



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**

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

May 4, 2017

EA-16-125

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 05000454/2017001; 05000455/2017001 AND EXERCISE OF  
ENFORCEMENT DISCRETION**

Dear Mr. Hanson:

On March 30, 2017, the U.S. Nuclear Regulatory Commission (NRC) completed a quarterly integrated inspection at your Byron Station, Units 1 and 2. On April 24, 2017, the NRC inspectors discussed the results of this inspection with Mr. M. Kanavos and other members of your staff. The enclosed report represents the results of this inspection.

A violation of the licensee's current site-specific licensing basis for tornado-generated missile protection was identified. Because this violation was identified during the discretionary period discussed in Enforcement Guidance Memorandum 15-002, "Enforcement Discretion for Tornado Missile Protection Noncompliance," Revision 1, and because the licensee implemented interim compensatory measures and has planned final corrective actions, the NRC is exercising enforcement discretion by not issuing an enforcement action for the underlying 10 CFR Part 50 Appendix B, Criterion III, "Design Control" violation. Discretion for continued operation has previously been permitted on an interim basis and is discussed in NRC inspection report 05000454/2016002; 05000455/2016002.

In addition, the inspectors documented a licensee-identified violation which was determined to be of very low safety significance in this report. The NRC is treating this violation as a non-cited violation (NCV) consistent with Section 2.3.2.a of the Enforcement Policy.

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: (1) the Regional Administrator, Region III; (2) the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and (3) the NRC Resident Inspector at the Byron 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 Duncan, Chief  
Branch 3  
Division of Reactor Projects

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

Enclosure:  
IR 05000454/2017001; 05000455/2017001

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Letter to Bryan Hanson from Eric Duncan dated May 4, 2017

SUBJECT: BYRON STATION, UNITS 1 AND 2—NRC INTEGRATED INSPECTION  
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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Nos: 05000454; 05000455  
License Nos: NPF-37; NPF-66

Report No: 05000454/2017001; 05000455/2017001

Licensee: Exelon Generation Company, LLC

Facility: Byron Station, Units 1 and 2

Location: Byron, IL

Dates: January 1 through March 31, 2017

Inspectors: J. McGhee, Senior Resident Inspector  
B. Bartlett, Project Engineer  
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Approved by: E. Duncan, Chief  
Branch 3  
Division of Reactor Projects

Enclosure

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## SUMMARY

Inspection Report 05000454/2017001, 05000455/2017001; 01/01/2017–03/31/2017; Byron Station, Units 1 and 2; Other Activities.

This report covers a 3-month period of inspection by resident inspectors and announced baseline inspections by regional inspectors. The significance of inspection findings is indicated by their color (i.e., greater than Green, or Green, White, Yellow, Red) and determined using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process," dated April 29, 2015. Cross-cutting aspects are determined using IMC 0310, "Aspects within the Cross-Cutting Areas," dated December 4, 2014. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy, dated November 1, 2016. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG–1649, "Reactor Oversight Process," Revision 6.

### **NRC-Identified and Self-Revealed Findings**

None.

### **Licensee-Identified Violations**

- A violation of the licensee's current site-specific licensing basis for tornado-generated missile protection was identified. Because this violation was identified during the discretionary period discussed in Enforcement Guidance Memorandum 15–002, "Enforcement Discretion for Tornado Missile Protection Noncompliance," Revision 1, and because the licensee implemented interim compensatory measures and has planned final corrective actions, the NRC is exercising enforcement discretion by not issuing an enforcement action for the underlying 10 CFR Part 50 Appendix B, Criterion III, "Design Control," violation. This violation is discussed in Section 4OA3.3
- One additional licensee-identified violation of very low safety significance was reviewed by the NRC. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program (CAP). This violation and CAP tracking number are listed in Section 4OA7 of this report.

## **REPORT DETAILS**

### **Summary of Plant Status**

During this inspection period, both Unit 1 and 2 at Byron Station were periodically scheduled to vary electrical output by the grid operator to ramp down a few hundred megawatts for short periods to help ease congestion on the transmission system or to support the economic dispatch agreement between Exelon and the grid operator.

#### **Unit 1**

Unit 1 began the period operating at full power and continued to operate at power levels directed by the grid operator with no significant equipment issues until February 27, 2017, when the unit was shut down for refueling outage B1R21. The unit was restarted beginning on March 26, 2017, and reconnected to the electrical grid on March 27. On March 28, 2017, during power ascension, the forced cooling for the 1E main power transformer tripped. Operators responded to the indicated transformer winding heat-up by reducing generator output from 1162 megawatts (MW) to 735 MW. Additional information on the plant transient is included in this report in Section 4OA3.1. Unit 1 reached full power on March 30, 2017, and operated at scheduled power levels for the remainder of the inspection period.

#### **Unit 2**

The unit began the period at full power and operated at scheduled power levels for the entire inspection period.

### **1. REACTOR SAFETY**

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

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

##### **.1 Readiness of Offsite and Alternate AC Power Systems**

##### **a. Inspection Scope**

The inspectors verified that plant features and procedures for operation and continued availability of offsite and alternate alternating current (AC) power systems during adverse weather were appropriate. The inspectors reviewed the licensee's procedures affecting these areas and the communications protocols between the transmission system operator (TSO) and the plant to verify that the appropriate information was being exchanged when issues arose that could impact the offsite power system. Examples of aspects considered in the inspectors' review included:

- coordination between the TSO and the plant during off-normal or emergency events;
- explanations for the events;
- estimates of when the offsite power system would be returned to a normal state; and
- notifications from the TSO to the plant when the offsite power system was returned to normal.

The inspectors also verified that plant procedures addressed measures to monitor and maintain availability and reliability of both the offsite AC power system and the onsite alternate AC power system prior to or during adverse weather conditions. Specifically, the inspectors verified that the procedures addressed the following:

- actions to be taken when notified by the TSO that the post-trip voltage of the offsite power system at the plant would not be acceptable to assure the continued operation of the safety-related loads without transferring to the onsite power supply;
- compensatory actions identified to be performed if it would not be possible to predict the post-trip voltage at the plant for the current grid conditions;
- re-assessment of plant risk based on maintenance activities which could affect grid reliability, or the ability of the transmission system to provide offsite power; and
- communications between the plant and the TSO when changes at the plant could impact the transmission system, or when the capability of the transmission system to provide adequate offsite power was challenged.

The inspectors also reviewed CAP items to verify that the licensee was identifying adverse weather issues at an appropriate threshold and entering them into their CAP in accordance with station corrective action procedures.

This inspection constituted one readiness of offsite and alternate AC power systems sample as defined in Inspection Procedure (IP) 71111.01–05.

b. Findings

No findings were identified.

.2 Readiness for Impending Adverse Weather Condition—Severe Thunderstorm Watch and High Wind Conditions

a. Inspection Scope

Since thunderstorms with potential tornados and high winds were forecast in the vicinity of the facility for the evening of March 6, 2017, the inspectors reviewed the licensee's overall preparations/protection for the expected weather conditions. On March 6, the inspectors walked down the licensee's emergency power distribution power systems because their safety-related functions could be affected or required as a result of high winds, tornado-generated missiles or the loss of offsite power. The inspectors evaluated the licensee staff's preparations against the site's procedures and determined whether the staff's actions were adequate. During the inspection, the inspectors focused on plant-specific design features and the licensee's procedures used to respond to specified adverse weather conditions. The inspectors also toured the plant grounds to look for any loose debris that could become missiles during a tornado. The inspectors evaluated operator staffing and accessibility of controls and indications for those systems required to control the plant. Additionally, the inspectors reviewed the Updated Final Safety Analysis Report (UFSAR) and performance requirements for systems selected for inspection, and verified that operator actions were appropriate as specified by plant-specific procedures. The inspectors also reviewed a sample of CAP items to verify that the licensee identified adverse weather issues at an appropriate threshold and

disposed them through the CAP in accordance with station corrective action procedures.

This inspection constituted one readiness for impending adverse weather condition sample as defined in IP 71111.01–05.

b. Findings

No findings were identified.

1R04 Equipment Alignment (71111.04)

.1 Quarterly Partial System Walkdowns

a. Inspection Scope

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

- Equipment line-ups credited for Low Temperature Overpressure Protection (LTOP) with Unit 1 in Mode 5 after refueling;
- Unit 1 Train B (1B) safety injection (SI) subsystem while the 1A SI subsystem was out-of-service for planned maintenance;
- 1B diesel generator (DG) starting air, fuel oil, and lube oil subsystems while the 1A DG was out-of-service for overhaul; and
- 1B Residual Heat Removal (RH) subsystem with reduced reactor coolant system inventory.

The inspectors selected these systems based on their risk significance relative to the Reactor Safety Cornerstones at the time they were inspected. The inspectors attempted to identify any discrepancies that could impact the function of the system and, therefore, potentially increase risk. The inspectors reviewed applicable operating procedures, system diagrams, the UFSAR, Technical Specification (TS) requirements, outstanding work orders (WOs), issue reports (IRs), and the impact of ongoing work activities on redundant trains of equipment in order to identify conditions that could have rendered the systems incapable of performing their intended functions. The inspectors also walked down accessible portions of the systems to verify system components and support equipment were aligned correctly and operable. The inspectors examined the material condition of the components and observed operating parameters of equipment to verify that there were no obvious deficiencies. The inspectors also verified that the licensee had properly identified and resolved equipment alignment problems that could cause initiating events or impact the capability of mitigating systems or barriers and entered them into the CAP with the appropriate significance characterization.

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

b. Findings

No findings were identified.

.2 Semi-Annual Complete System Walkdown

a. Inspection Scope

On March 20 through March 23, 2017, the inspectors performed a complete system alignment inspection of the Unit 2 auxiliary feedwater system to verify the functional capability of the system. This system was selected because it was considered both safety significant and risk significant in the licensee's probabilistic risk assessment. The inspectors walked down the system to review mechanical and electrical equipment lineups, electrical power availability, system pressure and temperature indications, component labeling, component lubrication, component and equipment cooling, hangers and supports, operability of support systems, and to ensure that ancillary equipment or debris did not interfere with equipment operation. The inspectors examined the auxiliary feedwater pumps, valves, diesel-driven auxiliary feedwater pump batteries and associated electrical cable condition, and the diesel fuel oil line-up. The inspectors reviewed a sample of past and outstanding WOs to determine whether any deficiencies significantly affected the system function. In addition, the inspectors reviewed the CAP database to ensure that system equipment alignment problems were being identified and appropriately resolved.

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

b. Findings

No findings were identified.

1R05 Fire Protection (71111.05)

.1 Routine Resident Inspector Tours (71111.05Q)

a. Inspection Scope

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

- Auxiliary building 383' general area;
- Auxiliary building radwaste and remote shutdown panel area;
- Division 21 miscellaneous electrical equipment and battery rooms;
- Division 22 miscellaneous electrical equipment and battery rooms;
- Unit 1 containment pipe penetration area; and
- Unit 1 main steam and auxiliary feedwater pipe tunnel.

The inspectors reviewed areas to assess if the licensee had implemented a fire protection program that adequately controlled combustibles and ignition sources within the plant, effectively maintained fire detection and suppression capability, maintained passive fire protection features in good material condition, and implemented adequate compensatory measures for out-of-service, degraded or inoperable fire protection equipment, systems, or features in accordance with the licensee's fire plan. The inspectors selected fire areas based on their overall contribution to internal fire risk as documented in the plant's Individual Plant Examination of External Events with later

additional insights, their potential to impact equipment which could initiate or mitigate a plant transient, or their impact on the plant's ability to respond to a security event. The inspectors verified that fire hoses and extinguishers were in their designated locations and available for immediate use; that fire detectors and sprinklers were unobstructed; that transient material loading was within analyzed limits; and fire doors, dampers, and penetration seals appeared to be in satisfactory condition. The inspectors also verified that minor issues identified during the inspection were entered into the licensee's CAP.

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

b. Findings

No findings were identified.

1R06 Flooding (71111.06)

.1 Internal Flooding

a. Inspection Scope

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

- Unit 1 and Unit 2 A and B train Essential Service Water (SX) pump and valve rooms; and
- Unit 1 auxiliary feedwater pipe tunnel.

This inspection constituted two internal flooding samples as defined in IP 71111.06–05.

b. Findings

No findings were identified.

1R08 Inservice Inspection Activities (71111.08)

From February 27, 2017, through March 20, 2017, the inspectors conducted a review of the implementation of the licensee's Inservice Inspection (ISI) Program for monitoring degradation of the Unit 1 reactor coolant system (RCS), emergency feedwater systems, risk-significant piping and components, and containment systems.

The reviews described in Sections 1R08.1, 1R08.2, 1R08.3, 1R08.4, and 1R08.5 below, count as one inspection sample as described by Inspection Procedure 71111.08.

.1 Piping Systems Inservice Inspection

a. Inspection Scope

The inspectors reviewed records of the following Non-Destructive Examinations (NDE) required by the American Society of Mechanical Engineers (ASME) Section XI Code, and/or Title 10, *Code of Federal Regulations* (CFR), Part 50.55a, to evaluate compliance with the ASME Code, Section XI, and Section V requirements, and if any indications and defects were detected, to determine whether these were dispositioned in accordance with the ASME Code or an NRC-approved alternative requirement:

- Ultrasonic (UT) Examination of the Reactor Vessel Head Penetrations;
- UT Examination of Feedwater System Pipe welds 1FW03DD-16/C14, 1FW03DD-16/C15, 1FW03DD-16/C16, 1FW03DD-16/C17, 1FW03CD-16/C17, 1FW03DD-16/C19.01 and 1FW03DD-16/C20.01;
- UT Examination of RCS welds 1RC24AA-4/J06, 1RC24AA-4/J07, 1RC24AA-4/J09, and 1RC24AA-4/J10;
- UT Examination of B Steam Generator (SG) Primary Head-to-Tubesheet weld 1RC-01-BB/SGW-01;
- Dye Penetrant Examination of Safety Injection System Pipe to Closure Plate weld 1SI03DA-W-09; and
- Bare Metal Visual Examination of the Reactor Vessel Head.

The inspectors observed the following NDE conducted as part of the licensee's industry initiative inspection program for thermal fatigue cracking to determine if the examination was conducted in accordance with the licensee's augmented inspection program and associated licensee examination procedures and if any indications and defects were detected, to determine if these were dispositioned in accordance with approved procedures and NRC requirements:

- UT Examination of RCS pipe bends 1RC14AD-2", 1RC14AA, 1RC14AB, and 1RC14AC in the RCS to meet MRP-146, "Thermal Fatigue in Normally Stagnant Non-Isolable Reactor Coolant System Branch Lines."

The inspectors reviewed the following examination records with relevant/recordable conditions/indications identified by the licensee to determine if acceptance of these indications for continued service was in accordance with the ASME Code Section XI or an NRC-approved alternative:

- Magnetic particle examination of reactor head-to-flange weld 1RC-01-R/RVHC-01.

The inspectors reviewed records of the following risk-significant pressure boundary ASME Code Section XI Class 2 welds fabricated since the beginning of the last refueling outage to determine if the licensee applied the pre-service NDE and acceptance criteria required by the Construction Code and the ASME Code Section XI. Additionally, the inspectors reviewed the welding procedure specification and supporting weld procedure

qualification records to determine if the weld procedure was qualified in accordance with the requirements of the Construction Code and the ASME Code Section IX:

- Welds 1, 2, 19 and 20 in the auxiliary feedwater system - WO 01635685–05.

b. Findings

No findings were identified.

.2 Reactor Pressure Vessel Upper Head Penetration Inspection Activities

a. Inspection Scope

For the Unit 1 vessel head, a bare metal visual examination and a non-visual examination of the head penetration nozzles was required pursuant to 10 CFR 50.55a(g)(6)(ii)(D).

The inspectors observed the visual examination conducted on a sample of the reactor vessel head penetration nozzles to determine if the activities were conducted in accordance with the requirements of ASME Code Case N–729 and 10 CFR 50.55a(g)(6)(ii)(D). For the sample reviewed, the inspectors confirmed that:

- the required visual examination scope/coverage was achieved and limitations (if applicable were recorded) in accordance with the licensee procedures;
- the licensee criteria for visual examination quality and instructions for resolving interference and masking issues were adequate; and
- if indications of potential through-wall leakage were identified, the licensee entered the condition into the CAP and implemented appropriate corrective actions.

The inspectors observed the non-visual examinations conducted on a sample of the reactor vessel head penetration nozzles to determine if the activities were conducted in accordance with the requirements of ASME Code Case N–729 and 10 CFR 50.55a(g)(6)(ii)(D). In particular, the inspectors confirmed that:

- the required examination scope (volumetric and surface coverage) was achieved and limitations (if applicable were recorded) in accordance with the licensee procedures;
- the UT equipment and procedures used were demonstrated by blind demonstration testing;
- if indications or defects were identified, the licensee documented the conditions in examination reports and/or entered this condition into the CAP and implemented appropriate corrective actions; and
- if indications were accepted for continued service the licensee evaluation and acceptance criteria were in accordance with the ASME Section XI Code, 10 CFR 50.55a(g)(6)(ii)(D) or an NRC approved alternative.

The licensee had previously identified flaws in penetration nozzle 76 and had installed a weld overlay of Alloy 52 filler metal to embed/seal the nozzle area containing the flaws. During the current refueling outage, the licensee inadvertently scored/gouged the weld overlay repair with a grinder during the process of removing the penetration nozzle 76 guide funnel. To correct this defect, the licensee performed a welded repair that

restored the Alloy 52 overlay to the original thickness. The inspectors reviewed records of this welded repair on the upper head penetration nozzle 76 overlay to determine if the licensee applied the pre-service NDE and acceptance criteria as required by the NRC approved relief request 14R-10, Revision 0, "Alternative Requirements for the Repair of Reactor Vessel Head Penetrations." Additionally, the inspectors reviewed the welding procedure specification and supporting weld procedure qualification records to determine if the weld procedure used was qualified in accordance with the Construction Code and the ASME Code Section IX requirements.

During the current refueling outage, the licensee identified two rejectable planar indications on penetration nozzle 76 that were located just below the existing Alloy 52 overlay repair on this nozzle. The licensee also identified rejectable indications in nozzle base material located at tack welds on the guide funnels attached to the bottom of penetration nozzles 74, 77 and 76. The licensee reported these conditions to the NRC under 10 CFR 50.72(b)(3)(ii)(A) as an event or condition that results in the condition of the nuclear power plant, including its principal safety barriers, being seriously degraded. The licensee removed these flaw indications by mechanical methods (e.g., grinding). The inspectors reviewed the engineering change package for the repair of these nozzles to determine if the licensee applied the post repair acceptance criteria required by Code Case N-729-1, "Alternative Examination Requirements for Pressurized Water Reactor Vessel Upper Heads With Nozzles Having Pressure-Retaining Partial-Penetration Welds."

b. Findings

No findings were identified.

.3 Boric Acid Corrosion Control

a. Inspection Scope

On February 27, 2017, the inspectors performed an independent walkdown on portions of the RCS and connected systems within containment which had received a recent licensee boric acid walkdown to determine if the licensee's visual examinations had effectively identified boric acid leakage that potentially degraded safety-related components.

The inspectors reviewed the following licensee evaluations of RCS components with boric acid deposits to determine if degraded components were documented in the CAP and for degraded components that the planned or completed corrective actions met the Construction Code, ASME Section XI Code, and/or NRC approved alternative.

- Boric Acid Corrosion Control Evaluation Action Request (AR) 02564032; Dry Boric Acid on Body-to-Bonnet (1RC8037B); and
- Boric Acid Corrosion Control Evaluation AR 02556269; Inactive Boric Acid Leak on 1SI8801A.

The inspectors reviewed the following corrective actions related to evidence of boric acid leakage to determine if the corrective actions completed were consistent with the requirements of the ASME Code Section XI and 10 CFR Part 50, Appendix B, Criterion XVI.

- IR 02588106; Body to Bonnet Leak 1AB007; and
- IR 02603831; Identify Leak Source 1VF89AB.

b. Findings

No findings were identified.

.4 Steam Generator Tube Inspection Activities

a. Inspection Scope

For the Unit 1 SGs, no examination was required pursuant to the TS during the current refueling outage. Therefore, no NRC review was completed for this inspection procedure attribute.

b. Findings

No findings were identified.

.5 Identification and Resolution of Problems

a. Inspection Scope

The inspectors performed a review of ISI/SG-related problems entered into the licensee's CAP and conducted interviews with licensee staff to determine if:

- the licensee had established an appropriate threshold for identifying ISI/SG related problems;
- the licensee had identified issues related to excessive deposit buildup on the SG tube bundle and/or excessive SG tube wear indicative of fluid-elastic instability within the SG tube bundle;
- the licensee had performed a root cause (if applicable) and taken appropriate corrective actions; and
- the licensee had evaluated operating experience and industry generic issues related to ISI and pressure boundary integrity.

The inspectors performed these reviews to evaluate compliance with 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requirements. The corrective action documents reviewed by the inspectors are listed in the Attachment to this report.

b. Findings

No findings were identified.

1R11 Licensed Operator Requalification Program (71111.11)

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

a. Inspection Scope

On February 9, 2017, the inspectors observed a crew of licensed operators in the plant's simulator during licensed operator requalification training. The inspectors verified that operator performance was adequate, evaluators were identifying and documenting crew

performance problems, and that training was being conducted in accordance with licensee procedures. The inspectors evaluated the following areas:

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

The crew's performance in these areas was compared to pre-established operator action expectations and successful critical task completion requirements.

This inspection constituted one quarterly licensed operator requalification program simulator sample as defined in IP 71111.11-05.

b. Findings

No findings were identified.

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

a. Inspection Scope

On February 26 and 27, 2017, the inspectors observed operating personnel in the main control room manipulate controls to shutdown Unit 1 from 100 percent power to begin the refueling outage.

In addition, on March 26 and 27, 2017, the inspectors observed operating personnel in the main control room manipulate controls to take the unit from shutdown to 27 percent power. These were activities that required heightened awareness or were related to increased risk.

During both observations above, the inspectors evaluated the following areas:

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

The performance in these areas was compared to pre-established operator action expectations, procedural compliance and task completion requirements.

This inspection constituted two licensed operator heightened activity/risk samples as defined in IP 71111.11–05.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12)

.1 Routine Quarterly Evaluations

a. Inspection Scope

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

- Auxiliary power function AP–04 following a motor control center 480 volt supply breaker trip;
- Main control room ventilation chilled water functions VC–01 and WO–02 following an extended maintenance outage window and chiller trip;
- Post-accident sample function PS–02 following steam generator blowdown valve 1SD005B failure; and
- Maintenance Rule (a)(3) assessment report for July 2015 through December 2016.

The inspectors reviewed events including those in which ineffective equipment maintenance had resulted in valid or invalid automatic actuations of engineered safeguards systems and independently verified the licensee's actions to address system performance or condition problems in terms of the following:

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

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

This inspection constituted four quarterly maintenance effectiveness samples as defined in IP 71111.12–05.

b. Findings

No findings were identified.

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

.1 Maintenance Risk Assessments and Emergent Work Control

a. Inspection Scope

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

- 1A safety injection subsystem out-of-service for planned maintenance, auxiliary building ventilation out-of-service for planned maintenance, and 1A solid state protection system surveillance during the week of January 2, 2017;
- Instrument Bus 113 constant voltage transformer replacement and 1A DG out-of-service for 6-year preventative maintenance activities during the week of January 30, 2017;
- Unit 1 outage B1R21 shutdown safety management plan (SSMP) and outage Level II schedule prior to and during the outage as the schedule was implemented;
- 1B DG slave relay testing, Unit 1 main steam safety valve testing, Unit 1 auxiliary feedwater full flow testing, and 2B containment spray subsystem testing during the week of February 20, 2017;
- Instrument Bus 112 battery bank test with DC Bus 112 and Instrument Bus 212 cross-tied; and
- Emergent repair of residual heat removal heat exchanger valve 1RH607 resulting in escalation of Unit 1 shutdown risk on March 16, 2017.

These activities were selected based on their potential risk significance relative to the Reactor Safety Cornerstones. The inspectors verified that risk assessments were performed as required by 10 CFR 50.65(a)(4) and were accurate and complete. When emergent work was performed, the inspectors verified that the plant risk was promptly reassessed and risk management actions were identified. The inspectors reviewed the scope of maintenance and outage work, discussed the results of the assessment with the licensee's probabilistic risk analyst or shift technical advisor, and verified plant conditions were consistent with the risk assessment. The inspectors also reviewed TS requirements and walked down portions of redundant safety systems to verify risk analysis assumptions were valid and credited risk management actions had been implemented.

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

b. Findings

No findings were identified.

1R15 Operability Determinations and Functional Assessments (71111.15)

.1 Operability Evaluations

a. Inspection Scope

The inspectors reviewed the following issues:

- Bus 242 undervoltage relay failed to reset during surveillance testing;
- Common unit 'B' train control room chilled water pump high differential pressure during comprehensive inservice test;
- 0A essential service water makeup pump fuel oil pump bullseye empty;
- Flooding concern for diesel fuel oil storage tank rooms; and
- Unit 2 containment inner door high leakage alarm.

The inspectors selected these potential operability issues based on the risk significance of the associated components and systems. The inspectors evaluated the technical adequacy of the evaluations to ensure that TS operability was properly justified and the subject component or system remained available such that no unrecognized increase in risk occurred. The inspectors compared the operability and design criteria in the appropriate sections of the TSs and UFSAR to the licensee's evaluations to determine whether the components or systems were operable. Where compensatory measures were required to maintain operability, the inspectors determined whether the measures in place would function as intended and were properly controlled. The inspectors determined, where appropriate, compliance with bounding limitations associated with the evaluations. Additionally, the inspectors reviewed a sample of corrective action documents to verify that the licensee was identifying and correcting any deficiencies associated with operability evaluations.

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

b. Findings

No findings were identified.

.2 Licensee Implementation of Enforcement Guidance Memorandum 15-002, "Enforcement Discretion for Tornado-Generated Missile Protection Noncompliance"

On May 25, 2016, the licensee initiated IR 02673848, identifying a nonconforming condition of 10 CFR 50, Appendix A, Criterion 4, "Environmental and Dynamic Effects Design Basis." Specifically, multiple locations were identified in the refueling water storage tank (RWST) roof hatches and in the L-line wall above the 451' elevation (separating the turbine building from the Class I auxiliary building) where SSCs were not adequately protected from tornado-generated missiles. The licensee declared multiple SSCs inoperable and reported the issue to the NRC in EN 51958 on May 25, 2016. The licensee implemented compensatory measures designed to lessen the likelihood of tornado-generated missile effects within the expiration time of the affected TS LCO required actions. The inspectors reviewed the licensee's immediate actions and compensatory measures to restore operability of the affected SSCs in accordance with Revision 0 of enforcement guidance memorandum (EGM) 15-002. The inspectors documented the review in Inspection Report 05000454/2016002; 05000455/2016002 as a partial sample as defined in IP 71111.15-02.

a. Inspection Scope

The EGM required that more comprehensive compensatory measures be implemented within 60 days of the issue discovery and remain in place until permanent repairs were completed or the NRC decided the discretion was no longer needed. The licensee implemented additional procedural enhancements to shorten the response time required to minimize the effects of potential damage caused by tornado missile impact to L-line wall penetrations. Additionally, a temporary barrier was erected to provide shielding for the RWST access hatches. The inspectors reviewed the licensee's 60-day compensatory measures and concluded that those actions provided additional protection such that the likelihood of tornado missile effects were lessened. In addition, the inspectors continued to monitor those additional actions to ensure that the compensatory measures remained in place. For example, when the National Weather Service identified a Tornado Watch on February 28, 2017, the inspectors verified that the licensee executed the procedurally directed compensatory measures.

This review completed the previous partial sample and constituted one operability sample as defined in IP 71111.15-02.

b. Findings

No findings were identified. Additional information regarding the non-conforming conditions and performance deficiencies associated with the tornado-generated missile vulnerability is discussed in Section 4OA3.3 of this report.

1R18 Plant Modifications (71111.18)

.1 Plant Modifications

a. Inspection Scope

The inspectors reviewed the following modification:

- 1A SX pump cubicle cooler replacement.

The inspectors reviewed the configuration changes and associated 10 CFR 50.59 safety evaluation screening against the design basis, the UFSAR, and the TSs to verify that the modification did not affect the operability or availability of the affected system. The inspectors, as applicable, observed ongoing and completed work activities to ensure that the modification was installed as directed and consistent with the design control documents; the modification operated as expected; post-modification testing adequately demonstrated continued system operability, availability, and reliability; and that operation of the modification did not impact the operability of any interfacing systems. As applicable, the inspectors verified that relevant procedure, design, and licensing documents were properly updated. Lastly, the inspectors discussed the plant modification with operations, engineering, and training personnel to ensure that the individuals were aware of how the operation with the plant modification in place could impact overall plant performance.

This inspection constituted one permanent plant modification sample as defined in IP 71111.18-05.

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19)

.1 Post-Maintenance Testing

a. Inspection Scope

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

- Routine replacement of manual setpoint controller for flow control valve from 1B auxiliary feedwater pump to 1A steam generator;
- Unit 2 governor valve #1 linear variable differential transformer (LVDT) replacement;
- Unit 2 main steam isolation valve emergent nitrogen leak and accumulator recharge;
- 1RH01SB valve containment assembly (i.e. canned valve) local leak rate test (LLRT) surveillance following bolt hole sealing to recover margin;
- 1RY8033 failed as-found containment LLRT;
- 1A DG governor replacement;
- 1RH01SA valve containment assembly (i.e. canned valve) LLRT surveillance following flange seal repair to recover margin;
- 1B DG fuel oil ratio relay replacement; and
- 1AF049A and 1AF049D FLEX connection check valve disassembly and inspection.

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

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

b. Findings

No findings were identified.

1R20 Outage Activities (71111.20)

.1 Refueling Outage Activities

a. Inspection Scope

The inspectors reviewed the Shutdown Safety Management Plan (SSMP) and contingency plans for the Unit 1 refueling outage (RFO), conducted February 27 through March 26, 2017, to confirm that the licensee had appropriately considered risk, industry experience, and previous site-specific problems in developing and implementing a plan that assured maintenance of defense-in-depth. During the RFO, the inspectors observed portions of the shutdown and cooldown processes and monitored licensee controls over the outage activities listed below:

- licensee configuration management, including maintenance of defense-in-depth commensurate with the SSMP for key safety functions and compliance with the applicable TS when taking equipment out-of-service;
- implementation of clearance activities and confirmation that tags were properly hung and equipment appropriately configured to safely support the work or testing;
- installation and configuration of reactor coolant pressure, level, and temperature instruments to provide accurate indication, accounting for instrument error;
- controls over the status and configuration of electrical systems to ensure that TS and SSMP requirements were met, and controls over switchyard activities;
- monitoring of decay heat removal processes, systems, and components;
- controls to ensure that outage work was not impacting the ability of the operators to operate the spent fuel pool cooling system;
- reactor water inventory controls including flow paths, configurations, and alternative means for inventory addition, and controls to prevent inventory loss;
- controls over activities that could affect reactivity;
- maintenance of containment as required by TSs;
- licensee fatigue management, as required by 10 CFR 26, Subpart I;
- refueling activities, including fuel handling;
- startup and ascension to full power operation, tracking of startup prerequisites, walkdown of primary containment to verify that debris had not been left which could block emergency core cooling system suction strainers, and reactor physics testing; and
- licensee identification and resolution of problems related to RFO activities.

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

b. Findings

No findings were identified.

## 1R22 Surveillance Testing (71111.22)

### .1 Surveillance Testing

#### a. Inspection Scope

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

- 1BOSR 3.13.5–1, Unit One Train A Solid State Protection System Surveillance (routine);
- 2BOSR 5.5.8.SI.5–1A, Unit Two Group A Inservice Testing (IST) Requirements for Safety Injection Pump 2SI01PA (IST);
- 2BOSR 5.5.8.CS.5–2C, Unit Two Comprehensive Inservice Testing (IST) Requirements for CS Pump 2CS01PB (IST);
- 1BOSR 0.5–2.AF.1–2, Unit One Train B Auxiliary Feedwater Valves Stroke Test (IST);
- 1BOSR SI–910, Unit One Cold Leg Isolation Valves Leakage Surveillance (ISO Valve);
- 2BOSR 3.2.8–608B, Unit Two ESFAS Instrumentation Slave Relay Surveillance (Train B Automatic Safety Injection – K608) (routine);
- 1BOSR 0.1–5, Unit One Mode 5 Tech Spec Data Sheet D4 Low Temperature Overpressure Requirements (routine);
- 1BVSr 7.1.1–1, Unit One Main Steam Safety Valves Operability Test (routine);
- 1BOSR 8.1.9–1, Unit One Train A Diesel Generator Safe Shutdown Sequencer and Single Load Rejection Test (routine); and
- 1BOSR 6.1.1–11; Unit One Primary Containment Type C Local Leakage Rate Tests and IST Tests of Pressurizer Relief System (ISO Valve).

The inspectors observed in-plant activities and reviewed procedures and associated records to determine the following:

- did preconditioning occur;
- were the effects of the testing adequately addressed by control room personnel or engineers prior to the commencement of the testing;
- were acceptance criteria clearly stated, sufficient to demonstrate operational readiness, and consistent with the system design basis;
- was plant equipment calibration correct, accurate, and properly documented;
- were as-left setpoints within required ranges; and was the calibration frequency in accordance with TSs, the UFSAR, plant procedures, and applicable commitments;
- was measuring and test equipment calibration current;
- was the test equipment used within the required range and accuracy, and were applicable prerequisites described in the test procedures satisfied;
- did test frequencies meet TS requirements to demonstrate operability and reliability;
- were tests performed in accordance with the test procedures and other applicable procedures;

- were jumpers and lifted leads controlled and restored where used;
- were test data and results accurate, complete, within limits, and valid;
- was test equipment removed following testing;
- where applicable for IST activities, was testing performed in accordance with the applicable version of Section XI of the ASME Code and were reference values consistent with the system design basis;
- was the unavailability of the tested equipment appropriately considered in the performance indicator (PI) data;
- were test results not meeting acceptance criteria addressed with an adequate operability evaluation or was the system or component declared inoperable;
- was the reference setting data accurately incorporated into the test procedure;
- was equipment returned to a position or status required to support the performance of its safety functions following testing;
- were problems identified during the testing appropriately documented and dispositioned in the licensee's CAP;
- were annunciators and other alarms demonstrated to be functional and were setpoints consistent with design requirements; and
- were alarm response procedure entry points and actions consistent with the plant design and licensing documents.

This inspection constituted five routine surveillance testing samples, three in-service test samples, and two containment isolation valve samples as defined in IP 71111.22, Sections -02 and -05.

b. Findings

No findings were identified.

1EP6 Drill Evaluation (71114.06)

.1 Emergency Preparedness Drill Observation

a. Inspection Scope

The inspectors evaluated the conduct of a routine licensee emergency drill on January 25, 2017, to identify any weaknesses and deficiencies in classification, notification, and protective action recommendation development activities. The inspectors observed emergency response operations in the Technical Support Center to determine whether the event classification, notifications, and protective action recommendations were performed in accordance with procedures. The inspectors also attended the licensee drill critique to compare any inspector-observed weakness with those identified by the licensee staff in order to evaluate the critique and to verify whether the licensee staff was properly identifying weaknesses and entering them into the CAP. As part of the inspection, the inspectors reviewed the drill package.

This emergency preparedness drill inspection constituted one sample as defined in IP 71114.06-06.

b. Findings

No findings were identified.

## 2. RADIATION SAFETY

### 2RS1 Radiological Hazard Assessment and Exposure Controls (71124.01)

#### .1 Radiological Hazard Assessment (02.02)

##### a. Inspection Scope

The inspectors assessed the licensee's current and historic isotopic mix, including alpha emitters and other hard-to-detect radionuclides. The inspectors evaluated whether survey protocols were reasonable to identify the magnitude and extent of the radiological hazards.

The inspectors determined if there have been changes to plant operations since the last inspection that may have resulted in a significant new radiological hazard for onsite individuals. The inspectors evaluated whether the licensee assessed the potential impact of these changes and implemented periodic monitoring, as appropriate, to detect and quantify the radiological hazard. The inspectors reviewed the last two radiological surveys from selected plant areas and evaluated whether the thoroughness and frequency of the surveys were appropriate for the given radiological hazard.

The inspectors conducted walk-downs of the facility, including radioactive waste processing, storage, and handling areas to evaluate material conditions and performed independent radiation measurements as needed to verify conditions were consistent with documented radiation surveys.

The inspectors assessed the adequacy of pre-work surveys for select radiologically risk-significant work activities.

The inspectors evaluated the radiological survey program to determine if hazards were properly identified. The inspectors discussed procedures, equipment, and performance of surveys with radiation protection staff and assessed whether technicians were knowledgeable about when and how to survey areas for various types of radiological hazards.

The inspectors observed work in potential airborne areas to assess whether air samples were being taken appropriately for their intended purpose and reviewed various survey records to assess whether the samples were collected and analyzed appropriately. The inspectors also reviewed the licensee's program for monitoring contamination, which has the potential to become airborne.

These inspection activities constituted one complete sample as defined in IP 71124.01-05.

##### b. Findings

No findings were identified.

.2 Instructions to Workers (02.03)

a. Inspection Scope

The inspectors reviewed select radiation work permits used to access high radiation areas and evaluated the specified work control instructions or control barriers. The inspectors also assessed whether workers were made aware of the work instructions and area dose rates.

The inspectors reviewed electronic alarming dosimeter dose and dose rate alarm setpoint methodology. For selected electronic alarming dosimeter occurrences, the inspectors assessed the worker's response to the alarm, the licensee's evaluation of the alarm, and any follow-up investigations.

The inspectors reviewed the licensee's methods for informing workers of changes in plant operations or radiological conditions that could significantly impact their occupational dose.

The inspectors reviewed the labeling of select containers of licensed radioactive material that could cause unplanned or inadvertent exposure to workers.

These inspection activities constituted one complete sample as defined in IP 71124.01–05.

b. Findings

No findings were identified.

.3 Contamination and Radioactive Material Control (02.04)

a. Inspection Scope

The inspectors observed locations where the licensee monitors material leaving the radiologically controlled area and assessed the methods used for the control, survey, and release of material from these areas. As available, the inspectors observed health physics personnel surveying and releasing material for unrestricted use.

The inspectors observed workers leaving the radiologically controlled area and assessed their use of tool and personal contamination monitors and reviewed the licensee's criteria for use of the monitors.

The inspectors assessed whether instrumentation was used at its typical sensitivity levels based on appropriate counting parameters or whether the licensee had established a de facto release limit.

The inspectors selected several sealed sources from the licensee's inventory records and assessed whether the sources were accounted for and verified to be intact. The inspectors also evaluated whether any transactions, since the last inspection, involving nationally tracked sources were reported in accordance with Title 10 of the *Code of Federal Regulations*, (10 CFR) Part 20.2207.

These inspection activities constituted one complete sample as defined in IP 71124.01–05.

b. Findings

No findings were identified.

.4 Radiological Hazards Control and Work Coverage (02.05)

a. Inspection Scope

The inspectors evaluated ambient radiological conditions during tours of the facility. The inspectors assessed whether the conditions were consistent with applicable posted surveys, radiation work permits, and worker briefings.

The inspectors evaluated the adequacy of radiological controls, such as required surveys, radiation protection job coverage, and contamination controls. The inspectors evaluated the licensee's use of electronic alarming dosimeters in high noise areas as high radiation area monitoring devices.

The inspectors assessed whether radiation monitoring devices were placed on the individual's body consistent with licensee procedures. The inspectors assessed whether the dosimeter was placed in the location of highest expected dose or that the licensee properly employed a U.S. Nuclear Regulatory Commission (NRC) approved method of determining effective dose equivalent.

The inspectors reviewed the application of dosimetry to effectively monitor exposure to personnel in work areas with significant dose rate gradients.

For select airborne area radiation work permits, the inspectors reviewed airborne radioactivity controls and monitoring, the potential for significant airborne levels, containment barrier integrity, and temporary filtered ventilation system operation.

The inspectors examined the licensee's physical and programmatic controls for highly activated or contaminated materials stored within pools and assessed whether appropriate controls were in place to preclude inadvertent removal of these materials from the pool.

These inspection activities constituted one complete sample as defined in IP 71124.01–05.

b. Findings

No findings were identified.

.5 High Radiation Area and Very High Radiation Area Controls (02.06)

a. Inspection Scope

The inspectors observed posting and physical controls for high radiation areas and very high radiation areas to assess adequacy.

The inspectors conducted a selective inspection of posting and physical controls for high radiation areas and very high radiation areas to assess conformance with performance indicators.

The inspectors reviewed procedural changes to assess the adequacy of access controls for high and very high radiation areas to determine whether procedural changes substantially reduced the effectiveness and level of worker protection.

The inspectors assessed the controls for high radiation areas greater than 1 rem/hour and areas with the potential to become high radiation areas greater than 1 rem/hour for compliance with TSs and procedures.

The inspectors assessed the controls for very high radiation areas and areas with the potential to become very high radiation areas. The inspectors also assessed whether individuals were unable to gain unauthorized access to these areas.

These inspection activities constituted one complete sample as defined in IP 71124.01–05.

b. Findings

No findings were identified.

.6 Radiation Worker Performance and Radiation Protection Technician Proficiency (02.07)

a. Inspection Scope

The inspectors observed radiation worker performance and assessed their performance with respect to radiation protection work requirements, the level of radiological hazards present, and radiation work permit controls.

The inspectors assessed worker awareness of electronic alarming dosimeter setpoints, stay times, or permissible dose for radiologically significant work as well as expected response to alarms.

The inspectors observed radiation protection technician performance and assessed whether the technicians were aware of the radiological conditions and radiation work permit controls and whether their performance was consistent with training and qualifications for the given radiological hazards.

The inspectors observed radiation protection technician performance of radiation surveys and assessed the appropriateness of the instruments being used, including calibration and source checks.

These inspection activities constituted one complete sample as defined in IP 71124.01–05.

b. Findings

No findings were identified.

.7 Problem Identification and Resolution (02.08)

a. Inspection Scope

The inspectors assessed whether problems associated with radiological hazard assessment and exposure controls were being identified at an appropriate threshold and were properly addressed for resolution. For select problems, the inspectors assessed the appropriateness of the corrective actions. The inspectors also assessed the licensee's program for reviewing and incorporating operating experience.

The inspectors reviewed select problems related to human performance errors and assessed whether there was a similar cause and whether corrective actions taken resolved the problems.

The inspectors reviewed select problems related to radiation protection technician error and assessed whether there was a similar cause and whether corrective actions taken resolved the problems.

These inspection activities constituted one complete sample as defined in IP 71124.01–05.

b. Findings

No findings were identified.

2RS2 Occupational ALARA Planning and Controls (71124.02)

.1 Implementation of ALARA and Radiological Work Controls (02.04)

a. Inspection Scope

The inspectors reviewed the radiological administrative, operational, and engineering controls planned for selected radiologically significant work activities and evaluated the integration of these controls and as-low-as-reasonably-achievable (ALARA) requirements into work packages, work procedures and/or radiation work permits.

The inspectors conducted observations of in-plant work activities and assessed whether the licensee had effectively integrated the planned administrative, operational, and engineering controls into the actual field work to maintain occupational exposure ALARA. The inspectors observed pre-job briefings, and determined if the planned controls were discussed with workers. The inspectors evaluated the placement and use of shielding, contamination controls, airborne controls, radiation work permit controls, and other engineering work controls against the ALARA plans.

The inspectors assessed licensee activities associated with work-in-progress to ensure the licensee was tracking doses, performed timely in-progress reviews, and, when jobs did not trend as expected, appropriately communicated additional methods to be used to reduce dose. The inspectors evaluated whether health physics and ALARA staff were involved with the management of radiological work control when in-field activities deviated from the planned controls. The inspectors assessed whether the Outage

Control Center and station management provided sufficient support for ALARA re-planning.

The inspectors assessed the involvement of ALARA staff with emergent work activities during maintenance and when possible, attended in-progress review discussions, outage status meetings, and/or ALARA committee meetings.

The inspectors compared the radiological results achieved with the intended radiological outcomes and verified that the licensee captured lessons learned for use in the next outage.

These inspection activities supplemented those documented in Inspection Reports 05000454/2016002; 05000455/2016002 and 05000454/2016004; 05000455/2016004 and constituted one complete sample as defined in IP 71124.02–05.

b. Findings

No findings were identified.

.2 Radiation Worker Performance (02.05)

a. Inspection Scope

The inspectors observed radiation worker and radiation protection technician performance during work activities being performed in radiation areas, airborne radioactivity areas, or high radiation areas to assess whether workers demonstrated the ALARA philosophy in practice and followed procedures. The inspectors observed radiation worker performance to evaluate whether the training and skill level was sufficient with respect to the radiological hazards and the work involved.

The inspectors interviewed individuals from selected work groups to assess their knowledge and awareness of planned and/or implemented radiological and ALARA work controls.

These inspection activities supplemented those documented in Inspection Reports 05000454/2016002; 05000455/2016002 and 05000454/2016004; 05000455/2016004 and constituted one complete sample as defined in IP 71124.02–05.

b. Findings

No findings were identified.

## 2RS5 Radiation Monitoring Instrumentation (71124.05)

### .1 Walkdowns and Observations (02.02)

#### a. Inspection Scope

The inspectors assessed select portable survey instruments that were available for use for current calibration and source check stickers, and instrument material condition and operability.

The inspectors observed licensee staff demonstrate performance checks of various types of portable survey instruments. The inspectors assessed whether high range instruments responded to radiation on all appropriate scales.

The inspectors walked down area radiation monitors and continuous air monitors to determine whether they were appropriately positioned relative to the radiation sources or areas they were intended to monitor. The inspectors compared monitor response with actual area conditions for selected monitors.

The inspectors assessed the functional checks for select personnel contamination monitors, portal monitors, and small article monitors to verify they were performed in accordance with the manufacturer's recommendations and licensee procedures.

These inspection activities constituted one complete sample as defined in IP 71124.05-05.

#### b. Findings

No findings were identified.

### .2 Calibration and Testing Program (02.03)

#### a. Inspection Scope

The inspectors assessed laboratory analytical instruments used for radiological analyses to determine whether daily performance checks and calibration data indicated that the frequency of the calibrations was adequate and there were no indications of degraded instrument performance. The inspectors assessed whether appropriate corrective actions were implemented in response to indications of degraded instrument performance.

The inspectors reviewed the methods and sources used to perform whole body count functional checks before daily use and assessed whether check sources were appropriate and aligned with the plant's isotopic mix. The inspectors reviewed whole body count calibration records since the last inspection and evaluated whether calibration sources were representative of the plant source term and that appropriate calibration phantoms were used. The inspectors looked for anomalous results or other indications of instrument performance problems.

The inspectors reviewed select containment high range monitor calibration and assessed whether an electronic calibration was completed for all range decades, with at least one decade at or below 10 rem/hour calibrated using an appropriate radiation source, and calibration acceptance criteria was reasonable.

The inspectors reviewed select monitors used to survey personnel and equipment for unrestricted release to assess whether the alarm setpoints were reasonable under the circumstances to ensure that licensed material was not released from the site. The inspectors reviewed the calibration documentation for each instrument selected and discussed the calibration methods with the licensee to determine consistency with the manufacturer's recommendations.

The inspectors reviewed calibration documentation for select portable survey instruments, area radiation monitors, and air samplers. The inspectors reviewed detector measurement geometry and calibration methods for portable survey instruments and area radiation monitors calibrated onsite and observed the licensee demonstrate use of the instrument calibrator. The inspectors assessed whether appropriate corrective actions were taken for instruments that failed performance checks or were found significantly out of calibration, and that the licensee had evaluated the possible consequences of instrument use since the last successful calibration or performance check.

The inspectors reviewed the current output values for instrument calibrators. The inspectors assessed whether the licensee periodically measured calibrator output over the range of the instruments used with measuring devices that have been calibrated by a facility using National Institute of Standards and Technology traceable sources and corrective factors for these measuring devices were properly applied in its output verification.

The inspectors reviewed the licensee's 10 CFR, Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste," source term to assess whether calibration sources used were representative of the types and energies of radiation encountered in the plant.

These inspection activities constituted one complete sample as defined in IP 71124.05-05.

b. Findings

No findings were identified.

.3 Problem Identification and Resolution (02.04)

a. Inspection Scope

The inspectors evaluated whether problems associated with radiation monitoring instrumentation were being identified by the licensee at an appropriate threshold and were properly addressed for resolution. The inspectors assessed the appropriateness of the corrective actions for a selected sample of problems documented by the licensee that involved radiation monitoring instrumentation.

These inspection activities constituted one complete sample as defined in IP 71124.05-05.

b. Findings

No findings were identified.

#### 4. OTHER ACTIVITIES

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

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

##### .1 Unplanned Scrams per 7000 Critical Hours

###### a. Inspection Scope

The inspectors sampled licensee submittals for the Unplanned Scrams per 7000 Critical Hours performance indicator (PI) for Byron Station Units 1 and 2 for the period from the first quarter 2016 through the fourth quarter 2016. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in Nuclear Energy Institute (NEI) 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, dated August 31, 2013, were used. The inspectors reviewed the licensee's operator narrative logs, issue reports, event reports and NRC Integrated Inspection Reports for the period of January 2016 through December 2016 to validate the accuracy of the submittals. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the PI data collected or transmitted for this indicator.

This inspection constituted two unplanned scrams per 7000 critical hours samples as defined in IP 71151-05.

###### b. Findings

No findings were identified.

##### .2 Unplanned Scrams with Complications

###### a. Inspection Scope

The inspectors sampled licensee submittals for the Unplanned Scrams with Complications performance indicator for Byron Station Units 1 and 2 for the period from the first quarter 2016 through the fourth quarter 2016. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, dated August 31, 2013, were used. The inspectors reviewed the licensee's operator narrative logs, issue reports, event reports and NRC Integrated Inspection Reports for the period of January 2016 through December 2016 to validate the accuracy of the submittals. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the PI data collected or transmitted for this indicator.

This inspection constituted two unplanned scrams with complications samples as defined in IP 71151-05.

###### b. Findings

No findings were identified.

.3 Unplanned Power Changes per 7000 Critical Hours

a. Inspection Scope

The inspectors sampled licensee submittals for the Unplanned Transients per 7000 Critical Hours performance indicator for Byron Station Units 1 and 2 for the period from the first quarter 2016 through the fourth quarter 2016. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, dated August 31, 2013, were used. The inspectors reviewed the licensee's operator narrative logs, issue reports, maintenance rule records, event reports and NRC Integrated Inspection Reports for the period of January 2016 through December 2016 to validate the accuracy of the submittals. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the PI data collected or transmitted for this indicator.

This inspection constituted two unplanned transients per 7000 critical hours samples as defined in IP 71151-05.

b. Findings

No findings were identified.

4OA2 Identification and Resolution of Problems (71152)

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

a. Inspection Scope

As discussed in previous sections of this report, the inspectors routinely reviewed issues during baseline inspection activities and plant status reviews to verify they were being entered into the licensee's CAP at an appropriate threshold, adequate attention was being given to timely corrective actions, and adverse trends were identified and addressed. Some minor issues were entered into the licensee's CAP as a result of the inspectors' observations; however, they are not discussed in this report.

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

b. Findings

No findings were identified.

.2 Annual Follow-up of Selected Issues: Fill Degradation in Essential Service Water Cooling Tower Cell G

a. Inspection Scope

The inspectors selected the following issue report for in-depth review:

- IR 2707553; Essential Service Water Cooling Tower (SXCT) Fill Degradation – Cell G.

The inspectors chose this issue as a follow-up to an operability evaluation of a degraded condition affecting the ultimate heat sink (UHS). The inspectors verified the following attributes during their review of the licensee's corrective actions for the above issue report and other related issue reports:

- complete and accurate identification of the problem in a timely manner commensurate with its safety significance and ease of discovery;
- consideration of the extent of condition, generic implications, common cause, and previous occurrences;
- evaluation and disposition of operability/functionality/reportability issues;
- classification and prioritization of the resolution of the problem commensurate with safety significance;
- identification of the root and contributing causes of the problem;
- identification of corrective actions, which were appropriately focused to correct the problem;
- scheduling of corrective actions in a timely manner commensurate with the safety significance of the issue; and
- evaluate applicability for operating experience and communicate applicable lessons learned to appropriate organizations.

The inspectors discussed the corrective actions and associated evaluations with licensee personnel. The inspector accompanied the station employees during an inspection of the cell in order to independently evaluate the extent of the degradation and the rate of change.

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

b. Findings

No findings were identified.

.3 Annual Follow-up of Selected Issues: Non-conforming Condition with Reactor Coolant Pump Flywheel Inspection

a. Inspection Scope

The inspectors selected the following issue reports for in-depth review:

- IR 02393595; NRC Identified Issues with Vendor Exam Procedure;
- IR 02399248; NRC Identified Issue Classified as Non-conformance; and
- IR 02467656; Issues Identified with Engineering Evaluation.

In February 2015, the NRC identified a Green finding with an associated NCV of 10 CFR 50, Appendix B, Criterion IX, "Control of Special Processes," in Inspection Report 05000454(455)/201504005 because the vendor's liquid penetrant testing procedure used on reactor coolant pump (RCP) flywheel 2A/D483 did not meet the American Society of Mechanical Engineers (ASME) Code version that the station was committed to during the third program inspection interval. Specifically, the liquid penetrant developer dwell time specified in the vendor procedure was less than that specified in the station program procedure. After discussion with the inspectors, the licensee

identified that the vendor test was not valid and issued the additional IR to track resolution of the non-conformance. The licensee performed a “use as-is” evaluation of the flywheel condition using vendor supplied information and rescheduled the inspection within the same program inspection interval.

The inspectors verified the following attributes during their review of the licensee's corrective actions for the above issue reports and other related issue reports:

- complete and accurate identification of the problem in a timely manner commensurate with its safety significance and ease of discovery;
- consideration of the extent of condition, generic implications, common cause, and previous occurrences;
- evaluation and disposition of operability/functionality/reportability issues;
- classification and prioritization of the resolution of the problem commensurate with safety significance;
- identification of the cause of the problem;
- identification of corrective actions, which were appropriately focused to correct the problem;
- completion of corrective actions in a timely manner commensurate with the safety significance of the issue;
- effectiveness of corrective actions taken to preclude repetition; and
- evaluate applicability for operating experience and communicate applicable lessons learned to appropriate organizations.

The inspectors discussed the corrective actions and associated evaluations with licensee personnel.

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

b. Findings

No findings were identified.

.4 Annual Follow-up of Selected Issues: Failure of U2 Refueling Water Storage Tank Heater to Operate

a. Inspection Scope

The inspectors selected the following IRs for in-depth review:

- IR 03978141; U2 Refueling Water Storage Tank (RWST) Heater Not Running As Required; and
- IR 03968355; U2 RWST Heater Not Running As Required.

Between December 2016 and February 2017, the licensee initiated multiple issue reports involving the Unit 2 RWST heater and its associated pump. The inspectors reviewed these IRs and their associated work requests and WOs, as well as prior issue reports involving the failure of the similar equipment on Unit 1. As appropriate, the inspectors verified the following attributes during their review of the licensee's corrective actions for the above issue reports and other related issue reports:

- complete and accurate identification of the problem in a timely manner commensurate with its safety significance and ease of discovery;
- consideration of the extent of condition, generic implications, common cause, and previous occurrences;
- evaluation and disposition of operability/functionality/reportability issues;
- classification and prioritization of the resolution of the problem commensurate with safety significance;
- identification of the root and contributing causes of the problem;
- identification of corrective actions, which were appropriately focused to correct the problem; and
- completion of corrective actions in a timely manner commensurate with the safety significance of the issue.

The inspectors discussed the corrective actions and associated evaluations with licensee personnel.

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

b. Findings

No findings were identified.

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

.1 Unit 1 Rapid Power Reduction Due to Main Power Transformer Cooling Group 1 Trip

a. Inspection Scope

During the Unit 1 refueling outage, Byron Station installed two new Hyundai-manufactured main power transformers (MPTs). The transformers were energized on March 26, 2017, with Cooling Group 1 selected as the lead cooling bank. Initial power ascension was in progress with the unit at 1162 MWe when the initial alarms were received at 1744 on March 28.

Unit 1 operators received several alarms on the 1E MPT. Investigation revealed that the breaker supplying Cooling Group 1 (6 fans and 3 oil pumps) had tripped open. The control room dispatched an operator to investigate locally and followed the actions designated in the alarm response procedure (BAR). The BAR directed operators to monitor oil and winding temperatures and contained a statement that the maximum temperature allowed by the vendor was 110 degrees Centigrade. Indication for key parameters (load, winding temperature, oil temperature and operating status) was available to the control room operators from the plant process computer. The plant process computer had a trend page with data points labeled hotspot winding temperature and the indicated temperature was rising rapidly.

As control room operators monitored the rising temperature indication, they identified that although the rising temperature indications were not one of the procedurally identified points on the Temperature Monitoring Table of 1BGP 100–3A12, Hyundai Transformer Operation Tables, they didn't know what the indications were and why they were not on the Table, but were on the transformer trend page. Due to the high rate of temperature increase of the two indications, the operating crew elected to believe the

indication and reduced transformer loading to prevent damage to the transformer. Initially, the crew reduced load at a rate of 20 MW/minute. When the temperature rise continued, they increased the rate to 250 MW/minute using the pre-set turbine control runback option. At the indicated 75 degrees Centigrade temperature, the backup cooling group started. As the runback neared completion, the temperature indication stopped rising. The local operator found the supply breaker tripped and reset it. Transformer cooling restarted and the runback was terminated at 735 MWe. With cooling restored, the operating crew recommenced power ascension.

The inspectors reviewed the operator actions in response to the plant indications and determined that the operator actions were in accordance with available procedural guidance. Troubleshooting of the supply breaker identified that the compression fittings connecting the load side wiring to the breaker were not fully tightened during assembly of the transformer and some arcing was evident. The breaker was replaced and thermography used to evaluate potential extent of condition did not identify any similar vulnerabilities on other connection sites.

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

b. Findings

No findings were identified.

.2 (Closed) Licensee Event Reports 05000455/2016-001-00 and 05000455/2016-001-01: Manual Reactor Trip Due to Circuit Breaker Failure that Caused Actuation of Feedwater Hammer Prevention System with Automatic Isolation of Feedwater to Two Steam Generators and Low Steam Generator Levels

This event, which occurred on October 12, 2016, involved the control room operators manually tripping the Unit 2 reactor from 90 percent power due to a partial feedwater isolation following a bus feed breaker trip. Following the reactor trip, both trains of auxiliary feedwater (AF) also actuated due to low steam generator levels. The unit trip was previously discussed in Section 4OA3 of Inspection Report 2016004. The licensee performed an Equipment Apparent Cause Evaluation (IR 02727378) and determined that the apparent cause of the breaker trip was a manufacturing defect on the feed breaker overcurrent trip device circuit board. The licensee replaced the breaker and overcurrent trip device prior to unit restart on October 13, 2016. Additionally, as a corrective action, the licensee planned to revise the breaker refurbishment testing requirements to include testing to identify if other overcurrent trip devices trip prior to reaching their setpoint. The manual reactor protection system (RPS) actuation and the automatic AF actuation were reportable under 10 CFR 50.73(a)(2)(iv)(A). The licensee submitted licensee event report (LER) 05000455/2016-001-00 on December 9, 2016.

Upon review of Revision 00 of the LER, the inspectors identified that the licensee reported the event as an event or condition that resulted in the manual or automatic actuation of a safety system, and the licensee described the manual actuation of RPS. However, the licensee failed to describe the automatic AF actuation, which is, itself, a reportable event. The licensee entered this issue into their CAP as IR 03966389 and submitted Revision 01 of the LER on February 15, 2017. Both Revision 00 and Revision 01 of this LER are closed.

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

.3 (Closed) Licensee Event Report 05000454/2016-002-00; 05000455/2016-002-00, Inadequate Protection from Tornado Missiles Identified Due to Non-Conforming Design Conditions

a. Inspection Scope

The inspectors reviewed LER 05000454/2016-002-00; 05000455/2016-002-00, which was submitted to the NRC on July 21, 2016. On May 25, 2016, the licensee identified non-conforming conditions in the plant as-built configuration and conditions such that specific technical specification equipment on both units was considered to not be adequately protected from tornado missiles as required by the current licensing and design basis. Specific vulnerabilities included: ventilation openings in the wall that separated the nonsafety-related turbine building from the safety-related auxiliary building, and a roof access hatch fabricated of sheet metal on top of the Unit 1 and Unit 2 refueling water storage tanks not providing adequate protection. The licensee entered various technical specification action statements for the equipment listed below. Operability was restored promptly using the guidance in Interim DSS-ISG-2016-01, "Clarification of Licensee Actions in Receipt of Enforcement Discretion," dated February 2016 per Enforcement Guidance Memorandum EGM 15-002, "Enforcement Discretion for Tornado-Generated Missile Protection Non-Compliance," dated June 10, 2015.

A list of specific equipment adversely effected and discussed in the LER included:

- Both trains of control room ventilation for a shared Unit 1 and Unit 2 control room;
- Unit 1 division 11 and Unit 2 division 21 battery chargers and associated DC buses;
- Unit 1 112/114 and Unit 2 212/214 engineered safeguard feature inverters;
- Main control room radiation monitors 0PR31J, 0PR32J, 0PR33J, and 0PR34J;
- Unit 1 and Unit 2 containment spray systems;
- Unit 1 and Unit 2 emergency core cooling water systems;
- Unit 1 and Unit 2 refueling water storage tanks; and
- Essential service water cooling towers (ultimate heat sink for both Units).

The inspectors reviewed the LER to ensure it was reported accurately in accordance with Title 10 of the *Code of Federal Regulations*, (10 CFR), Part 50.73 reporting requirements. Therefore, this LER is closed.

b. Findings

A finding and an associated violation of 10 CFR, Part 50, Appendix B, Criterion III, "Design Control," was identified based upon the lack of adequate tornado missile protection to the safety-related equipment listed above. The finding was determined to be less than red (i.e., high safety significance) based on a generic and bounding risk evaluation performed by the NRC in support of the resolution of tornado-generated missile non-compliances. The bounding risk evaluation is discussed in Enforcement Guidance Memorandum 15-002, "Revision 1: Enforcement Discretion for Tornado-Generated Missile Protection Non-Compliance," and can be found in ADAMS Accession No. ML14114A556.

Because this finding and violation was identified during the discretionary period covered by Enforcement Guidance Memorandum 15–002, Revision 1, “Enforcement Discretion for Tornado Missile Protection Non-Compliance” and because the licensee has implemented interim compensatory measures, and has final corrective actions planned, the NRC is exercising enforcement discretion by not issuing an enforcement action. The NRC has previously exercised enforcement discretion for continued operation for an interim period as discussed in Section 1R15.2 of this report and in NRC Inspection Report 05000454/2016-002; 05000455/2016-002.

#### 4OA5 Other Activities

##### .1 Institute of Nuclear Power Operations Plant Accreditation Report Review

###### a. Inspection Scope

The inspectors reviewed the final report for the Institute of Nuclear Power Operations (INPO) National Academy for Nuclear Training plant accreditation for operator training programs at Byron Station conducted during the week of July 25, 2016. While the inspectors were briefed on the team’s issues at the conclusion of the site visit, the final report was not issued until December 14, 2016. The inspectors reviewed the report to ensure that issues identified were consistent with the NRC perspectives of licensee performance and to determine if any significant safety issues were identified that required further NRC follow-up.

###### b. Findings

No findings were identified.

#### 4OA6 Management Meetings

##### .2 Interim Exit Meetings

Interim exits were conducted for:

- The inspection results for the Radiation Safety Program review with Mr. M. Kanavos, Site Vice President, and other members of the licensee’s staff on January 27, 2017;
- The inspection results for LER 05000454/2016-002-00; 05000455/2016-002-00, Inadequate Protection from Tornado Missiles Identified Due to Non-Conforming Design Conditions review with Mr. D. Spitzer, Regulatory Assurance Manager, on March 7, 2017;
- The inspection results for the Radiation Safety Program review with Mr. M. Kanavos, Site Vice President, and other members of the licensee’s staff on March 10, 2017; and
- The inspection results for the Inservice Inspection with Mr. M. Kanavos, Site Vice President, and other members of the licensee’s staff on March 20, 2017.

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

#### 40A7 Licensee-Identified Violations

The following violation of very low significance (Green) was identified by the licensee and is a violation of NRC requirements which meets the criteria of the NRC Enforcement Policy for being dispositioned as an NCV.

On March 11, 2017, with Unit 1 shutdown and in a refueling outage, pipefitters assigned to cut out and replace service water valve 1WS413 discovered that piping was blocked upstream of the valve and the work scope was appropriately changed to remove the blocked piping. Taking action they believed was allowed by the work instructions, the pipefitters opened a pipe union and removed the pipe. They then set the removed section containing valve 1WS023C on a nearby tripod to continue work. A system engineer performing a walkdown in the area identified that the removed valve had a clearance (danger) tag on it and immediately stopped work and contacted the operations department. Technical Specification 5.4.1 requires, in part, that written procedures be established, implemented and maintained covering the procedures recommended in Regulatory Guide 1.33, Revision 2, Appendix A, February 1978. One administrative procedure recommended in Appendix A is, "Equipment Control (e.g. locking and tagging)." OP-AA-109-101, "Clearance and Tagging," accomplished the locking and tagging requirement for Byron Station. Section 5.2, Danger Tags, established standards for implementation of the tagging process. Step 5.2.2 stated, "A component with a Danger Tag attached to it shall not be physically removed from the system." Contrary to the requirements stated above, a component with a danger tag attached was physically removed from the system on March 11, 2017. Specifically, pipefitters disconnected a pipe union and removed associated service water piping from the system that contained valve 1WS023C which had a clearance (danger) tag attached.

The licensee immediately verified that the cooler the piping served was out-of-service on both the supply and return sides with a clearance boundary in place and drained so that the workers were not exposed to a pressurized source. The workers immediately acknowledged their error stating they did not see the tag because they were focused on the demolition activities. The issue was entered into the licensee's CAP as IR 03984215, and the maintenance organization conducted a stand down to reinforce the station standards for compliance with the clearance procedure. The inspectors determined that this issue was more than minor because the performance deficiency adversely impacted the Configuration Control attribute of the Initiating Events Cornerstone objective to limit the likelihood of events that upset plant stability and challenge safety functions during shutdown operations. The inspectors determined the issue was of very low safety significance, or Green by answering "No" to all screening questions in IMC 0609, Appendix G, "Shutdown Operations Significant Determination Process," Exhibit 2, "Initiating Events Screening Questions."

ATTACHMENT: SUPPLEMENTAL INFORMATION

## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### Licensee

M. Kavanos, Site Vice President  
T. Chalmers, Plant Manager  
T. Faley, Maintenance Director  
C. Keller, Engineering Director  
H. Welt, Operations Director  
B. Barton, Radiation Protection Manager  
D. Spitzer, Regulatory Assurance Director  
D. Anthony, ISI Program Engineer  
M. Swartz, Senior NDE Specialist  
J. Miller, NDE Services  
D. Merkle, Engineering Programs Manager  
G. Contrady, NRC Regulatory Assurance  
K. McGuire, Plant Systems Manager  
S. Kerr, Manager - Projects  
P. Boyle, Work Management Director  
L. Zurawski, Regulatory Assurance

#### U.S. Nuclear Regulatory Commission

J. McGhee, Byron Station Senior Resident Inspector  
J. Draper, Byron Resident Inspector  
M. Jeffers, DRS Chief, Engineering Branch 2  
E. Duncan, Chief, Reactor Projects Branch 3

#### Illinois Emergency Management Agency

L. Torres, IEMA

## LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

### Opened

None

### Closed

05000454/2016002; 05000455/2016002	LER	Inadequate Protection for Tornado Missiles Identified Due to Non-Conforming Design Conditions
05000455/2016-001-00; 05000455/2016-001-01	LER	Manual Reactor Trip Due to Circuit Breaker Failure that Caused Actuation of Feedwater Hammer Prevention System with Automatic Isolation of Feedwater to Two Steam Generators and Low Steam Generator Levels

## LIST OF DOCUMENTS REVIEWED

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

### 1R01 Adverse Weather Protection

- OP-AA-108-107-1001, Revision 7; Station Response to Grid Capacity Conditions
- 0BOA ENV-1, Revision 123; Adverse Weather Conditions Unit 0
- 1BOA ENV-1, Revision 101; Adverse Weather Conditions Unit 1
- 2BOA ENV-1, Revision 101; Adverse Weather Conditions Unit 2
- 0BOA ELEC-1, Revision 15; Degraded SWYD Voltage Unit 0
- OP-AA-108-107-1002, Revision 10; Interface Procedure Between BGE/COMED/PECO and Exelon Generation (Nuclear/Power) for Transmission Operations
- OP-AA-108-107, Revision 4; Switchyard Control
- BAP 330-9T1, Revision 11; Byron 345kV Switchyard

### 1R04 Equipment Alignment

- M-61, Sheet 1A, Revision AU; Diagram of Safety Injection
- M-61, Sheet 1B, Revision AX; Diagram of Safety Injection
- M-61, Sheet 2, Revision AF; Diagram of Safety Injection
- M-61, Sheet 3, Revision AK; Diagram of Safety Injection
- M-61, Sheet 4, Revision AZ; Diagram of Safety Injection
- M-61, Sheet 5, Revision V; Diagram of Safety Injection
- M-61, Sheet 6, Revision AM; Diagram of Safety Injection
- BOP SI-E1B, Revision 4; Safety Injection System Train 'B' Electrical Lineup
- BOP SI-M1B, Revision 4; Train 'B' Safety Injection System Valve Lineup
- M-152, Sheet 9, Revision AA; Diagram of Diesel Generator Lube Oil Schematic
- M-152, Sheet 10, Revision AD; Diagram of Diesel Generator Fuel Oil Schematic
- M-152, Sheet 18, Revision R; Diagram of Starting Air
- BOP DG-E1, Revision 8; Diesel Generator Electrical Line-up (Unit 1)
- BOP DG-E1B, Revision 3; Diesel Generator Train B Electrical Line-up (Unit 1)
- M-62, Sheet 1, Revision BF; Diagram of Residual Heat Removal (Unit 1)
- BOP RH-6, Revision 48; Operation of the RH System in Shutdown Cooling
- BOP RH-E1B, Revision 3; Residual Heat Removal System Train B Electrical Line-up (Unit 1)
- BOP RH-M1B, Revision 11; Train 'B' Residual Heat Removal System Valve Lineup
- 1BOSR 0.1-5, Unit One Mode 5 Tech Spec Data Sheet D4 Low Temperature Overpressure Requirements
- IR 02529689; Flex Validation of 2B AF Suction Local Alignment to SX
- BOP AF-M2A, Revision 007; Auxiliary Feedwater System Train A Valve Lineup
- BOP AF-M2B, Revision 008; Auxiliary Feedwater System Train B Valve Lineup
- BOP AF-E2A, Revision 001; Auxiliary Feedwater Train A Electrical Lineup (Unit 2)
- BOP AF-E2B, Revision 002; Auxiliary Feedwater Train B Electrical Lineup (Unit 2)

### 1R05 Fire Protection

- Pre-Fire Plan FZ 11.4-0 N – Auxiliary Bldg. General Area – North – 383' Elev.
- Pre-Fire Plan FZ 11.4-0 S – Auxiliary Bldg. General Area – South – 383' Elev.

- Pre-Fire Plan FZ 11.4-0 W – Auxiliary Bldg. General Area – West – 383' Elev.
- Pre-Fire Plan FZ 11.4C-0 – Auxiliary Bldg. 383' Elev. Remote Shutdown and Radwaste Panels
- Pre-Fire Plan FZ 5.4-2 – Auxiliary Bldg. 451'-0" Elev. Division 22 Misc. Electrical Equipment and Battery Room
- Pre-Fire Plan FZ 11.3-1 Unit 1 Containment Pipe Penetration Area
- Pre-Fire Plan FZ 18.3-1 Miscellaneous Area 377' 0" Elevation Unit 1 Main Steam & Auxiliary Feedwater Pipe Tunnel

#### 1R06 Flooding

- M-42, Sheet 1A, Revision AR; Diagram of Essential Service Water
- M-42, Sheet 1B, Revision AT; Diagram of Essential Service Water
- M-42, Sheet 2A, Revision BC; Diagram of Essential Service Water
- M-42, Sheet 2B, Revision BC; Diagram of Essential Service Water
- CC-AA-201 Plant Barrier Control Program
- IR 0272689; EOC – Corrosion on 0SX168B
- IR 02663826; Min Wall Thickness < 87.5% of Nominal Wall Thickness for SX Piping
- IR 03977700; Groundwater Inleakage in U1 Aux Feed Tunnel

#### 1R08 Inservice Inspection Activities

- AR 03984513; Scored Weld Overlay for Penetration 76; March 13, 2017
- AR 03983749; NRC Issues with EC 618534; March 10, 2017
- AR 03983458; TS TRM Appendix G RCP Flywheel has Incorrect Reference; March 9, 2017
- AR 03982084; CRDM Penetrations- Additional UT Indications; March 6, 2017
- AR 03982986; NRC ID Unqualified WPS; March 8, 2017
- AR 03981686; UT Indications in Penetration 76; March 5, 2017
- AR 03981426; NRC Review of Work Package for B1R21; March 4, 2017
- AR 03981261; Unacceptable PT Indication P31; March 3, 2017
- AR 03980792; RVCH Penetration #47 Not Volumetrically Examined; March 2, 2017
- AR 03980599; NRC Question Use of ETSS 21998.1- Past SG Inspection; March 2, 2017
- AR 02713844; Program Health SG; September 9, 2016
- AR 02663826; Min Wall SX Piping; May 2, 2016
- AR 02661989; Min Wall SX Piping; April 27, 2016
- AR 02603831; Identify Leak Source 1VF89AB; December 22, 2015
- AR 02588106; Body to Bonnet Leak 1AB007; November 17, 2015
- AR 02568391; FME FW Suction Strainer; October 9, 2015
- AR 02564049; Boric Acid Residue on Fittings 1PR16A; October 1, 2015
- AR 02564032; Dry Boric Acid on Body-to-Bonnet (1RC8037B); October 1, 2015
- AR 02559653; Foreign Object in 1B SG Secondary Side; September 24, 2015
- AR 02559658; Foreign Object in 1c SG Secondary Side; September 24, 2015
- AR 02559526; Reactor Head Flange Weld MT Indications; September 23, 2015
- AR 02556269; Inactive Boric Acid Leak on 1SI8801A; September 17, 2015
- AR 02550405; 1SX93AA-8" Below Min Wall; September 2, 2015
- AR 02547859; 1SX93AB-8" Below Min Wall; August 28, 2015
- AR 02431695; Leak 0SX02D-30"; January 1, 2015
- AR 02427918; 1C SG PORV Seat Leak; December 19, 2014
- ASME Weld Map; 1RC01R-CETC Penetration 76 Repair Defect of Weld Excavation and Profile Layers; March 18, 2017
- ASME Weld Data Record – Existing Reactor Head Penetration 76 Repair; March 18, 2017
- ASME Weld Data Records – Weld 1,2,19 and 20 – WO 01635685-05; April 25, 2015

- ASME Section XI Repair/Replacement Plan; Install Two New 4" Check Valves; February 17, 2015
- Certified Material Test Report; 3/32 X 36" Weld Wire CP9530-L0529; September 23, 2014
- EC 0000618534; Unit 1 Rx Head Penetration P74, P76 and P77 Flaw Repair; March 8, 2017
- ECR 0000427917; Provide Guidance for Verification of Depth Restoration on Weld Repair of the EFR Overlay on Penetration 76; March 18, 2017
- ECR 0000427882; Weld Repair to Weld Overlay on 1RC01R; March 14, 2017
- ECR 0000427955; Provide Guidance for Welding Requirements for Weld Repair on P76 Necessary to Meet the Basis of WCAP-15987; March 18, 2017
- EPRI PDQS-717 – Procedure 54-ISI-604-011; September 17, 2015
- EPRI PDQS-682 – Procedure 54-ISI-603-005; February 9, 2015
- EPRI PDQS-858 – Procedure PDI-UT-1; July 25, 2016
- EPRI PDQS-859 – Procedure PDI-UT-2; July 25, 2016
- EPRI PDQS-772 – Procedure PDI-UT-3; November 8, 2013
- Procedure ER-AA-335-031; Ultrasonic Examination of Austenitic Piping Welds; Revision 8
- Procedure ER-AA-335-002; Liquid Penetrant Examination; Revision 9
- Procedure ER-AP-335-001; Bare Metal Visual Examination for Nickel Alloy Materials; Revision 5
- Procedure ER-AP-331-1001; BACC Inspections, Implementation and Inspection Guidelines; Revision 9
- Procedure ER-AP-331-1002; BACC Program Identification, Screening and Evaluation; Revision 9
- Procedure 54-ISI-604-013; AREVA Automated UT Examination of Open Tube RPV Closure Head Penetrations; Revision 13
- Procedure 54-ISI-603-008; AREVA Automated UT Examination of RPV Closure Head Penetrations Containing Thermal Sleeves; Revision 8
- Procedure EXE-ISI-210; Manual Ultrasonic Examination of Vessel Welds Greater than 2"; Revision 5
- Procedure EXE-PDI-UT-2; Ultrasonic Examination of Austenitic Piping Welds in Accordance with PDI-UT-2; Revision 7
- Procedure EXE-PDI-UT-1; Ultrasonic Examination of Ferritic Piping Welds in Accordance with PDI-UT-1; Revision 7
- PQR 1-53B; January 29, 1986
- PQR 2-53A; February 12, 1986
- PQR 002-41-055; February 10, 1994
- PQR-107; January 23, 1987
- PQR A-001; October 19, 1998
- PQR A-002; March 9, 1999
- PQR 1-50C; January 3, 1984
- PQR W-RCVH-P43; February 5, 2014
- Report 2015-121; Radiographic Examination and Interpretation Report- Weld 1and 2; dated May 29, 2015
- Report 2015-122; Radiographic Examination and Interpretation Report- Weld 19 and 20; dated May 29, 2015
- Report VT-2 Visual Examination NDE Report; dated October 1, 2015
- Report 2015-UT-173; UT Thickness-1SX93AA-8"; September 3, 2015
- Report 2017-UT-024; UT Calibration/Examination-1RC14AD-2"; March 7, 2017
- Report 2017-UT-020; UT Calibration/Examination-1RC14AA; March 7, 2017
- Report 2017-UT-022; UT Calibration/Examination-1RC14AB; March 7, 2017
- Report 2017-UT-023; UT Calibration/Examination-1RC14AC; March 7, 2017
- Report 2017-PT-011; Liquid Penetrant Examination Data Sheet - Penetration 31; March 4, 2017
- Report 2017-PT-017; Liquid Penetrant Examination Data Sheet - Penetration 31; March 6, 2017

- Report 2017-PT-049; Liquid Penetrant Examination Data Sheet – 1RC01R Penetration 76; March 18, 2017
- Report B1R21-UT-077; UT Calibration/Examination-1FW03DD-16/C14; March 5, 2017
- Report B1R21-UT-079; UT Calibration/Examination-1FW03DD-16/C15; March 5, 2017
- Report B1R21-UT-075; UT Calibration/Examination-1FW03DD-16/C16; March 5, 2017
- Report B1R21-UT-076; UT Calibration/Examination-1FW03DD-16/C17; March 5, 2017
- Report B1R21-UT-078; UT Calibration/Examination-1FW03DD-16/C19.01; March 5, 2017
- Report B1R21-UT-080; UT Calibration/Examination-1FW03DD-16/C20.01; March 7, 2017
- Report B1R21-UT-073; UT Calibration/Examination-1FW03DC-16/C17; March 5, 2017
- Report B1R21-UT-110; UT Calibration/Examination-1RC-01-BB/SGW-01; March 8, 2017
- Report B1R21-PT-001; Liquid Penetrant Examination- 1SI03DA-2/W-09; March 4, 2017
- Report B1R20-MT-001; Magnetic Particle Examination- 1RC-01-R/RVHC-01; September 25, 2015
- Report B1R20-MT-002; Magnetic Particle Examination- 1RC-01-R/RVHC-01; September 25, 2015
- Report B1R20-VEN-003; Visual Examination 1RC01R/RPV Head Penetration Surface; March 19, 2017
- Welder TS5462 – Welders Qualified to ASME Section IX; March 15, 2017
- WO 01370255-01; Replace Valve 1RH8729A; December 14, 2016
- WO 04608043-04; 1RC01R – Perform Weld Repair of Gouge on Overlay on Penetration 76; March 18, 2017
- WO 01878069; LR-RX Pressure Vessel Bare Metal Examination U1-Rx Vessel; March 14, 2017
- WPS 1-1-GTSM-PWHT; Revision 2
- WPS 8-8-GT-1; Revision 0
- WPS 43-43-GT-RVCH; Revision 0
- WPRS 1-8-GTSM; Revision 2

#### 1R11 Licensed Operator Regualification Program

- Evaluation Scenario for week of February 9, 2017
- 1BGP 100-4, Revision 57; Power Decension
- 1BGP 100-5, Revision 72; Plant Shutdown and Cooldown

#### 1R12 Maintenance Effectiveness

- IR 02660876; MCC 234X5-F4-FR Failed to Trip. Replace in B2R19
- IR 02660414; Issue Opening 2AP73E-H
- IR 02660369; MCC 234V3 Breaker Failed in Mid Position
- IR 02532120; MCC 232X2A Feed Breaker Would Not Close from MCR
- IR 02727378; MCC 234V4 Not Energized Subsequent U-2 Rx Trip
- IR 02732275; Maintenance Rule Plant Level Criteria for AP-04 Function Exceeded
- Maintenance Rule System Basis Document for Function AP-04
- ER-AA-310, Revision 9; Implementation of the Maintenance Rule
- ER-AA-310-1001, Revision 4; Maintenance Rule – Scoping
- ER-AA-310-1004, Revision 13; Maintenance Rule – Performance Monitoring
- ER-AA-310-1005, Revision 7; Maintenance Rule – Dispositioning Between (a)(1) and (a)(2)
- (a)(1) Action Plan for IR 2732275; January 5, 2017
- Failure Classification Form for IR 02727378; dated December 11, 2016
- Maintenance Rule System Basis Document for Functions VC-01 and WO-02
- Maintenance Rule System Basis Document for Function PS-02
- Failure Classification Form for IR 02660740; dated May 2, 2016

- (a)2 evaluation for function PS-02 dated January 31, 2017 for period January 2015 through January 2017
- Maintenance Rule (a)(3) Assessment Report for July 2015 through December 2016; approved March 6, 2017

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

- WO 01136534; 1SX2080A Valve Stem Is Twisted
- Risk Evaluation for Week of 1/2/17; Revision 1
- OP-AA-201-012-1001, Revision 1; Operations On-Line Fire Risk Management
- IR 03967829; OP-MW-201-007 Lessons Learned
- IR 03969898; Received Unexpected Local Alarm DG 1A "Turbo Lube Oil Press Low"
- BAR 1PL07J-1-C6, Revision 53; Turbo Lube Oil Pressure Low
- Risk Evaluation for Week of 1/30/17; Revision 1
- B1R21 Shutdown Safety Management Plan (SSMP) dated 12/16/2016
- IR 02724388; Shutdown Risk Actions and Check-in for B1R21
- WO 01884294; NERC-112 "B" Train 125V Battery Bank Service Test
- Risk Evaluation for Week of 2/20/17; Revision 3
- OP-AA-108-117, Revision 4; Protected Equipment Program
- OP-BY-108-117-1000, Revision 9; Byron Protected Equipment Program

#### 1R15 Operability Determinations and Functional Assessments

- IR 03957398, Relay Failed During Undervoltage Surveillance
- MA-BY-773-406, Revision 3; Bus 242 Undervoltage Protection Monthly Surveillance
- TS 3.3.5, "Loss of Power (LOP) Diesel Generator (DG) Start Instrumentation" and associated bases
- IR 03963040; 0A SX Makeup Pump Fuel Oil Pump Bullseye Is Empty
- IR 00593970; 0A SX Makeup Pump Top Bullseye Fuel Oil Sightglass Empty
- TS 3.7.9, "Ultimate Heat Sink (UHS)" and associated bases
- IR 03966564; 0B VC Chilled Water Pump ASME Failed
- 0BOSR 5.5.8.WO.5-2c, Revision 3; Unit Zero Comprehensive Inservice Testing (IST) Requirements for 0B Control Room Chilled Water Pump, 0WO01PB
- IST Evaluation Report 17-001 for 0WO01PB; January 25, 2017
- ASME OM Code-2004; Code for Operation and Maintenance of Nuclear Power Plants
- WO 01902345; Change Grease in Coupling per BMP 3229-1 Section F.2
- IR 03971728; Flooding Concern for DOST Rooms
- IR 03974728; Additional Information for IR 3971728 – DOST Room Flooding
- IR 03979760; Entered 0BOA Env-1 for Ogle County Tornado Watch
- IR 03977879; Unit 2 Containment Equipment Hatch Inner Door Has High Leakage
- 2BOL PC-1, Revision 6; LCOAR Containment Airlock Door Seals
- 2BOSR 6.2.1-1, Revision 8; Unit Two Primary Containment Type B Local Leak Rate Tests of the Equipment Hatch Airlock Door Gasket Interspaces
- IR 03981455; Package Closure Gap

#### 1R18 Plant Modifications

- WO 01786930; SX Pump Cubicle Cooler Replacement 1VA01SA EC 404261
- EC 404261, Revision 000; 1SX01PA Pump Cubicle Cooler Replacement 1VA01SA

## 1R19 Post-Maintenance Testing

- IR 03959110; Small Nitrogen Leak on 2D MSIV Standby Train
- WO 04586612; Recharge 2MS001D As Required
- IR 03956657; Unit 2 Governor Valve Number 1 LVDT Possibly Failing
- WO 04586131; Unit 2 Governor Valve Number 1 LVDT Possibly Failing
- WO 01689302; Replace Manual Setpoint Control Station to 1AF005E
- BISR 3.4.2-200, Revision 13; Surveillance Calibration of Aux Feedwater to Steam Generators A, B, C and D Flow Control Loops
- Test Report Package (TRP) for 1AF-012, Revision 5; Auxiliary Feedwater to Steam Generator 1A Flow Control Loop (AF)
- 6E-1-4031AF02, Revision O; Loop Schematic Diagram Aux. Feedwater Steam Gen. 1A Flow Control System ESF-12 Panel 1PA34J
- 6E-1-4030AF13, Revision N; Schematic Diagram Aux. Feedwater Pump 1B Startup Panel 1AF01J Annunciator
- 6E-1-4030AN008, Revision V; Schematic Diagram Annunciator Window Engraving 1UL-AN011, 012, 013 & 014 at 1PM06J
- IR 03967363; 1HK-AF032A TRP Needs to Be Updated
- IR 03981789; Failed As Found LLRT on 1RY8033
- WO 01860521; Rebuild Actuator, Regulators/Replace Elastomers
- WO 01594618; LLRT for P-27 – 1RY8033 and 1RY8047
- 1BOSR 6.1.1-11, Revision 11; Unit One Primary Containment Type C Local Leakage Rate Tests and IST Tests of Pressurizer Relief System
- WO 01878059; Perform Leakage Test
- IR 03977220; 1RH01SB Leak Rate Test Results
- WO 01864352; Perform Leakage Test
- WO 01883193; Replace Fuel Oil Ratio Relay
- IR 03974278; 1PY-DG8035B Ratio Relay Has Minor Fuel Oil Leak
- M-152, Sheet 10, Revision AD; Manufacturers Supplemental Diagram of Diesel Generator Fuel Oil Schematic
- WO 01880603; Replace Governor Actuator
- 1BOSR 8.1.2-1, Revision 030; Unit One 1A Diesel Generator Operability Surveillance
- 1BOSR 8.1.17-1, Revision 026; Unit One 1A Diesel Generator SI Signal Override Test
- 1BOSR 8.1.9-1, Revision 20; 1A Diesel Generator Safe Shutdown Sequencer and Single Load Rejection Test
- 1BOSR 6.1.1-11, Revision 11; Unit One Primary Containment Type C Local Leakage Rate Tests and IST Tests of Pressurizer Relief System
- WO 01888438; Disassemble and Inspect Check Valve
- WO 01888439; Disassemble and Inspect Check Valve
- MA-AA-733-1001, Revision 10; Guidance for Check Valve General Visual Inspection
- IR 03987907; NRC ID Discrepancy with W/O 01888439-01 Close Out
- IR 03987904; Check Valve Inspection on 1AF049D Found Unsat Condition
- IR 03989586; 1AF049D Leakage Exceeded Acceptance Criteria
- IR 03989581; 1AF049A Leakage Exceeded Acceptance Criteria
- IR 03986813; 1AF049D Check Valve Indicates Leak-by
- 1BOSR FX-S1, Revision 0; Unit 1 Auxiliary Feedwater FLEX Connection Low Point Drain Semiannual Inspection
- M-132, Revision A; Diagram of Auxiliary Feedwater FLEX
- IR 03991319; Concerns Raised in IR# 3986813 Need More Evaluation
- IR 03994502; NRC Identified Improper LCO Exit

## 1R20 Outage Activities

- IR 03979357; Incipient Fire in the Reactor Head Stand Area Unit 1 Containment
- IR 03979244; 4.0 Critique of B1R21 Ramp Offline
- WO 01953865; Replace Graphoil Gasket 1B RVLIS Head 40 Pin Connector
- C/O 00135681; U-1 Reactor Vessel
- IR 03980966; NRC Question on Scaffold Storage
- IR 03982655; Dry Boric Acid on Pipe Cap By 1SI138 Valve
- IR 03983517; Unit 2 CC Surge Tank Level Transmitter Missing Label
- IR 03975511; Underwater Pool Lights Found With Missing Crimps
- EC 618443; Lost Parts Evaluation – Missing spent Fuel Pool Lighting Safety Clips
- IR 03983299; Work Hour Limit Waiver
- LS-AA-119, Revision 12; Fatigue Management and Work Hour Limits
- IR 03979646; NRC ID – Inactive Boric Acid Leak (1SI8955D)
- IR 03979653; NRC ID – Inactive Boric Acid Leak on Pipe Cap Dwnstrm (1CV223)
- IR 02550590; Inactive Leak from Test Connection on (1CV066C)
- IR 03979637; NRC ID – Inactive Boric Acid Leak (1PS136)

## 1R22 Surveillance Testing

- 2BOSR 5.5.8.SI.5-1A Unit 2 Group A Inservice Testing (IST) Requirements For Safety Injection Pump 2SI01PA
- BOP SI-1 Safety Injection System Startup
- BOP SI-2 Safety Injection System Shutdown
- 1BOSR 3.1.5-1, Revision 37; Unit One Train A Solid State Protection System Surveillance
- WO 01933026; 1 BOSR 3.1.5-1, Train A SSPS Bi-Monthly Surveillance
- IR 03958508; SSPS Procedure Needs Revision
- 1BOSR 3.1.5-1, Revision 36; Unit One Train A Solid State Protection System Surveillance
- 1BOSR 3.2.8-602A, Revision 10; Unit One ESFAS Instrumentation Slave Relay Surveillance (Train A Automatic Safety Injection and RWST Lo-2 Level – K602, K647, K648)
- BAP 1310-10, Revision 20; HU-AA-104-101, Procedure Use and Adherence, Byron Addendum
- HU-AA-104-101, Revision 5; Procedure Use and Adherence
- BOP VA-5, Revision 12; Aux Building Charcoal Booster Fan Operation
- 6E-0-4030VA15, Revision O; Schematic Diagram Auxiliary Building Charcoal Booster Fan 0C 0VA03CC
- 6E-1-4114G, Revision P; External Wiring Diagram Solid State (Rx & ESF) Protection System Cab. Train A (Output Section) Part 4 (1PA09J)
- 6E-0-4046AB, Revision H; Internal-External Wiring Diagram Main Control Panel HVAC 0PM02J Part 2
- 6E-0-4046AL, Revision P; Internal/External Wiring Diagram Main Control Panel HVAC 0PM02J Part 11
- 6E-1-4030EF11, Revision AB; Schematic Diagram Reactor Protection System Output Relays Development Train “A”
- 2BOSR 5.5.8.CS.5-2C Comprehensive Inservice Testing (IST) Requirements for CS Pump 2CS01PB
- 2BOSR 3.8.2-644A – Unit 2 ESFAS Instrument Slave Relay Surveillance Train A Automatic Containment Spray – K644
- 1BOSR SI-910 Unit One Cold Leg Isolation Valves Leakage Surveillance
- 1BOL 6.3 Containment Isolation Valves Tech Spec LCO #3.6.3
- M-61, Sheet 1A, Revision AU; Diagram of Safety Injection

- M-61, Sheet 2, Revision AF; Diagram of Safety Injection
- M-61, Sheet 3, Revision AK; Diagram of Safety Injection
- IR 03965991; 1AF005F STT Falls Outside IST Admin Limit
- WO 01963113; STT 1AF005E-H (Week H)
- 0BOL IST1, Revision 2; LCOAR IST – ASME Stroke Times
- 1BOSR 0.5-2.AF.1-2, Revision 10; Unit One Train B Auxiliary Feedwater Valves Stroke Test
- IST Valve Evaluation Report # 17-002; 1AF005F; January 24, 2017
- 2BOSR 3.2.8-608B, Revision 3; Unit Two ESFAS Instrumentation Slave Relay Surveillance (Train B Automatic Safety Injection – K608)
- WO 04569090; Slave Relay Train B SI-K608/AF, ACB 2422 (Wk K)
- Surveillance Test Interval (STI) Evaluation Form BY-14-001, Revision 0; Revise Manual SI and Phase A, Feedwater Isolation, Manual Phase B and Containment Spray Actuation, Slave Relay Test, and Containment Isolation Valve Actuation Surveillance Test Surveillance Frequency from 18 Months to 36 Months
- 1BOSR 0.1-5, Revision 19; Unit One Mode 5 Tech Spec Data Sheet D4 Low Temperature Overpressure Requirements
- 1BOSR 4.12.4-1, Revision 2; Reactor Coolant System Overpressure Protection Systems Operability Non-Routine Surveillance
- TRP 1RC-0407, Revision 3; Calibration of Wide Range Reactor Coolant Pressure Loop 1C Hot Leg (RC)
- WO 01791968; Cal of Wide Range RC Temp (1T-0413A) Loop
- TRP 1RC-0413A, Revision 5; Calibration of Wide Range Reactor Coolant Outlet Temperature (Hot Leg) (RC)
- 6E-1-4031RC26, Revision S; Loop Schematic Diagram Reactor Coolant System Cold Overpressurization System Control 1A & 1D
- 6E-1-4031RC13, Revision P; Loop Schematic Diagram Wide Range Temp. (Hot Leg) Protection I (1TE-RC022A, 1TE-RC023A)
- 6E-1-4031RC31, Revision C; Loop Schematic Diagram Reactor Coolant Hot Leg 1A, 1B, 1C & 1D Wide Range Temp.
- 6E-1-4031RC34, Revision D; Loop Schematic Diagram Reactor Coolant System Wide Range Pressure (1PT-0407)
- TRP 1RC-022A, Revision 0; Calibration of Reactor Coolant Hot Leg Wide Range Temperature 1A Loop for the Fire Hazards Panel
- WO 01864920; Main Steam Safety Valves Operability Test (<94% Rx Pwr)
- 1BVSR 7.1.1-1, Revision 10; Unit 1 Main Steam Safety Valves Operability Test
- WO 01691544; 1MS014B IST Trevitest
- BMP 3114-15, Revision 33; Main Steam Safety Valve Verification of Lift Point Using Furmanite's Trevitest Equipment
- WO 01860298; 1A EDG Safe Shutdown Sequence and Load Reject
- 1BOSR 8.1.9-1, Revision 20; 1A Diesel Generator Safe Shutdown Sequencer and Single Load Rejection Test
- 1BOSR 6.1.1-11, Revision 11; Unit One Primary Containment Type C Local Leakage Rate Tests and IST Tests of Pressurizer Relief System

## 2RS1 Radiological Hazard Assessment and Exposure Controls

- PI-AA-126-1005-F-01; Check in Self-Assessment, Infield Work Control; Dated January 30, 2017
- RP-AA-19; High Radiation Area Program Description; Revision 2
- RP-AA-300; Radiological Survey Program; Revision 14
- RP-AA-300-1001; Discrete Radioactive Particle Controls; Revision 5

- RP-AA-302; Determination of Alpha Levels and Monitoring; Revision 8
- RP-AA-350; Personnel Contamination Monitoring Decontamination and Reporting; Revision 17
- RP-AA-460; Controls for High and Locked High Radiation Areas; Revision 29
- RP-AA-460-002; Additional High Radiation Exposure Controls
- CY-BY-130-300-F-01; Isotopic Analysis Request Form, RX Head Lift; Dated March 1, 2017
- Survey Map #276; RX1-XXX-U1 Containment Blank, Survey # 2017-0672; Dated March 3, 2017
- Survey Map #230; U-1 426 All Inclusive, Survey # 2017-711; Dated March 3, 2017
- Survey Map #231; RX1-426 Laydown Area; Survey 2017-680; Dated March 4, 2017
- Radiation Work Permit BY-1-17-00677; RX Head Peening; Dated February 20, 2017
- Radiation Work Permit BY-1-17-00649; Emergent RX Head Repairs of Penetrations; Dated March 4, 2017
- Radiation Work Permit BY-1-17-00647; CRMD Inspection; Dated February 20, 2017
- B1R21 Outage RWP ALARA Index
- B1R21 Emergent Rx Head Repairs Pen 74, 76, 77 Dose Estimates
- B1R21 Reactor Head Repair Project Mockup Plan; Dated March 9, 2017
- IR 02659846; B2R19 LL Higher Than Expected Smearable Levels in RX Cavity; Dated July 5, 2016
- IR 02702477; 0WY49-2 Demin Water Flush, August 9, 2016, Failed to Reduce Dose; Dated August 9, 2016
- IR 02735075; Emergent Dose Required for ½ LS-WF 009 Inspection; Dated October 31, 2016
- IR 03980911; EMD Rad Worker Performance Gap Identified; Dated March 3, 2017

## 2RS2 Occupational ALARA Planning and Controls

- RP-AA-401; Attachment 2, Combined ALARA Plan/Micro-ALARA Plan, RWP Number: BY-00677; Task 4-B1R21 Rx Head Peening – Rad Surveys & CETC Funnel Prep (Underhead)
- RP-AA-401; Attachment 2, Combined ALARA Plan/Micro-ALARA Plan; RWP Number: BY-1-17-00649; B1R21 Rx Head Emergent Repair to a Repair
- RP-AA-401; Attachment 6, ALARA Work-In-Progress Review, RWP Number BY-1-17-00608; Rx Head and Vessel Internal ISI
- RP-AA-401; Attachment 6, ALARA Work-In-Progress Review, RWP Number BY-1-17-00668; B1R21 Temporary Power; Dated March 8, 2017

## 2RS5 Radiation Monitoring Instrumentation

- PI-AA-126-1005-F-01; Check in Self-Assessment; Radiation Protection Instrumentation; October 19, 2016
- RP-AA-226; Calibration of Canberra Accuscan Whole Body Counter; Revision 1
- RP-AA-229; Fastscan ABACOS Plus Whole Body Counter (WBC) Calibration; Revision 3
- RP-AA-230; Operation of Canberra FASTSCAN Whole Body Counter (WBC) Using ABACOS Plus; Revision 3
- RP-AA-700; Controls for Radiation Protection Instrumentation; Revision 4
- RP-AA-700-1100; Operation of the Eberline RO-2/2A/20, BICRON RSO 50E; Revision 1
- RP-AA-700-1235; Operation and Calibration of the PM-12 Gamma Portal Monitor; Revision 3
- RP-AA-700-1246; Operation of Air Samplers; Revision 4
- RP-BY-904; Area Radiation Monitoring System Alert/High Alarm Set Points

- RP-AA-700; Attachment 1, Out of Tolerance Report (Sample) Page 1 of 1, Instrument Model: RSO-50, Instrument Serial No: B311V; Revision 4; September 2, 2016
- RP-AA-700-1239; Attachment 2; SAM-12 Calibration Data Sheet (CDS); SAM-12 Serial Number: 258; December 12, 2016
- Inventory of All In-Service Radiation Detection Instrumentation; January 19, 2017
- Exelon Powerlabs Certificate of Calibration; Certificate Number: 0010996786; December 12, 2016
- Exelon Powerlabs Certificate of Calibration; Certificate Number: 0010999234; December 14, 2016
- Exelon Powerlabs Certificate of Calibration; Certificate Number: 0010960893; May 26, 2016
- IR 02739390; Power Supply Cal Possible to RMS Communications Issues; November 10, 2016
- IR 02597073; 1AR11J Check Source Test Failed; December 8, 2015
- IR 02660580; B2R19 LL Loss of Loop Causes Loss of Rad Monitors; April 25, 2016

#### 40A1 Performance Indicator Verification

- NEI 99-02, Revision 7; Regulatory Assessment Performance Indicator Guidance

#### 40A2 Identification and Resolution of Programs

- IR 2707553; SXCT Fill Degradation – Cell G
- WO 1959705; Follow-up Inspection of SXCT Cell G Fill Prior to 2/24/17
- Report from Wiss, Janney, Elstner Associates, Inc. to the Exelon System Engineer dated November 28, 2016 concerning Laboratory Studies of Clay Fill Tile, Cooling Tower Cells G and E, SX Cooling Tower of Byron Nuclear Generating Facility
- IR 02393595; NRC Identified Issues with Vendor Exam Procedure
- IR 02399248; NRC Identified Issue Classified as Non-conformance
- IR 02467656; Issues Identified with Engineering Evaluation
- EC 401126, Revision 001; Nonconformance Evaluation for the RCP Flywheels
- Curtis Wright Corporation, Test Report CPS-14-014 “Byron Penetrant Test Evaluation,” dated October 14, 2014
- IR 03978141; U2 RWST Htr Not Running As Required
- IR 03968355; U2 RWST Htr Not Running As Required
- IR 03957841; U-2 RWST Htg Pp Motor Electrical Troubleshooting Results
- IR 03955944; U2 RWST Pp Trip
- IR 03949532; EOC of RWST Heater Issue
- IR 03948260; U-2 RWST Heater Failed to Cycle ON When Expected
- IR 00458250; Alert Declaration Challenge Following UE Termination
- IR 00457630; RWST Heater Breaker Found Tripped
- IR 00458146; U1 RWST Heater Failure and Smoke Generated
- WR 01334262; U2 RWST Heater Not Running As Required
- M-136, Revision BB; Diagram of Safety Injection
- WO 04583619; U2 RWST Pp Trip

#### 40A3 Follow-Up of Events and Notices of Enforcement Discretion

- EACE 02727378; Loss of Power to MCC 324V4 and Subsequent Unit Trip Due to Lowering Steam Generator Levels on 2B and 2C Steam Generators; November 17, 2016
- IR 03990691; 1E MPT Group 1 Cooling Fans Supply Breaker Trip
- IR 03990685; Accessibility to New Unit 1 MPT Cabinets During Transient
- IR 03990741; 4.0 Critique of Loss of Cooling to the 1E MPT

- IR 03991415; 1E MPT Cooling Group 1 Troubleshooting Results
- 1BGP 100-3A12, Revision 0; Hyundai Transformer Operation Tables
- 6E-1-4030MP12, Sheet 1, Revision NEW; Schematic Diagram Main Power Transformer 1E Cooling System
- 6E-1-4030MP12, Sheet 2, Revision NEW; Schematic Diagram Main Power Transformer 1E Cooling System
- BOP EH-13, Revision 4; DEHC Operations

#### 4OA5 Other Activities

- INPO National Academy for Nuclear Training Accreditation Final Report for Byron Station; dated December 14, 2016

#### 4OA7 Licensee-Identified Violations

- IR 03984215; Level 4 C&T – Excessive WS Piping Removed
- WO 01376760; 1WS17BC-2” – Replace Blocked Section of Piping
- OP-AA-109-101, Revision 12; Clearance and Tagging

## LIST OF ACRONYMS USED

AC	Alternating Current
ADAMS	Agencywide Documents Access and Management System
AF	Auxiliary Feedwater
ALARA	As-Low-As-Reasonably-Achievable
AR	Action Request
ASME	American Society of Mechanical Engineers
BAR	Alarm Response Procedure
CAP	Corrective Action Program
CFR	<i>Code of Federal Regulations</i>
DEHC	Digital Electro-hydraulic Control
DG	Diesel Generator
DRP	Division of Reactor Projects
EGM	Enforcement Guidance Memorandum
FW	Feedwater
INPO	Institute of Nuclear Power Operations
IP	Inspection Procedure
IR	Inspection Report
IR	Issue Report
ISI	In-Service Inspection
IST	Inservice Testing
LER	Licensee Event Report
LLC	Limited Liability Corporation
LLRT	Local Leak Rate Testing
LTOP	Low Temperature Overpressure Protection
LVDT	Linear Variable Differential Transformer
MW	Megawatts
MPT	Main Power Transformer
NCV	Non-Cited Violation
NDE	Non-Destructive Examination
NEI	Nuclear Energy Institute
NRC	U.S. Nuclear Regulatory Commission
PI	Performance Indicator
PI&R	Problem Identification and Resolution
PM	Post-Maintenance
RCP	Reactor Coolant Pump
RCS	Reactor Coolant System
RFO	Refueling Outage
RP	Radiation Protection
RPS	Radiation Protection Specialist
RPS	Reactor Protection System
RWST	Refueling Water Storage Tank
SG	Steam Generator
SI	Safety Injection
SSC	System, Structure or Component
SSMP	Shutdown Safety Management Plan
SXCT	Essential Service Water Cooling Tower
TS	Technical Specification
TSO	Transmission System Operator
UFSAR	Updated Final Safety Analysis Report

UHS	Ultimate Heat Sink
URI	Unresolved Item
UT	Ultrasonic
WO	Work Order