UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
2443 WARRENVILLE RD. SUITE 210
LISLE, IL 60532-4352

January 27, 2016

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 05000454/2015004; 05000455/2015004

Dear Mr. Hanson:

On December 31, 2015, the U.S. Nuclear Regulatory Commission (NRC) completed an integrated inspection at your Byron Station, Units 1 and 2. The enclosed report documents the results of this inspection, which were discussed on January 5, 2016, with Mr. M. Kanavos and other members of your staff.

Based on the results of this inspection, the NRC has identified three findings of very low safety significance (Green). The NRC has also determined that violations are associated with two of the issues. These violations are being treated as Non-Cited Violations (NCVs) in accordance with Section 2.3.2 of the NRC Enforcement Policy and are described in the subject inspection report. Additionally, four licensee-identified violations are listed in Section 4OA7 of this report.

If you contest the subject or severity of these NCVs, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with copies to the Regional Administrator, Region III; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at Byron Station.

In addition, if you disagree with the cross-cutting aspect assigned to any finding in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region III, and the NRC Resident Inspector at Byron Station.

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 2.390, “Public Inspections, Exemptions, Requests for Withholding,” of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC’s Public Document Room or from the Publicly Available Records (PARS) component of the NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

John Jandovitz, Acting Chief
Branch 3
Division of Reactor Projects

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

Enclosure:
IR 05000454/2015004; 05000455/2015004

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Nos:	05000454; 05000455
License Nos:	NPF–37; NPF–66
Report No:	05000454/2015004; 05000455/2015004
Licensee:	Exelon Generation Company, LLC
Facility:	Byron Station, Units 1 and 2
Location:	Byron, IL
Dates:	October 1 through December 31, 2015
Inspectors:	J. McGhee, Senior Resident Inspector J. Draper, Resident Inspector L. Smith, Reactor Inspector J. Cassidy, Senior Health Physicist A. Shaikh, Senior Reactor Inspector V. Meghani, Reactor Inspector M. Holmberg, Reactor Inspector B. Palagi, Operations Engineer G. Hansen, Senior Emergency Preparedness Inspector C. Thompson, Resident Inspector, Illinois Emergency Management Agency
Approved by:	John Jandovitz, Acting Chief Branch 3 Division of Reactor Projects

Enclosure

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SUMMARY

IR 05000454/2015004, 05000455/2015004; 10/01/2015 – 12/31/2015; Byron Station, Units 1 and 2; Inservice Inspection Activities, Post Maintenance Testing, and Outage Activities.

This report covers a 3-month period of inspection by resident inspectors and announced baseline inspections by regional inspectors. Three Green findings were identified by the inspectors. Two of the findings were considered Non-Cited Violations (NCVs) of U.S. Nuclear Regulatory Commission (NRC) regulations. 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 February 4, 2015. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," dated February 2014.

NRC-Identified and Self-Revealed Findings/Violations

Cornerstone: Initiating Events

- Green. A finding of very low safety significance and associated NCV of Technical Specification (TS) 5.4.1.a, "Procedures," was self-revealed during the Unit 1 refueling outage that ended on October 2, 2015, as a result of the licensee's failure to implement the requirements of OP-AA-109-101, "Clearance and Tagging Program." Two instances of personnel failing to implement the procedural requirements were identified. First, on September 18, 2015, workers in the switchyard performed a preventative maintenance task to replace the breaker and removed the old breaker with the danger tag still attached. Additionally, on September 28, a deficient clearance order for the Unit 1 polar crane was put in place to support maintenance, and the clearance order did not incorporate temporary plant configuration changes. The licensee entered both issues in the Corrective Action Program (CAP). The site performed a work stand down with switchyard workers to reinforce the procedural requirements following the first issue and with all operators qualified to prepare and approve clearance orders to communicate the second event, potential consequences, and procedural implementation shortfalls. The site also performed a review of all open temporary configuration changes with clearances to ensure equipment was properly tagged out.

  The inspectors determined that the licensee's failure to implement the requirements of OP-AA-109-101, "Clearance and Tagging Program," was a performance deficiency. The inspectors reviewed IMC 0612, Appendix B, "Issue Screening," and determined that the issue was more than minor because, if left uncorrected, the performance deficiency could result in a more significant safety concern. Specifically, failure to implement the requirements of the protective tagging program could result in a direct challenge to nuclear safety through an initiating event, barrier degradation or damage to equipment necessary to mitigate an event. The inspectors determined that while the Initiating Events Cornerstone attributes of Equipment Performance and Human Error best addressed the specific performance deficiencies identified, more than one cornerstone was potentially affected since the performance deficiency affected programmatic control of equipment configuration. The inspectors utilized IMC 0609, Appendix G, "Shutdown Operations Significance Determination Process," dated May 9, 2014, to evaluate the

significance. After evaluating plant conditions at the time the examples occurred, the inspectors used Attachment 1, "Phase 1 Initial Screening and Characterization of Findings," Exhibit 2, "Initiating Events Screening Questions," and answered all of the questions such that the issue was screened as Green or very low safety significance. The common element to these two examples was the lack of familiarity of the individuals with the process and their understanding of the indications present. As a result, inspectors assigned a Human Performance cross-cutting aspect of Training (H.9). [Section 1R20]

Cornerstone: Mitigating Systems

- Green. A finding of very low safety significance (Green) and an associated NCV of Title 10 of the *Code of Federal Regulations* Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings, was self-revealed on October 7, 2015, when the Unit 1 diesel oil storage tank (DOST) high level alarm and 1B DOST sump high-high alarms actuated as a result of a mispositioned valve in the diesel fuel oil (DO) system. Specifically, when administrative controls were removed from two valves in the DO system, one of the valves was not placed in its standby position resulting in fuel oil trains being cross-tied across divisions. The licensee entered this issue into its CAP. Corrective actions included closing the mispositioned valve and restoring fuel oil storage tank levels in both trains. The operators were briefed on the requirement to use controlled documents and using human performance error reduction techniques when identifying the restoration position of components under administrative controls.

  The inspectors evaluated the performance deficiency in accordance with IMC 0612, Appendix B, "Issue Screening," and characterized the issue as more than minor because the performance deficiency is associated with the Mitigating Systems Cornerstone objective attribute of Configuration Control of operating equipment, and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to an initiating event. Specifically, mispositioning the 1DO055A so that the fuel oil trains were cross-tied created a flow path during operation of the 1A DG that transferred fuel oil out of the "A" train tanks to the "B" train tanks. In this instance, tank low level alarms were received and the senior reactor operators declared the 1A DG inoperable, but operators were able to terminate the event before the tank level reached actual TS minimum level. The inspectors determined the finding could be evaluated using the Significance Determination Process (SDP) in accordance with IMC 0609, "Significance Determination Process," Attachment 4, "Initial Screening and Characterization of Findings," dated June 19, 2012, and IMC 0609, Appendix A, "The SDP for Findings At-Power," dated June 19, 2012, Exhibit 2 – Mitigating Systems Screening Questions Section A. All questions were answered "No." Therefore, the finding screened as Green. The inspectors determined that this finding had an associated cross-cutting aspect in the area of Human Performance – Design Margins in that the supervisor assumed the open position was changed by the modification and did not use the appropriate rigor to identify the required position using controlled documents and thereby implementing the design requirements to maintain margin (H.6). [Section 1R19]

Cornerstone: Barrier Integrity

- Green. The NRC inspectors identified a finding of very low safety significance (Green) when licensee personnel failed to ensure accuracy of calculations used to support an operability evaluation of the Unit 1 reactor vessel head flange for the impression caused by an allen wrench trapped between the stud tensioner and the head flange during stud de-tensioning. The licensee entered this issue in its CAP as Issue Report 02559542. Corrective actions included a significant revision to the Operability Evaluation to address each of the inspector's concerns.

  The finding was determined to be more than minor because it was associated with the Reactor Coolant System (RCS) Equipment and Barrier Performance attribute of the Barrier Integrity Cornerstone, and adversely affected the cornerstone objective of providing reasonable assurance that physical barriers RCS protect the public from radionuclide releases caused by accidents or events. Additionally, More than Minor Example 3.a of IMC 0612, Appendix E, "Examples of Minor Issues," was used to answer this more than minor screening question. Specifically, the licensee used incorrect area in the bearing stress calculation that, at the time of discovery, resulted in reasonable doubt of the operability as the bearing stress exceeded the allowable stress value used in the evaluation to preclude plastic deformation. In accordance with IMC 0609, "Significance Determination Process," Attachment 4, "Initial Characterization of Findings," dated June 19, 2012, Table 2, the RCS boundary issues need to be considered under the Initiating Event Cornerstone. Using Table 3, the inspectors determined the finding pertained to an event or degraded condition while the plant was in shutdown and, therefore, used IMC 0609, Appendix G "Shutdown Operations Significance Determination Process," dated May 9, 2014, for significance determination. The finding did not represent a loss of level control per the Criteria in Appendix G, Attachment 1. The inspectors reviewed Appendix G, Attachment 1, Exhibit 2, "Initiating Events Screening Questions." The inspectors answered "No" to Question A.1, and found all other questions to be not applicable and, therefore, concluded that the finding was of very low safety significance (Green). This finding had a cross-cutting aspect in Human Performance – Avoid Complacency because the licensee reviewer, expecting acceptable results, did not use appropriate rigor in evaluating possible errors. Specifically, the licensee did not expect a numerical error in the evaluation performed by the vendor and did not take expected actions to verify accuracy. (H.12) [Section 1R08]

Licensee-Identified Violations

Violations of very low safety or security significance that were identified by the licensee have been reviewed by the NRC. Corrective actions taken or planned by the licensee have been entered into the licensee's CAP. These violations and CAP tracking numbers are listed in Section 4OA7 of this report.

REPORT DETAILS

Summary of Plant Status

Unit 1

On October 1, 2015, Unit 1 was in the process of starting up from the refueling outage. The outage ended on October 2, 2015, and the unit reached full power on October 5, 2015, after completion of all required testing. Beginning October 7, 2015, both Unit 1 and 2 at Byron Station were scheduled to vary electrical output by the grid operator, Pennsylvania, New Jersey, Maryland Interconnection, to ramp down a few hundred megawatts to help ease congestion on the transmission system. Once transmission equipment issues were resolved, the practice continued on the basis of load demand and was termed "Economic Dispatch." The unit continues to be stable and at the end of the period was operating at full power.

Unit 2

The unit began the period at full power. Byron Station operated at scheduled power levels for the entire inspection period. (See Unit 1 summary for discussion of Economic Dispatch.)

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity, and Emergency Preparedness

1R01 Adverse Weather Protection (71111.01)

.1 Winter Seasonal Readiness Preparations

a. Inspection Scope

The inspectors conducted a review of the licensee's preparations for winter conditions to verify that the plant's design features and implementation of procedures were sufficient to protect mitigating systems from the effects of adverse weather. Documentation for selected risk-significant systems was reviewed to ensure that these systems would remain functional when challenged by inclement weather. During the inspection, the inspectors focused on plant specific design features and the licensee's procedures used to mitigate or respond to adverse weather conditions. 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. Cold weather protection, such as heat tracing and area heaters, was verified to be in operation where applicable. The inspectors also reviewed Corrective Action Program (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. The inspectors' reviews focused specifically on the following plant systems due to their risk significance or susceptibility to cold weather issues:

- Diesel generator ventilation; and
- Condensate storage tanks.

This inspection constituted one winter seasonal readiness preparations sample as defined in Inspection Procedure (IP) 71111.01–05.

b. Findings

No findings were identified.

.2 Readiness for Impending Adverse Weather Condition—High Wind Conditions

a. Inspection Scope

Since thunderstorms with potential tornados and high winds were forecast in the vicinity of the facility for the night of December 23, 2015, the inspectors reviewed the licensee's overall preparations/protection for the expected weather conditions. On the afternoon of December 23, after high wind advisories were issued by the National Weather Service, the inspectors walked down the transformer yards, circulating water screen house and essential service water cooling towers, in addition to the licensee's emergency alternating current (AC) power systems, because their design functions could be affected or required as a result of high winds generated missiles or the loss of offsite power. The inspectors evaluated the licensee's preparations against the site's procedures and determined that 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. The inspectors also reviewed a sample of CAP items to verify that the licensee identified adverse weather issues at an appropriate threshold and dispositioned 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:

- 2B diesel generator (DG) following 24 hour run and hot restart surveillance;
- 1B auxiliary feedwater (AF) system following surveillance;
- 1A containment spray (CS) system after surveillance operation; and
- 2B AF system.

The inspectors selected these systems based on their risk significance relative to the Reactor Safety Cornerstones at the time they were inspected. The inspectors attempted to identify any discrepancies that could impact the function of the system and, therefore, potentially increase risk. The inspectors reviewed applicable operating procedures, system diagrams, UFSAR, Technical Specification (TS) requirements, outstanding work orders (WOs), issue reports, and the impact of ongoing work activities on redundant trains of equipment in order to identify conditions that could have rendered the systems incapable of performing their intended functions. The inspectors also walked down accessible portions of the systems to verify system components and support equipment were aligned correctly and operable. The inspectors examined the material condition of the components and observed operating parameters of equipment to verify that there were no obvious deficiencies. The inspectors also verified that the licensee had properly identified and resolved equipment alignment problems that could cause initiating events or impact the capability of mitigating systems or barriers and entered them into the 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 October 15, 2015, the inspectors performed a complete system alignment inspection of the Unit 1 diesel fuel oil (DO) 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. A review of a sample of past and outstanding WOs was performed to determine whether any deficiencies significantly affected the system function. In addition, the inspectors reviewed the CAP database to ensure that system equipment alignment problems were being identified and appropriately resolved.

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 availability, accessibility, and the condition of firefighting equipment in the following risk-significant plant areas:

- Control room refrigeration equipment room and auxiliary building 383' elevation general area – south;
- 1A diesel generator and day tank room;
- 1A diesel oil storage tank room;
- 1B diesel oil storage tank room;
- Unit 2 6.9 KV non-engineered safeguard feature switchgear room;
- Division 21 miscellaneous electrical equipment and battery room; and
- Division 22 miscellaneous electrical equipment and battery room.

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 the analyzed limits; and fire doors, dampers, and penetration seals appeared to be in satisfactory condition. The inspectors also verified that minor issues identified during the inspection were entered into the licensee's CAP.

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

b. Findings

No findings were identified.

1R08 Inservice Inspection Activities (71111.08)

From September 14, 2015, through October 21, 2015, 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, IR08.4, and 1R08.5 below, count as one inspection sample as described by IP 71111.08.

.1 Piping Systems Inservice Inspection

a. Inspection Scope

The inspectors reviewed records of the following Non-Destructive Examinations (NDEs) 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 U.S. Nuclear Regulatory Commission (NRC)-approved alternative requirement:

- Ultrasonic (UT) Examination of the Reactor Vessel Head Penetrations;
- UT Examination of the Stream Generator (SG) Manway Studs;
- Eddy Current Testing (ECT) of the Reactor Vessel Head Vent Line;
- ECT of SG Tubes;
- Liquid Penetrant (PT) Examination of the Reactor Vessel Head Penetrations No. 31 and 43;
- Magnetic Particle Examination of Reactor Head-to-Flange Weld (1RC-01-R-RVHC-01);
- Bare Metal Visual (BMV) Examination of the Reactor Vessel Head;
- Visual Examination of Containment Liner Plate and Penetrating Items (IWE Exams); and
- Visual Examinations of Hot Leg Nozzles and Reactor Vessel Flange Surfaces.

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:

- Report No. B1R19-UT-014; UT Examination of SG Outlet Nozzle Inner Radius; and
- Report No. B1R19-PT-003; PT Examination of Reactor Pressure Vessel Control Rod Drive Housing.

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: followed the welding procedure; applied appropriate weld filler material; and implemented the applicable Section XI or construction Code NDE and acceptance criteria. 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 Construction Code and the ASME Code Section IX.

- Class 2 – Welding on Auxiliary Feedwater Valve 1AF013C – WO 01423944-01.

b. Findings

No findings were identified.

.2 Reactor Pressure Vessel Upper Head Penetration Inspection Activities

a. Inspection Scope

For the Unit 1 reactor vessel head, a BMV examination and a non-visual examination were required this outage pursuant to 10 CFR 50.55a(g)(6)(ii)(D).

The inspectors reviewed video records of the BMV examination conducted on the reactor vessel head and penetration nozzles to determine if the activities were conducted in accordance with the requirements of ASME Code Case (CC) N-729-1 and 10 CFR 50.55a(g)(6)(ii)(D). Specifically, to determine:

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

The inspectors observed and reviewed data for non-visual examinations conducted on the reactor vessel head penetrations and the head vent line to determine if the activities were conducted in accordance with the requirements of ASME CC N-729-1 and 10 CFR 50.55a(g)(6)(ii)(D). Specifically, to determine:

- If the required examination scope (volumetric and surface coverage) was achieved and limitations (if applicable) were recorded, in accordance with the licensee procedures;
- If the UT examination equipment and procedures used were demonstrated by blind demonstration testing;
- For indications or defects identified, that the licensee documented the conditions in examination reports and/or entered this condition into the CAP and implemented appropriate corrective actions; and
- For indications accepted for continued service, that 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.

b. Findings

No findings were identified.

.3 Boric Acid Corrosion Control

a. Inspection Scope

The inspectors independently walked down the Unit 1 RCS loop piping, including the reactor coolant pumps, pressurizer, and emergency core cooling systems within containment to identify boric acid leakage. The inspectors then reviewed the walk down performed by the licensee to ensure that components with boric acid deposits were

identified and entered into the CAP. The inspectors observed these examinations to determine whether the licensee focused on locations where boric acid leaks can cause degradation of safety-significant components.

The inspectors reviewed the following licensee evaluations of components with boric acid deposits to determine if the affected components were documented and properly evaluated in the CAP. Specifically, the inspectors evaluated the licensee's corrective actions to determine if degraded components met the component Construction Code and/or the ASME Section XI Code.

- Boric Acid Corrosion Control (BACC) Evaluation 1631082; Steam Leak from Packing (1RC8003A);
- BACC Evaluation 1637747; Inactive Boric Acid Leak on 1B RH HX Exit;
- BACC Evaluation 2532041; Leak on Seal Injection Line;
- BACC Evaluation 2536012; Boric Acid Residue and Moisture from 1CV8519; and
- BACC Evaluation 1631088; Leak on Seal Weld (1RC8044A).

The inspectors reviewed the following corrective actions related to evidence of boric acid leakage to determine whether 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 1631082; Steam Leak from Packing (1RC8003A);
- IR 1637747; Inactive Boric Acid Leak on 1B RH HX Exit;
- IR 2532041; Leak on Seal Injection Line;
- IR 2536012; Boric Acid Residue and Moisture from 1CV8519; and
- IR 1631088; Leak on Seal Weld (1RC8044A).

b. Findings

No findings were identified.

.4 Steam Generator Tube Inspection Activities

a. Inspection Scope

The NRC inspectors observed acquisition of eddy current (EC) data, interviewed eddy current testing (ECT) data personnel, and reviewed documentation related to the SG ISI Program to determine if:

- in-situ SG tube pressure testing screening criteria used were consistent with those identified in the Electric Power Research Institute (EPRI) TR-107620, "SG In-Situ Pressure Test Guidelines," and that these criteria were properly applied to screen degraded SG tubes for in-situ pressure testing;
- the numbers and sizes of SG tube flaws/degradation identified was bound by the licensee's previous outage Operational Assessment predictions;
- the SG tube ECT scope and expansion criteria were sufficient to meet the TS, and the EPRI 1003138, "Pressurized Water Reactor SG Examination Guidelines";

- the SG tube ECT scope included potential areas of tube degradation identified in prior outage SG tube inspections and/or as identified in NRC generic industry operating experience applicable to these SG tubes;
- the licensee identified new tube degradation mechanisms and implemented adequate extent of condition inspection scope and repairs for the new tube degradation mechanism;
- the licensee implemented repair methods which were consistent with the repair processes allowed in the plant TS requirements and to determine if qualified depth sizing methods were applied to degraded tubes accepted for continued service;
- the licensee implemented an inappropriate "plug on detection" tube repair threshold (e.g., no attempt at sizing of flaws to confirm tube integrity);
- the licensee primary-to-secondary leakage (e.g., SG tube leakage) was below 3 gallons-per-day or the detection threshold during the previous operating cycle;
- the ECT probes and equipment configurations used to acquire data from the SG tubes were qualified to detect the known/expected types of SG tube degradation in accordance with Appendix H, "Performance Demonstration for ECT," of EPRI 1003138, "Pressurized Water Reactor SG Examination Guidelines";
- the licensee performed secondary side SG inspections for location and removal of foreign materials; and
- the licensee implemented repairs for SG tubes damaged by foreign material.

The licensee did not perform in-situ pressure testing of SG tubes. Therefore, no NRC review was completed for this inspection 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 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.

b. Findings

(1) Inaccurate Operability Basis for Unit 1 Reactor Vessel Head Flange Damage

Introduction: The inspectors identified a finding of very low safety significance (Green) when licensee personnel failed to ensure accuracy of calculations used to support an

operability evaluation of the Unit 1 reactor vessel head flange for the impression caused by an allen wrench trapped between the stud tensioner and the head flange during stud de-tensioning.

Description: During Unit 1 reactor vessel head de-tensioning, a wrench got trapped between the tensioner housing and the top of the head flange. The tensioner force pressed the wrench into the flange and left an impression with depth up to 13/64th of an inch. The licensee performed an operability evaluation, 15-002, with inputs received from Westinghouse to justify continued operation for one fuel cycle. The evaluation indicated that the bearing stress due to the stud tensioner housing bearing on the head flange in the area of impression location would be impacted and determined the revised stress based on the reduced bearing area. Looking at the sketch in the evaluation, the inspectors noted that the bearing area used in the calculation appeared to be inconsistent with the dimensions in the sketch. Further review confirmed that the area used was not accurate and that using the correct area would result in the bearing stress exceeding the material yield stress used as the acceptance criteria in the evaluation. The licensee subsequently determined the correct area based on drawings along with field verification. The licensee also concluded that the yield stress determined from the Certified Material Test Report could be used as acceptance criteria for the subject condition because it was associated with maintenance activity only. The calculated stresses using the bearing areas in question were applicable during tensioning and/or de-tensioning work only and would not result in any permanent deformation. These stresses would not be present during any of the operating or design basis conditions. In the revised operability evaluation, the licensee concluded that the reactor head was acceptable for continued operation for one fuel cycle and also identified corrective action requiring permanent resolution for the degraded condition.

The inspectors determined that during preparation and review of the evaluation to support operability, the licensee failed to follow standard mathematical principles for determining areas of geometrical shapes. The resulting error led to an incorrect conclusion that the bearing stresses were below the specific material yield strength of the reactor vessel head flange.

The inspectors reviewed the revised evaluation and further clarifications provided by the licensee, and after consultations with the Office of Nuclear Reactor Regulation staff, concluded that the licensee conclusion was reasonable, and did not affect safe operations. The licensee entered this issue in its CAP as IR 02559542.

Analysis: The inspectors determined that the failure to correctly determine the load bearing area resulting in an inaccurate basis for the operability evaluation was a performance deficiency. Specifically, during preparation and review of the evaluation to support operability, the licensee failed to follow standard mathematical principles for determining areas of geometrical shapes. The error in bearing area calculations resulted in the incorrect conclusion that the applied bearing stress was less than the acceptance limit used in the evaluation.

The finding was determined to be more than minor because it was associated with the RCS Equipment and Barrier Performance attribute of the Barrier Integrity Cornerstone, and adversely affected the cornerstone objective of providing reasonable assurance that physical barriers RCS protect the public from radionuclide releases caused by accidents or events. Additionally, More than Minor Example 3.a of IMC 0612, Appendix E,

"Examples of Minor Issues," was used to answer this more than minor screening question. Specifically, the licensee used the incorrect area in the bearing stress calculation that, at the time of discovery, resulted in reasonable doubt of the operability as the bearing stress exceeded the allowable stress value used in the evaluation to preclude plastic deformation.

In accordance with IMC 0609, "SDP," Attachment 4, "Initial Characterization of Findings," dated June 19, 2012, Table 2, the RCS boundary issues need to be considered under the Initiating Event Cornerstone and using Table 3, the inspectors determined the finding pertained to an event or degraded condition while the plant was in shutdown, and therefore used IMC 0609, Appendix G, for significance determination. The finding did not represent a loss of level control per the Criteria in Appendix G, "Shutdown Operations SDP," Attachment 1, "Phase 1 Initial Screening and Characterization of Findings," dated May 9, 2014. The inspectors reviewed Appendix G, Attachment 1, Exhibit 2, "Initiating Events Screening Questions." The inspectors answered "No" to Question A.1, and found all other questions to be not applicable, and therefore concluded that the finding was of very low safety significance (Green).

This finding had a cross-cutting aspect in Human Performance – Avoid Complacency because the licensee reviewer, expecting acceptable results, did not use appropriate rigor when evaluating possible errors. Specifically, the licensee did not expect a numerical error in the evaluation performed by the vendor and did not take expected actions to verify accuracy (H.12).

Enforcement: This finding did not involve enforcement action because no regulatory requirement was violated. **(FIN 05000454/2015004-01; Inaccurate Technical Basis for Operability Evaluation of Reactor Head Flange Damage)**

1R11 Licensed Operator Requalification Program (71111.11)

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

a. Inspection Scope

On October 28, 2015, the inspectors observed a crew of licensed operators in the plant's simulator during licensed operator requalification training. The inspectors observed the administration of the dynamic scenario portion of the annual operating test to assess the licensee's effectiveness in conducting the examination, including the conduct of pre-examination briefings, evaluations of individual operator and crew performance, and post-examination analysis. 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 in parallel with examination evaluators:

- licensed operator performance;
- clarity and formality of communications;
- demonstrated 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
- demonstrated ability to identify and implement appropriate TS actions and Emergency Plan actions.

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 and satisfied the inspection program requirement for the resident inspectors to observe a portion of an in-progress annual requalification operating test during a training cycle in which it was not observed by the NRC during the biennial portion of this IP.

b. Findings

No findings were identified.

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

a. Inspection Scope

On October 1, 2015, the inspectors observed the operating crew startup Unit 1 following refueling outage B1R20. The inspector observed pre-job briefings, reactivity manipulations, and equipment manipulations. This was an activity that required heightened awareness and was related to increased risk. The inspectors evaluated the following areas:

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

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

This inspection constituted one quarterly licensed operator heightened activity/risk sample as defined in IP 71111.11–05.

b. Findings

No findings were identified.

.3 Biennial Written and Annual Operating Test Results (71111.11A)

a. Inspection Scope

The inspectors reviewed the overall pass/fail results of the Annual Operating Test, administered by the licensee from October 21, 2015, through November 19, 2015, as required by 10 CFR 55.59(a). The results were compared to the thresholds established in IMC 0609, Appendix I, “Licensed Operator Requalification SDP," to assess the overall adequacy of the licensee’s Licensed Operator Requalification Training program to meet the requirements of 10 CFR 55.59.

This inspection constitutes one biennial licensed operator requalification inspection sample as defined in IP 71111.11.

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:

- Maintenance Rule unavailability criteria exceeded for AP-02 function;
- Diverse and Flexible Coping Strategies (FLEX) electrical equipment reliability criteria approaching threshold for FX-01 function; and
- Reactor containment fan cooler train 1D reliability criteria approaching threshold for VP-05 function.

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

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

The inspectors assessed performance issues with respect to the reliability, availability, and condition monitoring of the system. In addition, the inspectors verified maintenance

effectiveness issues were entered into the CAP with the appropriate significance characterization.

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

b. Findings

No findings 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:

- Emergent maintenance on 1B diesel generator during “A” train week.

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

This maintenance risk assessment and emergent work control activity constituted one sample 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 that were selected based on the risk significance of the associated components and systems:

- 1A diesel generator after fuel oil supply recirculation valve 1DO055A was found open when it should have been closed;

- Repetitive communication issues with radiation monitoring system loop 5 detectors;
- Unit reactor vessel head flange impression;
- Structural steel fireproofing missing in the Auxiliary Electrical Equipment Room (AEER); and
- 2B auxiliary feedwater diesel air intake hose clamp found loose.

The inspectors evaluated the technical adequacy of the evaluations to ensure that TS operability was properly justified and the subject component or system remained available such that no unrecognized increase in risk occurred. The inspectors compared the operability and design criteria in the appropriate sections of the TS, Technical Requirements Manual (TRM) 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.

In addition, the inspectors reviewed the implementation of the station's Operator Work-Around (OWA) Program to ensure there were not an excessive number of OWAs and OWAs were identified at the appropriate threshold, entered into the CAP, and corrected. The inspectors verified that the licensee evaluated the cumulative impact of OWAs including the potential to impact operator effectiveness during transient or accident response. The inspectors reviewed operator shift logs and rounds data, maintenance backlog and emergent work documentation, deferred and projected plant modifications, and open standing orders. The inspectors reviewed the minutes of OWA Board Meetings held during the last 12 months, including the licensee's quarterly aggregate evaluations of OWAs, operator challenges and operator burdens. The inspectors also reviewed a sampling of corrective action documents to verify that the licensee identified and corrected any deficiencies associated with operability evaluations and OWAs.

This operability inspection constituted six samples (one of which was Operator Work-Arounds) as defined in IP 71111.15–05.

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.18)

.1 Plant Modifications

a. Inspection Scope

The inspectors reviewed the following plant modification:

- Engineering Change (EC) 400682, "Unit 2 Reactor Vessel Closure Head Penetration Ultra High Pressure Cavitation Peening."

In EC 400682, the licensee approved application of a water jet cavitation peening process for the Byron Unit 2 reactor vessel closure head penetration nozzles and J-groove welds. This process is designed to impart a compressive residual stress to the surface of the penetration nozzle and weld materials susceptible to primary water stress

corrosion cracking (PWSCC) and is intended to diminish the potential for future PWSCC induced cracks and associated leakage. The licensee expects the peened nozzles to result in a reduction in cumulative dose/exposure associated with performing future reactive nozzle repairs caused by PWSCC. The licensee scheduled application of the water jet cavitation peening process during the next Unit 2 refueling outage scheduled for the spring of 2016.

The inspectors reviewed the proposed design configuration change and associated 10 CFR 50.59 safety evaluation No. 6G-15-002 against the design basis, the UFSAR, and the TS, to verify that the modification did not affect the operability or availability of the affected reactor coolant system. Additionally, the inspectors reviewed supporting industry basis documents and vendor qualification documents for the proposed water jet cavitation peening process.

The review discussed above did not constitute a complete permanent modification inspection sample as defined in IP 71111.18-05, because the peening modification had not yet been applied. Specifically, the inspectors did not complete a review of the modification implementation or post modification acceptance tests.

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) activities to verify that procedures and test activities were adequate to ensure system operability and functional capability:

- Unit 2 main turbine governor valve #3 failed to fully close;
- 2A diesel generator trip during test mode start; and
- 1B diesel fuel oil FLEX connection installation.

These activities were selected based upon the structure, system, or component's ability to impact risk. The inspectors evaluated these activities for the following (as applicable): the effect of testing on the plant had been adequately addressed; testing was adequate for the maintenance performed; acceptance criteria were clear and demonstrated operational readiness; test instrumentation was appropriate; tests were performed as written in accordance with properly reviewed and approved procedures; equipment was returned to its operational status following testing (temporary modifications or jumpers required for test performance were properly removed after test completion); and test documentation was properly evaluated. The inspectors evaluated the activities against 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 three post-maintenance testing samples as defined in IP 71111.19–05.

b. Findings

(1) Mispositioned Valve in Diesel Fuel Oil System

Introduction: A finding of very low safety significance (Green) and an associated NCV of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," was self-revealed on October 7, 2015, when the Unit 1 diesel oil storage tank (DOST) high level alarm and 1B DOST sump high-high alarms actuated as a result of a mispositioned valve in the diesel fuel oil DO system.

Description: At 09:28 a.m. on October 7, 2015, the 1A DG was started for a monthly surveillance run. At 09:41 a.m., the main control room received a 1B DG DOST high level alarm, and a field operator was dispatched to check levels locally. After verifying that sump levels were high, the operator was instructed to close 1DO055B, 1B & 1D DO Transfer Pump Recirculation to Storage Tank Isolation Valves. Further trouble-shooting identified that the flow path to the B train was though the 1DO055A, 1A & 1C DO Transfer Pump Recirculation to Storage Tank Isolation Valves, which was not in its expected (closed) position. The operators found the valve open when it should have been closed, thereby creating a flow path from the 1A fuel transfer pump and the A train DO recirculation line to the B train storage tanks through the 1DO055B. The operators closed 1DO055A and restored tank levels for both trains to the normal bands.

The licensee's investigation revealed that the valve had been mispositioned as a result of a sequence of errors. A supervisor who was generating a checklist to be used to verify compliance before changing operating modes recognized that the unit was committed to being FLEX compliant prior to moving the unit to Mode 2. The supervisor determined that 1DO055A and 1DO055B were closed and equipment status tags (ESTs) were placed on the valves after a previous event (January 28, 2014) as administrative controls. The supervisor incorrectly assumed that since both valves were closed with ESTs in place that the restored position for both valves would be open. The standby position of 1DO055B was changed from normally closed to normally open following installation of modifications during the outage for the FLEX strategy implementation. However, 1DO055A standby position did not change and should have been left closed according to the plant's controlled documents and design basis. Both valves were opened at the direction of the supervisor following implementation of the FLEX modification when administrative equipment status tags (ESTs) controlling the valves closed were removed.

Analysis: The inspectors determined that the supervisor's failure to return the component to the position required by controlled documents when the EST was removed was contrary to 10 CFR 50, Part 50, Appendix B, Criterion V, and a performance deficiency.

The inspectors evaluated the performance deficiency in accordance with IMC 0612, Appendix B, "Issue Screening," and characterized the issue as more than minor because the performance deficiency is associated with the Mitigating Systems Cornerstone

objective attribute of Configuration Control of operating equipment and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events. Specifically, mispositioning the 1DO055A so that the fuel oil trains were cross-tied created a flow path during operation of the 1A DG that transferred fuel oil out of the "A" train tanks to the "B" train tanks. In this instance, tank low level alarms were received and the senior reactor operators declared the 1A DG inoperable, but operators were able to terminate the event before the tank level reached actual TS minimum level.

The inspectors evaluated the finding using the SDP in accordance with IMC 0609, "SDP," Attachment 4, "Initial Characterization of Findings," dated June 19, 2012, Table 3, for the Mitigating Systems Cornerstone and IMC 0609, Appendix A, "The SDP for Findings At-Power," dated June 19, 2012, Exhibit 2 – Mitigating Systems Screening Questions, Section A, and all questions were answered "No." Therefore, the finding screened as Green.

The inspectors determined that this finding had an associated cross-cutting aspect in the area of Human Performance – Design Margins in that the supervisor assumed the open position was changed by the modification and did not use the appropriate rigor to identify the required position using controlled documents and thereby implementing the design requirements to maintain margin (H.6).

Enforcement: Title 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," requires, in part, that activities affecting quality shall be prescribed by documented procedures and shall be accomplished in accordance with these procedures.

Step 4.1.2 of OP-AA-108-101, "Control of Equipment and System Status," directs realignment to design configuration at the completion of the task. It states "Component position changes must be restored to normal alignment, maintenance performed to correct the condition requiring abnormal positioning, or procedural guidance developed that updates the desired change."

BOP DO-M1, "Diesel; Fuel Oil System Valve Lineup," specified the design standby position for 1DO055A as "Closed."

Contrary to the above, on September 28, 2015, an activity affecting quality was not accomplished in accordance with prescribed procedures. Specifically, an operating supervisor authorized removal of an equipment status tag on 1DO055A, and identified the as-left position as "Open" when the normal position was "Closed." Failure to follow the procedural guidance resulted in placement of the component in a position creating a flow path between divisions that on October 7, 2015, resulted in an unplanned transfer of fuel oil out of the "A" train storage tanks.

The licensee's immediate corrective actions included restoring the 1DO055A and 1DO055B to the position specified in the design documentation and documenting the issue in the CAP as IR 2567216. In addition, operators verified the corresponding Unit 2 valves were correctly positioned as an extent of condition review.

Because this violation was of very low safety significance and it was entered into the licensee's CAP, it is being treated as a Non-Cited Violation (NCV), consistent with

Section 2.3.2 of the NRC Enforcement Policy **(NCV 05000454/2015004–02, "Mispositioned Valve in Diesel Fuel Oil Transfer Pump Recirculation Flow Path").**

1R20 Outage Activities (71111.20)

.1 Refueling Outage Activities

a. Inspection Scope

The inspectors continued the inspection activities for the Unit 1 refueling outage (RFO), conducted September 14 through October 2, 2015. Inspector's review of the Unit 1 shutdown and cooldown of the reactor coolant system, core refueling activities, and other outage activities that were completed prior to October 1 were previously documented in Byron Station, Units 1 and 2, NRC Integrated Inspection Report 05000454(455)/2015003.

During the remainder of the RFO, the inspectors monitored licensee controls over the testing processes and startup of the reactor and steam plant including the outage activities listed below:

- configuration management, including maintenance of defense-in-depth commensurate with the Outage Risk Management Profile for key safety functions and compliance with the applicable TS when taking equipment out of service;
- 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 and switchyard activities to ensure that TS and Outage Risk Management Profile requirements were met;
- 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;
- controls over activities that could affect reactivity;
- licensee fatigue management, as required by 10 CFR 26, Subpart I;
- demobilization of refueling activities and equipment;
- startup and ascension to full power operation, tracking of startup prerequisites, walkdown of the 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

(1) Failure to Implement Clearance and Tagging Procedure Requirements

Introduction: A finding of very low safety significance (Green) and associated NCV of TS 5.4.1.a, "Procedures," was self-revealed during the Unit 1 refueling outage that ended on October 2, 2015, as a result of the licensee's failure to implement the requirements of OP-AA-109-101, "Clearance and Tagging Program." Two instances of personnel failing to implement the procedural requirements were identified.

Description: During final clear of clearance order (C/O) #00127744 on September 21, 2015, operators identified that the danger tag for the unit auxiliary transformer (UAT) 141-1 control cabinet cooling breaker was missing. Further investigation revealed that on September 18, 2015, workers in the switchyard performed a preventative maintenance task to replace the breaker and removed the old breaker with the danger tag still attached. The new breaker was installed in the required "OFF" position. Additionally, the timeline revealed that the breaker was replaced after the workers had signed off C/O #00127744 so that there was no direct challenge to worker safety as a result of the event. The licensee responded to this event by stopping substation work activities and conducting a safety stand down to ensure everyone was aware of the procedural requirements and significance of removing clearance isolation boundary protection.

Additionally, a second event involving compliance with OP-AA-109-101 occurred during the outage. The C/O #00123609 was prepared in January 2015 as an outage preparation activity planned to support WO 1724149, "(Sample Grease, Change Oil) Polar Crane Lubrication." In August 2015, a temporary plant configuration change was implemented to supply power to the Unit 1 polar crane from a Unit 2 power supply to support the scheduled bus 143 outage window. The C/O #00126435 was placed on August 22, 2015, with the Unit 1 and Unit 2 breakers tagged open. On September 14, 2015, the breaker supplying the Unit 1 polar crane from Unit 2 was closed. On September 28, 2015, operators printed C/O #00123609 in preparation to tag out the polar crane for implementation of the lubrication work. When the C/O was printed, the clearance order computer program assigned the existing tag on the Unit 1 power supply to the C/O instead of issuing a new tag. The C/O was then automatically updated to "Complete," indicating that the component was de-energized and tagged out when, in fact, it was not. The C/O personnel did not recognize that the breaker assigned to the C/O was no longer the power supply to the crane because of the temporary change. As a result, the Unit 2 power to the crane was not removed and the work was performed with the crane still energized. The licensee performed a stand down with all operators qualified to prepare and approve clearance orders to communicate the event, potential consequences and procedural implementation shortfalls. The licensee's investigation determined that more rigorous use of the checklists included in OP-AA-109-101 could have prevented this event. A review was also performed of all open temporary configuration changes with clearances to ensure equipment was properly tagged out.

Analysis: Two examples of failure to implement the procedural requirements of OP-AA-109-101, "Clearance and Tagging Program," were identified during the 2015 Unit 1 refueling outage. The inspectors determined that the licensee's failure to implement the requirements of OP-AA-109-101 was a violation of TS 5.4.1.a and a performance deficiency. First, substation personnel working in the switchyard removed a circuit breaker in the relay house switchgear that had a danger tag attached and replaced it with a new breaker. In the second example, individuals preparing a clearance for a maintenance task on the Unit 1 polar crane did not recognize that a temporary configuration change was in place that reconfigured the power to the crane in a way that made the pre-programmed component identification inaccurate resulting in the correct power supply not being tagged out as requested. The inspectors reviewed IMC 0612 Appendix B, "Issue Screening," and determined that the issue was more than minor, because, if left uncorrected, the performance deficiency would result in a more significant safety concern. Specifically, failure to implement the requirements of the

protective tagging program would result in a direct challenge to nuclear safety through an initiating event, barrier degradation or damage to equipment necessary to mitigate an event.

No actual challenge to safety occurred in either event included in this finding. However, the inspectors determined that while the Initiating Events Cornerstone attributes of Equipment Performance and Human Error best addressed the specific performance deficiencies identified, more than one cornerstone was potentially affected since the performance deficiency affected programmatic control of equipment configuration. The inspectors utilized IMC 0609, Appendix G, "Shutdown Operations SDP," dated May 9, 2014, to evaluate the significance. After evaluating plant conditions at the time the examples occurred, the inspectors used Attachment 1, "Phase 1 Initial Screening and Characterization of Findings," Exhibit 2, "Initiating Events Screening Questions," and answered all of the questions such that the issue was screened as Green or very low safety significance.

The common element to these two findings was the lack of familiarity of the individuals with the process and their understanding of the indications present. In the first example, supplemental personnel working in the switchyard under the site clearance and tagging program, did not recognize the site danger tag was physically different than the one used in the transmission system even though they were trained on the process and qualified during pre-outage activities. In the second example, operations personnel did not recognize the computer software indication that a temporary change was in place affecting the component and as a result, did not investigate further or engage others for assistance. As a result, the inspectors assigned a Human Performance cross-cutting aspect of Training (H.9).

Enforcement: TS 5.4.1.a requires, in part, that written procedures recommended in Regulatory Guide 1.33, Revision 2, Appendix A, February 1978, be established and implemented. Equipment Control (i.e. locking and tagging) is one of the administrative procedures listed in Regulatory Guide 1.33, Appendix A.

OP-AA-109-101 establishes programmatic controls to protect personnel and equipment against potential hazards during physical work on equipment. Two separate sections of this procedure set forth requirements that apply to the specific performance deficiencies described in this finding. First, Step 5.2.2 states, "A component with a Danger Tag attached to it shall not be physically removed from the system." Next, step 7.1.11 states, "The impact of a C/O on a Temporary Configuration Change Package (TCCP) shall be CONSIDERED and should be DOCUMENTED in the Special Instructions section of the C/O."

Contrary to the above, personnel working within the clearance order process during the fall of 2015, refueling outage at Byron, Unit 1, did not implement requirements of OP-AA-109-101, "Clearance and Tagging." Specifically, on September 18, 2015, workers in the switchyard performing a preventative maintenance task removed a breaker with a danger tag attached and replaced it with a different breaker. Additionally, on September 24, 2015, individuals preparing and approving implementation of a clearance order did not recognize that it impacted an existing Temporary Configuration Change and, therefore, did not consider the impact resulting in failure to remove electrical power from the crane as requested by the work group. No injuries or equipment damage occurred as a result of either event. Both occurrences were

documented in the licensee's CAP as IR 02558491 and IR 02557781, respectively. This violation is being treated as an NCV, consistent with Section 2.3.2 of the Enforcement Policy. **(NCV 05000454/2015004-03, Failure to Implement Protective Tagging Procedure Requirements.)**

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:

- 2BOSR 8.1.12-1; "2A Diesel Generator ESF Actuation Test Signal Start And Non-Emergency Trip Bypass Test, And Generator Differential Trip Test" (Routine); and
- 1BOSR 1.7.1-1; Unit One Digital Rod Position Indication (DRPI) Operability Checkout (Routine).

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

- preconditioning occurred;
- the effects of the testing were adequately addressed by control room personnel or engineers prior to the commencement of the testing;
- acceptance criteria were clearly stated, demonstrated operational readiness, and were consistent with the system design basis;
- plant equipment calibration was correct, accurate, and properly documented;
- as-left setpoints were within required ranges; and the calibration frequency was in accordance with TSs, the USAR, procedures, and applicable commitments;
- measuring and test equipment calibration was current;
- test equipment was used within the required range and accuracy; applicable prerequisites described in the test procedures were satisfied;
- test frequencies met TS requirements to demonstrate operability and reliability; tests were performed in accordance with the test procedures and other applicable procedures; jumpers and lifted leads were controlled and restored where used;
- test data and results were accurate, complete, within limits, and valid;
- test equipment was removed after testing;
- where applicable for inservice testing activities, testing was performed in accordance with the applicable version of Section XI, American Society of Mechanical Engineers code, and reference values were consistent with the system design basis;
- where applicable, test results not meeting acceptance criteria were addressed with an adequate operability evaluation or the system or component was declared inoperable;
- where applicable for safety-related instrument control surveillance tests, reference setting data were accurately incorporated in the test procedure;

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

This inspection constituted two routine surveillance testing samples as defined in IP 71111.22, Sections–02 and–05.

b. Findings

No findings were identified.

1EP4 Emergency Action Level and Emergency Plan Changes (71114.04)

a. Inspection Scope

The regional inspectors performed an in-office review of the latest revisions to the Emergency Plan and Emergency Action Levels (EALs).

The licensee transmitted the Emergency Plan and EAL revisions to the NRC pursuant to the requirements of 10 CFR 50, Appendix E, Section V, “Implementing Procedures.” The NRC review was not documented in a Safety Evaluation Report and did not constitute approval of licensee-generated changes; therefore, this revision is subject to future inspection.

This EAL and Emergency Plan Changes inspection constituted one sample as defined in Inspection Procedure 71114.04.

b. Findings

No findings were identified.

2. RADIATION SAFETY

Cornerstones: Public Radiation Safety and Occupational Radiation Safety

2RS3 In-Plant Airborne Radioactivity Control and Mitigation (71124.03)

This inspection constituted one complete sample as defined in IP 71124.03-05.

.1 Inspection Planning (02.01)

a. Inspection Scope

The inspectors reviewed the plant FSAR to identify areas of the plant designed as potential airborne radiation areas and any associated ventilation systems or airborne monitoring instrumentation. Instrumentation review included continuous air monitors (continuous air monitors and particulate-iodine-noble-gas-type instruments) used to identify changing airborne radiological conditions such that actions to prevent an

overexposure may be taken. The review included an overview of the Respiratory Protection Program, and a description of the types of devices used. The inspectors reviewed FSAR, TSs, and emergency planning documents to identify location and quantity of respiratory protection devices stored for emergency use.

The inspectors reviewed the licensee's procedures for maintenance, inspection, and use of respiratory protection equipment including self-contained breathing apparatus, as well as procedures for air quality maintenance.

The inspectors reviewed any reported performance indicators related to unintended dose resulting from intakes of radioactive material.

b. Findings

No findings were identified.

.2 Engineering Controls (02.02)

a. Inspection Scope

The inspectors reviewed the licensee's use of permanent and temporary ventilation to determine whether the licensee uses ventilation systems as part of its engineering controls (in lieu of respiratory protection devices) to control airborne radioactivity. The inspectors reviewed procedural guidance for use of installed plant systems, such as containment purge, spent fuel pool ventilation, and auxiliary building ventilation, and assessed whether the systems are used, to the extent practicable, during high-risk activities (e.g., using containment purge during cavity floodup).

The inspectors selected installed ventilation systems used to mitigate the potential for airborne radioactivity, and evaluated whether the ventilation airflow capacity, flow path (including the alignment of the suction and discharges), and filter/charcoal unit efficiencies, as appropriate, were consistent with maintaining concentrations of airborne radioactivity in work areas below the concentrations of an airborne area to the extent practicable.

The inspectors selected temporary ventilation system setups (high-efficiency particulate air/charcoal negative pressure units, down draft tables, tents, metal "Kelly buildings," and other enclosures) used to support work in contaminated areas. The inspectors assessed whether the use of these systems is consistent with licensee procedural guidance and as-low-as-reasonably-achievable (ALARA) concept.

The inspectors reviewed airborne monitoring protocols by selecting installed systems used to monitor and warn of changing airborne concentrations in the plant and evaluated whether the alarms and setpoints were sufficient to prompt licensee/worker action to ensure that doses are maintained within the limits of 10 CFR, Part 20, and the ALARA concept.

The inspectors assessed whether the licensee had established trigger points (e.g., the Electric Power Research Institute's "Alpha Monitoring Guidelines for Operating Nuclear Power Stations") for evaluating levels of airborne beta-emitting (e.g., plutonium-241), and alpha-emitting radionuclides.

b. Findings

No findings were identified.

.3 Use of Respiratory Protection Devices (02.03)

a. Inspection Scope

For those situations where it is impractical to employ engineering controls to minimize airborne radioactivity, the inspectors assessed whether the licensee provided respiratory protective devices such that occupational doses are ALARA. The inspectors selected work activities where respiratory protection devices were used to limit the intake of radioactive materials, and assessed whether the licensee performed an evaluation concluding that further engineering controls were not practical and that the use of respirators is ALARA. The inspectors also evaluated whether the licensee had established means (such as routine bioassay) to determine if the level of protection (protection factor) provided by the respiratory protection devices during use was at least as good as that assumed in the licensee's work controls and dose assessment.

The inspectors assessed whether respiratory protection devices used to limit the intake of radioactive materials were certified by the National Institute for Occupational Safety and Health/Mine Safety and Health Administration or have been approved by the NRC per 10 CFR 20.1703(b). The inspectors selected work activities where respiratory protection devices were used. The inspectors evaluated whether the devices were used consistent with their National Institute for Occupational Safety and Health/Mine Safety and Health Administration certification or any conditions of their NRC approval.

The inspectors reviewed records of air testing for supplied-air devices and self-contained breathing apparatus bottles to assess whether the air used in these devices meets or exceeds Grade D quality. The inspectors reviewed plant breathing air supply systems to determine whether they meet the minimum pressure and airflow requirements for the devices in use.

The inspectors selected several individuals qualified to use respiratory protection devices, and assessed whether they have been deemed fit to use the devices by a physician.

Due to limited in-field observations, the inspectors reviewed training curricula for users of respiratory protection devices and requested a demonstration of device use (donning, doffing, functional checks, and device malfunction) from selected individuals.

The inspectors chose multiple respiratory protection devices staged and ready for use in the plant or stocked for issuance for use. The inspectors assessed the physical condition of the device components (mask or hood, harnesses, air lines, regulators, air bottles, etc.), and reviewed records of routine inspection for each. The inspectors selected several of the devices and reviewed records of maintenance on the vital components (e.g., pressure regulators, inhalation/exhalation valves, hose couplings). The inspectors reviewed the Respirator Vital Components Maintenance Program to ensure that the repairs of vital components were performed by the respirators' manufacturer.

b. Findings

No findings were identified.

.4 Self-Contained Breathing Apparatus for Emergency Use (02.04)

a. Inspection Scope

Based on the FSAR, TSs, and emergency operating procedure requirements, the inspectors reviewed the status and surveillance records of self-contained breathing apparatuses staged in-plant for use during emergencies. The inspectors reviewed the licensee's capability for refilling and transporting self-contained breathing apparatus air bottles to and from the control room and operations support center during emergency conditions.

The inspectors selected several individuals on control room shift crews and from designated departments currently assigned emergency duties (e.g., onsite search and rescue duties) to assess whether control room operators and other emergency response and radiation protection personnel (assigned in-plant search and rescue duties or as required by emergency operating procedures or the emergency plan) were trained and qualified in the use of self-contained breathing apparatuses (including personal bottle changeout). The inspectors evaluated whether personnel assigned to refill bottles were trained and qualified for that task.

The inspectors determined whether appropriate mask sizes and types are available for use (i.e., in-field mask size and type match what was used in fit-testing). The inspectors determined whether on-shift operators had no facial hair that would interfere with the sealing of the mask to the face and whether vision correction (e.g., glasses inserts or corrected lenses) was available as appropriate.

The inspectors reviewed the past 2 years of maintenance records for select self-contained breathing apparatus units used to support operator activities during accident conditions and designated as "ready for service" to assess whether any maintenance or repairs on any self-contained breathing apparatus unit's vital components were performed by an individual, or individuals, certified by the manufacturer of the device to perform the work. The vital components typically are the pressure-demand air regulator and the low-pressure alarm. The inspectors reviewed the onsite maintenance procedures governing vital component work to determine any inconsistencies with the self-contained breathing apparatus manufacturer's recommended practices. For those self-contained breathing apparatuses designated as "ready for service," the inspectors determined whether the required, periodic air cylinder hydrostatic testing was documented and up-to-date, and the retest air cylinder markings required by the U.S. Department of Transportation were in place.

b. Findings

No findings were identified.

.5 Problem Identification and Resolution (02.05)

a. Inspection Scope

The inspectors evaluated whether problems associated with the control and mitigation of in-plant airborne radioactivity were being identified by the licensee at an appropriate threshold and were properly addressed for resolution in the licensee CAP. The inspectors assessed whether the corrective actions were appropriate for a selected sample of problems involving airborne radioactivity and were appropriately documented by the licensee.

b. Findings

No findings were identified.

2RS4 Occupational Dose Assessment (71124.04)

This inspection constituted one complete sample as defined in IP 71124.04-05.

.1 Inspection Planning (02.01)

a. Inspection Scope

The inspectors reviewed the results of the Radiation Protection Program audits related to internal and external dosimetry (e.g., licensee's quality assurance audits, self-assessments, or other independent audits) to gain insights into overall licensee performance in the area of dose assessment and focus the inspection activities consistent with the principle of "smart sampling."

The inspectors reviewed the most recent National Voluntary Laboratory Accreditation Program accreditation report on the vendor's most recent results to determine the status of the contractor's accreditation.

A review was conducted of the licensee procedures associated with dosimetry operations, including issuance/use of external dosimetry (routine, multi-badging, extremity, neutron, etc.), assessment of internal dose (operation of whole-body counter, assignment of dose based on derived air concentration-hours, urinalysis, etc.), and evaluation of and dose assessment for radiological incidents (distributed contamination, hot particles, loss of dosimetry, etc.). The inspectors evaluated whether the licensee had established procedural requirements for determining when external and internal dosimetry is required.

b. Findings

No findings were identified.

.2 External Dosimetry (02.02)

a. Inspection Scope

The inspectors evaluated whether the licensee's dosimetry vendor is National Voluntary Laboratory Accreditation Program accredited, and if the approved irradiation test categories for each type of personnel dosimeter used are consistent with the types

and energies of the radiation present and the way the dosimeter is being used (e.g., to measure deep dose equivalent, shallow dose equivalent, or lens dose equivalent).

The inspectors evaluated the onsite storage of dosimeters before their issuance, during use, and before processing/reading. The inspectors also reviewed the guidance provided to rad-workers with respect to care and storage of dosimeters.

The inspectors assessed whether non-National Voluntary Laboratory Accreditation Program accredited passive dosimeters (e.g., direct ion storage sight read dosimeters) were used according to licensee procedures that provide for periodic calibration, application of calibration factors, usage, reading (dose assessment) and zeroing. The licensee does not use non-National Voluntary Laboratory Accreditation Program accredited passive dosimeters.

The inspectors assessed the use of active dosimeters (electronic personal dosimeters) to determine if the licensee uses a “correction factor” to address the response of the electronic personal dosimeter as compared to the passive dosimeter for situations when the electronic personal dosimeter must be used to assign dose. The inspectors also assessed whether the correction factor is based on sound technical principles.

The inspectors reviewed dosimetry occurrence reports or CAP documents for adverse trends related to electronic personal dosimeters, such as interference from electromagnetic frequency, dropping or bumping, failure to hear alarms, etc. The inspectors assessed whether the licensee had identified any trends and implemented appropriate corrective actions.

b. Findings

No findings were identified.

.3 Internal Dosimetry (02.03)

Routine Bioassay (In Vivo)

a. Inspection Scope

The inspectors reviewed procedures used to assess the dose from internally deposited nuclides using whole-body counting equipment. The inspectors evaluated whether the procedures addressed methods for differentiating between internal and external contamination, the release of contaminated individuals, the route of intake and the assignment of dose. The inspectors reviewed the whole-body count process to determine if the frequency of measurements was consistent with the biological half-life of the nuclides available for intake.

The inspectors reviewed the licensee's evaluation for use of its portal radiation monitors as a passive monitoring system to determine if instrument minimum detectable activities were adequate to determine the potential for internally deposited radionuclides sufficient to prompt additional investigation.

The inspectors selected several whole-body counts and evaluated whether the counting system used had sufficient counting time/low background to ensure appropriate sensitivity for the potential radionuclides of interest. The inspectors reviewed the

radionuclide library used for the count system to determine its appropriateness. The inspectors evaluated whether any anomalous count peaks/nuclides indicated in each output spectra received appropriate disposition. The inspectors reviewed the licensee's 10 CFR Part 61 data analyses to determine whether the nuclide libraries included appropriate gamma-emitting nuclides. The inspectors evaluated how the licensee accounts for hard-to-detect nuclides in the dose assessment.

b. Findings

No findings were identified.

Special Bioassay (In Vitro)

a. Inspection Scope

There were no internal dose assessments obtained using in vitro monitoring for the inspectors to review. The inspectors reviewed and assessed the adequacy of the licensee's program for in vitro monitoring (i.e., urinalysis and fecal analysis) of radionuclides (tritium, fission products, and activation products), including collection and storage of samples.

The inspectors reviewed the Vendor Laboratory Quality Assurance Program, and assessed whether the laboratory participated in an industry recognized cross-check program including whether out-of-tolerance results were resolved appropriately.

b. Findings

No findings were identified.

Internal Dose Assessment – Airborne Monitoring

a. Inspection Scope

The inspectors reviewed the licensee's program for airborne radioactivity assessment and dose assessment, as applicable, based on airborne monitoring and calculations of derived air concentration. The inspectors determined whether flow rates and collection times for air sampling equipment were adequate to allow lower limits of detection to be obtained. The inspectors also reviewed the adequacy of procedural guidance to assess internal dose if respiratory protection was used. The licensee had not performed dose assessments using airborne/derived air concentration monitoring since the last inspection.

b. Findings

No findings were identified.

Internal Dose Assessment – Whole-Body Count Analyses

a. Inspection Scope

The inspectors reviewed several dose assessments performed by the licensee using the results of whole-body count analyses. The inspectors determined whether affected

personnel were properly monitored with calibrated equipment and that internal exposures were assessed consistent with the licensee's procedures.

b. Findings

No findings were identified.

.4 Special Dosimetric Situations (02.04)

Declared Pregnant Workers

a. Inspection Scope

The inspectors assessed whether the licensee informs workers, as appropriate, of the risks of radiation exposure to the embryo/fetus, the regulatory aspects of declaring a pregnancy, and the specific process to be used for (voluntarily) declaring a pregnancy.

The inspectors selected individuals who had declared pregnancy during the current assessment period and evaluated whether the licensee's radiological monitoring program (internal and external) for declared pregnant workers is technically adequate to assess the dose to the embryo/fetus. The inspectors reviewed exposure results and monitoring controls employed by the licensee and with respect to the requirements of 10 CFR 20.

b. Findings

No findings were identified.

Dosimeter Placement and Assessment of Effective Dose Equivalent for External Exposures

a. Inspection Scope

The inspectors reviewed the licensee's methodology for monitoring external dose in non-uniform radiation fields or where large dose gradients exist. The inspectors evaluated the licensee's criteria for determining when alternate monitoring, such as use of multi-badging, was to be implemented.

The inspectors reviewed dose assessments performed using multi-badging to evaluate whether the assessment was performed consistently with licensee procedures and dosimetric standards.

b. Findings

No findings were identified.

Shallow Dose Equivalent

a. Inspection Scope

The inspectors reviewed shallow dose equivalent dose assessments for adequacy. The inspectors evaluated the licensee's method (e.g., VARSKIN or similar code) for

calculating shallow dose equivalent from distributed skin contamination or discrete radioactive particles.

b. Findings

No findings were identified.

Neutron Dose Assessment

a. Inspection Scope

The inspectors evaluated the licensee's Neutron Dosimetry Program, including dosimeter types and/or survey instrumentation.

The inspectors reviewed neutron exposure situations (e.g., independent spent fuel storage installation operations or at-power containment entries), and assessed whether (a) dosimetry and/or instrumentation was appropriate for the expected neutron spectra, (b) there was sufficient sensitivity for low dose and/or dose rate measurement, and (c) neutron dosimetry was properly calibrated. The inspectors also assessed whether interference by gamma radiation had been accounted for in the calibration and whether time and motion evaluations were representative of actual neutron exposure events, as applicable.

b. Findings

No findings were identified.

Assigning Dose of Record

a. Inspection Scope

For the special dosimetric situations reviewed in this section, the inspectors assessed how the licensee assigns dose of record for total effective dose equivalent, shallow dose equivalent, and lens dose equivalent. This included an assessment of external and internal monitoring results, supplementary information on individual exposures (e.g., radiation incident investigation reports and skin contamination reports), and radiation surveys and/or air monitoring results when dosimetry was based on these techniques.

b. Findings

No findings were identified.

.5 Problem Identification and Resolution (02.05)

a. Inspection Scope

The inspectors assessed whether problems associated with occupational dose assessment are being identified by the licensee at an appropriate threshold and are properly addressed for resolution in the licensee CAP. The inspectors assessed the appropriateness of the corrective actions for a selected sample of problems documented by the licensee involving occupational dose assessment.

b. Findings

No findings were identified.

2RS5 Radiation Monitoring Instrumentation (71124.05)

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

.1 Inspection Planning (02.01)

a. Inspection Scope

The inspectors reviewed the plant's FSAR to identify radiation instruments associated with monitoring area radiological conditions including airborne radioactivity, process streams, effluents, materials/articles, and workers. Additionally, the inspectors reviewed the instrumentation and the associated TS requirements for post-accident monitoring instrumentation, including instruments used for remote emergency assessment.

The inspectors reviewed a listing of in-service survey instrumentation including air samplers and small article monitors, along with instruments used to detect and analyze workers' external contamination. Additionally, the inspectors reviewed personnel contamination monitors and portal monitors, including whole-body counters, to detect workers' internal contamination. The inspectors reviewed this list to assess whether an adequate number and type of instruments were available to support operations.

The inspectors reviewed licensee and third-party evaluation reports of the Radiation Monitoring Program since the last inspection. These reports were reviewed for insights into the licensee's program and to aid in selecting areas for review ("smart sampling").

The inspectors reviewed procedures that govern instrument source checks and calibrations, focusing on instruments used for monitoring transient high radiological conditions, including instruments used for underwater surveys. The inspectors reviewed the calibration and source check procedures for adequacy and as an aid to smart sampling.

The inspectors reviewed the area radiation monitor (ARM) alarm setpoint values and setpoint bases as provided in the TS and the UFSAR.

The inspectors reviewed effluent monitor alarm setpoint bases and the calculational methods provided in the Offsite Dose Calculation Manual (ODCM).

b. Findings

No findings were identified.

.2 Walkdowns and Observations (02.02)

a. Inspection Scope

The inspectors walked down effluent radiation monitoring systems, including at least one liquid and one airborne system. Focus was placed on flow measurement devices and all accessible point-of-discharge liquid and gaseous effluent monitors of the selected systems. The inspectors assessed whether the effluent/process monitor configurations

aligned with ODCM descriptions and observed monitors for degradation and out-of-service tags.

The inspectors selected portable survey instruments that were in use or available for issuance and assessed calibration and source check stickers for currency as well as instrument material condition and operability.

The inspectors observed licensee staff performance as the staff demonstrated source checks for various types of portable survey instruments. The inspectors assessed whether high-range instruments were source checked on all appropriate scales.

The inspectors walked down ARMs and continuous air monitors to determine whether they were appropriately positioned relative to the radiation sources or areas they were intended to monitor. Selectively, the inspectors compared monitor response (via local or remote control room indications) with actual area conditions for consistency.

The inspectors selected personnel contamination monitors, portal monitors, and small article monitors, and evaluated whether the periodic source checks were performed in accordance with the manufacturer's recommendations and licensee procedures.

b. Findings

No findings were identified.

.3 Calibration and Testing Program (02.03)

Process and Effluent Monitors

a. Inspection Scope

The inspectors selected effluent monitor instruments (such as gaseous and liquid) and evaluated whether channel calibration and functional tests were performed consistent with radiological effluent TS/ODCM. The inspectors assessed whether: (a) the licensee calibrated its monitors with National Institute of Standards and Technology traceable sources; (b) the primary calibrations adequately represented the plant nuclide mix; (c) when secondary calibration sources were used, the sources were verified by the primary calibration; and (d) the licensee's channel calibrations encompassed the instrument's alarm set-points.

The inspectors assessed whether the effluent monitor alarm setpoints were established as provided in the ODCM and station procedures.

For changes to effluent monitor setpoints, the inspectors evaluated the basis for changes to ensure that an adequate justification existed.

b. Findings

No findings were identified.

Laboratory Instrumentation

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.

b. Findings

No findings were identified.

Whole-Body Counter

a. Inspection Scope

The inspectors reviewed the methods and sources used to perform whole-body count functional checks before daily use of the instrument 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.

b. Findings

No findings were identified.

Post-Accident Monitoring Instrumentation

a. Inspection Scope

Inspectors selected containment high-range monitors and reviewed the calibration documentation since the last inspection.

The inspectors assessed whether an electronic calibration was completed for all range decades above 10 rem/hour and whether at least 1 decade at or below 10 rem/hour was calibrated using an appropriate radiation source.

The inspectors assessed whether calibration acceptance criteria were reasonable; accounting for the large measuring range and the intended purpose of the instruments.

The inspectors selected effluent/process monitors that were relied on by the licensee in its emergency operating procedures as a basis for triggering emergency action levels and subsequent emergency classifications, or to make protective action recommendations during an accident. The inspectors evaluated the calibration and availability of these instruments.

The inspectors reviewed the licensee's capability to collect high-range, post-accident iodine effluent samples.

As available, the inspectors observed electronic and radiation calibration of these instruments to assess conformity with the licensee's calibration and test protocols.

b. Findings

No findings were identified.

Portal Monitors, Personnel Contamination Monitors, and Small Article Monitors

a. Inspection Scope

For each type of these instruments used onsite, the inspectors assessed whether the alarm setpoint values were reasonable under the circumstances to ensure that licensed material is 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.

b. Findings

No findings were identified.

Portable Survey Instruments, Area Radiation Monitors, Electronic Dosimetry, and Air Samplers/Continuous Air Monitors

a. Inspection Scope

The inspectors reviewed calibration documentation for at least one of each type of instrument. For portable survey instruments and ARMs, the inspectors reviewed detector measurement geometry and calibration methods and had the licensee demonstrate use of its instrument calibrator as applicable. The inspectors conducted comparison of instrument readings versus an NRC survey instrument if problems were suspected.

As available, the inspectors selected portable survey instruments that did not meet acceptance criteria during calibration or source checks to assess whether the licensee had taken appropriate corrective action for instruments found significantly out of calibration (e.g., greater than 50 percent). The inspectors evaluated whether the licensee had evaluated the possible consequences of instrument use since the last successful calibration or source check.

b. Findings

No findings were identified.

Instrument Calibrator

a. Inspection Scope

As applicable, the inspectors reviewed the current output values for the licensee's portable survey and ARM instrument calibrator unit(s). The inspectors assessed whether the licensee periodically measures calibrator output over the range of the instruments used through measurements by ion chamber/electrometer.

The inspectors assessed whether the measuring devices had been calibrated by a facility using National Institute of Standards and Technology traceable sources and whether corrective factors for these measuring devices were properly applied by the licensee in its output verification.

b. Findings

No findings were identified.

Calibration and Check Sources

a. Inspection Scope

The inspectors reviewed the licensee's 10 CFR 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.

b. Findings

No findings were identified.

.4 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 in the licensee's CAP. The inspectors assessed the appropriateness of the corrective actions for a selected sample of problems documented by the licensee that involve radiation monitoring instrumentation.

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 Mitigating Systems Performance Index—Emergency AC Power System

a. Inspection Scope

The inspectors sampled licensee submittals for the Mitigating Systems Performance Index (MSPI) - Emergency AC Power System performance indicator for Byron, Units 1 and 2, for the period from the 4th quarter 2014, through the 3rd quarter 2015. To determine the accuracy of the Performance Indicator (PI) data reported during those periods, guidance contained in Nuclear Energy Institute (NEI) 99–02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, dated August 31, 2013, was used. The inspectors reviewed the licensee's operator narrative logs, MSPI derivation reports, issue reports, event reports and NRC Integrated Inspection Reports for the period of October 1, 2014, through September 30, 2015, to validate the accuracy of the submittals. The inspectors reviewed the MSPI component risk coefficient to determine if it had changed by more than 25 percent in value since the previous inspection, and if so, that the change was in accordance with applicable NEI guidance. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the PI data collected or transmitted for this indicator and none were identified.

This inspection constituted two MSPI emergency AC power system samples as defined in IP 71151–05.

b. Findings

No findings were identified.

.2 Mitigating Systems Performance Index—High Pressure Injection Systems

a. Inspection Scope

The inspectors sampled licensee submittals for the Mitigating Systems Performance Index - High Pressure Injection Systems performance indicator for Byron, Units 1 and 2 for the period from the 4th quarter 2014, through the 3rd quarter 2015. To determine the accuracy of the PI data reported during those periods, guidance contained in NEI 99–02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, dated August 31, 2013, was used. The inspectors reviewed the licensee's operator narrative logs, issue reports, MSPI derivation reports, event reports and NRC Integrated Inspection Reports for the period of October 1, 2014, through September 30, 2015, to validate the accuracy of the submittals. The inspectors reviewed the MSPI component risk coefficient to determine if it had changed by more than 25 percent in value since the previous inspection, and if so, that the change was in accordance with applicable NEI guidance. The inspectors also reviewed the licensee's issue report database to determine if any

problems had been identified with the PI data collected or transmitted for this indicator and none were identified.

This inspection constituted two MSPI high pressure injection system samples as defined in IP 71151–05.

b. Findings

No findings were identified.

.3 Mitigating Systems Performance Index—Residual Heat Removal System

a. Inspection Scope

The inspectors sampled licensee submittals for the Mitigating Systems Performance Index - Residual Heat Removal System performance indicator for Byron, Units 1 and 2 for the period from the 4th quarter 2014, through the 3rd quarter 2015. To determine the accuracy of the PI data reported during those periods, guidance contained in the NEI 99–02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, dated August 31, 2013, was used. The inspectors reviewed the licensee's operator narrative logs, issue reports, MSPI derivation reports, event reports and NRC Integrated Inspection Reports for the period of October 1, 2014, through September 30, 2015, to validate the accuracy of the submittals. The inspectors reviewed the MSPI component risk coefficient to determine if it had changed by more than 25 percent in value since the previous inspection, and if so, that the change was in accordance with applicable NEI guidance. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the PI data collected or transmitted for this indicator and none were identified.

This inspection constituted two MSPI residual heat removal system 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 part of the various baseline inspection procedures discussed in previous sections of this report, the inspectors routinely reviewed issues during baseline inspection activities and plant status reviews to verify they were being entered into the licensee's CAP at an appropriate threshold, that adequate attention was being given to timely corrective actions, and that adverse trends were identified and addressed. Attributes reviewed included: identification of the problem was complete and accurate; timeliness was commensurate with the safety significance; evaluation and disposition of performance issues, generic implications, common causes, contributing factors, root causes, extent-of-condition reviews, and previous occurrences reviews were proper and adequate; and

that the classification, prioritization, focus, and timeliness of corrective actions were commensurate with safety and sufficient to prevent recurrence of the issue.

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

b. Findings

No findings were identified.

.2 Daily Corrective Action Program Reviews

a. Inspection Scope

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

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

b. Findings

No findings were identified.

.3 Semi-Annual Trend Review

a. Inspection Scope

The inspectors performed a review of the licensee's CAP and associated documents to identify trends that could indicate the existence of a more significant safety issue. The inspectors' review was focused on repetitive equipment issues, but also considered the results of daily inspector CAP item screening discussed in Section 4OA2.2 above, licensee trending efforts, and licensee human performance results. The inspectors' review nominally considered the 6-month period of June 15, 2015, through December 15, 2015, although some examples expanded beyond those dates where the scope of the trend warranted.

The review also included issues documented outside the normal CAP in major equipment problem lists, repetitive and/or rework maintenance lists, departmental problem/challenges lists, system health reports, quality assurance audit/surveillance reports, self-assessment reports, and Maintenance Rule assessments. The inspectors compared and contrasted their results with the results contained in the licensee's CAP trending reports. Corrective actions associated with a sample of the issues identified in the licensee's trending reports were reviewed for adequacy.

This review constituted one semi-annual trend inspection sample as defined in IP 71152–05.

b. Findings

No findings were identified.

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

.1 (Closed) Licensee Event Report (LER) 05000454/2015-004-00: Unanalyzed Condition due to a Design Deficiency with Pressurizer Power Operated Relief Valve Circuitry that Could Prevent Valve Manual Closure to Mitigate Spurious Operation

This design deficiency, which was initially identified by the licensee on August 20, 2015, and entered in the licensee's CAP as IR 02544466, was confirmed to exist at Byron Station following NRC identification of an issue at another Exelon facility. The condition as identified could have prevented a credited manual action to close the power operated relief valve (PORV) block valve following spurious opening of the DC solenoid controlled air operated PORV as a result of a control room or cable spreading room design basis fire. On September 2, 2015, an additional design deficiency was confirmed during the extent of condition review in which credited fire safe shutdown actions to remove 125 Vdc control power fuses to mitigate spurious opening of the pressurizer PORV during a design basis fire did not adequately mitigate the design basis fire induced hot short. Fire watches of the affected main control room and cable spreading room fire zones were immediately implemented as compensatory actions in accordance with the fire protection program. The licensee modified the PORV block valve circuitry for both units to correct the first identified deficiency and implemented corrective actions to track completion of design changes to eliminate the second design vulnerability.

The causes of the design deficiencies were legacy design errors from original construction and fire safe shutdown strategy changes introduced during resolution of Information Notice 92-18, "Potential for Loss of Remote Shutdown Capability during a Control Room Fire." Enforcement associated with this issue is discussed further in Section 4OA7 of this report. This LER is closed.

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

.2 (Closed) Licensee Event Report (LER) 05000454/2015-005-00: Byron Unit 1, Liquid Penetrant Indications in Embedded Flaw Seal Weld Repair of Control Rod Drive Mechanism Penetration 31 During Refueling Outage

On September 18, 2015, during the Byron Unit 1 refueling outage, in-service liquid penetration (PT) examinations were performed on the previously repaired control rod drive mechanisms (CRDMs) at penetrations 31 and 43. During the examination of the repair for CRDM penetration 31, one 9/32 inch rounded indication and one 0.010 inch linear indication were identified, exceeding the acceptance criteria of dimensions greater than 3/16 inch for rounded indication and linear indications of any size. The licensee entered the issue into its CAP as IR 02557389. The linear indication was repaired with buffing only, while the rounded indication was repaired using both buffing and welding. There were no rejectable indications found on penetration 43.

The cause of the flaws was attributed to existing weld discontinuities and minor subsurface voids opening to the surface or enlarging due to thermal and/or pressure stresses during plant operation. Inspectors evaluated the inspection techniques and

repairs. Further discussion of NRC reviews of this issue is included in Section 1R08 of this report. This LER is closed.

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

4OA5 Other Activities

.1 (Closed) Unresolved Item (URI) 05000454/2015007-04; 05000455/2015007-04: Potentially Inadequate Evaluation/Corrective Actions: Diesel Oil Storage Tanks (DOST) Vent Line Seismic Supports and Tornado Missile Protection

As documented in URI 05000454/2015007-04; 05000454/2015007-04, the inspectors identified a concern that the licensee's evaluation and corrective actions following identification of design and installation deficiencies in 2009 pertaining to DOST vent lines may have been inadequate. The original NRC identified deficiency was documented as an NCV in NRC IR 05000454/2009004-02; 05000455/2009004-02 and identified the concern that the vent lines were not seismically supported and protected from tornado missile impact as described in the UFSAR and in an NRC Safety Evaluation Report (SER). The licensee had entered the original concern in their CAP as IR 877430 and IR 933712.

During review of the licensee corrective actions, the inspectors reviewed the UFSAR as well as the NRC SER and noted that the NRC acceptance of the DOST vent design was based on commitment by the licensee that the subject piping would be seismically supported and that unused flanged piping connections were available for venting the tank if the designated vent line gets blocked due to a tornado missile impact. The licensee's evaluations indicated that the vent lines may not be seismically supported and that the plan to use the available flanged connections may not be effective due to lack of procedural guidance and training. As part of corrective actions, the licensee performed an evaluation of the tanks and the overflow piping to demonstrate that the Seismic Category 1 overflow piping can provide for an alternate vent path in case the main vent piping is damaged either due to a seismic event or a tornado missile impact. The URI was opened to review adequacy of licensee's corrective actions and to determine if the changes to the NRC commitments specified in the SER could be made without prior NRC approval. The inspectors reviewed the NEI 99-04, "Guidelines for Managing NRC Commitment Changes," as well as the NRC Office Instruction LIC-100, "Control of Licensing Basis for Operating Reactors," and with consultations with the Nuclear Reactor Regulation (NRR) technical staff, concluded that provisions of 10 CFR 50.59 were applicable to the changes being made to the methods for protection of the DOST from potential damage to the vent lines due to a seismic event or tornado missile impact. The inspectors further concluded that based on the technical evaluation performed by the licensee, the possible venting path through the overflow piping provided adequate protection to the tanks in the event of blocked vent piping. Consequently, there was no associated safety concern and, therefore, the URI can be closed. The inspectors also noted that the description in the UFSAR lacked clarity regarding the method of protection relied upon for protection of the vent piping against seismic or tornado missile events and that the licensee's IR 2559779 identified open corrective actions to revise UFSAR description. No findings were identified. The URI is closed.

4OA6 Management Meetings

.1 Exit Meeting Summary

On January 5, 2016, the inspectors presented the inspection results to Mr. M. Kanavos, and other members of the licensee staff. The licensee acknowledged the issues presented. The inspectors confirmed that none of the potential report information discussed was considered proprietary. Proprietary material received during the inspections was either destroyed or returned to the licensee.

.2 Interim Exit Meetings

Interim exits were conducted for:

- the results of the ISI inspection with D. Spitzer, Regulatory Assurance Manager, on October 21, 2015;
- the results for inspection in the areas of in-plant airborne radioactivity control and mitigation; and occupational dose assessment with Mr. T. Chalmers, Plant Manager, on October 23, 2015;
- the inspection results for inspection in the area of radiation monitoring instrumentation with Mr. T. Chalmers, Plant Manager, on November 20, 2015;
- the results of the modification inspection with Mr. M. Kanavos, Site Vice President, on December 2, 2015;
- the results of the annual review of EAL and Emergency Plan Changes with the Licensee's Emergency Preparedness Manager, Mr. R. Lloyd, on December 15, 2015; and
- the results of the operating exam inspection via telephone with Mr. M. McCue, Maintenance and Technical Training Manager, on December 16, 2015.

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

4OA7 Licensee-Identified Violations

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity, and Occupational Radiation Safety

The following violations of very low significance (Green) were identified by the licensee and are violations of NRC requirements which meet the criteria of the NRC Enforcement Policy for being dispositioned as NCVs:

- On September 21, 2015, during the Unit 1 refueling outage, welders performed a modification to install a new valve on the combined discharge of the "B" train fuel oil transfer pumps. During the post maintenance run of the 1B diesel generator and support systems (including fuel oil), operators observed high discharge pressure on the fuel oil transfer pumps. Troubleshooting revealed the purge dam material used during the weld application had been wadded up when installed and left in the piping after the welding was complete, had wedged in the 1B diesel fuel oil day tank inlet isolation valve, 1DO005B, and blocked fuel oil flow to the day tank. Welders had assumed that the water-soluble purge dam material (referred to a rice paper) would dissolve in the fuel oil and, therefore, did not need to be removed prior to clearance order release. Several steps in

CC-AA-501-1026, Exelon Nuclear Welding Program Purging Techniques, allow use of water-soluble purge dams specified by brand name in recommended applications, but step 4.5.1 specifies that if water-soluble purge dams are used, that they be flushed from the system, and step 4.5.3 assigns responsibility to the supervisor to assure, in part, that all purge materials have been removed from the system. In addition, step 4.2.5.2 states "Do not wad water soluble paper purge dam materials into a pipe or tube." Work order instructions did not incorporate the information provided in CC-AA-501-1026 and the weld data sheet only specified that a dam was to be used. Failure to provide work instructions appropriate to the circumstances is a performance deficiency. Title 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," requires, in part, that activities affecting quality shall be documented by instruction, procedures, or drawings of a type appropriate to the circumstances and shall be accomplished in accordance with those instructions, procedures, or drawings. Contrary to the above, the work instructions included in WO 01635687 on September 21, 2015, did not include instructions appropriate to the circumstances in that the work order did not include steps to ensure that the purge dam material was removed after welding was complete.

The issue was entered into CAP as IR 02559056 and the purge dam material was removed. An extent of condition review determined that other welding performed during this outage and the previous Unit 2 outage was performed in compliance with the guidance included I CC -AA-501-1026. The inspectors determined this issue was more than minor because the performance deficiency impacted the Equipment Performance attribute of the Mitigating Systems Cornerstone in that the fuel oil system was made available for service and the diesel generator was credited as available by the operating staff when, in fact, it was not available. The inspectors used IMC 0609, "SDP," Appendix G, "Shutdown Operations," Attachment 1, "Phase 1 Operational Checklist for Both PWRs and BWRs," Checklist 2, "PWR Cold Shutdown Operation," to determine that no quantitative assessment was required and that the issue was Green or very low safety significance.

- On October 23, 2015, during a return to full power after power maneuvering on October 23, 2015, the Unit 2 axial offset (AO) exceeded the procedural limit of the reactivity maneuver guidance sheet (ReMA). AO is an indication used to ensure power distribution and fuel conditioning limits are properly maintained throughout the core during steady state conditions and when maneuvering the plant up or down in power. The Unit 2 reactor operator (NSO) was focused primarily on RCS temperature control, which had stabilized because the reactivity changes from power ascension and poison burnout were offset enough to stabilize temperature control, and did not recognize the AO trend was still becoming more negative. The operator was not monitoring all of the critical parameters specified in the ReMA and, as a result, the AO value dropped to -4.3% and exceeding the ±3% from a target value of -0.5% before the operator took action to correct it. Failure to operate within the procedurally specified limits was a performance deficiency. Technical Specification 5.4.1.a requires, in part, that written procedures be established and implemented covering the procedures recommended in Regulatory Guide 1.33, Revision 2, Appendix A, February 1978. 2BGP 100-3, POWER ASCENSION, states in step E.1.e, "the rate of Reactor Power rise shall be limited per NF-AP-440" and refers the operator to the ReMA

guidance. In step 5.3.4 of NF-AP-440, PWR FUEL CONDITIONING, operators are directed to maintain AO within ±3% of target when increasing power above 75% of rated thermal power. The load following ReMA specified a target value of -0.5% for AO. Contrary to the TS 5.4.1.a requirements specified above, the operator did not implement the actions specified in procedures established for changing power and load following to control the key parameter within the specified control band.

The operator identified that AO was outside the specified band and the crew immediately took action to restore AO to within the ReMA limits by withdrawing control rods. The issue was entered into CAP as IR 02575960, and the operating department implanted prompt action to communicate the cause of the error to all operators and qualified nuclear engineers. In addition, additional management observations of power maneuvering activities were put in place. The inspectors determined this issue was more than minor because the performance deficiency impacted the Human Performance attribute of the Barrier Integrity Cornerstone and adversely impacted the cornerstone objective to provide reasonable assurance that the physical design barrier (fuel cladding) protect the public from radionuclide releases caused by accidents or events. Specifically, failure to follow fuel conditioning guidelines to monitor and control key parameters while making reactivity changes could result in fuel clad damage and adversely impact nuclear safety. The inspectors determined that the issue was of very low safety significance (Green) because the axial offset was still within the bounding limits established and analyzed by the core operating limit report and no fuel damage occurred.

- As discussed in Section 4OA3.1 of this report, the licensee identified through communication of operating experience from Braidwood Station that design deficiencies in the circuits associated with the Pressurizer PORV block valves might have resulted in the valves not being available when required due to fire-induced failures in the event of a fire in the control room, cable spreading rooms, or electrical cable penetration areas. Byron License Conditions 2.C(6) for Unit 1 and 2.E for Unit 2, required, in part, that the licensee implement and maintain in effect all provisions of the fire protection program as described in the FSAR, as supplemented and amended, and as approved in SERs and their supplements. Section 2.4.3.2, “Pressurizer PORVs and Block Valves” of the Safe Shutdown Analysis, stated, in part, that the Division 12(22) PORV and block valves both have control cables in the main control room and in two of the lower cable spreading rooms. Should a fire in any of these zones cause the spurious opening of the PORV, coincident with control circuit damage to the block valve, the block valve could still be closed. A “remote/local” isolation switch and control switch are provided for the block valve at its motor control center, located in the Division 12(22) electrical penetration area. The block valve can be closed by placing the “remote/local” isolation switch in “local” and then closing the valve with the control switch provided. Additionally, Section 2.4.3.2 also stated that in fire zones where one of the PORVs had a control cable present in the zone that can spuriously open the PORV and its associated block valve does not have AC power available, the PORV will be failed closed by pulling its control power fuse at its DC distribution panel. Contrary to the above, as of August 20, 2015, the licensee failed to implement and maintain all provisions of their approved fire protection program. Specifically, the licensee failed to ensure that control circuits

associated with the PORVs and local control function would close the PORV block valve during the postulated fire.

The licensee entered this issue into their CAP, established fire watches, and performed plant modifications to correct the issue. The inspectors determined that the issue was more than minor because the performance deficiency impacted the Protection Against External Factors Attribute of the Mitigating Systems Cornerstone in that fire-induced circuit failures could impair the operation of the PORV block valves and complicate shutdown of the plant in the event of a fire in the control room, cable spreading rooms, or electrical cable penetration areas. The finding was determined to be of very low safety significance (Green) based on a detailed risk-evaluation performed by a Region III Senior Reactor Analyst.

- The licensee identified an NCV of TS 5.4.1, "Procedures," for a failure to wear dosimetry as prescribed on the radiation work permit (RWP). The licensee's TS 5.4.1 required, in part, that written procedures shall be established, written, and maintained for Access Control to Radiation Areas including a RWP System. Station, procedure RP-AA-1008, Revision 4, "Unescorted Access to and Conduct in Radiologically Controlled Areas," requires that radiation workers are responsible to read, understand, and acknowledge the appropriate copy of the RWP for any work requiring an RWP. The RWP 10017249, Revision 0, states that "Workers shall be evaluated for proper dosimetry placement. Only Radiation Protection shall reposition dosimetry." Additionally, RP-AA-1008, Revision 4, "Unescorted Access to and Conduct in Radiologically Controlled Areas," Step 4.2.7, states, "WEAR the primary (DLR) and secondary (electronic) whole-body dosimeters within 6 inches or less (about a hands width) of each other on the chest region unless otherwise specified by Radiation Protection Supervision or the RWP. Dosimetry movement is not allowed unless directed by Radiation Protection. Dosimetry should be facing outward."

  Contrary to the above, on September 23, 2015, a contract carpenter removed his electronic alarming dosimeter and the dosimetry movement was not directed by Radiation Protection. The licensee entered this issue into the CAP as IR 02559980. The inspectors determined that this issue was of very low safety significance (Green) after reviewing IMC 0609, Appendix C, "Occupational Radiation Safety SDP," dated August 19, 2008. The inspectors determined that it was not an ALARA planning issue, there was neither overexposure nor substantial potential for an overexposure, and the licensee's ability to assess dose was not compromised. Therefore, the finding screened as Green (very-low safety significance).

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

M. Kanavos, Site Vice President
A. Corrigan, Regulatory Assurance
T. Chalmers, Plant Manager
A. Corrigan, Regulatory Assurance
D. Spitzer, Regulatory Assurance
B. Barton, Radiation Protection
J. Armstrong, Security
S. Kerr, Training
B. Jacobs, Project Management
E. Richards, Maintenance
B. Currier, Design Engineering
E. Hernandez, Operations
C. Keller, Engineering
K. McGuire, Chemistry Manager
J. Feimster, Senior Manager Design Engineering
B. Barton, Radiation Protection Manager
J. Reed, Radiation Protection Technical Support Manager
R. Lloyd, Emergency Preparedness Manager
M. McCue, Maintenance and Technical Training Manager

U.S. Nuclear Regulatory Commission

J. Jandovitz, Acting Chief, Reactor Projects Branch 3
K. Pusateri, Reactor Inspector

Illinois Emergency Management Agency

C. Thompson, IEMA

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

05000454/2015004-01	FIN	Inaccurate Technical Basis for Operability Evaluation of Reactor Head Flange Damage
05000454/2015004-02	NCV	Mispositioned Valve in Diesel Fuel Oil Transfer Pump Recirculation Flow Path
05000454/2015004-03	NCV	Failure to Implement Protective Tagging Procedure Requirements

Closed

05000454/2015004-01	FIN	Inaccurate Technical Basis for Operability Evaluation of Reactor Head Flange Damage
05000454/2015004-02	NCV	Mispositioned Valve in Diesel Fuel Oil Transfer Pump Recirculation Flow Path
05000454/2015004-03	NCV	Failure to Implement Protective Tagging Procedure Requirements
05000454/2015-004-00; 05000455/2015-004-00	LER	Unanalyzed Condition due to a Design Deficiency with Pressurizer Power Operated Relief Valve Circuitry that Could Prevent Valve Manual Closure to Mitigate Spurious Operation
05000454/2015-005-00	LER	Byron Unit 1, Liquid Penetrant Indications in Embedded Flaw Seal Weld Repair of Control Rod Drive Mechanism Penetration 31 During Refueling Outage
05000454/2015007-04; 05000454/2015007-04	URI	Potentially Inadequate Evaluation/Corrective Actions: DOST Vent Line Seismic Supports and Tornado Missile Protection

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.

Section 1R01

- IR 1661128; 1A DG Room Temperature Is Erratic
- IR 1661162; 1A DG Room Air Intake Hydromotor Failed
- BAR 0-34-B1; Revision 13; DG Room 1A Temp High-Low
- IR 2397420; Outside Air Damper on 2A DG Room Has Failed Open
- IR 2434400; 1A DG Room Temperature Found at 36 Deg F
- IR 2596442; 1B DG Rm “Purge On” Tile Locked in After Panel Check
- BOP VD-5; Revision 13; DG Room Ventilation System Operation
- M-97; Revision S; Diagram of Diesel Generator Room 1A & 1B Ventilation System
- M-98; Revision P; Diagram of Diesel Generator Room 2A & 2B Ventilation System
- M-2097; Revision I; HVAC/C&I Diagram Diesel Generator Room Ventilation System – VD
- Test Report Package for Calibration of 1VD-065; Revision 000
- Test Report Package for Calibration of 1VD-051; Revision 001
- Test Report Package for Calibration of 1VD-066; Revision 000
- BAR 0-34-B2; Revision 11; DG Room 1B Temp High-Low
- BAR 0-31-B1; Revision 12; DG Room 2A Temp High Low
- BAR 0-31-B2; Revision 11; DG Room 2B Temp High-Low
- BOP XFT-1; Revision 6; Cold Weather Operations
- WO 1784724; Freezing Temp Prot – Protected Area Bldgs Vent Sys and Tks
- 0BOSR XFT-A3; Revision 12; Freezing Temperature Equipment Protection Plant Ventilation Systems
- 0BOSR XFT-A4; Revision 11; Freezing Temperature Equipment Protection Protected Area Buildings Ventilation Systems and Tanks
- 6E-1-4030VD01; Revision L; Schematic Diagram Diesel Generator Room 1A HVAC System Ventilation Fan 1A 1VD01CA
- 6E-1-4030VD04; Revision N; Schematic Diagram Diesel Generator Room 1A HVAC System Ventilation and Exhaust Fans Auxiliary Relays Switches, and Alarms, Part II
- PMCR 00082927; Preventative Maintenance Change Review Form for 1TS-VD065, 1TS-VD066, 2TS-VD065, 2TS-VD066
- WO 1657810; Install High Room Temp Circuitry 1VD01CA/B EC 393794
- WO 1688956; Perform Calibration
- WO 1358890; Diesel Generator Room 1A Temp Switch
- EC 393794; Revision 2; Install High Room Temperature Start Circuitry for the Unit 1 1VD01CA/B Emergency Diesel Generator Room Vent Fans
- IR 2601344; Incorrect Information in BOP VD-5

Section 1R04

- M-50; Revision EDSF; Diagram of Diesel Fuel Oil
- BOP DO-M1; Revision 22; Diesel Fuel Oil System Valve Lineup
- BOP AF-M1B; Revision 7; Auxiliary Feedwater System Train “B” Valve Lineup
- Drawing M-37; Revision BE; Diagram of Auxiliary Feedwater
- Drawing M-152, Sheet 9; Revision AA; Diagram of Diesel Lube Oil
- Drawing M-152 Sheet 14; Revision Z; Diagram of Diesel Jacket Water
- Drawing M-152 Sheet 18; Revision R; Diagram of Diesel Starting Air
- BOP DG-1; Revision 19; Diesel Generator Alignment to Standby Condition
- BOP DG-M2; Revision 20; Diesel Generator System Valve Lineup
- IR 1627217; 2B DG Emergency Stop Push Button is Degraded
- WR 1716334; 2B DG Emergency Stop Push Button is Degraded
- BOP CS-E1; Revision 4; Containment Spray System Electrical Lineup
- BOP CS-E1A; Revision 1; Containment Spray System “Train A” Electrical Lineup
- BOP CS-M1; Revision 13; Containment Spray System Valve Lineup
- BOP CS-M1A; Revision 3; Containment Spray System “Train A” Valve Lineup
- BOP CS-M1C; Revision 2; Containment Spray System “Train C” Valve Lineup
- BOP AF-1; Revision 29; Diesel Driven Aux Feedwater Pump Alignment To Standby Condition
- BOP AF-M2; Revision 16; Auxiliary Feedwater System Valve Lineup

Section 1R05

- Pre-Fire Plan FZ 11.4-0 South; Revision 1; Aux. Bldg. 383”-0” Elev. General Area – South
- Pre-Fire Plan FZ 11.4A; Revision 0; Aux. Bldg. 383”-0” Elev. Control Room Refrigeration Equipment Room
- Pre-Fire Plan FZ 9.2-1, FZ 9.3-1; Revision 1; Aux. Bldg. 401’-0” Elev.1A Diesel Generator & Day Tank Room
- Pre-Fire Plan FZ 10.2-1; Revision 1; Aux. Bldg. 383’-0” Elev.1A Diesel Fuel Oil Storage Tank Room
- Pre-Fire Plan FZ 10.1-1; Revision 1; Aux. Bldg. 383’-0” Elev.1B Diesel Fuel Oil Storage Tank Room
- Pre-Fire Plan FZ 5.3-2; Revision 1; Aux. Bldg. 451’-0” Elev. Unit 2 6.9KV Non-ESF Switchgear Room
- Pre-Fire Plan FZ 5.6-2; Revision 2; Aux. Bldg. 451’-0” Elev. Division 21 Misc. Electrical Equipment and Battery Room
- Pre-Fire Plan FZ 5.4-2; Revision 1; Aux. Bldg. 451’-0” Elev. Division 22 Misc. Electrical Equipment and Battery Room

Section 1R08

- Procedure ER-AP-331-1001; BACC Inspections, Implementation and Inspection Guidelines; Revision 7
- Procedure ER-AP-331-1002; BACC Program Identification, Screening and Evaluation; Revision 8
- IR 1631088; Leak on Seal Weld (1RC8044A) (R1); Dated March 10, 2014
- WO 01721168; Leak on Seal Weld (1RC8045A); Dated March 19, 2014
- IR 1631082; Steam Leak from Packing (1RC8003A) (R3); Dated March 10, 2014
- IR 1637747; 1B RH PP, Leak on Seal Injection Line; Dated March 24, 2014

- IR 2532041; Inactive Boric Acid Leak on 1B RH HX Exit; Dated July 23, 2015
- IR 2536012; Boric Acid Residue and Moisture from 1CV8519; Dated July 31, 2015
- Procedure OP-AA-108-225; Operability Determinations; Revision 16
- Operability Evaluation 15-002; Unit 1 Reactor Vessel Head flange Impression; Revisions 0 and 1
- NDE Procedure ER-AA-335-003; Magnetic Particle Examination (MT); Revision 6
- Work Order (WO) 01423944-01; Welding on Auxiliary Feedwater Valve 1AF013C; Revision 21
- WO 01734329-01; RPV Head Bare Metal Visual Examination; Dated September 14, 2015
- WO 01574379; VT-3 Examination of Hot Leg Nozzles and Vessel Flange Surface; Dated September 24, 2015
- NDE Report B1R20-MT-001; MT Report for RPV Head-to-Flange Weld; Dated September 25, 2015
- NDE Report 2015-240, 241, 248, 259, 260, and 268; PT Examination of RPV Head Penetrations Nos. 31 and 43; Dated September 19, 2015
- WO 01728785-02; ASME IWE Containment and IWL Metallic Liners Visual Examinations; Dated September 20, 2015
- NDE Report B1R20-UT-062; UT Examination of SG Manway Studs; Dated September 23, 2015
- NDE Report 180-9245793-000; B1R20 RPVH Penetration Examination Report
- IR 02557389; CRDM Penetration 31 PT Indications; Dated September 18, 2015
- Procedure 54-ISI-604; AREVA Automated UT Examination of Open Tube RPV Closure Head Penetrations; Revision 1
- Procedure 54-ISI-494; AREVA Multi-Frequency Eddy Current Array Probe Examination of Vent line and RVLIS Nozzle Bores; Revision 1
- Document 51-9188025-001; AREVA Technical Justification Report for ET Examinations of Vent line and RVLIS Nozzles and Welds; Revision 001
- IR 02389459; ISI Surface Indication 2MS01AA-30.25” Welded Attachment E-2; Dated October 1, 2014
- IR 01651913; VT-2 of Embedded EDG Diesel Oil Piping Not Per Section XI; Dated April 25, 2014
- IR 02390926; 2SXA9A-6’ UT Identified Areas Below MIN. Wall Requirements; Dated October 4, 2014
- IR 02396955; Steam Generator Snubber Fluid Sample Exceed Criteria; Dated October 16, 2014
- IR 02389425; SX Return Header Wall Thinning; Dated October 1, 2014
- IR 02494393; B&W SG Tube/Tubesheet Weld ASME Section III Code Compliance; Dated May 1, 2015
- AR 02432068; Loose Parts Noise for U-2 S/G “D” Upper NR TAP; Dated January 3, 2015
- IR 01680109; End of Cycle Report for B1C19; Dated July 9, 2014
- Procedure 54-ISI-460; AREVA Multi-Frequency ECT of Nozzle Welds and Regions; Revision 1
- Procedure EXE-UT-74; AREVA UT Examination of Unit 1 Replacement SG Primary Manway Stud at Byron and Braidwood; Revision 1
- Procedure 54-ISI-603; AREVA Automated UT Examination of RPV Closure Head Penetrations Containing Thermal Sleeves; Revision 1

Section 1R11

- 1BGP 100-3; Revision 91; Power Ascension
- 1BGP 100-3T1; Revision 29; Power Ascension Flowchart
- 1BGP 100-2; Revision 34; Plant Startup
- 1BGP 100-1; Revision 58; Plant
- TQ-AA-155-F109; Revision 000; Simulator Evaluation – Crew Competency Standards
- TQ-AA-155-F106; Revision 000; Simulator Evaluation – Shift Manger Competency Standards
- TQ-AA-155-F107; Revision 000; Simulator Evaluation – STA or IA Competency Standards
- TQ-AA-155-F109; Revision 000; Simulator Evaluation – Individual Competency Standards
- LORT Annual Exam Status Report Byron Generating Station 2015

Section 1R12

- IR 02492862; Maintenance Rule Unavailability Criteria For AP-02 Function is Exceeded
- (a)(1) Action Plan Development and Action Plan (Monitoring) Goal Setting Template for Maintenance Rule function AP-02; Dated June 2, 2015
- Maintenance Rule Performance Criteria Selection Template for function AP-02 Dated
- IR 02490281; Maintenance Preventable Functional Failure on DG Ventilation
- IR 2586476; All Flex Diesel Generator Need Battery Replacement
- Maintenance Rule System Basis Document; FX-01, Provide Response During an Extended Loss of All AC Power Beyond Design Basis Event; November 24, 2015
- Memo from P. Hoogervorst, Cummins NPower, to Exelon; Dated September 4, 2015; Operational Dependence Statement regarding Battery Box Heaters
- ER-AA-310; Revision 9; Implementation of the Maintenance Rule
- ER-AA-310-1004; Revision 13; Maintenance Rule – Performance Monitoring
- IR 2582798; 0FX01KC Is Dead Control Panel Dark
- IR 2583342; 0FX01KA Batteries Degraded But Functional
- IR 2583346; 0FX01KB Batteries Degraded But Functional
- IR 2583377; Overheated Heat Trace on Flex Emergency Diesel Generator
- IR 2547347; Flex EDG, Found Battery Damaged from Heat
- IR 2586476; All Flex Diesel Generator Need Battery Replacement
- IR 2587992; Heat Trace on 0FX01KA Battery Compartment Found Wired Incorrectly
- Letter from P. Hoogervorst, Cummins NPower, to S. Mokkapati, Exelon; Dated November 19 2015; Battery Heaters – Flex Diesel Generators
- Drawing 7436T; Single Phase Load Center Schematic; Dated October 7, 2014
- IR 2587994; Heat Trace on 0FX01KB Battery Compartment Found Wired Incorrectly
- IR 2587996; Heat Trace on 0FX01KC Battery Compartment Found Wired Incorrectly
- IR 2587976; Flex Equipment Not Treated as Augmented Quality
- IR 02404656; 1D RCFC Time Delay Relay May Need Calibration
- IR 02507247; 1D RCFC Fan Did Not Start in Slow Speed During Relay Test
- IR 02508546; NOS ID: Response To Previous 1D RCFC Start Abnormality
- IR 02467391; RCFC Winding Degradation Extent of Condition

Section 1R13

- Online Risk Assessment for Week of December 14, 2015 – E-4
- Online Risk Assessment for Week of December 14, 2015 – Revision 1
- Online Risk Assessment for Week of December 14, 2015 – Revision 2
- IR 02599351; December 2014 Risk Sheet in E-0 Package Not Current

Section 1R15

- IR 02567216; Received High Alarm for 1B DOST Sump
- IR 02573602; RMS Loop 5 Erratic
- 1BOL 4.15; Revision 9; LCOAR, RCS Leakage Detection Instrumentation, Tech Spec LCO 3.4.15
- 0BOL 11.a; Revision 9; LCOAR, Radioactive Liquid Effluent Monitoring Instrumentation, TRM LCO #3.11.a
- 0BOL 11.b; Revision 12; Radioactive Gaseous Effluent Monitoring Instrumentation, TRM LCO #3.11.b
- IR 02573602; RMS Loop 5 Erratic
- IR 02575374; RMS Loop 5 Erratic
- IR 02576181; Loss of Loop 5 – Rad Monitor Communications
- IR 02578276; RMS Loop 5 Erratic
- IR 02571474; NOS ID – Evaluate Tube Steel for Fire Proofing
- EC 403747; Revision 0; GL 86-10 Evaluation for Use of Alternate Compensatory Measures Associated with Missing Fireproofing on Structural Beams Due to Attached Secondary and Auxiliary Steel
- IR 02579699; Evaluation of Alternate Fire Protection Compensatory Actions
- IR 02568014; NOS Identified: Fire Proofing Missing on Beams in Unit 2 AEER
- Operations Standing Order 15-044; Dated October 31, 2015; Revised Requirements for Compensatory Actions – U2 AEER
- 2014 Q4 Operator Burden/Degraded Equipment Aggregate Assessment; Performed December 1, 2014
- 2015 Q1 Operator Burden/Degraded Equipment Aggregate Assessment; Performed March 8, 2015
- 2015 Q2 Operator Burden/Degraded Equipment Aggregate Assessment; Performed June 3, 2015
- 2015 Q3 Operator Burden/Degraded Equipment Aggregate Assessment; Performed August 12, 2015
- 2014 Q4 Operator Work-around Board Meeting Minutes
- OP-AA-102-103, Revision 4; Operator Work-Around Program
- IR 02602070; 2B AF Air Intake – Loose Hose Clamp
- EC 403292; Operability Evaluation 15-002 – Unit 1 Reactor Vessel Head Flange Impression

Section 1R18

- 50.59 Evaluation No. 6G15-002; EC 400482, DRP 16-013, DRP 16-015; Revision 0
- 50.59 Screening No. GE-15-063; EC 400482, DRP 16-013, DRP 16-015; Revision 0
- EC 400682; Unit 2 Reactor Vessel Closure Head Penetration Ultra High Pressure Cavitation Peening; Revision 0
- EPRI Report 3002002952; Materials Reliability Program: Study of New Mitigation Technique Effects on Nondestructive Evaluation Inspectability; Dated November 2014
- EPRI Report 1025839; Technical Basis for PWSCC Mitigation by SSI, MRP-267 RI; Dated July 2012
- EPRI Report 3002006654; PWSCC Mitigation by SSI, MRP-335 R2; Dated August 2015
- AREVA Report 51-8083161-000; Peening Process Parameter Development Summary for RV Head Applications; Revision 0
- AREVA Report 150-8086004; Special Process Qualification Report; Draft Issue
- EPRI Report 3002000656; Materials Reliability Program, Effects of Surface Peening on the Inspectabitity of Nondestructive Evaluation; Dated November 2013

Section 1R19

- IR 02570788; 2A DG Trip During Test Mode Start
- WO 1869392; 2A DG Trip During Test Mode Start
- 2BOSR 8.1.12-1; Revision 11; 2A Diesel Generator ESF Actuation Test Signal Start and Non-emergency Trip Bypass Test, and Generator Differential Trip Test
- IR 02559056; Troubleshooting Results for High Pressure from 1B DO Pumps
- IR 02559167; FME -
- WO 01635687; Diesel Oil Storage FLEX Connection EC 393419

Section 1R20

- IR 02558491; OPS Focus OP-AA-109-101, Section 7.3.9 Breaker Standard Not Met
- IR 02557781; TCC's and Clearance Order Overlap
- WO 01724149; (Sample Grease, Change Oil) Polar Crane Lubrication
- MA-AP-736-683; Revision 1; Polar Crane Bridge Brake System Oil and Oil Filter Change Out
- IR 02557842; MSIV Accumulator Not Blown Down
- BY-MODE-011; Revision 7; TS 3.0.4.b Evaluation – Entry to Modes 4, 3, 2, and 1 with 1PR11J, 1MS018C, 1AF01PB, Turbine Overspeed Protection Inoperable
- OU-AP-104; Revision 21; Shutdown Safety Management Program Byron/Braidwood Annex
- IR 02560118; B1R20M5 1CV190 Not Assembled – Delaying Rx Head Reset
- IR 02560134; B1R20M3 1B CV Pp Motor Target of Boric Acid Leak
- OU-AP-200; Revision 19; Administrative Controls During Fuel Handling Activities for Byron and Braidwood
- IR 02559373; N-31 SR CPS Unexpected Rise in Reading
- ECR 420466; Engineering Instructions for Rx Head Impression Repair B1R20; Dated September 21, 2015
- IR 02560234; NRC ID – Inactive Leak Downstream of 1SI8955D (WR only)
- IR 02462782; Minor Inactive Boric Acid Leakage on 1SI8905D
- IR 02560237; NRC ID – Inactive Packing leak 1SI8816D (WR only)
- IR 02462799; Boric Acid Leak on 1SI8834B
- IR 02550620; Inactive Leak from Test Connection off 1SI026A (WR only)
- IR 02555745; Inactive Boric Acid Leak on CAP 1SI095
- IR 01275934; 1PS136 Leaking By, Active Leak from Compression Cap
- IR 02560242; NRC ID – Drain Funnel with Boric Acid Deposits
- IR 02550590; Inactive Leak from Test Connection on 1CV066C (WR only)
- IR 02560245; NRC ID – Boric Acid Deposits and Streaks on SSCS
- IR 02554744; NRC Identified Issues During Mode 3 Walkdown
- IR 02555441; NRC – Only One Light on Lit on Emergency Light 1LL094E (401 OMB)
- IR 02555537; NRC – All Lights Lit on Emergency Light 1LL083E (401 OMB R-20)
- IR 02555542; NRC Identified Graffiti in Containment on Wall R-20 (377 OMB)
- IR 02555547; NRC Identified Oil Residue Near 1SI8808A Actuator
- IR 02555558; NRC Identified Oil Residue Near 1SI8808B Actuator
- IR 02555563; NRC Identified Oil Residue Near 1SI8808C Actuator
- IR 02555568; NRC Identified Oil Residue Near 1SI8808D Actuator
- IR 02555629; NRC ID – Inactive Boric Acid Leak Downstream of 0WE038

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- 1BOSR 1.7.1-1; Revision 1; Unit One Digital Rod Position Indication (DRPI) Operability Checkout
- TS 3.1.7; Rod Position Indication and associated bases
- TRM 3.1.g; Position Indication System - Shutdown
- TRM 3.1.k; Position Indication System – Shutdown (Special Test Exception)
- UFSAR Section 7.7.1; Descriptions of Control Systems Not Required for Safety
- 2BOSR 8.1.12-1; Revision 11; 2A Diesel Generator ESF Actuation Test Signal Start and Non-Emergency Trip Bypass Test, And Generator Differential Trip Test
- IR 1543020; 2PI-DG130A Material Building Up Inside of Gauge

Section 1EP4

- EP-AA-1000; Exelon Nuclear Standardized Radiological Emergency Plan; Revisions. 26, 27, & 28
- EP-AA-120; Emergency Plan Administration; Revision 17
- EP-AA-120-1001; 10 CFR 50.54(q) Change Evaluation; Revision 7
- EP-AA-1002; Exelon Nuclear Radiological Emergency Plan Annex for Byron Station; Revision 34
- EP-AA-1002 Addendum 1; Byron Station On-Shift Staffing Technical Basis; Revision 1
- EP-AA-1002 Addendum 2; Evacuation Time Estimates for Byron Generating Station Plume Exposure Pathway Emergency Planning Zone; Revision 1
- EP-AA-1002 Addendum 3; Emergency Action Levels for Byron Station; Revision 0
- 50.54(q) Evaluation No. 14-108; EP-AA-1000, “Exelon Nuclear Standardized Radiological Emergency Plan” (Revision 26), Evaluation and Effectiveness Review; Dated December 8, 2014
- 50.54(q) Evaluation No. 14-122; EP-AA-1002 Addendum 1, “Byron Station On-Shift Staffing Technical Basis” Evaluation and Effectiveness Review; Dated November 6, 2014
- 50.54(q) Evaluation No. 15-06; EP-AA-1000, “Exelon Nuclear Standardized Radiological Emergency Plan” (Revision 27), Evaluation and Effectiveness Review; Dated April 30, 2015
- 50.54(q) Evaluation No. 15-70; EP-AA-1000, “Exelon Nuclear Standardized Radiological Emergency Plan” (Revision 28), Evaluation and Effectiveness Review; Dated July 1, 2015

Section 2RS3

- IR 02393496; Check-In Self-Assessment, Respiratory Program Utilizing NRC IP 71124.03; Dated April 16, 2015
- IR 01606584; Transition from ISI Viking to MSA Firehawk SCBA; Dated January 10, 2014
- IR 02574636; SCBA Compressor Location and Cascade System OOS; Dated October 21, 2015
- IR 01161416; SCBA Cascade Cylinders Leak; Dated January 11, 2011
- RP-BY-826; Charging of Air Cylinders for Self-Contained
- RP-AA-440; Respiratory Protection Program; Revision 11
- RP-AA-825; Maintenance, Care and Inspection of Respiratory Protective Equipment; Revision 8
- RP-BY-825-1003; Operation, Inspection and Use of the MSA Firehawk M7 Air Mask Self-Contained Breathing Apparatus (SCBA); Revision 3

- Quarterly Service Air and Self Contained Breathing Apparatus; Dated March 10, 2014
- Quarterly Service Air and Self Contained Breathing Apparatus; Dated June 6, 2014
- Quarterly Service Air and Self Contained Breathing Apparatus; Dated September 5, 2014
- Quarterly Service Air and Self Contained Breathing Apparatus; Dated December 2, 2014
- Quarterly Service Air and Self Contained Breathing Apparatus; Dated February 27, 2015
- Quarterly Service Air and Self Contained Breathing Apparatus; Dated June 4, 2015
- Quarterly Service Air and Self Contained Breathing Apparatus; Dated September 2, 2015

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- IR 02393488; Check-In Self-Assessment; Occupational Dose Assessment – External Dosimetry; Dated June 10, 2015
- IR 02393490; Check-In Self-Assessment; Occupational Dose Assessment – Internal Dosimetry; Dated May 21, 2015
- IR 01500444; B2R17 LL Elevated Airborne Contam during Head Lift; Dated April 11, 2013
- IR 02481923; DCS Neutron Dose Higher Than Expected; Dated April 8, 2015
- CR-2557940; Work Continued After RP Directed Hold; Dated September 21, 2015
- RP-AA-11; External Dose Control Program Description; Revision 2
- RP-AA-12; Internal Dose Control Program Description; Revision 1
- RP-AA-203; Exposure Control and Authorization; Revision 3
- RP-AA-224; CEDE Dose Tracking Using Lapel Air Samplers; Revision 7
- RP-AA-220; Bioassay Program; Revision 10
- RP-AA-221; Review, Correction, and Analysis of Whole Body Count Data; Revision 2
- RP-AA-222; Methods for Estimating Internal Exposure from In-Vivo and In-Vitro Bioassay Data; Revision 5
- RP-AA-301; Radiological Air Sampling Program; Revision 8
- RP-AA-302; Determination of Alpha Levels and Monitoring; Revision 7
- BY-14-00; Calculating Neutron Correction Factor for DMC 200 GN; Dated May 29, 2014
- BY-14-003; Byron Whole Body Personnel Contamination and Portal Monitor Annual Limit of Intake Sensitivity Study; Dated June 18, 22014
- TLD Background Evaluation; Byron Station; Dated May 1, 2009

Section 2RS5

- IR 2393491-02; Check-In Self-Assessment; Radiation Monitoring Instrumentation; Dated May 21, 2015
- IR 1325216; Check-In Self-Assessment; Power Lab Vendor Audit; Dated December 13, 2012
- IR 2059974; Original Transfer Calibration Paperwork Missing; Dated September 8, 2014
- IR 1539143; Containment High Range Rad Monitor Setpoint Surveillance; Dated July 24, 2013
- IR #2503967; Unit 1 and Unit 2 Main Steamline Monitor Setpoints Found Outside of UFSAR Specification; Dated June 26, 2015
- IR 2589905; NRC Identified: Process/Program Improvements; Dated November 19, 2015
- IR 2589912; NRC ID: Potential for Incorrect Significance Level Determination; Dated November 19, 2015
- RP-BY-900-2PR29J / E-Plan; Post-Accident Vent Stack Sampling of the Wie-Range Gas Monitor (WRGM); Revision 2
- CY-AA-130-201; Radiochemistry Quality Control; Revision 3
- RP-AA-700; Controls for Radiation Protection Instrumentation; Revision 3

- Calibration Report 89-400, SN 8142; Radcal Model 2026C 26-1498 with Internal Pressure and Temperature Correction; Dated November 5, 2015
- Work Order 1705618-01; Cal of a General Atomics Radiation Monitoring Skid 0AR; Dated July 13, 2015
- RP-AA-700-1240; Attachment 1, ARGOS-5 Calibration Data Sheet; Monitor Number 164; Dated January 17, 2015
- RP-AA-700-1215; Attachment 2, RADeCO AVS-28A Calibration Data Sheet, Serial Number 6388; Dated January 13, 2015
- RP-AA-700-1216; Attachment 1, RADeCO H-809V, H-809V-1, H-809V-II Calibration Data Sheet, Serial Number 6040; Dated August 18, 2015
- Certification of Calibration; Certificate #0010893936, AMP-100, Serial #5005-058; Dated June 16, 2015
- Certification of Calibration; Certificate #0010891324, AMS-4, Serial #1630; Dated June 5, 2015
- Certification of Calibration; Certificate #0010891310, ASP-1/AC3-7, Serial #899/409; Dated June 12, 2015
- Certification of Calibration; Certificate #0010882734, ASP-1, Serial #1076; Dated June 30, 2015
- Certification of Calibration; Certificate #0010891335, ASP-2E, Serial #0408/232370; Dated June 22, 2015
- Certification of Calibration; Certificate #0010901800, ASP-2E, Serial #0416; Dated September 8, 2015
- RP-AA-700-1215; Attachment 2, RADeCO AVS-28A Calibration Data Sheet, Serial Number 6388; Dated January 13, 2015
- Certification of Calibration; Certificate #0010907033, Flow meter, Serial #C-812; Dated August 11, 2015
- Certification of Calibration; Certificate #0010907033, Flow meter, Serial 1234; Dated August 11, 2015
- Certification of Calibration; Certificate #000882572, Frisker, Serial Number 319267; Dated August 11, 2015
- Calibration of the Canberra FASTSCAN B1 Whole-Body Count System at the Byron Nuclear Generating Station; Dated July 30, 2015
- Calibration of the Canberra FASTSCAN B2 Whole-Body Count System at the Byron Nuclear Generating Station; Dated July 29, 2015

Section 4OA1

- IR 2596940; MSPI Availability Decision for BOSR SX-SA1
- IR 2500813; U1 RH Going MSPI “At Risk”
- MSPI Derivation Reports for Unavailability and Unreliability Indices for Emergency AC Power, High Pressure Injection, and Residual Heat Removal for Byron Units 1 and 2
- 1BOSR SX-SA1; Revision 20; Unit One Diesel Generator Essential Service Water Crosstie Line Semi-Annual Flush
- BY-MSPI-001; Revision 16; Reactor Oversight Program MSPI Basis Document – Byron Nuclear Generating Station
- NEI 99-02; Revision 7; Regulatory Assessment Performance Indicator Guideline

Section 4OA3

- LER 05000454/2015-004-00; “Unanalyzed Condition due to a Design Deficiency with Pressurizer Power Operated Relief Valve Circuitry that Could Prevent Valve Manual Closure to Mitigate Spurious Operation
- IR 02544466; MCR Fire/PORV Block Valves Safe Shutdown Strategy
- TS 3.4.11; Pressurizer PORVs and Associated Bases
- IR 02544977; Evaluation of Alternate Fire Protection Compensatory Actions
- IR 02550409; Extent of Condition Review of IR 02544466 PORV Fire SSD Strategy
- Unit 1/2 Standing Order 15-033; Potential Hot Short During Fire Could Cause Safe S/D [Shutdown] Equipment Inoperability
- EC 402994; Revision 0; GL 86-10 Evaluation for Use of Alternate Compensatory Measures Associated with MCR Fire/PORV Block Valves Safe Shutdown Strategy
- IR 02557389; CRDM Penetration 31 PT Indications
- LER 05000454/2015-005-00; “Byron Unit 1, Liquid Penetrant Indications in Embedded Flaw Seal Repair of Control Rod Drive Mechanism Penetration 31 During Refueling Outage”

Section 4OA5

- NEI 99-04; Guidelines for Managing NRC Commitment Changes
- NRC Office Instruction LIC-100; Control of Licensing Basis for Operating Reactor

Section 4OA7

- IR 02575960; Gap in Precise Control – Reactivity Management
- LER 454-2015-004-00; Unanalyzed Condition Due to a Design Deficiency with Pressurizer Power Generated Relief Valve Criticality That Could Prevent Valve Manual Closure to Mitigate Spurious Operation
- IR 02544466; MCR Fire/PORV Block Valves Safe Shutdown Strategy
- TS 3.4.11; Pressurizer PORVs and Associated Bases
- IR 02544977; Evaluation of Alternate Fire Protection Compensatory Actions
- IR 02550409; Extent of Condition Review of IR 02544466 PORV Fire SSD Strategy
- Unit 1/2 Standing Order 15-033; Potential Hot Short During Fire Could Cause Safe S/D [Shutdown] Equipment Inoperability
- EC 402994; Revision 0; GL 86-10 Evaluation for Use of Alternate Compensatory Measures Associated with MCR Fire/PORV Block Valves Safe Shutdown Strategy
- IR 02559056; Troubleshooting Results for High Pressure From 1B DO Pumps
- IR 02591479; Rejected Maintenance Product at MRC
- IR 02577136; B1R20 FME Trend
- IR 02559167; FME – Weld Rice Paper Left in Line 1DO03BB-1 ½”
- IR 02559299; FME – Weld Rice Paper Left in Line 1CV08BA-4”
- IR 02559300; FME – Weld Rice Paper Left in Line 1FW03CB-16”
- IR 02559301; FME – Weld Rice Paper Left in Line 1SI02BB-6”
- IR 02561114; IR to Document Rice Paper Used for Purge Dam
- WO 01635687; Diesel Oil Storage FLEX Connection EC 393419
- WO 00507644; 1B DG Fuel Oil Transfer Pump Pressure High
- IN 93-63; Improper Use of Soluble Weld Purge Dam Material

LIST OF ACRONYMS USED

ADAMS	Agencywide Document Access and Management System
AEER	Auxiliary Electrical Equipment Room
AF	Auxiliary Feedwater System
ALARA	As-Low-As-Is-Reasonably-Achievable
AO	Axial Offset
ARM	Area Radiation Monitor
ASME	American Society of Mechanical Engineers
BACC	Boric Acid Corrosion Control
BMV	Bare Metal Visual
CAP	Corrective Action Program
CEDE	Committed Effective Dose Equivalent
CFR	*Code of Federal Regulations*
CRD	Control Rod Drive
CSR	Cable Spreading Room
DC	Direct Current
DG	Diesel Generator
DO	Diesel Oil System
DOST	Diesel Oil Storage Tank
DRP	Division of Reactor Projects
EAL	Emergency Action Levels
EC	Eddy Current
ECT	Eddy Current Testing
ED	Electronic Dosimeter
EPRI	Electric Power Research Institute
EST	Equipment Status Tags
FLEX	Diverse and Flexible Coping Strategies
FSAR	Final Safety Analysis Report
IMC	Inspection Manual Chapter
IP	Inspection Procedure
IR	Inspection Report
IR	Issue Report
ISI	Inservice Inspection
LER	Licensee Event Report
MSIV	Main Steam Isolation Valve
MSPI	Mitigating Systems Performance Index
NCV	Non-Cited Violation
NDE	Non-Destructive Examination
NEI	Nuclear Energy Institute
NRC	U.S. Nuclear Regulatory Commission
ODCM	Offsite Dose Calculation Manual
OWA	Operator Workaround
PARS	Publicly Available Records
PI	Performance Indicator
PORV	Power Operated Relief Valve
PT	Dye Penetrant Testing
PWSCC	Primary Water Stress Corrosion Cracking

RCS	Reactor Coolant System
ReMA	Reactivity Maneuver Guidance Sheet
RFO	Refueling Outage
RP	Radiation Protection
RPV	Reactor Pressure Vessel
RWP	Radiation Work Permit
SDP	Significance Determination Process
SER	Safety Evaluation Report
SG	Steam Generator
TLD	Thermo-luminescent Device
TRM	Technical Requirements Manual
TS	Technical Specification
UAT	Unit Auxiliary Transformer
UFSAR	Updated Final Safety Analysis Report
URI	Unresolved Item
UT	Ultrasonic Testing
WO	Work Order

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Sincerely,

/RA/

John Jandovitz, Acting Chief
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