/2018
- Braidwood Station, Unit 1 and 2; 2017 Radioactive Effluent Release Report; 04/27/2018
- Environmental Incorporated Midwest Laboratory; Sampling Procedures Manual; Revision 15
- GHD Quarterly Progress Report No. 04; Braidwood Generating Station Remediation at the Circulating Water Blowdown House Discharge at Braceville, Illinois; 2018
- Murray and Trettel, Inc.; Monthly Report on the Meteorological Monitoring Program at the Braidwood Nuclear Generating Station; March 2018

### 71151—Performance Indicator Verification

#### Procedures:

- LS-AA-2001; Collecting and Reporting of NRC Performance Indicator Data; Revision 15
- LS-AA-2150; Monthly Data Elements for NRC RETS/ODCM Radiological Effluent Occurrences; Revision 5
- Monthly Performance Indicator Data compiled by the licensee from July 2017 through June 2018

### 71152—Identification and Resolution of Problems

#### Action Requests/Issue Reports:

- 3974584; North Oil Separator Tritium >1150 pCi/L; 02/15/2017
- 3985651; North Oil Separator Tritium >1150 pCi/L; 03/15/2017
- 4103291; North Oil Separator Tritium Results >1150 pCi/L; 02/12/2018
- 4104421; Environmental Monitoring for North Oil Separator; 02/15/2018
- 4110626; North Oil Separator Tritium Results >1150 pCi/L; 03/02/2018
- 4116691; North Oil Separator Tritium Results >1150 pCi/L; 03/19/2018
- 4129213; North Oil Separator Tritium Results >1150 pCi/L; 04/20/2018
- 4163979; 1B Auxiliary Feedwater Pump Bearing Oil Deflector Partially Backed Out; 08/31/2018
- 2510222; Need to Adjust 1B AF Pump Inboard Bearing Oil Deflector; 06/09/15
- 2510218; Need to Adjust 1A AF Pump Inboard Bearing Oil Deflector; 06/04/15

#### Procedures:

- BwCP 220-2; Tritium Analysis; Revision 18
- CY-BR-170-2060; On-Site Groundwater Monitoring; Revision 6
- EN-AA-408; Radiological Groundwater Protection Program; Revision 0
- EN-AA-408-4000; Radiological Groundwater Protection Program Implementation; Revision 9
- EN-BR-402-0007; Sampling and Reporting Requirements for the North Oil Separator and Main Drainage Ditch; Revision 14
- EN-BR-408-4160; Radiological Groundwater Protection Program Reference Material; Revision 8
- NO-AA-10; Quality Assurance Topical Report; Revision 93
- PI-AA-120; Issue Identification and Screening Process; Revision 8
- PI-AA-125; Corrective Action Program (CAP) Procedure; Revision 6
- PI-AA-125-1001; Root Cause Analysis Manual; Revision 3

### 71153—Follow-Up of Events and Notices of Enforcement Discretion

#### Action Requests/Issue Reports:

- 4128714; OSP-A – Loss of ESF Bus 141 During 1A EDG Sequencer Testing; 04/19/2018
- 4129116; OSP-A – 1B DG Tripped During Monthly Surveillance; 04/20/2018
- 4129712; 1A Diesel Generator Secured During 1BwOSR 3.8.1.19-1; 04/22/2018
- 4130140; Oil Leak in Turbo Charger and Coming Out Cylinders; 04/24/2018
- 4164956; 1DG01EB – 1B DG – Exciter Freewheeling Diode Extent-of-Condition; 08/16/2018
- 4164964; 2DG01EA – 2A DG – Exciter Freewheeling Diode Extent-of-Condition; 08/16/2018
- 4164967; 2DG01EB – 2B DG – Exciter Freewheeling Diode Extent-of-Condition; 08/16/2018

#### Procedures:

- 1BwOA ELEC-3; Loss of 4KV ESF Bus; Revision 102

- 1BwOSR 3.8.1.11-1; 1A Diesel Generator Loss of ESF Bus Voltage With No SI Signal; Revisions 16 – 18
- BwMP 3100-022; Diesel Generator 2 Year Inspection; Revisions 33 – 38