



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

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

February 6, 2019

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

SUBJECT: BYRON STATION, UNITS 1 AND 2—NRC INTEGRATED INSPECTION REPORT
05000454/2018004 AND 05000455/2018004

Dear Mr. Hanson:

On December 31, 2018, the U.S. Nuclear Regulatory Commission (NRC) completed an integrated inspection at your Byron Station, Units 1 and 2. On January 16, 2019, the NRC inspectors discussed the results of this inspection with Mr. T. Chalmers and other members of your staff. The results of this inspection are documented in the enclosed report.

No findings or violations of more than minor significance were identified during this inspection.

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/

Hironori Peterson, Chief
Branch 3
Division of Reactor Projects

Docket Nos. 50-454; 50-455
License Nos. NPF-37; NPF-66

Enclosure:
IR 05000454/2018004; 05000455/2018004

cc: Distribution via LISTSERV®

Letter to Bryan C. Hanson from Hironori Peterson dated February 6, 2019

SUBJECT: BYRON STATION, UNITS 1 AND 2—NRC INTEGRATED INSPECTION REPORT
05000454/2018004 AND 05000455/2018004

DISTRIBUTION:

Michael McCoppin

RidsNrrDorlLpl3

RidsNrrPMBYron Resource

RidsNrrDirslrib Resource

Darrell Roberts

John Giessner

Jamnes Cameron

Allan Barker

DRPIII

DRSIII

ROPreports.Resource@nrc.gov

ADAMS Accession Number: ML19039A068

OFFICE	RIII		RIII				
NAME	NShah:lg		HPeterson				
DATE	2/5/2019		2/6/2019				

OFFICIAL RECORD COPY

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Numbers: 50-454; 50-455

License Numbers: NPF-37; NPF-66

Report Numbers: 05000454/2018004; 05000455/2018004

Enterprise Identifier: I-2018-004-0024

Licensee: Exelon Generation Company, LLC

Facility: Byron Station, Units 1 and 2

Location: Byron, IL

Dates: October 1 through December 31, 2018

Inspectors: J. McGhee, Senior Resident Inspector
C. Hunt, Resident Inspector
G. Hansen, Senior Emergency Preparedness Inspector
J. Park, Reactor Inspector
R. Baker, Senior Operations Engineer
G. Roach, Senior Operations Engineer
J. Bozga, Senior Reactor Inspector
N. Feliz-Adorno, Senior Reactor Inspector
C. Thompson, Resident Inspector, Illinois Emergency
Management Agency

Approved by: H. Peterson, Chief
Branch 3
Division of Reactor Projects

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring licensee's performance by conducting an integrated quarterly inspection at Byron 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

No findings or violations were identified.

Additional Tracking Items

Type	Issue Number	Title	Report Section	Status
LER	05000455/2018-001-00	Byron Unit 2 Automatic Safety System Actuation due to System Auxiliary Transformer 242-2 Failure and Subsequent Unit 2 Loss of Offsite Power (LOOP)	71153	Closed
URI	05000454/2012008-01; 05000455/2012008-01	Inadequate Undervoltage Protection	71153	Closed

TABLE OF CONTENTS

PLANT STATUS.....	4
INSPECTION SCOPES	4
REACTOR SAFETY	4
OTHER ACTIVITIES – BASELINE	7
INSPECTION RESULTS	9
EXIT MEETINGS AND DEBRIEFS	12
DOCUMENTS REVIEWED.....	12

PLANT STATUS

Both Units 1 and 2 operated at scheduled power levels for the entire quarter.

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

Seasonal Extreme Weather (1 Sample)

The inspectors evaluated readiness for seasonal extreme weather conditions prior to the onset of seasonal cold temperatures. Risk significant systems reviewed for extreme cold weather included the reactor water storage tank (RWST), the essential service water system (SX), and the SX cooling tower.

Impending Severe Weather (2 Samples)

The inspectors evaluated readiness for impending adverse weather conditions for high wind conditions forecast on October 3, 2018. A second sample was performed on November 23, 2018 for a winter weather warning for November 25, 2018 with 8–12 inches of snow forecast for the site.

71111.04—Equipment Alignment

Partial Walkdown (4 Samples)

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

- (1) 2B diesel generator, controls, and auxiliary systems on October 23, 2018;
- (2) 2B auxiliary feedwater (AF) pump during 2A AF pump work window on November 11, 2018;
- (3) 0A train of control room ventilation during a 0B train work window on November 13, 2018; and
- (4) Unit 1 stator cooling system on December 21, 2018, after compensatory actions were taken for temperature control valve cycling.

71111.05AQ—Fire Protection Annual/Quarterly

Quarterly Inspection (4 Samples)

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

- (1) 2A diesel generator fuel oil storage tank room on October 5, 2018;
- (2) 2B diesel generator fuel oil storage tank room on October 5, 2018;
- (3) Auxiliary building 401' – 0" elevation general area on November 30, 2018; and
- (4) 1A diesel generator fuel oil storage tank room on December 18, 2018.

Annual Inspection (1 Sample)

The inspectors evaluated fire brigade performance on October 23, 2018.

71111.11—Licensed Operator Requalification Program and Licensed Operator Performance

Operator Requalification (1 Sample)

The inspectors observed a crew of licensed operators in the plant's simulator during licensed operator requalification training on November 6, 2018. The resident inspectors observed a portion of an in-progress annual requalification operating test for an operating crew not observed by the NRC examiners during the biennial portion of this IP.

Operator Performance (1 Sample)

The inspectors observed and evaluated operator performance in the control room and adjacent areas on December 18, 2018, during the performance of an operational high risk surveillance.

Operator Exams (1 Sample)

The inspectors reviewed and evaluated requalification examination results on December 12, 2018.

Operator Requalification Program (1 Sample)

The inspectors evaluated the operator requalification program from October 15, 2018 to October 26, 2018.

71111.12—Maintenance Effectiveness

Routine Maintenance Effectiveness (3 Samples)

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

- (1) Maintenance Rule (a)(3) assessment for the period of January 2017 through June 2018;
- (2) Primary containment (Function PC); and
- (3) Unit 0 SX Makeup (Function SX-06).

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) Emergent risk due to degraded condition of 1B centrifugal charging pump (CV) auxiliary oil pump and removal from service for repair on October 10, 2018;
- (2) Walk down of risk management actions and protected equipment associated with the 2A AF pump work window on November 8, 2018; and
- (3) Walk down of risk management actions and protected equipment associated with the 0A VC chiller work window on December 10, 2018.

71111.15—Operability Determinations and Functionality Assessments (4 Samples)

The inspectors evaluated the following operability determinations and functionality assessments:

- (1) Unit 1 leading edge flow meter after trouble alarms and automatic transfer to flow venturies on October 11, 2018;
- (2) 0A essential service water (SX) makeup pump after high vibration was measured at the upper gearbox on November 1, 2018;
- (3) 1C steam generator level instrument failed channel check on November 19, 2018; and
- (4) 1RF027 valve stroke test failure while 1BOSR 6.3.5–14 was being performed on November 19, 2018.

71111.18—Plant Modifications (1 Sample)

The inspectors evaluated the following temporary or permanent modifications:

- (1) Engineering Change (EC) 624333, Revision 1; Steam Generator Blowdown Overboard and Reduction.

71111.19—Post Maintenance Testing (4 Samples)

The inspectors evaluated the following post maintenance tests:

- (1) WO 04838406, Unexpected Rod Motion on Unit 1, due to spiking temperature reference signal on October 11, 2018;
- (2) 0BOSR Z.7.a.6–2, Revision 1; Unit Zero Essential Service Water Make-up Pump Prime Mover Inspection, and 0BOSR 7.9.6–2, Revision 41; Essential Service Water Makeup Pump 0B Monthly Operability Surveillance, after preventative maintenance on the pump on October 18, 2018;
- (3) 2BOSR 5.5.8.AF.5–1a; Unit Two Group A Inservice Testing (IST) Requirements for Motor Driven Auxiliary Feedwater Pump 2AF01PA, Revision 12 on 2A AF pump after preventative maintenance on pump, heat exchangers and coupling on November 9, 2018; and
- (4) WO 4596749–41, OPS VC/VS Cross-Tie Mod – “A” Train Testing, EC 0618035, not performed as planned and engineering evaluation required.

71111.22—Surveillance Testing

The inspectors evaluated the following surveillance tests:

In-Service (2 Samples)

- (1) 2BOSR 5.5.8.DO-1, Unit Two Test of the Diesel Oil Transfer System, for the 2B diesel oil transfer pumps on November 1, 2018; and
- (2) 1BOSR 5.5.8.SI.5-1C, Unit One Comprehensive IST Requirements for Safety Injection Pump 1SI01PA, Revision 7, on September 13, 2018.

71114.02—Alert and Notification System Testing (1 Sample)

The inspectors evaluated the maintenance and testing of the alert and notification system on October 15–18, 2018.

71114.03—Emergency Response Organization Staffing and Augmentation System (1 Sample)

The inspectors evaluated the readiness Emergency Response Organization on October 15–18, 2018.

71114.04—Emergency Action Level and Emergency Plan Changes (1 Sample)

The inspectors evaluated submitted Emergency Action Level and Emergency Plan changes on November 29, 2018. This evaluation does not constitute NRC approval.

71114.05—Maintenance of Emergency Preparedness (1 Sample)

The inspectors evaluated the maintenance of the emergency preparedness program on October 15–18, 2018.

71114.06—Drill Evaluation

Emergency Planning Drill (1 Sample)

The inspectors evaluated an emergency drill with the Technical Support Center participating on November 14, 2018.

OTHER ACTIVITIES – BASELINE

71151—Performance Indicator Verification (9 Samples)

The inspectors verified licensee performance indicators submittals listed below:

- (1) MS06: Emergency AC Power Systems—2 Samples (October 1, 2015 through September 30, 2018);
- (2) MS07: High Pressure Injection Systems—2 Samples (October 1, 2015 through September 30, 2018);
- (3) MS09: Residual Heat Removal Systems—2 Samples (October 1, 2015 through September 30, 2018);

- (4) EP01: Drill/Exercise Performance—1 Sample (September 1, 2017 through June 30, 2018);
- (5) EP02: Emergency Response Organization Drill Participation—1 Sample (September 1, 2017 through June 30, 2018); and
- (6) EP03: Alert And Notification System Reliability—1 Sample (September 1, 2017 through June 30, 2018).

71152—Problem Identification and Resolution

Semiannual Trend Review (1 Sample)

The inspectors reviewed the licensee's corrective action program and various other administrative processes for trends that might be indicative of a more significant safety issue.

Annual Follow-Up of Selected Issues (2 Samples)

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

- (1) Unit 1 steam generator lower lateral support shim plate issues were identified and repaired during the refueling outage. Inspectors reviewed the repairs prior to reactor startup, but concerns regarding potential design or installation issues with these critical seismic support elements warranted a more detailed inspection of the calculations and design specifications used to support the functionality of the shim plates; and
- (2) Action Request (AR) 04140600 "Westinghouse Part 21 For CRDM [Control Rod Drive Mechanism] Thermal Sleeves" and AR 04140999 "Westinghouse Part 21 For CRDM Thermal Sleeves" were associated with a 10 CFR Part 21 notification Westinghouse made to the NRC (Westinghouse LTR–NRC–18–34, dated May 23, 2018). The specific issue was associated with wear of thermal sleeves in the CRDM penetration tubes which could have a safety consequence that was not previously considered (reference: NRC Information Notice "Thermal Sleeve Flange Wear Leads to Stuck Control Rod at Foreign Nuclear Plant").

The review for this sample was conducted in accordance with the NRC Operating Experience Smart Sample 2018/01 "Evaluation of Licensee Actions Taken in Response to 10 CFR Part 21 Notification of the Potential Existence of Defects Related to Control Rod Drive Mechanism Thermal Sleeves," to evaluate the licensee's use of operating experience and ensure that this issue was adequately evaluated for applicability, and applicable lessons learned communicated to appropriate organizations and implemented.

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

Licensee Event Reports (1 Sample)

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

- (1) Licensee Event Report (LER) 455–2018–001–00, Byron Station Unit 2 Automatic Safety

System Actuation Following a Trip of a Safety Auxiliary Transformer and Subsequent Loss of Offsite Power.

INSPECTION RESULTS

No findings or violations were identified.

71152—Problem Identification and Resolution

Observation	71152 – Semi Annual Trend Review
In addition to the licensee's corrective action program (CAP), the inspectors reviewed the licensee's abnormal component position data sheet, equipment status tag log, and operator burden and degraded equipment aggregate assessment, for the previous six months, to identify trends that might indicate the existence of a more significant safety issue. The inspectors selected a sample of items tracked by the licensee in these processes to verify that issues were entered into the CAP and that the issue reports were given a priority commensurate with their safety significance. The inspectors concluded that the licensee continues to identify issues and enter those issues into the CAP in a timely manner. The inspectors did not identify any adverse trends that would be indicative of a more significant safety issue.	

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

Observation-LER 455/2018–001–00, Byron Station Unit 2 Automatic Safety System Actuation following a trip of a Safety Auxiliary Transformer and subsequent Loss of Offsite Power	71153
<p>On July 6, 2018, with both units at Byron Station operating at full power, Station Auxiliary Transformer (SAT) 242–1 and SAT 242–2 tripped due to an internal fault on SAT 242–2 causing a loss of offsite power on Unit 2 and safety system actuation. The circuit breakers supplying the common feed to SAT 242–1 and 242–2 tripped open on a differential current relay and sudden pressure actuation. A significant amount of oil was found leaking from the transformer and bushings. There were no switching operations or weather events in progress at the time of the failure. The 2A and 2B diesel generators automatically started on 4.16 kilovolt bus undervoltage signal and sequenced on to the Unit 2 emergency safeguards feature buses as designed. All other buses normally powered from the SATs automatically transferred to the Unit Auxiliary Transformers as designed. In addition, the 2A auxiliary feedwater pump automatically started on the 2A diesel generator sequencing timer actuation and injected into the Unit 2 steam generators. The inspectors' review of the operator performance in response to the event was previously documented in NRC Integrated Inspection Report 05000454/2018003 and 05000455/2018003 with no performance deficiencies identified. The licensee's causal investigation concluded that maintenance activities to replace a low voltage bushing performed in May of 2018 exposed previously damaged high voltage lead insulation to air and contaminants resulting in partial discharges that ultimately resulted in the failure after the transformer was re-energized.</p> <p>Review of the operating history of the transformer revealed that the dissolved gas analysis of the SAT 242–2 oil changed significantly after a 2012 switchyard event that resulted in operation of the transformer under load for approximately 40 minutes with an open phase supply from the switchyard. That event was documented in LER 05000454/2012–001–00, "Unit 2 Loss of Normal Offsite Power and Reactor Trip and Unit 1 Loss of Normal Offsite</p>	

Power Due to Failure of System Auxiliary Transformer Inverted Insulators,” and subsequent evaluation of SAT 242–2 revealed some indication that a thermal fault had occurred in SAT 242–2. After reviewing the dissolved gas trends, the licensee concluded that the fault represented a long term concern for reliability rather than an imminent failure condition. This conclusion was supported by the transformer original equipment manufacturer (OEM) and the licensee implemented a monitoring program, including installation of online dissolved gas monitors, with contingency actions to remove the transformer should the trends indicate a degrading condition. The transformer continued to operate in this condition until May 2018.

During a preventative maintenance outage in May of 2018, Commonwealth Edison transformer technicians identified an oil leak on a low voltage bushing and the site prudently decided to replace the bushing. Transformer oil level was drained to a level that allowed access to the bushing connections but kept the transformer windings immersed in oil in accordance with the transformer group maintenance plan. Contingency plans to limit introduction of moisture and contaminants were put in place to purge the transformer cavity with dry heated and filtered air while the transformer case was open and to minimize time that the transformer case was open. The bushing was replaced and oil level was subsequently restored with degassed oil using gravity fill. SAT 242–2 was re-energized on May 25, 2018. An oil sample was drawn on June 4 with acceptable results. Another oil sample was drawn on June 24 to evaluate the cellulosic material (furan test) and the lab concluded that very little change had occurred since the last analysis and no accelerated degradation of the cellulosic (commonly referred to as paper) insulation was occurring. Dissolved gas monitors continued to sample gases every four hours and the output remained consistent with manual oil samples. Hydrogen gas trended up at a rate of 2–3 parts per million (ppm) per day from June 30 to July 6, but no additional hot metal gasses increased significantly and moisture content remained low. Hydrogen levels were still a factor of 10 below the industry standard required action level that required the transformer to be removed from service when the transformer failed on July 6.

Internal inspection of the failed transformer identified damage to the A-phase high voltage exit lead just above the top pressboard pressure ring. According to the evaluation, arcing flashover was created between that lead and the top core clamp in several locations. One strand of the high voltage lead was damaged, the porcelain broken and insulating paper burnt. It was evident that the insulation structure of the high voltage lead was compromised and the A-phase winding may have been compromised. The transformer was not able to be repaired on site. As a corrective action, the damaged transformer was removed from service and the unit was aligned to operate with SAT 242–1 supplying the loads as described in the previous discussion. The causal evaluation employed outside experts (the OEM and a recognized industry vendor) to perform a third party review and evaluate the transformer health evaluation after the 2012 event and the maintenance activities performed in 2018. Both vendor reports supported the licensee’s conclusion regarding the health of the machine after the 2012 event and concluded that machine would not likely have failed in 2018 if not exposed to the air and contaminants through the maintenance activity. However, the OEM also indicated that the partial drain and gravity refill was a less than desirable method for oil replacement on a 345 kilovolt transformer because it could introduce air bubbles that could become trapped in critical areas of the transformer insulation structure. The OEM would have recommended a vacuum fill and hold of the transformer after the maintenance to remove moisture and contaminants and to limit the possibility of trapped air bubbles. The inspectors reviewed the work documents, the vendor reports, industry maintenance recommendations and the OEM maintenance instructions and concluded that the licensee’s evaluation of the transformer condition after the 2012 event was supported by the data available. The inspectors also

concluded that while not optimum for large transformers, the partial drain methodology employed by the licensee was an acceptable industry method of transformer oil replacement. The licensee's actions to mitigate exposure to contaminants were reasonable and appropriate to the circumstances as understood by the licensee. Based on the inspectors' review, no performance deficiency was identified.

Based on the above, this LER is closed.

Unresolved Item (Closed)	URI 05000454/2012008-01; 05000455/2012008-01: Inadequate Undervoltage Protection	4OA5
<p><u>Description:</u></p> <p>On March 27, 2012, the U.S. Nuclear Regulatory Commission (NRC) documented an unresolved item (URI) in Inspection Report 05000454/2012008; 05000455/2012008 (ADAMS Accession No. ML12087A213) involving an undervoltage protection design vulnerability that was revealed during the loss of a single phase event, which occurred on January 30, 2012. The issue was opened as an unresolved item pending further review.</p> <p>Recognizing the generic implications of this issue, the NRC issued Bulletin 2012-01, "Design Vulnerability in Electric Power System," on July 27, 2012, to request, in part, that addressees comprehensively verify their compliance with applicable requirements described therein. Since that time, the industry developed an initiative to address the open phase condition of electric power system. Byron Station, Units 1 and 2, notified the NRC of their intention to complete necessary actions as scheduled in this initiative in letter from David Gullott titled "Exelon Generation Company, LLC Additional Information Regarding Response to Bulletin 2012-01, 'Design Vulnerability in Electric Power System,'" dated February 3, 2014. On March 9, 2017, the Commission issued a Staff Requirements Memorandum in SECY-16-0068 (ADAMS Accession No. ML17068A297) providing direction to the NRC staff regarding this issue. It stated, in part:</p> <p style="padding-left: 40px;">Going forward, the staff should verify that licensees have appropriately implemented the voluntary industry initiative. If the staff determines that a licensee does not adequately address potential OPCs [open phase conditions], including updating the licensing basis to reflect the need to protect against OPCs, the staff should consider the appropriate regulatory mechanism to impose the necessary requirements to protect against OPCs using the current guidance on such matters from the Office of the General Counsel.</p> <p>Corrective Action Reference: AR 01322212, B2F26 Potential Design Vulnerability in Switchyard Single Open Phase; 02/03/2012</p>		

Closure Basis: On April 5, 2018, the NRC completed an inspection of Temporary Instruction 2515/194, "Inspection of the Licensee's Implementation of Industry Initiative Associated with the Open Phase Condition Design Vulnerabilities in Electric Power Systems (NRC Bulletin 2012-01)," and did not identify any findings or violations of more-than-minor significance. This inspection was documented in Inspection Report 05000454/2018011; 05000455/2018011 (ADAMS Accession No. ML18138A136).

Based on the above, this URI is closed. This review did not represent an inspection sample.

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 October 18, 2018, the inspector presented the emergency preparedness inspection results to Mr. T. Chalmers, Site Vice President (Acting), and other members of the licensee staff.
- On October 26, 2018, the inspectors presented the licensed operator requalification program inspection results to Mr. P. Boyle, Plant Manager (Acting), and other members of the licensee staff.
- On November 29, 2018, the inspector presented the annual emergency preparedness program inspection results to Mr. B. Lloyd, Site Emergency Preparedness Manager.
- On December 12, 2018, the inspectors presented the completed 2018 LORT annual operating test and biennial written examination inspection results to Mr. K. Sanford, Operations Training Manager, per teleconference.
- On January 16, 2018, the inspector presented the quarterly integrated inspection results to Mr. T. Chalmers, and other members of the licensee staff.

DOCUMENTS REVIEWED

71111.01—Adverse Weather Protection

- WC-AA-107; Seasonal Readiness; Revision 20
- Temporary Configuration Change Package, TCCP 617316; TCCP – Proceduralized for Temporary Auxiliary Boiler Unit 1; Revision 000

71111.04—Equipment Alignment

- BOP AF-M2B, Auxiliary Feedwater System Train "B" Valve Lineup; Revision 8
- BOP VC-17, Swapping Control Room Chiller And HVAC Trains, Revision 14
- AR 04193204; 0A VC chiller oil recovery line; 11/8/2018
- EC 344171; Documentation of evaluation of the 0B VC chiller; Revision 0
- Drawing M-152, Sheet 1B; Manufacturer's Supplemental Diagram Generator Stator Water Cooling System; Revision EDSF

71111.05Q—Fire Protection Quarterly

- Pre-Fire Plan #93; FZ 10.1-2 Auxiliary Building 383'-0" Elevation 2B Diesel Fuel Oil Storage Tank Room; Revision 2

- Pre-Fire Plan #95; FZ 10.2-1 Auxiliary Building 383'-0" Elevation 1A Diesel Fuel Oil Storage Tank Room; Revision 2
- Pre-Fire Plan #95; FZ 10.2-2 Auxiliary Building 383'-0" Elevation 2A Diesel Fuel Oil Storage Tank Room; Revision 2
- Pre-Fire Plan #148; FZ 11.5-0 Auxiliary Building 401'-0" Elevation General Area-West; Revision 3
- Pre-Fire Plan #146; FZ 11.5-0 Auxiliary Building 401'-0" Elevation General Area-North; Revision 2
- Pre-Fire Plan #147; FZ 11.5-0 Auxiliary Building 401'-0" Elevation General Area-South; Revision 2

71111.11—Licensed Operator Requalification Program and Licensed Operator Performance

- OP-AA-101-111-1001; Operations Standards and Expectation; Revision 20
- OP-AA-102-106; Operator Response Time Program; Revision 04
- OP-AA-103-102; Watch-Standing Practices; Revision 16
- OP-AA-103-102-1001; Strategies for Successful Transient Mitigation; Revision 2
- OP-AA-105-101; Administrative Process for NRC License and Medical Requirements; Revision 21
- OP-AA-105-102; NRC Active License Maintenance; Revision 14
- OP-DR-102-106; Operator Response Time Program at Byron; Revision 09
- OP-DR-103-102-1002; Strategies for Successful Transient Mitigation; Revision 23
- OP-DR-108-101-1002; Operations Department Standards and Expectations; Revision 27
- TQ-AA-150; Operator Training Programs; Revision 16
- TQ-AA-201; Examination Security and Administration; Revision 17
- TQ-AA-155; Conduct of Simulator Training and Evaluation; Revision 08
- TQ-AA-306; Simulator Management; Revision 08
- TQ-AA-155-F04; Simulator Evaluation Form—Individual; Week 3 Crew D; October 25, 2018
- TQ-AA-155-F05; Simulator Evaluation Form—Crew; Week 3 Crew D; October 25, 2018
- TQ-AA-155-J010; Job Performance Measure (JPM) Development Job Aid; Revision 00
- TQ-AA-155-J020; Job Performance Measure Template Job Aid; Revision 00
- TQ-AA-155-J030; Simulator Evaluation Job Aid; Revision 02
- TQ-AA-150-J202; LORT Annual Exam Development Job Aid; Revision 03
- Byron Station LOR Simulator Scenario Guide (SEG) BY-66; Revision 6
- Byron Station LOR SEG BY-71; Revision 1
- Byron Station LOR SEG BY-72; Revision 6
- Byron Station LOR SEG BY-75; Revision 0
- Job Performance Measure (JPM) N004; Revision 10
- JPM N012; Revision 8
- JPM N023a; Revision 4
- JPM N056a; Revision 5
- JPM N056c; Revision 0
- JPM N085a; Revision 10
- JPM N102; Revision 3
- JPM N127; Revision 3
- JPM N130a; Revision 2
- JPM N32t; Revision 0
- Remedial Training Records; Various
- Byron Simulator Cycle 22 Steady State Test Records; dated May 25, 2017
- Byron Simulator Cycle 22 Reactor Physics Test Results; October 2017
- Byron Simulator Cycle 22 Core Performance Testing Records; dated May 23, 2017

- Byron Station PPC Replacement Site Acceptance Test (SAT) for Simulator Interface; dated February 12, 2018
- Byron Station Simulator Transient Test TT2; Loss Of All Feedwater (Normal and Emergency); March 2018
- Byron Station Simulator Transient Test TT5; Single Recirc Pump Trip; March 2018
- Byron Station Simulator Transient Test TT6; Turbine Trip from A Power Level Such That A Scram Does Not Occur; March 2018
- Byron Station Simulator Transient Test TT8; LOCA With A Loss Of Off-Site Power; March 2018
- Byron Station Simulator Post Event Transient Analysis; 2B Reactor Recirc Pump Trip 6/26/17; October 6, 2017
- Scenario Exercise Guide OPEX – I; Scenario Based Testing Report; March 20, 2018
- Scenario Exercise Guide OPEX – P; Scenario Based Testing Report; March 21, 2018
- Simulator Review Board (SRB) Minutes; 1st Quarter 2016; March 30, 2016
- SRB Minutes; 3rd Quarter 2016; September 23, 2016
- SRB Minutes; 1st Quarter 2017; June 26, 2017
- SRB Minutes; 3rd Quarter 2017; September 19, 2017
- SRB Minutes; 4th Quarter 2017; December 8, 2017
- AR 03966217; 4.0 Critique: Reactivity Control; 01/24/2017
- AR 04014697; Unit 2 TCV Failure 4.0 Critique; 05/25/2017
- AR 04064859; Incorrect SX MU Pump Start; 10/19/2017
- AR 04065037; 1B DG Unexpected Alarm – Level 4 CC Event; 10/20/2017
- AR 04077538; 4.0 Critique: 1A EH Pump Trip; 11/23/2017
- AR 04080034; 4.0 Critique of Response to U2 TCV Bypass Valve Failure; 12/01/2017
- AR 04098253; End of the Year Reactivity Management Roll Up; 01/29/2018
- AR 04152764; 4.0 Critique of Ops Response to DC Bus 111 Charger Loss; 07/03/2018
- AR 4039858; NOSA-BYR-17-08 Operations Functional Area Audit Report; 10/04/2017
- AR 4134069; NOSA-BYR-18-07 Training and Staffing Audit Report; 07/11/2018
- List of Open and Closed Simulator Work Requests; dated October 16, 2018
- Simulator Work Request (SWR) 16945; EC 401418, PPC
- SWR 17019; EC 403794, EHC System Upgrades
- SWR 132476; DEOP Screen Revision
- SWR 132942; EC 401316, Cyber Security
- SWR 133261; EC 406696, TR-81 MOD Modification
- SWR 133418; EC 388779, TR22/TR86 Open Phase Protective Relaying
- 2BOSR 3.1.5-2; Train B Solid State Protection System Surveillance; Revision 44
- AR 04204201; 2BOSR 3.1.5-2 Train 2B SSPS Reset Timer Out of Tolerance; 12/18/2018

71111.12—Maintenance Effectiveness

- Maintenance Rule System Basis Document for Function PC
- Function PC Summary Evaluation for Previous 2-Year Period; 09/2018
- Byron Station Maintenance Rule Periodic Assessment #15, Revision 0; January 2917 – June 2018; dated 9/28/2018

71111.13—Maintenance Risk Assessments and Emergent Work Control

- AR 04174760; B CV Pump Aux Oil Pump Is Cycling; 9/19/2018
- WO 04832473; B CV Pump Aux Oil Pump Is Cycling; 10/10/2018
- OP-BY-108-117-1000; Byron Protected Equipment Program; Revision 11

71111.15—Operability Determinations and Functionality Assessments

- AR 04182314; Unit 1 LEFM Trouble; 10/11/2018
- WO 04816930; 0SX02PA Comprehensive IST Requirements for SX Makeup Pump; 11/1/2018
- 0BOSR 5.5.8.SX.5-1c; Unit Zero Comprehensive Inservice Testing (IST) Requirements for Essential Service Water Makeup Pump 0A; Revision 14
- AR 04190344; 0SX02PA Upper Gear Box High Vibes; 11/1/2018
- AR 04201702; Remove 0SX02PA From Double Test Frequency; 12/10/2018
- AR 04196402; 1C S/G [Steam Generator] Level Channel1LI-0537 Failed Channel Check Per Rounds; 11/19/2018
- AR 04190942; 1RF027 Valve Stroke Test Failure 1BOSR 6.3.5-14; 11/2/2018

71111.18—Plant Modifications

- AR 04184575 Unit 2 Steam Generator Blowdown Overboard Issues 2SD054B; 10/17/2018
- AR 04185114; Steam Generator Blowdown Overboard Issues Local Inlet Gauges; 10/18/2018
- WO 04786778; Install EC 624333, SG Overboard Modification; 10/9/2018
- Report SL-013213, Revision 0; Study to Investigate Various Aspects of Steam Generator Blowdown Flow; March 22, 2016
- 1BOSR 0.1-1,2,3; Unit One Mode 1, 2, & 3 Shiftly And Daily Operating Surveillance; Revision 69

71111.19—Post Maintenance Testing

- AR 04180628; Unexpected Rod Motion on Unit 1; 10/05/2018
- AR 04184873; 0B SX Makeup Pump Tripped During PMT Run; 10/18/2018
- AR 04201813; VC/VS Xtie EC 618035 PMT for 0A VC Train; 12/10/2018
- EC 626548; Evaluation 0A VC/VS Crosstie Flow Capability with Respect to EC 618035 Modification Test Criteria; 12/11/2018
- BOP VC-20, VC Chilled Water System to VS Chilled Water System Crosstie Operation with One Train Inoperable for Maintenance; Revision 0

71111.22—Surveillance Testing

- 2BOSR 5.5.8.DO-1, Unit Two Test of the Diesel Oil Transfer System; Revisions 6, 7, and 8
- AR 04173100, Test Transmitters Found Out of Cal After Testing; 9/14/2018
- EC 625558, Evaluate Impact of Test Transmitters Found Out of Tolerance as Described in IR 04173100, Revision 0

71114.02—Alert and Notification System Testing

- Offsite Emergency Plan Alert and Notification System Addendum for Byron Nuclear Power Station; Dated May 2013
- U.S. Department of Homeland Security, FEMA Letter; Backup Alert and Notification System; Dated December 10, 2012
- Exelon Nuclear Manager, Midwest Emergency Preparedness Letter to Program Enhancement Manager, Illinois Emergency Management Agency; Submission of Byron Generating Station Public Alert and Notification System (ANS) Design Report, Revision 3; Dated October 1, 2018
- KLD-TR-986; Byron Generating Station Alert and Notification System (ANS) Design Report; Dated September 19, 2018

- EP-AA-1000; Exelon Nuclear Standardized Radiological Emergency Plan Section E; Revision 29
- EP-AA-1002; Exelon Nuclear Radiological Emergency Plan Annex for Byron Station, Section 4; Revision 35
- Byron Station 2017 Warning System Maintenance & Operational Reports
- Byron Station 2018 Warning System Maintenance & Operational Reports
- Byron Station Monthly Siren Availability Reports; September 2016 – September 2018
- Byron Station Siren Corrective Maintenance Reports; September 2016 – September 2018
- 2018/2019 Emergency Planning for the Byron Area (Community Information Booklet)
- AR 02738001; EP-Siren Failure (BY51)
- AR 03946775; EP-Planned Siren Upgrade (BY58)
- AR 04037291; EP-Siren Failure (BY48)
- AR 04072003; EP-Siren Failure (BY29)
- AR 04148373; EP-Siren Failure (BY05)

71114.03—Emergency Response Organization Staffing and Augmentation System

- EP-AA-1000; Exelon Nuclear Standardized Radiological Emergency Plan, Sections B and N; Revision 29
- EP-AA-1002; Exelon Nuclear Radiological Emergency Plan Annex for Byron Station, Section 2; Revision 35
- EP-AA-1002; Exelon Nuclear Radiological Emergency Plan Annex for Byron Station, Addendum 1, On-Shift Staffing Technical Basis; Revision 1
- EP-AA-112-100-F-06; ERO Notification or Augmentation; Revision W
- EP-AA-112-200; TSC Activation and Operation; Revision 11
- EP-AA-112-300; OSC Activation and Operation; Revision 10
- EP-AA-112-400; EOF Activation and Operation; Revision 14
- EP-AA-112-600; PIC Organization Activation and Operation; Revision 14
- EP-AA-112-700; Alternative Facility Activation and Operation; Revision 0
- TQ-AA-113; ERO Training and Qualification; Revision 34
- September 6, 2017 Emergency Response Organization Drive-In Drill Report; Dated September 25, 2017
- Quarterly Unannounced Off-Hours Call-In Augmentation Drill Results; November 2016 – August 2018
- Emergency Response Organization Duty Team Roster; Dated September 28, 2018
- ERO Staff Training Records Review (Sample – 10)
- AR 02714828; Operations Focus – EP Performance
- AR 03970778; Failure During Simulator Scenario
- AR 04157032; Emergency Preparedness Qualification Lapsed\

71114.04—Emergency Action Level and Emergency Plan Changes

- EP-AA-120; Emergency Plan Administration; Revision 21
- EP-AA-120-1001; 10 CFR 50.54(q) Change Evaluation; Revision 9
- EP-AA-1000; Exelon Nuclear Standardized Radiological Emergency Plan: Revision 29
- EP-AA-1002; Exelon Nuclear Radiological Emergency Plan Annex for Byron Station; Revisions 34 and 35
- EP-AA-1002 Addendum 1; Byron Station On-Shift Staffing Technical Basis; Revision 1
- EP-AA-1002, Addendum 3; Emergency Action Levels for Byron Station; Revisions 1 and 2
- 10 CFR 50.54(q) Evaluator Qualification Spreadsheet; Dated May 30, 2018

- 50.54(q) Evaluation No. 17-70; EP-AA-1002, Exelon Nuclear Radiological Emergency Plan Annex for Byron Station (Revision 35) Evaluation and Effectiveness Review; Dated August 23, 2017
- 50.54(q) Evaluation No. 17-93; EP-AA-1002, Addendum 3, Emergency Action Levels for Byron Station (Revision 2) Evaluation and Effectiveness Review; Dated July 28, 2017

71114.05—Maintenance of Emergency Preparedness

- EP-AA-1000; Exelon Nuclear Standardized Radiological Emergency Plan Section J, Protective Response; Revision 29
- EP-AA-1002; Exelon Nuclear Radiological Emergency Plan Annex for Byron Station, Section 3, Classification of Emergencies; Revision 35
- EP-AA-1002; Exelon Nuclear Radiological Emergency Plan Annex for Byron Station, Section 5.1, Emergency Response Facilities; Revision 35
- EP-AA-1002, Addendum 3; Emergency Action Levels for Byron Station; Revision 2
- KLD-TR-637; Evacuation Time Estimates for Byron Station Plume Exposure Pathway Emergency Planning Zone; Revision 0
- Byron Generating Station Annual Population Update – 2017; Dated June 6, 2017
- Byron Generating Station 2018 Population Update Analysis; Dated September 8, 2018
- EP-AA-122; Drills and Exercise Program; Revision 19
- EP-AA-124-F-03; Site & Site-Specific EOF Communications 9.3 & EMNET Satellite Communication Systems Semi-Annual Testing & Inventory; Dated July 30, 2018
- EP-MW-124-1001-F-01; Control Room/Simulator Inventory Records; 1st Quarter 2018 – 3rd Quarter 2018
- EP-MW-124-1001-F-02; CR/Simulator/TSC/OSC Equipment Test – TSC Software and Reference Document Inventory Records; 1st Quarter 2018 – 3rd Quarter 2018
- EP-MW-124-1001-F-03; Technical Support Center Inventory Records; 1st Quarter 2018 – 3rd Quarter 2018
- EP-MW-124-1001-F-04; Operations Support Center Inventory Records; 1st Quarter 2018 – 3rd Quarter 2018
- EP-MW-124-1001-F-05; Field Team Inventory Records; 1st Quarter 2018 – 3rd Quarter 2018
- EP-MW-124-1001-F-06; Assembly Area Inventory Records; 1st Quarter 2018 – 3rd Quarter 2018
- EP-MW-124-1001-F-08; Medical Response Kit Inventory Records; 1st Quarter 2018 – 3rd Quarter 2018
- EP-MW-124-1001-F-14; Monthly NARS Communications Test Records; January 2018 - October 2018
- EP-MW-124-1001-F-15; Monthly ENS Communications Test Records; January 2018 - October 2018
- EP-MW-124-1001-F-17; Quarterly Director's Hotline Test Records; 1st Quarter 2018 – 3rd Quarter 2018
- EP-MW-124-1001-F-18; Quarterly Operations Status Line Test Records; 1st Quarter 2018 – 3rd Quarter 2018
- EP-MW-124-1001-F-19; Quarterly Damage Control Line Test Records; 1st Quarter 2018 – 3rd Quarter 2018
- EP-MW-124-1001-F-20; Quarterly Technical Support Line Test Records; 1st Quarter 2018 – 3rd Quarter 2018
- October 03, 11, 18 and 25, 2016 TSC Tabletop PI Drills Report; Dated November 30 2016
- Byron 2017 NRC Graded Exercise Evaluation Report; Dated July 26, 2017
- Byron 2017 Medical and Health Physics Drill Findings and Observation Report; Dated September 9, 2017

- December 12, 2017, and January 31, 2018 TSC-OSC Tabletop Drills Report; Dated February 21, 2018
- EP Drill Report – March 21, March 28 and April 4, 2018 Drills; Dated April 30, 2018
- Byron 2018 Radiological and Plume Phase Radiological Monitoring (Environs) Drill Findings and Observation Report; Dated July 17, 2018
- Byron 2018 Medical and Health Physics Drill Evaluation Report; Dated August 15, 2018
- Byron 2018 Off-Year Exercise Evaluation Report; Dated May 22, 2018
- PI-AA-126-1001-F-01 (AR 4090606); Self-Assessment, Pre-NRC Baseline Inspection Assessment; Dated July 19, 2018
- NOSA-NCS-17-03; Emergency Preparedness Audit Report - Nuclear Corporate Support; Dated April 5, 2017
- NOSA-NCS-18-03; Emergency Preparedness Audit Report - Nuclear Corporate Support; Dated April 4, 2018
- NOSA-BYR-17-03; Emergency Preparedness Audit Report – Byron Station; Dated April 12, 2017
- NOSA-BYR-18-03; Emergency Preparedness Audit Report – Byron Station; Dated April 10, 2018
- AR 03952052; EP Inventory Discrepancies
- AR 03993542; MMD Mask Fits Drop Below 50% in 90 Days if No Actions Taken
- AR 04024687; Byron EP Exercise Failed Facility Objective - TSC
- AR 04050193; Byron 2017 Medical / HP Drill Enhancement
- AR 04013553; EAL HU3 Bases Discrepancy
- AR 04074151; NSRB ID: EP Facility Walkthrough Issues/Enhancements
- AR 04106380; Byron TSC/OSC Focused Area Drills Results
- AR 04132427; Byron 2018 SIM/TSC/OSC Drill Series – Improvement Areas
- AR 04147581; RP Instrument in EP Vans Set to Expire in August 2018

71151—Performance Indicator Verification

- Consolidated Data Entry 4.0 MSPI Derivation Report for Unit 1 MSPI – Emergency AC (EAC) Power System for September 2018
- Consolidated Data Entry 4.0 MSPI Derivation Report for Unit 2 MSPI – Emergency AC (EAC) Power System for September 2018
- Margin Calculation for EAC Power, HPI, and RHR Systems
- Consolidated Data Entry 4.0 MSPI Derivation Report for Unit 1 MSPI – High Pressure Injection (HPI) System for September 2018
- Consolidated Data Entry 4.0 MSPI Derivation Report for Unit 2 MSPI – High Pressure Injection (HPI) System for September 2018
- Consolidated Data Entry 4.0 MSPI Derivation Report for Unit 1 MSPI – Residual Heat Removal (RHR) System for September 2018
- Consolidated Data Entry 4.0 MSPI Derivation Report for Unit 2 MSPI – Residual Heat Removal (RHR) System for September 2018
- NRC Performance Indicator Data; Emergency Preparedness – Drill/Exercise Performance; 3rd Quarter 2017 – 2nd Quarter 2018
- NRC Performance Indicator Data; Emergency Preparedness – ERO Readiness 3rd Quarter 2017 – 2nd Quarter 2018
- NRC Performance Indicator Data; Emergency Preparedness – Alert and Notification System Reliability; 3rd Quarter 2017 – 2nd Quarter 2018

71152—Problem Identification and Resolution

- AR 04173407; Loose Shim Plate Assembly on Support 1RC-01-BA-LLR; 9/15/2018
- AR 04174489; Cracked Shim Plate Tack Weld on Support 1RC-01-BD-LLR; 9/18/2018
- AR 04140600; Westinghouse Part 21 For CRDM Thermal Sleeves; 05/23/2018
- AR 04140999; Westinghouse Part 21 For CRDM Thermal Sleeves; 05/24/2018
- AR 04156217; NSAL-18-1, TS Flange Wear Leads to Stuck Control Rod; 07/10/2018
- AR 04172030; MRP 2018-027 NEI 03-08 Needed Guidance Issued; 08/30/2018
- AR 04172031; NRC IN 2018-10 Issued for CRDM Thermal Sleeve Flange Wear; 08/28/2018
- EC 0000624381; Thermal Sleeve Evaluation; Revision 0
- OP-AA-108-101; Control of Equipment and System Status; Revision 14

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

- AR 04153681; Loss of Bus 13 –SAT 242-2 Failure; 9/6/2018
- ABB Report 4469811; Auxiliary Transformer Inspection SAT 242-2; 7/13/2018
- ABB Report 4473225; System Auxiliary Transformer SAT 242-2 Failure Analysis; 8/10/2018
- Doble Report; Summary of the Doble Review of the ABB Analysis of the SAT 242-2 Failure Analysis; 8/13/2018