



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**

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

October 27, 2015

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 05000454/2015003; 05000455/2015003

Dear Mr. Hanson:

On September 30, 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 October 8, 2015, with Mr. F. Kearney, and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

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

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)

B. Hanson

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Sincerely,

*/RA/*

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

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

Enclosure:  
IR 05000454/2015003; 05000455/2015003  
w/Attachment: Supplemental Information

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Nos: 05000454; 05000455

License Nos: NPF-37; NPF-66

Report No: 05000454/2015003; 05000455/2015003

Licensee: Exelon Generation Company, LLC

Facility: Byron Station, Units 1 and 2

Location: Byron, IL

Dates: July 1 through September 30, 2015

Inspectors: J. McGhee, Senior Resident Inspector  
C. Zoia, Acting Senior Resident Inspector  
J. Draper, Resident Inspector  
L. Smith, Reactor Inspector  
J. Cassidy, Senior Health Physicist  
G. Edwards, Health Physicist  
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Illinois Emergency Management Agency

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

Enclosure

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## **SUMMARY**

Inspection Report 05000454/2015003, 05000455/2015003; 07/01/2015 – 09/30/2015; Byron Station, Units 1 and 2; Routine Integrated Inspection Report.

This report covers a 3-month period of inspection by resident inspectors and announced baseline inspections by regional inspectors. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process" Revision 5, dated February 2014.

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

No findings were identified.

### **Licensee-Identified Violations**

No violations were identified.

## **REPORT DETAILS**

### **Summary of Plant Status**

#### **Unit 1**

Unit 1 began the period operating at full power and operated at or near full power until August 28, 2015, when Unit 1 began to coast down in power approaching the refueling outage. On September 13, 2015, with Unit 1 at 87 percent power, operators began deliberately lowering power to begin the scheduled refueling outage. Unit 1 was taken offline at midnight that same day and the reactor was shut down. The unit remained shut down and in refueling for the remainder of the inspection period.

#### **Unit 2**

Unit 2 began the period operating at full power and operated at or near full power for the entire inspection period.

### **1. REACTOR SAFETY**

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

#### **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:

- 1B containment spray train following surveillance testing;
- 2B auxiliary feedwater (AF) train following surveillance testing; and
- Unit 2 component cooling (CC) water pump alignment following maintenance on the 2B CC pump and realignment of the '0' CC pump.

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

These activities constituted three partial system walkdown samples as defined in Inspection Procedure (IP) 71111.04–05.

b. Findings

No findings were identified.

1R05 Fire Protection (71111.05)

.1 Routine Resident Inspector Tours (71111.05Q)

a. Inspection Scope

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

- Unit 2 main steam and AF pipe tunnel;
- Auxiliary Building 383'-0" elevation general areas;
- Unit 1 lower cable spreading room;
- Unit 2 lower cable spreading room;
- Unit 2 containment piping penetration area; and
- 1B centrifugal charging pump 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 analyzed limits; and fire doors, dampers, and penetration seals appeared to be in satisfactory condition. The inspectors also verified that minor issues identified during the inspection were entered into the licensee's CAP.

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

b. Findings

No findings were identified.

1R11 Licensed Operator Requalification Program (71111.11)

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

a. Inspection Scope

On August 18, 2015, the inspectors observed a crew of licensed operators in the plant's simulator during licensed operator requalification training. The simulator scenario required emergency plan implementation by a licensee operations crew. This evolution was planned to be evaluated and included in performance indicator (PI) data regarding drill and exercise performance. The inspectors observed event classification and notification activities performed by the crew. The inspectors also attended the post-evolution critique for the scenario. The inspectors verified that operator performance was adequate, evaluators were identifying and documenting crew performance problems, and that training was being conducted in accordance with licensee procedures. The inspectors evaluated the following areas:

- licensed operator performance;
- crew's clarity and formality of communications;
- the 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
- the ability to identify and implement appropriate TS 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.

b. Findings

No findings were identified.

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

a. Inspection Scope

On September 13, 2015, the inspectors observed operators in the main control room (MCR) maneuvering the plant in preparation for refueling outage B1R20. The operators performed a controlled shutdown from 87 percent power. This was an activity that required heightened awareness or was related to increased risk. The inspectors evaluated the following areas:

- licensed operator performance;
- crew's clarity and formality of communications;
- the 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
- the ability to identify and implement appropriate TS actions.

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.

1R12 Maintenance Effectiveness (71111.12)

.1 Routine Quarterly Evaluations

a. Inspection Scope

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

- Failure of the 1B AF pump oil deflector and unplanned unavailability/operability of the pump; and
- Essential service water strainer 2B through-wall pipe leak and unplanned inoperability of the 2B essential service water pump.

The systems were reviewed to determine the impact of the identified issues combined with other system availability and/or reliability impacts 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 two 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)

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:

- Extension of Unit 2 fuel pool cooling pump work and 'A' fire pump into the August 24 work week;
- Unit 1 refueling outage (B1R20) shutdown safety plan and risk profile;
- Incorporation of emergent AF pump work, emergent essential service water work, and emergent pressurizer relief valve block valve wiring modifications into the August 30 work week;
- Incorporation of emergent 1B AF pump oil cooler cleaning and Inverter 112 failure into the September 7 work week;
- Implementation of licensee actions to manage risk with high risk activities in progress affecting both units (111/112 direct current (DC) bus cross-tied, and Unit 1 inventory below five percent with reactor coolant system (RCS) loop stops closed and loops drained): and
- Incorporation of emergent DC breaker issues, extended 1B emergency diesel generator (DG) unavailability due to foreign material in the fuel supply line, and emergent unavailability of 1B safety injection during cavity drain down.

These activities were selected based on their potential risk significance relative to the Reactor Safety Cornerstones. As applicable for each activity, the inspectors verified that risk assessments were performed as required by 10 CFR 50.65(a)(4) and were accurate and complete. When emergent work was performed, the inspectors verified that 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.

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

b. Findings

No findings were identified.

1R15 Operability Determinations and Functional Assessments (71111.15)

a. Inspection Scope

The inspectors reviewed the following issues:

- Ultimate heat sink (UHS) capability with loss of all essential cooling water cooling tower fans;
- Power operated relief valve (PORV) block valve safe shutdown strategy for MCR fire;
- Potential leakage of AF FLEX connection check valve;
- Unit 1 cycle 21 core operating limits report;
- High leak rate measured from 1RH01SB (canister surrounding SI8811B);
- Safety-related DC battery 111 capacity did not meet the minimum capacity requirement during testing; and
- 2A AF pump oil deflector ring set screws found loose.

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

This operability inspection constituted seven samples as defined in IP 71111.15–05.

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.18)

a. Inspection Scope

The inspectors reviewed the following modifications:

- Instrument Bus 112 and 114 inverter replacements; and
- Backdraft/pressure control damper installation to mitigate excessive turbine building to auxiliary building differential pressure.

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

modifications with operations, engineering, and training personnel to ensure that the individuals were aware of how the operation with the plant modifications in place could impact overall plant performance.

This inspection constituted two plant modification samples as defined in IP 71111.18–05.

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19)

a. Inspection Scope

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

- 2B AF pump deflector ring set screw torque checks;
- 1B AF pump deflector ring set screw replacements;
- 2A pressurizer power-operated relief isolation valve stroke time testing following wiring modification;
- 2B CC water pump run following preventative maintenance;
- 1B AF pump run following emergent oil cooler cleaning;
- 1A essential service water pump discharge pressure indicator electronic circuit board replacement;
- 1B AF diesel prime mover inspection;
- 1B AF flow path operability surveillance following shutdown;
- 1AF014G – valve disassembly and inspection;
- 1A motor-driven AF pump inservice test; and
- 1B diesel-driven AF pump inservice test.

These activities were selected based upon the SSC's ability to impact risk. The inspectors evaluated these activities for the following: 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; and test documentation was properly evaluated. The inspectors evaluated the activities against TSs, the UFSAR, 10 CFR Part 50 requirements, and licensee procedures 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 PM tests to determine whether the licensee was identifying problems and entering them into the CAP and that the problems were being corrected commensurate with their importance to safety.

This inspection constituted 11 PM testing samples as defined in IP 71111.19–05.

b. Findings

No findings were identified.

1R20 Outage Activities (71111.20)

.1 Refueling Outage Activities

a. Inspection Scope

The inspectors reviewed the Outage Risk Management Profile including the outage risk profile and contingency plans for Unit 1 refueling outage B1R20 that began on September 14, 2015, to confirm that the licensee had appropriately considered risk, industry experience, and previous site-specific problems in developing and implementing a plan that assured maintenance of defense-in-depth. The inspectors observed portions of the shutdown and cooldown activities and monitored licensee controls over the following outage activities:

- configuration management, including maintenance of defense-in-depth commensurate with the Outage Risk Management Profile for key safety functions and compliance with the applicable TSs when taking equipment out-of-service;
- implementation of clearance activities and confirmation that tags were properly hung and equipment appropriately configured to safely support the work or testing;
- installation and configuration of reactor coolant pressure, level, and temperature instruments to provide accurate indication, accounting for instrument error;
- management of the configuration of electrical systems and switchyard work activities to ensure that TS and Outage Risk Management Profile requirements were met;
- monitoring of decay heat removal processes, systems, and components;
- spent fuel pool cooling system operation and management;
- reactor water inventory management including flow paths, configurations, and alternative means for inventory addition, and controls to prevent inventory loss;
- reactivity control management;
- licensee fatigue management, as required by 10 CFR 26, Subpart I;
- refueling activities, including fuel handling; and
- licensee identification and resolution of problems related to refueling outage activities.

The outage was in progress at the end of the inspection period. Additional inspection activities for this sample will be included and discussed in the fourth quarter 2015 integrated inspection report (IR).

This partial inspection constituted no sample as defined in IP 71111.20–05.

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22)

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 0.5-2AF.1-1; “Train A Auxiliary Feedwater Valves Stroke Test” (Routine);
- 1BOSR 3.1.2-1; “Unit One Calorimetric Calculation Daily Surveillance” (Routine);
- 1BOSR 7.1.1-1; “Main Steam Safety Valves Operability Test” (IST);
- 1BOSR 5.5.8.SI.5-2c; “Unit One Comprehensive Inservice Testing (IST) Requirements for Safety Injection Pump 1SI01PB” (IST);
- 1BOSR 6.1.1-9; “Unit One Primary Containment Type C Local Leakage Rate Tests and IST Tests of Chemical and Volume Control System” (Containment Isolation); and
- 1BOSR 7.5.4-2; Unit One Diesel Driven AF Pump Monthly Surveillance (Routine).

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

- did preconditioning occur;
- were the effects of the testing adequately addressed by control room personnel or engineers prior to the commencement of the testing;
- were acceptance criteria clearly stated, sufficient to demonstrate operational readiness, and consistent with the system design basis;
- was plant equipment calibration correct, accurate, and properly documented;
- were as-left setpoints within required ranges; and was the calibration frequency in accordance with TSs, the UFSAR, plant procedures, and applicable commitments;
- was measuring and test equipment calibration current;
- was the test equipment used within the required range and accuracy, and were applicable prerequisites described in the test procedures satisfied;
- did test frequencies meet TS requirements to demonstrate operability and reliability;
- were tests performed in accordance with the test procedures and other applicable procedures;
- were jumpers and lifted leads controlled and restored where used;
- were test data and results accurate, complete, within limits, and valid;
- was test equipment removed following testing;
- where applicable for IST activities, was testing performed in accordance with the applicable version of Section XI of the ASME Code and were reference values consistent with the system design basis;
- was the unavailability of the tested equipment appropriately considered in the PI data;
- where applicable, were test results not meeting acceptance criteria addressed with an adequate operability evaluation or was the system or component declared inoperable;
- where applicable for safety-related instrument control surveillance tests, was the reference setting data accurately incorporated into the test procedure;
- was equipment returned to a position or status required to support the performance of its safety functions following testing;
- were problems identified during the testing appropriately documented and dispositioned in the licensee’s CAP;

- where applicable, were annunciators and other alarms demonstrated to be functional and were setpoints consistent with design requirements; and
- where applicable, were alarm response procedure entry points and actions consistent with the plant design and licensing documents.

This inspection constituted three routine surveillance testing samples, two IST samples, and one containment isolation valve sample as defined in IP 71111.22, Sections–02 and–05.

b. Findings

No findings were identified.

1EP6 Drill Evaluation (71114.06)

.1 Emergency Preparedness Drill Observation

a. Inspection Scope

The inspectors evaluated the conduct of a routine licensee emergency drill on August 27, 2015, to identify any weaknesses and deficiencies in classification, notification, and protective action recommendation development activities. The inspectors observed emergency response operations in the Technical Support Center to determine whether the event classification, notifications, and protective action recommendations were performed in accordance with procedures. The inspectors also attended the licensee drill critique to compare any inspector-observed weakness with those identified by the licensee staff in order to evaluate the critique and to verify whether the licensee staff was properly identifying weaknesses and entering them into the CAP.

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

b. Findings

No findings were identified.

**2. RADIATION SAFETY**

2RS1 Radiological Hazard Assessment and Exposure Controls (71124.01)

The inspection activities supplement those documented in IR 05000454/2015003; 05000455/2015003, and constitute one sample as defined in IP 71124.01–05.

.1 Radiological Hazard Assessment (02.02)

a. Inspection Scope

The inspectors reviewed the last two radiological surveys from selected plant areas and evaluated whether the thoroughness and frequency of the surveys were appropriate for the given radiological hazard.

The inspectors selected the following radiologically risk-significant work activities that involved exposure to radiation:

- Steam Generator Install/Remove Nozzle Covers;
- Steam Generator Eddy Current Testing and Tube Repairs;
- B1R20 Reactor Cavity Decon with Added Controls; and
- B1R20 Emergent Reactor Head Repairs of Penetrations.

For these work activities, the inspectors assessed whether the pre-work surveys performed were appropriate to identify and quantify the radiological hazard and to establish adequate protective measures. The inspectors evaluated the radiological survey program to determine if hazards were properly identified, including the following:

- identification of hot particles;
- the presence of alpha emitters;
- the potential for airborne radioactive materials, including the potential presence of transuranics and/or other hard-to-detect radioactive materials;
- the hazards associated with work activities that could suddenly and severely increase radiological conditions and that the licensee has established a means to inform workers of changes that could significantly impact their occupational dose; and
- severe radiation field dose gradients that can result in non-uniform exposures of the body.

The inspectors observed work in potential airborne areas and evaluated whether the air samples were representative of the breathing air zone. The inspectors evaluated whether continuous air monitors were located in areas with low background to minimize false alarms and were representative of actual work areas. The inspectors evaluated the licensee's program for monitoring levels of loose surface contamination in areas of the plant with the potential for the contamination to become airborne.

b. Findings

No findings were identified.

.2 Instructions to Workers (02.03)

a. Inspection Scope

The inspectors selected various containers holding non-exempt licensed radioactive materials that may cause unplanned or inadvertent exposure of workers, and assessed whether the containers were labeled and controlled in accordance with 10 CFR Part 20.1904, "Labeling Containers," or met the requirements of 10 CFR 20.1905(g), "Exemptions To Labeling Requirements".

The inspectors reviewed the following radiation work permits (RWPs) used to access high radiation areas and evaluated the specified work control instructions or control barriers:

- RWP 10017271; Steam Generator Install/Remove Nozzle Covers
- RWP 10017272; Steam Generator Eddy Current Testing and Tube Repairs



- RWP 10017268; B1R20 Reactor Cavity Decon with Added Controls
- RWP 10017538; B1R20 Emergent Reactor Head Repairs of Penetrations

For these RWPs, the inspectors assessed whether allowable stay times or permissible dose (including from the intake of radioactive material) for radiologically significant work under each RWP were clearly identified. The inspectors evaluated whether electronic personal dosimeter alarm setpoints were in conformance with survey indications and plant policy.

The inspectors reviewed selected occurrences where a worker's electronic personal dosimeter noticeably malfunctioned or alarmed. The inspectors evaluated whether workers responded appropriately to the off-normal condition. The inspectors assessed whether the issue was included in the CAP, and dose evaluations were conducted as appropriate.

For work activities that could suddenly and severely increase radiological conditions, the inspectors assessed the licensee's means to inform workers of changes that could significantly impact their occupational dose.

b. Findings

No findings were identified.

.3 Contamination and Radioactive Material Control (02.04)

a. Inspection Scope

The inspectors observed locations where the licensee monitors potentially contaminated material leaving the radiological control area and inspected the methods used for control, survey, and release from these areas. The inspectors observed the performance of personnel surveying and releasing material for unrestricted use and evaluated whether the work was performed in accordance with plant procedures, and whether the procedures were sufficient to control the spread of contamination and prevent unintended release of radioactive materials from the site. The inspectors assessed whether the radiation monitoring instrumentation had appropriate sensitivity for the type(s) of radiation present.

The inspectors reviewed the licensee's criteria for the survey and release of potentially contaminated material. The inspectors evaluated whether there was guidance on how to respond to an alarm that indicated the presence of licensed radioactive material.

The inspectors reviewed the licensee's procedures and records to verify that the radiation detection instrumentation was used at its typical sensitivity level based on appropriate counting parameters. The inspectors assessed whether or not the licensee has established a *de facto* "release limit" by altering the instrument's typical sensitivity through such methods as raising the energy discriminator level or locating the instrument in a high-radiation background area.

The inspectors selected several sealed sources from the licensee's inventory records and assessed whether the sources were accounted for and verified to be intact.

The inspectors evaluated whether any transactions, since the last inspection, involving nationally tracked sources were reported in accordance with 10 CFR 20.2207.

b. Findings

No findings were identified.

.4 Radiological Hazards Control and Work Coverage (02.05)

a. Inspection Scope

The inspectors evaluated ambient radiological conditions (e.g., radiation levels or potential radiation levels) during tours of the facility. The inspectors assessed whether the conditions were consistent with applicable posted surveys, RWPs, and worker briefings.

The inspectors evaluated the adequacy of radiological controls, such as required surveys, radiation protection job coverage (including audio and visual surveillance for remote job coverage), and contamination controls. The inspectors evaluated the licensee's use of electronic personal dosimeters in high noise areas as high radiation area monitoring devices.

The inspectors assessed whether radiation monitoring devices were placed on the individual's body consistent with licensee procedures. The inspectors assessed whether the dosimeter was placed in the location of highest expected dose or that the licensee properly employed an NRC-approved method of determining effective dose equivalent.

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

The inspectors reviewed the following RWPs for work within airborne radioactivity areas with the potential for individual worker internal exposures:

- RWP 10017271; Steam Generator Install/Remove Nozzle Covers
- RWP 10017272; Steam Generator Eddy Current Testing and Tube Repairs
- RWP 10017268; B1R20 Reactor Cavity Decon with Added Controls
- RWP 10017538; B1R20 Emergent Reactor Head Repairs of Penetrations

For these RWPs, the inspectors evaluated airborne radioactive controls and monitoring, including potential for significant airborne levels (e.g., grinding, grit blasting, system breaches, entry into tanks, cubicles, and reactor cavities). The inspectors assessed barrier (e.g., tent or glove box) integrity and temporary high efficiency particulate air ventilation system operation.

The inspectors examined the licensee's physical and programmatic controls for highly activated or contaminated materials (i.e., nonfuel) stored within spent fuel and other storage pools. The inspectors assessed whether appropriate controls (i.e., administrative and physical controls) were in place to preclude inadvertent removal of these materials from the pool.

The inspectors examined the posting and physical controls for selected high-radiation areas and very high radiation areas to verify conformance with the occupational PI.

b. Findings

No findings were identified.

.5 Risk-Significant High-Radiation Area and Very-High Radiation Area Controls (02.06)

a. Inspection Scope

The inspectors discussed with the radiation protection manager the controls and procedures for high-risk, high-radiation areas, and very-high radiation areas. The inspectors discussed methods employed by the licensee to provide stricter control of very-high radiation area access as specified in 10 CFR 20.1602, "Control of Access to Very-High Radiation Areas," and Regulatory Guide (RG) 8.38, "Control of Access to High and Very-High Radiation Areas of Nuclear Plants." The inspectors assessed whether any changes to licensee procedures substantially reduce the effectiveness and level of worker protection.

The inspectors discussed the controls in place for special areas that have the potential to become very high radiation areas during certain plant operations with first line health physics supervisors (or equivalent positions having backshift health physics oversight authority). The inspectors assessed whether these plant operations require communication beforehand with the health physics group, so as to allow corresponding timely actions to properly post, control, and monitor the radiation hazards including re-access authorization.

The inspectors evaluated licensee controls for very high radiation areas and areas with the potential to become a very high radiation areas to ensure that an individual was not able to gain unauthorized access to the very high radiation areas.

b. Findings

No findings were identified.

.6 Radiation Worker Performance (02.07)

a. Inspection Scope

The inspectors observed radiation worker performance with respect to stated radiation protection work requirements. The inspectors assessed whether workers were aware of the radiological conditions in their workplace and the RWP controls/limits in place, and whether their performance reflected the level of radiological hazards present.

b. Findings

No findings were identified.

.7 Radiation Protection Technician Proficiency (02.08)

a. Inspection Scope

The inspectors observed the performance of the radiation protection technicians with respect to all radiation protection work requirements. The inspectors evaluated whether technicians were aware of the radiological conditions in their workplace and the RWP

controls/limits, and whether their performance was consistent with their training and qualifications with respect to the radiological hazards and work activities.

b. Findings

No findings were identified.

2RS2 Occupational As-Low-As-Reasonably-Achievable Planning and Controls (71124.02)

The inspection activities supplement those documented in IR 05000454(455)/2014002 and 05000454(455)/2015002; and constitute one sample as defined in IP 71124.02–05.

.1 Radiological Work Planning (02.02)

a. Inspection Scope

The inspectors reviewed the as-low-as-reasonably-achievable (ALARA) work activity evaluations, exposure estimates, and exposure mitigation requirements. The inspectors determined whether the licensee reasonably grouped the radiological work into work activities based on historical precedence, industry norms, and/or special circumstances.

The inspectors compared the results achieved (dose rate reductions and person-rem used) with the intended dose established in the licensee's ALARA planning for these work activities. The inspectors compared the person-hour estimates provided by maintenance planning and other groups to the radiation protection group with the actual work activity time requirements and evaluated the accuracy of these time estimates. The inspectors assessed the reasons (e.g., failure to adequately plan the activity and failure to provide sufficient work controls) for any inconsistencies between intended and actual work activity doses.

b. Findings

No findings were identified.

2RS6 Radioactive Gaseous and Liquid Effluent Treatment (71124.06)

This inspection constituted one sample as defined in IP 71124.06–05.

.1 Inspection Planning and Program Reviews (02.01)

Event Report and Effluent Report Reviews

a. Inspection Scope

The inspectors reviewed the radiological effluent release reports issued since the last inspection to determine if the reports were submitted as required by the Offsite Dose Calculation Manual (ODCM)/TSs. The inspectors reviewed anomalous results, unexpected trends, or abnormal releases identified by the licensee for further inspection to determine if they were evaluated, were entered in the CAP, and were adequately resolved.

The inspectors selected radioactive effluent monitor operability issues reported by the licensee as provided in effluent release reports, to review these issues during the onsite

inspection, as warranted, given their relative significance and determine if the issues were entered into the CAP and adequately resolved.

b. Findings

No findings were identified.

Offsite Dose Calculation Manual and Final Safety Analysis Report Review

a. Inspection Scope

The inspectors reviewed the UFSAR descriptions of the radioactive effluent monitoring systems, treatment systems, and effluent flow paths so they could be evaluated during inspection walkdowns.

The inspectors reviewed changes to the ODCM made by the licensee since the last inspection against the guidance in NUREG-1301, -1302, and -0133, and RGs 1.109, 1.21, and 4.1. When differences were identified, the inspectors reviewed the technical basis or evaluations of the change during the onsite inspection to determine whether they were technically justified and maintain effluent releases ALARA.

The inspectors reviewed licensee documentation to determine if the licensee had identified any non-radioactive systems that had become contaminated as disclosed either through an event report or the ODCM since the last inspection. This review provided an intelligent sample list for the onsite inspection of any 10 CFR 50.59 evaluations, and allowed a determination if any newly contaminated systems had an unmonitored effluent discharge path to the environment, whether any required ODCM revisions were made to incorporate these new pathways, and whether the associated effluents were reported in accordance with RG 1.21.

b. Findings

No findings were identified.

Groundwater Protection Initiative Program

a. Inspection Scope

The inspectors reviewed reported groundwater monitoring results and changes to the licensee's written program for identifying and controlling contaminated spills/leaks to groundwater.

b. Findings

No findings were identified.

Procedures, Special Reports, and Other Documents

a. Inspection Scope

The inspectors reviewed Licensee Event Reports, event reports, and/or special reports related to the effluent program issued since the previous inspection to identify any

additional focus areas for the inspection based on the scope/breadth of problems described in these reports.

The inspectors reviewed effluent program implementing procedures, particularly those associated with effluent sampling, effluent monitor setpoint determinations, and dose calculations.

The inspectors reviewed copies of licensee and third party (independent) evaluation reports of the effluent monitoring program since the last inspection to gather insights into the licensee's program and aid in selecting areas for inspection review (smart sampling).

b. Findings

No findings were identified.

.2 Walkdowns and Observations (02.02)

a. Inspection Scope

The inspectors walked down selected components of the gaseous and liquid discharge systems to evaluate whether equipment configuration and flow paths aligned with the documents reviewed in Section 2RS6.1 above and to assess equipment material condition. Special attention was made to identify potential unmonitored release points (such as temporary structures butted against turbine, auxiliary or containment buildings), building alterations which could impact airborne or liquid effluent controls, and ventilation system leakage that communicated directly with the environment.

For equipment or areas associated with the systems selected for review that were not readily accessible due to radiological conditions, the inspectors reviewed the licensee's material condition surveillance records, as applicable.

The inspectors walked down filtered ventilation systems to assess for conditions such as degraded high efficiency particulate air/charcoal banks, improper alignment, or system installation issues that would impact the performance or the effluent monitoring capability of the effluent system.

As available, the inspectors observed selected portions of the routine processing and discharge of radioactive gaseous effluents (including sample collection and analysis) to evaluate whether appropriate treatment equipment was used and the processing activities aligned with discharge permits.

The inspectors determined if the licensee had made significant changes to their effluent release points (e.g., changes subject to a 10 CFR 50.59 review or require NRC approval of alternate discharge points).

As available, the inspectors observed selected portions of the routine processing and discharging of liquid waste (including sample collection and analysis) to determine if appropriate effluent treatment equipment was being used and that radioactive liquid waste was being processed and discharged in accordance with procedure requirements and aligns with discharge permits.

b. Findings

No findings were identified.

.3 Sampling and Analyses (02.03)

a. Inspection Scope

The inspectors selected effluent sampling activities, consistent with smart sampling, and assessed whether adequate controls had been implemented to ensure representative samples were obtained (e.g., provisions for sample line flushing, vessel recirculation, composite samplers, etc.).

The inspectors selected effluent discharges made with inoperable (declared out-of-service) effluent radiation monitors to assess whether controls were in place to ensure compensatory sampling was performed consistent with the radiological effluent TSs/ODCM and that those controls were adequate to prevent the release of unmonitored liquid and gaseous effluents.

The inspectors determined whether the facility was routinely relying on the use of compensatory sampling in lieu of adequate system maintenance, based on the frequency of compensatory sampling since the last inspection.

The inspectors reviewed the results of the inter-laboratory comparison program to evaluate the quality of the radioactive effluent sample analyses and assessed whether the inter-laboratory comparison program includes hard-to-detect isotopes as appropriate.

b. Findings

No findings were identified.

.4 Instrumentation and Equipment (02.04)

Effluent Flow Measuring Instruments

a. Inspection Scope

The inspectors reviewed the methodology the licensee used to determine the effluent stack and vent flow rates to determine if the flow rates were consistent with radiological effluent TSs/ODCM or UFSAR values, and that differences between assumed and actual stack and vent flow rates did not affect the results of the projected public doses.

b. Findings

No findings were identified.

Air Cleaning Systems

a. Inspection Scope

The inspectors assessed whether surveillance test results since the previous inspection for TS required ventilation effluent discharge systems (high efficiency

particulate air and charcoal filtration), such as the auxiliary building ventilation system, met TS acceptance criteria.

b. Findings

No findings were identified.

.5 Dose Calculations (02.05)

a. Inspection Scope

The inspectors reviewed all significant changes in reported dose values compared to the previous radiological effluent release report (e.g., a factor of five, or increases that approach Appendix I criteria) to evaluate the factors which may have resulted in the change.

The inspectors reviewed radioactive liquid and gaseous waste discharge permits to assess whether the projected doses to members of the public were accurate and based on representative samples of the discharge path.

The inspectors evaluated the methods used to determine the isotopes that were included in the source term to ensure all applicable radionuclides are included within detectability standards. The review included the current Part 61 analyses to ensure hard-to-detect radionuclides were included in the source term.

The inspectors reviewed changes in the licensee's offsite dose calculations since the last inspection to evaluate whether changes were consistent with the ODCM and RG 1.109. The inspectors reviewed meteorological dispersion and deposition factors used in the ODCM and effluent dose calculations to evaluate whether appropriate factors were being used for public dose calculations.

The inspectors reviewed the latest Land Use Census to assess whether changes (e.g., significant increases or decreases to population in the plant environs, changes in critical exposure pathways, the location of nearest member of the public, or critical receptor, etc.) had been factored into the dose calculations.

For the releases reviewed above, the inspectors evaluated whether the calculated doses (monthly, quarterly, and annual dose) were within the 10 CFR Part 50, Appendix I, and TS dose criteria.

The inspectors reviewed, as available, records of any abnormal gaseous or liquid tank discharges (e.g., discharges resulting from misaligned valves, valve leak-by, etc.) to ensure the abnormal discharge was monitored by the discharge point effluent monitor. Discharges made with inoperable effluent radiation monitors, or unmonitored leakages were reviewed to ensure that an evaluation was made of the discharge to satisfy 10 CFR 20.1501 so as to account for the source term and projected doses to the public.

b. Findings

No findings were identified.



.6 Groundwater Protection Initiative Implementation (02.06)

a. Inspection Scope

The inspectors reviewed monitoring results of the Groundwater Protection Initiative to determine if the licensee had implemented its program as intended and to identify any anomalous results. For anomalous results or missed samples, the inspectors assessed whether the licensee had identified and addressed deficiencies through its CAP.

The inspectors reviewed identified leakage or spill events and entries made into 10 CFR 50.75 (g) records. The inspectors reviewed evaluations of leaks or spills and reviewed any remediation actions taken for effectiveness. The inspectors reviewed onsite contamination events involving contamination of groundwater and assessed whether the source of the leak or spill was identified and mitigated.

For unmonitored spills, leaks, or unexpected liquid or gaseous discharges, the inspectors assessed whether an evaluation was performed to determine the type and amount of radioactive material that was discharged by:

- assessing whether sufficient radiological surveys were performed to evaluate the extent of the contamination and the radiological source term and assessing whether a survey/evaluation had been performed to include consideration of hard-to-detect radionuclides; and
- determining whether the licensee completed offsite notifications, as provided in its Groundwater Protection Initiative implementing procedures.

The inspectors reviewed the evaluation of discharges from onsite surface water bodies that contained or potentially contained radioactivity, and the potential for groundwater leakage from these onsite surface water bodies. The inspectors assessed whether the licensee was properly accounting for discharges from these surface water bodies as part of their effluent release reports.

The inspectors assessed whether onsite groundwater sample results and a description of any significant onsite leaks/spills into groundwater for each calendar year were documented in the annual radiological environmental operating report for the radiological environmental monitoring program or the annual radiological effluent release report for the radiological effluent TS.

For significant, new effluent discharge points (such as significant or continuing leakage to groundwater that continues to impact the environment if not remediated), the inspectors evaluated whether the ODCM was updated to include the new release point.

b. Findings

No findings were identified.

.7 Problem Identification and Resolution (02.07)

a. Inspection Scope

Inspectors assessed whether problems associated with the effluent monitoring and control program were being identified by the licensee at an appropriate threshold and

were properly addressed for resolution in the licensee CAP. In addition, they evaluated the appropriateness of the corrective actions for a selected sample of problems documented by the licensee involving radiation monitoring and exposure controls.

b. Findings

No findings were identified.

2RS7 Radiological Environmental Monitoring Program (71124.07)

This inspection constituted one sample as defined in IP 71124.07–05.

.1 Inspection Planning (02.01)

a. Inspection Scope

The inspectors reviewed the annual radiological environmental operating reports and the results of any licensee assessments since the last inspection to assess whether the radiological environmental monitoring program was implemented in accordance with the TSs and ODCM. This review included reported changes to the ODCM with respect to environmental monitoring, commitments in terms of sampling locations, monitoring and measurement frequencies, land use census, inter-laboratory comparison program, and analysis of data.

The inspectors reviewed the ODCM to identify locations of environmental monitoring stations.

The inspectors reviewed the Final Safety Analysis Report for information regarding the environmental monitoring program and meteorological monitoring instrumentation.

The inspectors reviewed quality assurance audit results of the program to assist in choosing inspection “smart samples”. The inspectors also reviewed audits and technical evaluations performed on the vendor laboratory, if used.

The inspectors reviewed the annual effluent release report and the 10 CFR Part 61, “Licensing Requirements for Land Disposal of Radioactive Waste,” report, to determine if the licensee was sampling, as appropriate, for the predominant and dose-causing radionuclides likely to be released in effluents.

b. Findings

No findings were identified.

.2 Site Inspection (02.02)

a. Inspection Scope

The inspectors walked down select air sampling stations and dosimeter monitoring stations to determine whether they were located as described in the ODCM and to determine the equipment material condition. Consistent with smart sampling, the air sampling stations were selected based on the locations with the highest X/Q, D/Q wind sectors, and dosimeters were selected based on the most risk-significant locations (e.g., those that had the highest potential for public dose impact).

For the air samplers and dosimeters selected, the inspectors reviewed the calibration and maintenance records to evaluate whether they demonstrated adequate operability of these components. Additionally, the review included the calibration and maintenance records of select composite water samplers.

The inspectors assessed whether the licensee had initiated sampling of other appropriate media upon loss of a required sampling station.

The inspectors observed the collection and preparation of environmental samples from different environmental media (e.g., ground and surface water, milk, vegetation, sediment, and soil) as available to determine if environmental sampling was representative of the release pathways as specified in the ODCM and if sampling techniques were in accordance with procedures.

Based on direct observation and a review of records, the inspectors assessed whether the meteorological instruments were operable, calibrated, and maintained in accordance with guidance contained in the UFSAR, RG 1.23, "Meteorological Monitoring Programs for Nuclear Power Plants," and licensee procedures. The inspectors assessed whether the meteorological data readout and recording instruments in the control room and at the meteorological tower were operable.

The inspectors evaluated whether missed and/or anomalous environmental samples were identified and reported in the annual environmental monitoring report. The inspectors selected events that involved a missed sample, inoperable sampler, lost dosimeter, or anomalous measurement to determine if the licensee had identified the cause and had implemented corrective actions. The inspectors reviewed the licensee's assessment of any positive sample results (i.e., licensed radioactive material detected above the lower limits of detection), and reviewed the associated radioactive effluent release data that was the source of the released material.

The inspectors selected SSCs that involved or could reasonably involve licensed material for which there was a credible mechanism for licensed material to reach groundwater, and assessed whether the licensee had implemented a sampling and monitoring program sufficient to detect leakage of these SSCs to groundwater.

The inspectors evaluated whether records, as required by 10 CFR 50.75(g), of leaks, spills, and remediation since the previous inspection were retained in a retrievable manner.

The inspectors reviewed any significant changes made by the licensee to the ODCM as the result of changes to the land use census, long-term meteorological conditions (3-year average), or modifications to the sampler stations since the last inspection. The inspectors reviewed technical justifications for any changed sampling locations to evaluate whether the licensee performed the reviews required to ensure that the changes did not affect its ability to monitor the impacts of radioactive effluent releases on the environment.

The inspectors assessed whether the appropriate detection sensitivities with respect to TSs/ODCM were used for counting samples (i.e., the samples meet the TS/ODCM required lower limits of detection). The inspectors reviewed quality control charts for maintaining radiation measurement instrument status and actions taken for degrading detector performance. The licensee used a vendor laboratory to analyze the radiological

environmental monitoring program samples so the inspectors reviewed the results of the vendor's quality control program, including the inter-laboratory comparison, to assess the adequacy of the vendor's program.

The inspectors reviewed the results of the licensee's inter-laboratory comparison program to evaluate the adequacy of environmental sample analyses performed by the licensee. The inspectors assessed whether the inter-laboratory comparison test included the media/nuclide mix appropriate for the facility. If applicable, the inspectors reviewed the licensee's determination of any bias to the data and the overall effect on the radiological environmental monitoring program.

b. Findings

No findings were identified.

.3 Identification and Resolution of Problems (02.03)

a. Inspection Scope

The inspectors assessed whether problems associated with the radiological environmental monitoring program were being identified by the licensee at an appropriate threshold and were properly addressed for resolution in the licensee's CAP. Additionally, the inspectors assessed the appropriateness of the corrective actions for a selected sample of problems documented by the licensee that involved the radiological environmental monitoring program.

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**

40A1 Performance Indicator Verification (71151)

.1 Mitigating Systems Performance Index—Heat Removal System

a. Inspection Scope

The inspectors sampled licensee submittals for the Mitigating Systems Performance Index (MSPI) - Heat Removal System PI for Byron Station, Units 1 and 2 for the period from the fourth quarter 2014 through the second quarter 2015. To determine the accuracy of the 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, IRs, event reports, MSPI derivation reports, and NRC integrated IRs for the period of October 2014 through June 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, whether the change was in accordance with applicable NEI

guidance. The inspectors also reviewed the licensee's IR database to determine if any problems had been identified with the PI data collected or transmitted for this indicator.

This inspection constituted two MSPI - Heat Removal System samples as defined in IP 71151-05.

b. Findings

No findings were identified.

.2 Mitigating Systems Performance Index—Cooling Water Systems

a. Inspection Scope

The inspectors sampled licensee submittals for the MSPI - Cooling Water Systems PI for Byron Station, Units 1 and 2 for the period from the fourth quarter 2014 through the second 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, IRs, MSPI derivation reports, event reports, and NRC integrated IRs for the period of October 2014 through June 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, whether the change was in accordance with applicable NEI guidance. The inspectors also reviewed the licensee's IR database to determine if any problems had been identified with the PI data collected or transmitted for this indicator.

This inspection constituted two MSPI - Cooling Water System samples as defined in IP 71151-05.

b. Findings

No findings were identified.

.3 Reactor Coolant System Specific Activity

a. Inspection Scope

The inspectors sampled licensee submittals for the RCS specific activity PI for Byron Station, Units 1 and 2, for the period from the third quarter 2014 through the second quarter 2015. The inspectors used guidance contained in NEI 99-02, "Regulatory Assessment PI Guideline," Revision 7, dated August 2013, to determine the accuracy of the PI data reported during those periods. The inspectors reviewed the licensee's RCS chemistry samples, TS requirements, IRs, event reports and NRC integrated IRs to validate the accuracy of the submittals. The inspectors also reviewed the licensee's IR database to determine if any problems had been identified with the PI data collected or transmitted for this indicator. In addition to record reviews, the inspectors observed a chemistry technician obtain and analyze a RCS sample.

This inspection constituted two RCS specific activity samples as defined in IP 71151-05.

b. Findings

No findings were identified.

.4 Occupational Exposure Control Effectiveness

a. Inspection Scope

The inspectors sampled licensee submittals for the Occupational Exposure Control Effectiveness PI for the period from the third quarter 2014 through the second quarter 2015. The inspectors used guidance contained in NEI 99-02, "Regulatory Assessment PI Guideline," Revision 7, dated August 2013, to determine the accuracy of the PI data reported during those periods. The inspectors reviewed the licensee's assessment of the PI for occupational radiation safety to determine if indicator related data was adequately assessed and reported. To assess the adequacy of the licensee's PI data collection and analyses, the inspectors discussed with radiation protection staff, the scope and breadth of its data review and the results of those reviews. The inspectors independently reviewed electronic personal dosimetry dose rate and accumulated dose alarms and dose reports and the dose assignments for any intakes that occurred during the time period reviewed to determine if there were potentially unrecognized occurrences. The inspectors also conducted walkdowns of numerous locked high and very high radiation area entrances to determine the adequacy of the controls in place for these areas.

This inspection constituted one occupational exposure control effectiveness sample as defined in IP 71151-05.

b. Findings

No findings were identified.

.5 Radiological Effluent Technical Specification/Offsite Dose Calculation Manual Radiological Effluent Occurrences

a. Inspection Scope

The inspectors sampled licensee submittals for the radiological effluent TS/ODCM radiological effluent occurrences PI for the period from the third quarter 2014 through the second quarter 2015. The inspectors used guidance contained in NEI 99-02, "Regulatory Assessment PI Guideline," Revision 7, dated August 2013, to determine the accuracy of the PI data reported during those periods. The inspectors reviewed the licensee's IR database and selected individual reports generated since this indicator was last reviewed to identify any potential occurrences such as unmonitored, uncontrolled, or improperly calculated effluent releases that may have impacted offsite dose. The inspectors reviewed gaseous effluent summary data and the results of associated offsite dose calculations for selected dates to determine if indicator results were accurately reported. The inspectors also reviewed the licensee's methods for quantifying gaseous and liquid effluents and determining effluent dose.

This inspection constituted one Radiological Effluent TS/ODCM radiological effluent occurrences sample 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 IPs 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 Annual Follow-up of Selected Issues: NRC Identified Non-Conforming Condition Concerning the UFSAR Active Valve List

a. Inspection Scope

During a review of items entered in the licensee's CAP, the inspectors recognized a corrective action item documenting the failure to update UFSAR Table 3.9-16, "Active Valves for Byron - Units 1 & 2." On May 21, 2003, the licensee documented in IR 159974 that the NRC had identified that some valves were not listed in UFSAR Table 3.9-16 that potentially should have been. Part of the licensee's response to that IR included an extent of condition review to determine if there were other valves in the licensee's IST Program that were not listed in UFSAR Table 3.9-16 and to add them, if required.

From 2003 to 2006, the licensee performed this extent of condition review and identified 24 valves that were part of the licensee's IST Program, but were not listed in the UFSAR table, and determined that a UFSAR change was required to include those valves. The licensee initiated an engineering change (EC) 360252 to evaluate the valves, and from 2006 to 2013, the licensee extended the due date for this EC and the subsequent UFSAR change 15 times due to higher priority work. During most of this time period, the actions were not being tracked as corrective actions in the licensee's CAP, and the licensee's process did not require a manager review for the extensions. On March 15, 2013, in response to questions from the NRC inspectors during a Component Design Bases Inspection (CDBI) at Braidwood, the licensee generated IR 1488097, which identified that the actions associated with resolving the discrepancies between the IST Program and the active valve list in the UFSAR were not timely.

In response to IR 1488097, the licensee re-established a corrective action to track completion of the UFSAR update. During development of EC 360252, the licensee identified that they did not have all the seismic analyses documentation that was required for active valves. In 2013, the licensee initiated an action to coordinate with the valve vendors to obtain the documentation. The licensee documented that this action was extended multiple times because of difficulty coordinating with the vendors. In IR 1488097, the licensee documented that they reviewed each valve listed in EC 360252 to determine if there was supporting evidence confirming the valves had been seismically analyzed to the standards of active valves, including reviewing available calculations, comparing to similar previously qualified active valves, or comparing to previously qualified valves purchased to the same specifications. Based on this review, the licensee updated the active valve list in the UFSAR on July 20, 2015, and the corrective action to obtain the documented seismic analyses was due on January 20, 2016.

The inspectors assessed the following attributes while reviewing the licensee's corrective actions associated with the issue:

- operability and reportability issues were evaluated and dispositioned in a timely manner;
- extent of condition, generic implications, and common cause were considered;
- classification and prioritization of the problem's resolution was commensurate with the safety significance;
- corrective actions were appropriately focused to correct the problem;



- corrective actions were completed in a timely manner commensurate with the safety significance of the issue; and
- actions taken resulted in the correction of the identified problem.

The inspectors determined that the licensee's failure to have documented seismic analyses for valves that were required to perform their mechanical motion in times of an accident was contrary to 10 CFR 50, Appendix B, Criterion XVII, "Quality Assurance Records," and a violation in that the licensee failed to maintain the records of qualifications of equipment. However, the inspectors determined that this violation was not of more than minor significance because the licensee's review determined that there was supporting evidence confirming that the valves had been seismically analyzed to the standards of active valves. The corrective actions associated with these issues were being tracked with IR 1488097.

This review constituted one in-depth problem identification and resolution 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) 05000454/2015-003-01: One Train of the Diesel Generator (DG) System Inoperable Longer than Allowed by Technical Specifications Due to Loss of Diesel Fuel Oil System Volume

On October 8, 2014, the licensee implemented a configuration change as part of the licensee's diverse and flexible coping capability (FLEX) strategy for beyond design bases events that opened the normally closed recirculation isolation valve from the 1B DG fuel oil transfer pumps. On November 20, 2014, during the performance of a 1B DG surveillance test, the licensee identified that the diesel oil storage tank (DOST) associated with the 1A DG was overflowing. The licensee identified that the overflow was caused by through-seat leak-by of the DOST inlet valve while the fill piping was pressurized by the 1B DG fuel oil transfer pumps. Prior to the configuration change, the recirculation isolation valve from the 1B DG fuel oil transfer pumps isolated the transfer pumps' discharge pressure from the DOST inlet valve while the 1B DG was operated, precluding the possibility of leak-by of the inlet valve and isolating a flowpath between the DG trains.

Upon identification of the leakage, the licensee cycled the DOST inlet valve to flush the line and stopped the through-seat leakage. However, on December 22, 2014, during the next 1A DG surveillance test, the valve experienced leak-by again. The licensee administratively closed the recirculation isolation valve from the 1B DG fuel oil transfer pumps to stop the leak-by. The licensee later determined that the rate of diesel oil inventory loss out of the 1B DG train caused the 1B DG to be inoperable from October 8, 2014, (when the configuration change was implemented) until November 20, 2014, (when the leak-by was isolated) and from December 10, 2014, (when the DOST inlet valve was next manipulated) until December 22, 2014, (when the recirculation isolation valve from the transfer pumps was reclosed).

At the time of the events, the licensee failed to identify that the 1B DG was inoperable, and failed to take the TS 3.8.1 required actions to verify the operability of the other electrical sources within 1 hour and 24 hours. Also, during the first time period of inoperability, the licensee failed to restore the 1B DG to an operable status within 14 days and failed to be in Mode 3 within 6 hours thereafter. Therefore, each event was reportable as an operation or condition prohibited by the plant's TSs and was reported to the NRC.

The inspectors documented findings and violations associated with this event in NRC IR 05000454(455)/2015007 dated September 18, 2015. The licensee repaired the DOST inlet valve to correct leak-by of the valve. This LER is closed.

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

#### 40A5 Other Activities

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

###### a. Inspection Scope

The inspectors reviewed the final report for the plant evaluation conducted by the World Association of Nuclear Operators (WANO) in March 2015. The evaluation was conducted by WANO in lieu of the periodic Institute of Nuclear Power Operations evaluation. The inspectors reviewed the report to ensure that issues identified in the report were consistent with the NRC perspectives of licensee performance and to determine if any significant safety issues were identified that required further NRC follow-up.

###### b. Findings

No findings were identified.

##### .2 (Closed) Unresolved Item (URI) 05000454/2013004-01; 05000455/2013004-01: 10 CFR 50.59 Evaluation Affecting Tornado Analysis

In response to 2007 Non-Cited Violation (NCV) 05000454/2007004-003; 05000455/2007004-003, "Discrepancies with Tornado Analysis," the licensee completed EC 385829, "UHS [Ultimate Heat Sink] Capability with Loss of SX [Essential Service Water] Fans Due to Tornado Missiles," dated February 14, 2012. This analysis reviewed the design standards and design requirements for tornado protection of SSCs. The licensee concluded that deficiencies identified in the violation could be addressed analytically; therefore, no physical changes to the system would be required. The licensee adopted an approach that required two of the eight UHS fans to be available for use following a tornado.

In 2013, during inspection activities associated with the review of tornado protection of the UHS, the inspectors questioned the validity of the licensee's conclusions in the associated 50.59 documentation that no license amendment was required. The licensee evaluated the design basis changes made in EC 385829 in 10 CFR 50.59 safety evaluation 6G-11-004, "Tornado Missile Design Basis for the Essential Service Water Cooling Towers," dated February 9, 2012. This 10 CFR 50.59 safety evaluation concluded that the design basis changes could be implemented without obtaining a

license amendment. The inspectors questioned whether the licensee's revised approach (which credited equipment that was not protected from a tornado to mitigate the consequences of a tornado) constituted a change in a method of evaluation as described in the UFSAR and associated safety analyses. The inspectors engaged the Office of Nuclear Reactor Regulation (NRR) for clarification regarding the licensee's licensing basis and the licensee entered this question into their CAP as IR 1546621.

In the spring of 2015, an NRC CDBI team reviewed the current status of the issue both at the site and with NRR. The team concluded that the safety evaluation did not consider the adverse effects of the introduction of a new failure mode, the resulting loss of heat removal capacity during worst-case postulated conditions, and addition of operator actions that have not been demonstrated can be completed in the required time to restore the required Emergency Service Water Cooling Tower (SXCT) heat removal capacity during worst case conditions. As a result, the evaluation did not provide a basis for the determination that the change did not result in a more than a minimal increase in the likelihood of occurrence of a malfunction of the SXCT during and following a tornado event, and would not create a possibility for a malfunction of the SXCT with a different result than any previously evaluated. A Severity Level IV NCV (NCV 05000454/2015008-06; 05000455/2015008-06; Failure to Evaluate the Adverse Effects of Changing the SXCT Tornado Analysis as Described in the UFSAR) and an associated finding (FIN 05000454/2015008-07; 05000455/2015008-07, Failure to Evaluate the Adverse Effects of Changing the SXCT Tornado Analysis as Described in the UFSAR) were included in NRC IR 05000454(455)/2015008. The licensee entered the CDBI findings into CAP as IR 02506214 and initiated actions to submit a license amendment request to correct the non-conforming condition originally questioned in this URI. Current operability was supported by Operability Evaluation 13-007, "Ultimate Heat Sink Capability with Loss of Essential Service Water Cooling Tower Fans." The licensee revised emergency procedures to communicate operating limitations and completion time requirements for the actions outlined in the Operability Evaluation to safely transition both units to cold shutdown following a tornado that disabled all SX fans.

The inspectors determined that the actions implemented during the referenced CDBI inspection resolved the concerns identified in this URI. This URI is closed.

#### 40A6 Management Meetings

##### .1 Exit Meeting Summary

On October 8, 2015, the inspectors presented the inspection results to Mr. F. Kearny, Site Vice President, and other members of the licensee staff. The licensee acknowledged the issues presented. The inspectors confirmed that none of the potential report input discussed was considered proprietary.

##### .2 Interim Exit Meetings

An interim exit was conducted for the inspection results for the areas of radiological hazard assessment and exposure controls; occupational ALARA planning and controls; radioactive gaseous and liquid effluent treatment; radiological environmental monitoring; and RCS specific activity, occupational exposure control effectiveness, and radiological

effluent TS/ODCM radiological effluent occurrences PI verification with Mr. F. Kearny, Site Vice President, and other members of the licensee staff, on September 24, 2015.

ATTACHMENT: SUPPLEMENTAL INFORMATION

## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### Licensee

F. Kearney, Site Vice President  
T. Chalmers, Plant Manager  
D. Gullott, Corporate Licensing  
A. Corrigan, Regulatory Assurance  
D. Spitzer, Regulatory Assurance  
B. Barton, Radiation Protection  
J. Armstrong, Security  
S. Kerr, Training  
Z. Cox, Nuclear Oversight  
B. Jacobs, Project Management  
E. Richards, Maintenance  
T. Faley, Maintenance  
B. Currier, Design Engineering  
E. Hernandez, Operations  
B. Peters, Operations  
R. Lawler, Operations  
C. Keller, Engineering  
H. Welt, Engineering  
J. Golich, Sr. Environmental Specialist  
K. McGuire, Chemistry Manager

#### Nuclear Regulatory Commission

E. Duncan, Chief, Reactor Projects Branch 3  
J. McGhee, Senior Resident Inspector  
J. Draper, Resident Inspector

## LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

### Opened

None

### Closed

05000454/2015-003-01 LER One Train of the Diesel Generator System Inoperable Longer Than Allowed by Technical Specifications Due to Loss of Diesel Fuel Oil System Volume

05000454/2013004-01; URI 10 CFR 50.59 Evaluation Affecting Tornado Analysis  
05000455/2013004-01

## 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 1R04

- BOP CS-M2; Revision 11; Containment Spray System Valve Lineup
- Drawing M-46; Revisions AN and AR; Diagram of Containment Spray
- BOP AF-M2; Revision 16; AF System Valve Lineup
- Drawing M-122; Revision BC; Diagram of AF
- BOP CC-M2B; Revision 5; Train "B" CC System Valve Lineup
- Drawing M-139, Sheet 2; Revision AH; Diagram of CC

### Section 1R05

- Pre-Fire Plan FZ 18.3-2; Revision 1; Misc. Area 377'-0" Elev. Unit 2 Main Steam and AF Pipe Tunnel
- IR 2526109; NRC Identified 2LL043E No Amber Light
- IR 2526107; NRC Identified 2LL044E Red Light On
- IR 2526106; NRC Identified 2AF013A Packing Leak
- IR 2526104; NRC Identified 2VV05SB Not Working with EST Tag 2012
- IR 2526102; NRC Identified U-2 AF Tunnel Housekeeping
- Pre-Fire Plan FZ 11.4-0; North, Revision 2; Auxiliary Bldg. 383'-0" Elev. General Area – North
- Pre-Fire Plan FZ 11.4-0; West, Revision 1; Auxiliary Bldg. 383'-0" Elev. General Area – West
- BOP FP-30; Revision 9
- Reader Transaction History for Door D407; August 17, 2015
- Reader Transaction History for Door D396
- 0BOL 10.d; LOCAR CO2 Systems TRM Limiting Condition for Operation (LCO)# 3.10.d for LCSR CO2 OOS; August 17, 2015
- 0BOL 10.d; LOCAR CO2 Systems TRM LCO# 3.10.d for PBI 15-265 and 15-266; August 17, 2015
- BAP 1100-10; Response Procedure for Fire/Fire Alarm; Revision 15
- OP-AA-201-009; Control of Transient Combustible Material; Revision 17
- Pre-Fire Plan FZ 11.3-1; Auxiliary Bldg. 364'-0" Elev. Unit 1 Containment Pipe Penetration Area; Revision 1
- Pre-Fire Plan FZ 11.3G-1; Auxiliary Bldg. 364'-0" Elev. 1B Centrifugal Charging Pump Room; Revision 0
- Pre-Fire Plan FZ 3.2A-2; Auxiliary Building 439'-0" Elev. Lower Cable Spreading Room; Revision 1
- Pre-Fire Plan FZ 3.2B-2; Auxiliary Building 439'-0" Elev. Lower Cable Spreading Room; Revision 1
- SA-AA-129-2118; Management and Control of Temporary Power; Revision 8
- MA-AA-716-026; Station Housekeeping/Material Condition Program; Revision 13
- Byron Fire Protection Report
- IR 2543043; Unit 1 LCSR Door 0DSD394 Issue with Latch
- IR 2544118; 0DSD394 U-1 LCSR, Control RM Distraction, Repair Door

### Section 1R11

- IR 2543029; OPS Focus – Prompt Action Issues in the MCR Simulator
- TQ-AA-155; Conduct of Simulator Training and Evaluation; Revision 4
- Scenario Evaluation Guide; OBE-15-5-1; Revision 0
- TQ-AA-150; Operator Training Programs; Revision 12
- EP-AA-1002 Addendum 3; Emergency Action Levels for Byron Station, Revision 0
- 1BGP 100-4; Revision 52; Power Descension
- 1BGP 100-4T1; Revision 15; Power Descension Flowchart; 1BGP 1004T1 Flowchart

### Section 1R12

- IR 02541827; 2SX01FB-2 Has A Through Wall Leak on Backwash Line
- IR 02542688; EOC NDE Needed for SX Strainer Backwash Lines
- IR 02542693; EOC NDE Needed for SX Strainer Backwash Lines
- IR 02542695; EOC NDE Needed for SX Strainer Backwash Lines
- IR 02547859; 1SX93AB-8" NDE UT Thickness Below Minwall Requirements
- IR 02550405; 1SX93AA-8" NDE UT Thickness Below Minwall Requirements
- IR 02554191; SX UT Repeatedly Not Completed as Scheduled
- IR 02553891; Maintenance Rule CME [Condition Monitoring Event] Criteria Exceeded for SX
- System Health Report; Unit 1 AF; April 1, 2015 – June 30, 2015
- BMP 3103-4; AF Pump Mechanical Seals/Bearings Replacement; Revision 8
- WO 1851928; Ops Focus – AF Pump Deflector Ring Set Screw Torque Checks
- IR 2553543; AF Deflector Ring Safety Classification
- WO 1518985; Inboard Pump Water Leak 2AF01PA
- IR 2537835; Ops Focus – AF Pump Deflector Ring Set Screw Torque Checks
- IR 2537836; Ops Focus – AF Pump Deflector Ring Set Screw Torque Checks
- IR 2537840; Ops Focus – AF Pump Deflector Ring Set Screw Torque Checks
- IR 2538823; Ops Focus – AF Pump Deflector Ring Set Screw Torque Checks
- IR 2547397; Deflector Ring Set Screw Found Cracked 2B AF Pp
- IR 2550255; Deflector Ring Set Screws Found Loose
- IR 2506940; 1B AF Pump Oil Leak- Required Shutdown
- IR 2483012; As-Found Conditions of 1AF01PA Bearing Oil Deflectors
- IR 2510222; Need to Adjust 1B AF Pump Inboard Bearing Oil Deflector

### Section 1R13

- Risk Profile for Work Week August 24, 2015
- B1R20 Shutdown Safety Management Plan (SSMP)
- Risk Profile for Work Week August 31, 2015
- Risk Profile for Work Week September 7, 2015
- OU-AP-104, Revision 21; Shutdown Safety Management Program Byron/Braidwood Annex
- Risk Profile for Work Week September 21, 2015

### Section 1R15

- EC 394865; UHS Capability With Loss of Essential Service Water Cooling Tower Fans
- IR 2539092; Enhancement for BEP ES-0.2 to Include Degraded SXCT Information
- Unit 0/1/2 Standing Order 15-032; Cooldown with No Available SX Cooling Tower Fans and Change to 1/2BEP ES-0.2
- IR 2512643; Close Tornado Missile Op Eval, Use Functionality



- 1BEP ES – 0.2; Revision 204; Natural Circulation Cooldown, Unit 1
- BOP SX-T2; Revision 18; SX Tower Operation Guidelines
- TS 3.7.9; UHS and Associated Bases
- UFSAR Section 9.2.5; UHS
- UFSAR Section 3.5.4.1; Essential Service Water Cooling Tower (Byron)
- 1/2 BEP ES-0.2; Revision 203; Natural Circulation Cooldown Unit 1/2
- 50.59 Screening 6D-15-032; Revision 0; 1/2 BEP ES-0.2, Revision 203; Natural Circulation Cooldown Unit 1/2
- 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 02550255; Deflector Ring Set Screws Found Loose
- WO 1851928; AF Pump Deflector Ring Set Screw Torque Checks
- IR 02556207; DC 111 Capacity Test Results
- IR 02556277; ESF Battery Capacity Test Procedures Need Revision
- IR 02555685; 111 Battery DLRO Readings Greater than 20 Percent Baseline
- TS 3.8.6; "Battery Parameters," and Associated Bases
- IR 02552979; Results from Leak Rate Test on 1RH01SB
- IR 02555054; Results of Pressure Test on 1RH01SB
- EC 393364; Revision 2; AF Connection for FLEX in MS Valve Rooms Unit 2
- IR 2555185; Procedure Enhancement for AF-FX Draining
- IR 2553595; Enhancement/Additional Proc for AF-FX Draining
- IR 2553599; Drawing M-132 Sheet 2 Requires Revision
- IR 2549991; Enhancement Needed to 2BOSR FX-S1
- 2BOSR FX-S1; Revision 1; Unit 2 AF FLEX Connection Low Point Drain Semiannual Inspection
- 2BOSR FX-S1; Revision 0; Unit 2 AF FLEX Connection Low Point Drain Semiannual Inspection
- WO 1820888; 2BOSR FX-S1, AF Seat Leakage Test (Drain Test)
- IR 2478272; Questions Concerning EC 393417 and EC 393364
- IR 2478982; Review of AF FLEX ECs 393364 and 393417
- EC 393417; Revision 1; Auxiliary Feed Connections in Main Steam Valve Rooms Unit 1, FLEX Mod 5
- M-122; Revision BC; Diagram of AF
- M-132; Revision A; Diagram of AF FLEX
- Condition Monitoring Plan for Group CO-44; 2AF049A-D – FX to AF to S/G Cnmt Isol Vlv; February 18, 2015
- BYR15-052; Revision 1; ECCS Operational Leakage and SI8811 Valve Containment Assembly Leakage Limits
- IR 2552972; Results of Leak Rate Test on 1RH01SA
- IR 2552979; Results from Leak Rate Test on 1RH01SB
- BVP 200-7T2; Revision 9; Primary Coolant Sources Outside Containment Checkoff List
- BVP 200-7; Revision 15; Conduct of Pressure Testing Activities
- EC 342009; Revision 0; Generic Evaluation of ECCS Leakage External to Containment
- IR 1480456; Potential NUREG 0737 Program Deficiency (1/2RH01SA/B)
- BYR15-052; Revision 0; ESF Operational Leakage and SI8811 Valve Containment Assembly

- EC 402053; Revision 0; ECCS Leakage in Auxiliary Building While on Recirculation

### Section 1R18

- EC 362147; Revision 0; Replace ESF Inverter 1IP06E (Outage Scope) – Instrument Bus 112 – Connection to CVT 1IP02E
- EC 362149; Revision 0; Replace ESF Inverter 1IP08E (Outage Scope) – Instrument Bus 114 – Connection to CVT 1IP04E
- IR 02553132; 112/114 Inverter Pre-Outage Installation Issues
- IR 02555394; 112/114 Inverter Change to EC 362147/362149, Resource Impact
- IR 02558299; Dust Accumulated Inside of Instrument Inverter 112 and 114
- IR 02556788; Auxiliary Building/FHB Differential Pressures
- IR 02555938; Removing 0DSD319 Auxiliary Building Pressure Went Positive/MCR Alarm
- EC 400045; Revision 4; Install Backdraft/Pressure Control Damper in Place of Door 0DSD319 to Mitigate Excessive Turbine Building/Auxiliary Building Differential Pressure
- IR 02558473; Indicating Fuse F331 Found Degraded
- EC 394524; Revision 000; Evaluation of Miscellaneous Penetrations Subject to Effects of Turbine Building High Energy Line Breaks

### Section 1R19

- WO 01851927; AF Pump Deflector Ring Set Screw Torque Checks
- IR 02547397; Deflector Ring Set Screw Found Cracked 2B AF Pump
- WO 01823813; (Sample/Change) CC Pump 2B
- IR 02549550; As Found Conditions of 2B CC Pump
- WO 1852602; OPS Focus – AF Pump Deflector Ring Set Screw Torque Checks
- 6E-2-4030RY12, Revision L; Schematic Diagram Pressurizer Relief Isolation Valves 2RY8000A and 2RY8000B
- IR 2550878; Relay Contact Cartridge Broke 2RY030X
- IR 2548171; FPR Cable Routing Error for 2RY8000B
- IR 2544466; MCR Fire/PORV Block Valves Safe Shutdown Strategy
- WO 1855697; U-2 MCR Fire/PORV Block Valve Rewire 2RY8000A – EC 402998
- 2BOSR 3.3.1-1; Revision 20; Unit Two Accident Monitoring Instrumentation Monthly Channel Checks
- 2BOSR 0.5-2.RY.1; Revision 5; Unit Two 2RY8000A and 2RY8000B Stroke Test
- IR 02552497; 1B AF Pump Oil Cooler Temperature High
- IR 02554178; 1B AF Pump Oil Cooler Found Fouled
- WO 01859127; 1B AF Pump Oil Cooler Temperature High
- BOP AF-7; Revision 47; Diesel Driven AF Pump B Startup On Recirc
- BOP AF-8; Revision 26; Diesel Driven AF Pump B Shutdown
- WO 1579607; LLRT for P-28 – 1CV8100, 1CV8122, and 1CV8113
- 1BOSR 6.1.1-9; Revision 12; Unit One Primary Containment Type C Local Leakage Rate Tests and IST Tests of Chemical and Volume Control System
- WO 1720146; MOV PM, Actuator Inspection, Diagnostic Testing
- WO 1722929; CVCS CNMT Isolation Valve Stroke Test-Seal Ret (NR-When PL Cond Perm)
- 1BOSR 6.3.5-16; Revision 6; Unit One 1CV8100, 1CV8112, and 1CV8355A/B/C/D Stroke Time (ST) and Position Indication Test
- 1BOSR 7.5.7-2; Revision 10; Unit One Train B AF Flowpath Operability Surveillance Following Shutdown
- IR 2565286; Procedure Issues Noted In Completed AF Surveillance
- WO 1574439; 1AF014G IST Disassembly and Inspection

- 1BOSR Z.7.a.1; Revision 5; Unit One AF Diesel Engine Starting Sequence and Overspeed Trip Test
- WO 1726006; AF Diesel Prime Mover Inspection
- BOP AF-7T1; Revision 25; Diesel Driven AF Pump Operating Log
- BOP AF-1; Revision 29; Diesel Driven AF Pump Alignment to Standby Condition
- WO 1722328; Change Grease in Coupling per BMP 3229-1 Section F.2
- 1BOSR 5.5.8.AF.5-1a; Revision 8; Unit One Group A IST Requirements for Motor Driven AF Pump 1AF01PA
- WO 1720127; Rebuild/Replace Power Assemblies
- 1BOSR 5.5.8.AF.5-2a; Revision 8; Unit One Group A IST Requirements for Diesel Driven AF Pump 1AF01PB
- WO 1574437; 1AF014C IST Disassembly and Inspection
- 1BOSR 7.5.7-1; Revision 9; Unit One Train A AF Flowpath Operability Surveillance Following Shutdown

#### Section 1R20

- IR 02556840; Radiation Protection Fatigue Assessment/Work Hour Limit Waiver
- IR 02558662; Covered to Non-Covered Worker B1R20
- IR 02558673; Covered to Non-Covered Worker B1R20
- IR 02559038; Radiation Protection Fatigue Assessment/Work Hour Limit Waiver
- IR 02558809; 1B DG Fuel Oil Transfer Pump Pressure High
- IR 02558491; OP-AA-109-101, Section 7.3.9 Breaker Standard Not Met

#### Section 1R22

- 2BOSR 0.5-2.AF.1-1; Revision 8; Unit Two Train A AF Valves Stroke Test
- 2BOSR 0.5-2AF.3-2; Revision 6; Unit Two AF Train B Indication Test
- 2BOSR 0.5-2AF.3-1; Revision 7; Unit Two AF Train A Indication Test
- 2BOL 6.3; Revision 8; LCO Action Requirement Containment Isolation Valves Tech Spec LCO # 3.6.3
- 2BOL 7.5; Revision 6; LCO Action Requirement AF System Tech Spec LCO # 3.7.5
- 1BOSR 3.1.2-1; Unit One Calorimetric Calculation Daily Surveillance
- 1BOSR 5.5.8.SI.5-2c; Revision 5; Unit One Comprehensive IST Requirements for Safety Injection Pump 1SI01PB
- 1BVSR 7.1.1-1; Revision 10; Unit 1 Main Steam Safety Valves Operability Test
- BMP 3114-15; Revision 32; Main Steam Safety Valve Verification of Lift Point Using Furmanite's Trevitest Equipment
- IR 02553636; 1MS013A Lifted Outside 2.5 percent Acceptance Criteria B1R20 Trevi
- IR 02553764; 1MS5014B Body/Bonnet Leak During Trevi Testing
- WO 1807395; LLRT for P-41 – 1CV8152 and 1CV8160
- 1BOSR 6.1.1-9; Revision 12; Unit One Primary Containment Type C Local Leakage Rate Tests and IST Tests of Chemical and Volume Control System
- M-64, Sheet 5; Revision AY; Diagram of Chemical and Volume Control and Boron Thermal Regeneration
- M-64, Sheet 7; Revision AN; Diagram of Chemical and Volume Control and Boron Thermal Regeneration
- 1BOSR 7.5.4-2; Revision 18; Unit One Diesel Driven AF Pump Monthly Surveillance
- IR 02569403; NRC Questions on B1R20P MSSV TREVI Testing

## Section 1EP6

- Byron PI Tabletop 082715
- EP-AA-1002; Revision 34; Radiological Emergency Plan Annex For Byron Station

## Section 2RS1

- RP-AA-220; Bioassay Program; Revision 10
- RP-AA-224; CEDE Dose Tracking Using Lapel Air Samplers; Revision 1
- RP-AA-302; Determination of Alpha Levels and Monitoring; Revision 7
- RP-AA-800; Semi-Annual Source Inventory; May 27, 2015
- RP-AA-800; Attachment 2; Semi-Annual Source Leak Test; May 27, 2015
- RP-AA-800; Attachment 2; Semi-Annual Source Leak Test; December 17, 2014
- RP-AA-503; Unconditional Release Survey Method; Revision 9
- RP-AA-350-1001; Response to Guardhouse Portal Monitor Alarms; Revision 9
- RP-AA-462; Controls for Radiographic Operations; Revision 9
- RP-AA-300; Radiological Survey Program; Revision 12
- RP-AA-300-1001; Discrete Radioactive Particle Control; Revision 4
- RP-AA-301; Radiological Air Sampling Program; Revision 8
- RP-AA-460; Controls for High and Locked High Radiation Areas; Revision 26
- RP-AA-460-001; Controls for Very High Radiation Areas; Revision 5
- RP-AA-460-002; Additional High Radiation Controls; Revision 2
- RWP and Associated ALARA Files; RWP 10017271; Steam Generator Install/Remove Nozzle Covers; Multiple Dates
- RWP and Associated ALARA Files; RWP 10017272; Steam Generator Eddy Current Testing and Tube Repairs; Multiple Dates
- RWP and Associated ALARA Files; RWP 10017268; B1R20 Reactor Cavity Decon with Added Controls; Multiple Dates
- RWP and Associated ALARA Files; RWP 10017538; B1R20 Emergent Reactor Head Repairs of Penetrations; Multiple Dates

## Section 2RS2

- RP-AA-400; ALARA Program; Revision 12
- RWP and Associated ALARA Files; RWP 10015400; B2R18 Emergent Reactor Head Repairs of Penetrations; Multiple Dates

## Section 2RS6

- AR 2451514; Check-In Self-Assessment; RETS/REMP 71124.06 and 71124.07; June 4, 2015
- AR 2492619; Byron Conservation Club – ODCM Implications; April 29, 2015
- 2013 Annual Radioactive Effluent Release Report; April 24, 2014
- 2014 Annual Radioactive Effluent Release Report; April 16, 2015
- CY-BY-110-600-2; Chemistry Sample Points – Auxiliary Building; Revision 2
- CY-AA-170-2000; Annual Radioactive Effluent Release Report; Revision 7
- CY-BY-170-301; ODCM; Revision 11
- EN-AA-408-4000; Radiological Groundwater Protection Program Implementation; Revision 5
- EN-AA-408; Radiological Groundwater Protection Program; Revision 0
- EN-BY-408-4180; Radiological Groundwater Protection Program Scheduling and Notification; Revision 7
- WO 1462960; Non-Accessible HEPA Filter Performance Test; May 17, 2013

- WO 1620877; Non-Accessible HEPA Filter Performance Test; December 30, 2014
- WO 1658722; Non-Accessible HEPA Filter Performance Test; May 19, 2015
- Permit Number 2015074; Gaseous Permit Report; Waste Gas Decay Tank; February 13, 2015
- Permit Number 2014608; Gaseous Permit Report; Unit 1 Containment Purge; December 1, 2014

#### Section 2RS7

- Byron Nuclear Generating Station Units 1 and 2; Annual Radiological Environmental Operating Report; May 2015
- Annual Report on the Meteorological Monitoring Program at the Byron Nuclear Power Station; 2013; March 13, 2014
- Annual Report on the Meteorological Monitoring Program at the Byron Nuclear Power Station; 2014; No Date Provided
- AR 2451514; Check-In Self-Assessment; RETS/REMP 71124.06 and 71124.07; June 4, 2015
- Teledyne Brown Engineering Environmental Services; Knoxville Laboratory; Annual 2013 Quality Assurance Report; May 16, 2014
- Teledyne Brown Engineering Environmental Services; Knoxville Laboratory; Annual 2014 Quality Assurance Report; May 5, 2015
- 10 CFR 50.75 (g) Notebook; Various Dates
- Nuclear Procurement Issues Committee (NUPIC) Joint Audit of Teledyne Brown Engineering – Environmental Service; Knoxville Tennessee; TVA Supplier 2013V-16 – NUPIC Audit 23484; March 10, 2014
- REMP Quarterly Environmental Sample Collection Schedule
- Monthly Report on the Meteorological Monitoring Program at Byron; May 2015

#### Section 4OA1

- LS-AA-2200; Revision 5; Mitigating System Performance Index Data Acquisition and Reporting
- BY-MSPI-001; Revision 16; Reactor Oversight Program MSPI Basis Document
- MSPI Monthly Data Elements for Heat Removal Systems (AF); October 2014 – June 2015
- NEI 99-02; Revision 7; Regulatory Assessment PI Guideline
- 1BOSR SX-M1; Revision 8; 1A AF Pump SX Suction Line Monthly Surveillance
- 2BOSR 3.2.8-608b; Revision 1; Unit Two ESFAS Instrumentation Slave Relay Surveillance (Train B Automatic Safety Injection – K608)
- IR 02506940; 1B AF Pump Oil Leak – Required Shutdown

#### Section 4OA2

- WO 1792142; Loose Clamp Bolt Near L8 on 1A DG; May 24, 2015
- IR 2434048; Identified Two Cracked Welds on Fuel Oil Return Header
- BMP 3208-2; Emergency Standby DG Engine Inspection 24 Month Surveillance; Revision 21
- IR 02544127; 2015 Maintenance Rule FASA Deficiency, Unavailability Documentation
- CY-AA-130-3010; Dose Equivalent Iodine Determination; Revision 4
- LS-AA-2090; Monthly Data Elements for NRC RCS Specific Activity; Various Dates
- LS-AA-2150; Monthly Data Elements for NRC RETS/ODCM Radiological Effluent Occurrences; Various Dates

### Section 4OA3

- LER 05000454/2015-003-01; One Train of the DG System Inoperable Longer than Allowed by TSs Due to Loss of Diesel Fuel Oil System Volume; August 27, 2015
- LER 05000454/2015-003-00; One Train of the DG System Inoperable Longer than Allowed by TSs Due to Loss of Diesel Fuel Oil System Volume; July 27, 2015
- IR 2551538; Results of 1DO001C Troubleshooting
- WO 1796243; Valve Leaks By and Over Flowed the Tank
- IR 2551761; Received Alarm Diesel Fuel Oil Storage Tk Sump 1A High High

### Section 4OA5

- IR 05000454/2015008; 05000455/2015008
- IR 05000454/2007004; 05000455/2007004
- IR 02506214
- Standing Order 15-032; August 20, 2015; "Cooldown with No Available SX Cooling Tower Fans and Change to 1/2 BEP ES-0.2"
- IR 01546621; Inadequate 50.59 For EC 385829 (SXCT Tornado Missiles)
- EC 385829; "UHS Capability with Loss of SX Fans Due to Tornado Missiles," February 14, 2012
- 1/2 BEP ES-0.2; Revision 204; Natural Circulation Cooldown Unit 1
- BOP SX-T2; Revision 18; SX Tower Operations Guidelines
- EC 394865; UHS Capability With Loss of Essential Service Water Cooling Tower Fans

## LIST OF ACRONYMS USED

10 CFR	Title 10 of the Code of Federal Regulations
ADAMS	Agencywide Documents Access Management System
AF	Auxiliary Feedwater
ALARA	As-Low-As-Reasonably-Achievable
CAP	Corrective Action Program
CC	Component Cooling
CDBI	Component Design Bases Inspection
DC	Direct Current
DG	Diesel Generator
DOST	Diesel Oil Storage Tank
EC	Engineering Change
IP	Inspection Procedure
IR	Inspection Report
IR	Issue Report
IST	Inservice Testing
LCO	Limiting Condition for Operation
LER	Licensee Event Report
MCR	Main Control Room
MSPI	Mitigating Systems Performance Index
NCV	Non-Cited Violation
NEI	Nuclear Energy Institute
NRC	U.S. Nuclear Regulatory Commission
NRR	Nuclear Reaction Regulation
NUPIC	Nuclear Procurement Issues Committee
ODCM	Offsite Dose Calculation Manual
PARS	Publicly Available Records
PI	Performance Indicator
PM	Planned or Preventative Maintenance
PORV	Power Operated Relief Valve
RCS	Reactor Coolant System
RG	Regulatory Guide
RWP	Radiation Work Permit
SSC	Systems, Structures, and Components
SX	Essential Service Water
SXCT	Emergency Service Water Cooling Tower
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
UHS	Ultimate Heat Sink
URI	Unresolved Item
WANO	World Association of Nuclear Operators
WO	Work Order

B. Hanson

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Sincerely,

*/RA/*

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