



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

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

May 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 DESIGN BASIS ASSURANCE  
INSPECTION (PROGRAMS) INSPECTION REPORT 05000456/2018012 AND  
05000457/2018012

Dear Mr. Hanson:

On March 30, 2018, the U.S. Nuclear Regulatory Commission (NRC) completed an NRC Design Basis Assurance inspection (Programs) at your Braidwood Station, Units 1 and 2. On May 8, 2018, the NRC inspectors discussed the results of this inspection with Mr. Leaf, Site Operations Director, and other members of your staff. The results of this inspection are documented in the enclosed report.

The NRC inspectors did not identify any findings or violations of more-than-minor significance.

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 Title 10 of the *Code of Federal Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

*/RA/*

Mark Jeffers, Chief  
Engineering Branch 2  
Division of Reactor Safety

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

Enclosure:  
IR 05000456/2018012; 05000457/2018012

cc: Distribution via ListServ®

Letter to Bryan C. Hanson from Mark Jeffers dated May 31, 2018

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Nos: 50-456; 50-457; 72-073

License Nos: NPF-72; NPF-77

Report Numbers: 05000456/2018012; 05000457/2018012

Enterprise Identifier: I-2018-012-0000

Licensee: Exelon Generation Company, LLC

Facility: Braidwood Station, Units 1 and 2

Location: Braceville, IL

Dates: March 12, 2018, through March 30, 2018

Inspectors: J. Bozga, Senior Reactor Inspector  
J. Gilliam, Reactor Inspector  
J. Robbins, Reactor Inspector

Approved by: M. Jeffers, Chief  
Engineering Branch 2  
Division of Reactor Safety

Enclosure

## SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring licensee's performance by conducting a Design Bases Assurance (Programs) 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. The NRC and self-revealed findings, violations, and additional items are summarized in the table below.

### List of Findings and Violations

No findings or violations were identified.

### Additional Tracking Items

Type	Issue Number	Title	Report Section	Status
URI	05000456/2018012-01; 05000457/2018012-01	Qualification of Conduit Seal Removal for 2RY456 Limit Switch	IP71111.21N	Open

## 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 2515, "Light-Water Reactor Inspection Program - Operations Phase." 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

### 71111.21N—Design Bases Assurance Inspection (Programs)

The inspectors evaluated Environmental Qualification Program implementation through the sampling of the following components:

#### Risk Significant/Low Design Margin Components (7)

- (1) 2VA02CC, Residual Heat Removal Pump 2B Cubicle Cooler (Westinghouse motor bearing and bearing lubricant);
- (2) 2MS001D, 2D Main Steam Isolation Valve (3-way solenoid Coils, Isolation valves, 4-way Hydraulic Valves, and Cylinder Rod End Flow Control Valves);
- (3) 2AP21E, Motor Control Center 231X1 (Fuse Block, Control Device Panel, L-56 Electrical Interlock, MTC Control Transformer Lead Wire, Agastat E7000 Series, and J-11 Auxiliary Contacts);
- (4) 2SI8811A, Containment Sump Suction Valve (Limit Switches, Motor, and Operator);
- (5) 2SI8812A, Pump 2A Reactor Water Storage Tank Suction Motor Operated Valve (Motor, Operator, Limit Switches);
- (6) 2RH01PA, Residual Heat Removal Pump 2A (Motor, Pump); and
- (7) 2MS018D, Steam Generator Power Operated Relief Valve (Solenoids, Actuator, Motor, Limits Switches).

#### Primary Containment Components (3)

- (1) Primary containment electrical penetrations;
- (2) 2RY456, Pressurizer Power Operated Relief Valve (Actuator, Solenoids, Limit Switches); and
- (3) 2RY8000A, Pressurizer Power Operated Relief Valve Isolation Valve (Operator, Motor).

## INSPECTION RESULTS

### 71111.21N—Design Bases Assurance Inspection (Programs)

Unresolved Item	Qualification of Conduit Seal Removal for 2RY456 Limit Switch 05000456/2018012-01; 05000457/2018012-01 (Opened)	IP 71111.21N
<p><u>Description:</u> The inspectors identified an unresolved Item concerning the removal of the conduit seal of NAMCO EA180 limit switch for 2RY456 Pressurizer Power Operated Relief Valve.</p> <p>The inspectors reviewed GDS Calculation No. EQC-BY-002; Conduit Sealing Requirements for NAMCO EA-180 Limit Switches Installed at Byron Station, Units 1 and 2, 1/2ZS-RY455A, 456 and 1/2ZS-MS001A-D; Revision 1. The calculation determined the need for a qualified conduit seal was dependent on the actual installed conduit configuration. The conduit configurations at Byron and Braidwood were reviewed for the Namco Limit switches (EID's MS001A-D, RY455A and RY456) and because of the type and orientation of the conduit configuration, the site determined that qualified seals were no longer required to maintain Environmental Qualification of these switches. The original qualification performed by NAMCO for the limit switches required conduit seals as identified by the original testing. NAMCO performed the appropriate testing to qualify the switches to equipment qualification requirements which included conduit seals. The licensee performed a literature review that determined that the seals were no longer required. The inspectors were concerned that the removal of the conduit seal may adversely impact the NAMCO EA180 limit switch for 2RY456 environmental qualification.</p> <p>In response to the inspectors concern, the licensee initiated AR 4120790; NRC Question on EQ Binder Evaluation of Limit Switches; March 29, 2018.</p> <p>Near the end of the inspection period, the licensee provided the inspectors additional information relevant to the removal of the conduit seal of NAMCO EA180 limit switch for 2RY456, which will require additional review. Therefore, this issue is considered an unresolved item pending completion of inspector review and evaluation and discussion with the Office of Nuclear Reactor Regulation.</p>		

## EXIT MEETINGS AND DEBRIEFS

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

- On May 8, 2018, the inspectors presented the Design Bases Assurance Program Inspection results to Mr. Leaf, Site Operations Director, and other members of the licensee staff.

## DOCUMENTS REVIEWED

### 71111.21N—Design Bases Assurance Inspection (Programs)

- AR 1288474; Potential Green NCV – Classification of EQ Zones From HELB; 11/09/2011
- Specification No. G-678844; Control Valves ASME Boiler and Pressure Vessel Code Section III Classes 1, 2, and 3; Revision 2
- Stress Report No. 123-2197; Electrical Penetration Assemblies Byron Station - Unit 2; Braidwood Station - Unit 2; Revision D
- Specification No. 678815; Class 2 Pumps – Based on ASME Boiler and Pressure Vessel Code Section III – Rules for Construction of Nuclear Power Plant Components; Revision 2
- GDS Calculation No. EQC-BY-002; Conduit Sealing Requirements for NAMCO EA-180 Limit Switches Installed at the Byron Station, Units 1 and 2, 1/2 ZS-RY455A, 456 and 1/2 ZS-MS001A-D; Revision 1
- Calculation No. BRW-11-0142-M / BYR 11-127; Seismic Qualification Report Review for the SG PORV 1/2 MS018A/B/C/D Assemblies; Revision 1
- AR 4104002; 2018 Braidwood Environmental Qualification (EQ) Program FASA; 03/07/2018
- Calculation No. BYR04-070 (BRW-04-0057-M); EQ/Similarity Analysis of Crompton Corp. MOV Long Life (MOVLL) Grease – NLGI Grades 0 and 1 for Use at Exelon Nuclear Stations; Revision 0
- Calculation No. BRW-00-0106-N / BYR2000-058; Impact of Power Uprate on Radiological Equipment Qualification; Revision 1
- Calculation No. NED-M-MSD-32; Seismic Qualification Reevaluation of the safety injection motor operated valves 1/2 SI 8812A, B; Revision 0
- Calculation No. BRW-01-0153-E/BYR01-068; Environmental Parameters of EQ Zones; Revision 2
- Document No. PMED-BB-EQ-DBD-00; Byron/Braidwood Station, Units 1 and 2, Environmental Qualification Program Design Basis Document; Revision 0
- AR 1641008; NRC Information Notice 2014-04; Potential for Teflon Material Degradation in Containment Penetrations, Mechanical Seals and Other Components; 06/30/2014
- BwHP 4006-009; NAMCO Limit Switch Maintenance; Revision 12
- EA189-90060; Maintenance and Surveillance Instructions for EA180-Series; Revision C
- CAE/CBE-284; Safety Injection System; System Description; Revision 2
- G-678844; Design Specification for Plant Multi-220; Revision 2
- EQ-BB-026; Justification and Analysis of ASCO Solenoid Valves NP Series; Tab C; Revision 16
- EQ-BB-026; Environmental Qualification of ASCO Solenoid Valves NP Series; Tab F; Revision 16
- EQ-BB-028; Tab F; Appendix A Lubrication Data from LC8; Maintenance Form LC9; Revision 9
- EQ-BB-104; Tab C; Section 20.0; Maintenance and Surveillance; Revision 6
- EQ-GEN023; Justification and Analysis of NAMCO Controls Limit Switch Series EA180; Tab C0; Revision 15
- EQ-GEN023; Justification and Analysis of NAMCO Controls Limit Switch Series EA180; Tab C2; Revision 14
- EQ-BB-027; Justification and Analysis of Limitorque / MOV Actuator Outside Containment; Tab C; Revision 10
- EQ-BB-27; Environmental Qualification of Limitorque / MOV Actuator Outside Containment; Tab F; Revision 10
- EQ-BB-093; Westinghouse Motor Control Center; Tabs C, E, and F; Revision 10

- EQ-BB-024; Anchor Darling Main Steam Isolation Valve Hydraulic Operator; Tabs C, E, and F; Revision 11
- EQ-BB-008; Trane / Westinghouse Cubicle Coolers; Tabs C, E, and F; Revision 5
- EQ-BB-084; Justification and Analysis of Limitorque Motor Operator; Tab C; Revision 6
- EQ-BB-084; Environmental Qualification of Limitorque Motor Operator; Tab F; Revision 6
- EQ-BB-104; Justification and Analysis of Limitorque Motor Operator; Tab C; Revision 6
- EQ-BB-104; Environmental Qualification of Limitorque Motor Operator; Tab F; Revision 6
- EQPD-HE-1; Valve Electric Motor Operator Qualification Group A for Schulz Electric Co insulation System for random wound intermittent duty IE New and Rewound Motors; TAB C1; Revision 5
- EQDP-HE-1; Environmental Qualification of Valve Electric Motor Operator Qualification Group A for Limitorque / Reliance LR; Tab E; Revision 5
- EQDP-AE-2; Westinghouse Large Pump Motors and Auxiliary Lube Oil Pump Motors (Outside Containment); Tab E; Revision 6
- EQDP-HE-4; Westinghouse / Limitorque Valve Operators Group B; Tab E; Revision 4
- EQDP-BB-056; Borg-Warner Main Steam Power Operated Relief Valve Hydraulic Operator; Tab E; Revision 10
- EQDP-Mechanical; Pumps and Valves; Tab E; Revision 11
- BRW-11-0007-E/BYR10-144; Attachment A; [Margin for] ASCO Solenoid Valves NP Series; Revision 0
- EC 375887; Environmental Qualification of Schulz Random Wound; Intermittent Duty Motors for Use in Limitorque Valve Actuators at All Exelon Nuclear Stations; Revision 0
- Report No. 11210-CCR-2; Certificate of Compliance for 480 Volt A.C. Nuclear Safety Related Motor Control Centers; 04/26/1976
- BRW-96-244-E Attach B; Wyle Laboratories Material Aging Data Material Printout; 06/24/1996
- FE 071111; Replacement Fuse Block Evaluation; Revision 1
- CN-CRA-10-29; Byron and Braidwood, Units 1 and 2, Main Steamline Break IC/OC Evaluation of M&E Releases and Containment / Compartment Responses; Revision 0
- OP-BR-102-106; Operator Response Time Program at Braidwood Station; Revision 5
- BRW-96-550-E; Power Uprate Licensing Report for Byron Station and Braidwood Station, Units 1&2; Revision 1
- EC355825; Extend the Qualified Life for the Solenoid Valves on the 1FW035C; 2FW043BA; 2FW043B; and 2FW043D AOVs; Revision 1
- BRW-SE-1997-1800; 10 CFR 50.59, Safety Evaluation for UFSAR DRP 7-051; 04/21/1997
- 20E-2-3316D04; Electrical Installation Steam Tunnel / Safety Valve Room; Revision W
- Information Notice 2015-12, Unaccounted for Error Terms Associated with the Irradiation Testing and Environmental Qualification of Important-to-Safety Components; 11/20/2015
- List of deviations from EPRI Topical Report 106857-V1
- Letter from Commonwealth Edison Company to NRC; Subject: Environmental Qualification of Grease Mixtures in the Main Gear Case of Limitorque Operators (TAC NOS. 79472 and 79473); 04/11/1991
- CHRON 197797; Letter to Kurt Kofron and G. Keith Schwartz; Subject: Byron Units 1 and 2; Braidwood, Units 1 and 2, EQER 00-92-029 Evaluation of Conduit Seals for Namco Limit Switches Installed on MS001A-D; RY455A and RY456; 02/05/1993
- UL 746B; Standard for Safety Polymeric Materials – Long Term Property Evaluations; Revision 4
- Information Notice 2015-12; Impact Assessment for Byron and Braidwood Stations; Revision 0
- Work Order 01217998; 1FSV-CC053 Replace Solenoid Valve; 10/06/2010
- Work Order 01218415; Rebuild Actuator/Regulator/Pilot Valve and Replace Elastomers; 10/17/2010
- Work Order 10610064; Replace EQ Solenoid Valve 1FSV-RY8026; 04/11/2009



- Work Order 1901800-01; EM 2RH01PA-M Sample/Change Oil RH Pump Upper Bearing; 01/08/2018
- Work Order 1760862-01; 2MS018D Replace Actuator Hydraulic Fluid; 06/07/2017

Corrective Actions Documents Generated as a Result of the Inspection

- AR 4114910; Update EQ Binder EQ-BB-26; 03/14/2018
- AR 4115387; NRC ID: Unsecured MCC Cabinet Panels Found During EQ Audit; 03/15/2018
- AR 4115263; Update EQ Binder EQ-BB-093; 03/15/2018
- AR 4117468; Stress Report for Electrical Penetration Assemblies; 03/21/18
- AR 4120262; EQ Binder EQPD-HE-1 Qualification Life Clarification Needed; 03/28/2018
- AR 4120790; NRC Question on EQ Binder Evaluation of Limit Switches; 03/29/2018
- AR 4120754; EQ-BB-093 Tab G28 Missing Wyle Data for Data Section I.14.7; 03/29/2018
- AR 4120765; Challenges in Document Retrieval During NRC EQ Inspection; 03/29/2018