



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

REGION III
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November 8, 2016

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

SUBJECT: BYRON STATION, UNITS 1 AND 2—NRC INTEGRATED INSPECTION REPORT
05000454/2016003 AND 05000455/2016003

Dear Mr. Hanson:

On September 30, 2016, the U.S. Nuclear Regulatory Commission (NRC) completed a quarterly integrated inspection at your Byron Station, Units 1 and 2. On October 20, 2016, the NRC inspectors discussed the results of this inspection with Mr. T. Chalmers, Byron Plant Manager, and other members of your staff. The inspectors documented the results of this inspection in the enclosed inspection report.

Based on the results of this inspection, the NRC identified three issues that were evaluated under the risk significance determination process as having very low safety significance (Green). The NRC also determined that violations are associated with all of these issues. Because the licensee initiated issue reports to address these issues, these violations are being treated as Non-Cited Violations (NCVs), consistent with Section 2.3.2.a of the Enforcement Policy. These NCVs are described in the subject inspection report.

If you contest the violations or significance of these NCVs, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with copies to: (1) the Regional Administrator, Region III; (2) the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and (3) the NRC Resident Inspector at the Byron Station.

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

B. Hanson

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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 System (PARS) component of the NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

/RA/

Eric Duncan, Chief
Branch 3
Division of Reactor Projects

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

Enclosure:
IR 05000454/2016003; 05000455/2016003

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

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

Report No: 05000454/2016003; 05000455/2016003

Licensee: Exelon Generation Company, LLC

Facility: Byron Station, Units 1 and 2

Location: Byron, IL

Dates: July 1 through September 30, 2016

Inspectors: J. McGhee, Senior Resident Inspector
J. Draper, Resident Inspector
K. Pusateri, Reactor Engineer
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Approved by: E. Duncan, Chief
Branch 3
Division of Reactor Projects

Enclosure

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SUMMARY

Inspection Report 05000454/2016003, 05000455/2016003; 07/01/2016 – 09/30/2016; Byron Station, Units 1 and 2; Internal Flooding, Operability, and Radioactive Solid Waste Processing and Radioactive Material Handling, Storage, and Transportation.

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

NRC-Identified and Self-Revealed Findings

Cornerstone: Mitigating Systems

- **Green.** A finding of very low safety significance and an associated NCV of 10 CFR 50 Appendix B, Criterion V, "Instructions, Procedures and Drawings," was self-revealed on September 14, 2016, when a station employee discovered that the flood barrier door for the Unit 1 Train B (1B) diesel oil storage tank (DOST) was open and unattended for three hours and six minutes. The watertight door was installed to protect the DOST fuel oil transfer pumps from the effects of a postulated failure of a circulating water expansion joint at the condenser water boxes in the turbine building, and the open door rendered the 1B diesel generator inoperable. An operator was dispatched to assess the door and, after finding no mechanical issue with the door, closed the door to restore operability to the 1B diesel generator. The issue was entered into the licensee's Corrective Action Program (CAP) as IR 02699674.

The inspectors determined that the issue was more than minor because it was associated with the Configuration Control attribute of the Mitigating Systems Cornerstone and adversely impacted the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure to close and dog the 1B DOST door impacted the availability of the 1B diesel generator during postulated events. The finding was determined to be of very low safety significance, or Green, in accordance with IMC 0609, "Significance Determination Process," Attachment 0609.04, "Initial Characterization of Findings," Appendix A, "The Significance Determination Process (SDP) For Findings at Power," because the inspectors answered the Exhibit 2 – Mitigating Systems Screening Question B as "Yes." The inspectors determined that the finding involved the degradation of equipment specifically designed to mitigate a flooding event and used Exhibit 4 of the same Appendix to evaluate the significance. The inspectors determined that with the flood door open, this single condition during a turbine building flood event would degrade two trains of a multi-train system. Specifically, the turbine building flood would impact the diesel fuel transfer pumps for both Unit 1 emergency diesel generators. Therefore, a Detailed Risk

Evaluation was performed by a Senior Risk Analyst who concluded that the change in core damage frequency (Δ CDF) associated with the finding was $4.6E-10$ /year and since the total estimated Δ CDF was less than $1.0E-7$ /year, the issue screened as having very low safety significance (i.e., Green) using IMC 0609, Appendix H, "Containment Integrity Significance Determination Process," for large early release frequency (LERF). The inspectors assigned a cross-cutting aspect in the Avoiding Complacency element of the Human Performance Area (IMC 0310 H.12) to this finding because an individual accessing the room through the doorway failed to challenge the door to ensure proper closure in a manner that would have revealed the door was not properly latched. (Section 1R06.1)

- Green. A finding of very low safety significance and an associated NCV of Technical Specification (TS) 5.4.1.a, "Written Procedures," was self-revealed on August 24, 2016, when a fuel oil leak of approximately one-eighth gallon per minute was identified coming from a tubing connection after the Unit 2 Train B (2B) DG was started for routine surveillance testing. Technicians replaced a fuel oil relay during the previous shift and did not use the procedurally required tools to track alterations made to each individual input line as required by MA-AA-716-100, "Maintenance Alteration Process." The issue was entered into the licensee's CAP as IR 02707888. As part of their corrective actions, the leak was promptly repaired by tightening the fitting after the diesel generator was shut down; and the technicians reviewed human performance error prevention techniques, including proper use of the Maintenance Alterations Log, with supervisors.

The inspectors determined that the issue was more than minor because it was associated with the Configuration Control attribute of the Mitigating Systems Cornerstone and adversely impacted the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure to tighten all fittings during a maintenance activity resulted in a substantial fuel oil leak that could have resulted in a fire or could have impacted the availability of the diesel generator if the tubing had loosened further or become disconnected during a design basis event. The finding was determined to be of very low safety significance, or Green, in accordance with IMC 0609, "Significance Determination Process," Attachment 0609.04, "Initial Characterization of Findings," Appendix A, "The Significance Determination Process (SDP) For Findings at Power," because the inspectors answered Exhibit 2 – Mitigating Systems Screening Question A.1 as "Yes" since the diesel generator remained operable and functional until the fitting was repaired. The inspectors assigned a cross-cutting aspect in the Avoiding Complacency element of the Human Performance Area (IMC 0310 H.12) to this finding because judicious implementation of human performance error prevention tools could have prevented the failure to properly tighten the fitting, even if the Alterations Log was not used as required. (Section 1R15.1)

Cornerstone: Public Radiation Safety

- Green. A finding of very low safety significance and an associated NCV of 10 CFR 71.5(a) and 49 CFR 171.1(b)(12) was self-revealed when the licensee failed to properly block and brace a Radioactive Waste (Radwaste) Shipment that was shipped to a waste processing facility for disposal. The failure to properly block and brace the Radwaste Shipment caused a breach of the shipping package while in transit to the waste processing facility. When the shipment breach was discovered at the waste processing facility, contamination surveys were immediately conducted and it was determined that

no loss of content had occurred during transportation. The surveys also determined that radiation dose limits from the package were below NRC and Department of Transportation (DOT) limits. The waste processing facility notified the licensee of the breach during transport and the licensee entered the event into their CAP as IR 02665985.

The inspectors determined that the issue was more than minor because it was associated with the Program and Process attribute of the Public Radiation Safety Cornerstone and adversely impacted the cornerstone objective of ensuring adequate protection to public health and safety from exposure to radiation from routine civilian nuclear operations. Specifically, the breach of the transportation package by its content could lead to the inadvertent spread of radioactive contamination to the public domain if conditions had been slightly altered. The finding was determined to be of very low safety significance, or Green, in accordance with IMC 0609, Appendix D, "Public Radiation Safety Significance Determination Process," dated February 12, 2008, because the finding did not involve: (1) a radioactive shipment above radiation limits; (2) a certificate of compliance issue; (3) the failure to make emergency notifications; or (4) a low-level burial issue. A breach of the transportation package occurred during transit. However, the shipment contained less than a Type A quantity of material (LSA II shipment), and there was no loss of package contents or radioactive contamination. The inspectors assigned a cross-cutting aspect in the Resources element of the Human Performance Area (IMC 0310 H.1) to this finding due to inadequate procedures. (Section 2RS8.4)

Licensee-Identified Findings

None.

REPORT DETAILS

Summary of Plant Status

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

1. REACTOR SAFETY

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

1R01 Adverse Weather Protection (71111.01)

.1 External Flooding

a. Inspection Scope

The inspectors evaluated the design, material condition, and procedures for coping with the design basis probable maximum flood. The evaluation included a review to check for deviations from the descriptions provided in the Updated Final Safety Analysis Report (UFSAR) for features intended to mitigate the potential for flooding from external factors. As part of this evaluation, the inspectors walked down the River Screen House and checked for obstructions that could prevent draining, verified that the River Screen House roof did not contain obvious loose items that could clog drains in the event of heavy precipitation, and determined whether barriers required to mitigate flooding were in place and operable. The inspectors also reviewed the abnormal operating procedure for mitigating the design basis flood to ensure it could be implemented as written.

This inspection constituted one external flooding sample as defined in IP 71111.01–05.

b. Findings

No findings were identified.

1R04 Equipment Alignment (71111.04)

.1 Quarterly Partial System Walkdowns

a. Inspection Scope

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

- Unit 1 Train A (1A) residual heat removal (RH) during 1B RH work window;
- Unit 1 Train B (1B) diesel generator (DG) air and electrical lineup following surveillance testing; and
- Essential service water (SX) make-up subsystem.

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

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

b. Findings

No findings were identified.

1R05 Fire Protection (71111.05)

.1 Routine Resident Inspector Tours (71111.05Q)

a. Inspection Scope

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

- Auxiliary Building 346' elevation general area;
- Auxiliary Building 364' elevation general area;
- Main Control Room;
- Unit 1 auxiliary electrical equipment room; and
- Unit 2 auxiliary electrical equipment room.

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

plant transient, or their impact on the plant's ability to respond to a security event. The inspectors verified that fire hoses and extinguishers were in their designated locations and available for immediate use; that fire detectors and sprinklers were unobstructed; that transient material loading was within the analyzed limits; and fire doors, dampers, and penetration seals appeared to be in satisfactory condition.

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

b. Findings

No findings were identified.

1R06 Flooding (71111.06)

.1 Internal Flooding

a. Inspection Scope

Issue Report 02699674 documented that an internal flood barrier door for the B diesel oil storage tank (DOST) room door was discovered open and unattended. The individual who discovered the condition reported it to the main control room and operators declared both Unit 1 DGs inoperable as required by procedure BAP 1100–3A3, "Pre-evaluated Plant Barrier Matrix," and the door was closed. There was no malfunction of the door and the both DGs were declared operable after the door was secured.

The inspectors performed a walkdown of the following plant area to assess the adequacy of watertight doors and verify drains and sumps were clear of debris and were operable, and that the licensee complied with its commitments:

- 1B DOST Room

The watertight door to the 1B DOST room was designed to protect the plant and its safety-related equipment from internal flooding events. The inspectors reviewed flood analyses and design documents, including the UFSAR, engineering calculations, and abnormal operating procedures to identify licensee commitments. In addition, the inspectors reviewed licensee drawings to identify areas and equipment that may be affected by internal flooding caused by the failure or misalignment of nearby sources of water, such as the fire suppression or the circulating water systems. The inspectors also reviewed the licensee's corrective action documents with respect to past flood-related items identified in the CAP to verify the adequacy of the corrective actions.

This inspection constituted one internal flooding sample as defined in IP 71111.06–05.

b. Findings

Introduction: A self-revealed finding of very low safety significance (Green) and a NCV of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures and Drawings," was identified on August 2, 2016, when a station employee identified that the flood barrier door for the 1B DOST was open and unattended.

Discussion: At 9:34 a.m. on August 2, 2016, an individual called the main control room to report that the water tight door, 0DSSD192, was found open and unattended. The operators immediately declared both Unit 1 diesel generators (DGs) inoperable as required by procedure BAP 1100-3A3 and dispatched the Unit 1 turbine building operator to assess the door. The operator found no problem with the door operating mechanism or sealing surface and closed the door as directed to restore the DGs to an operable status. The operator did note that the local alarm that sounds and lights up when the watertight door is opened was not working (see Section 4OA2 of this report for additional information). The licensee subsequently initiated IR 02699674 for the open door and IR 02699683 for the non-operating door ajar alarm.

The watertight door was installed to protect the DOST transfer pumps from the effects of a postulated failure of a circulating water expansion joint at the condenser water boxes in the turbine building. The doorway was designed with two doors in sequence. There was a watertight flood barrier door on the turbine building side of the doorway. Then there was a security/fire/high energy line break (HELB) barrier door on the DOST room side of the doorway. This HELB/security door was found closed and latched at the time the individual found the watertight door open. A review determined that the security door was last accessed at 6:28 a.m. by a security officer performing routine rounds. When interviewed, the security officer was confident that the door had been dogged closed when he left the area; however, no other reason was identified for the door to be opened from the time the officer exited the room until the door was discovered open.

Analysis: The inspectors determined that the licensee's failure to ensure the flood barrier door was closed as required to maintain operability of safety-related equipment was a performance deficiency that warranted a significance determination. Specifically, when the door was left open and unattended, the flood barrier was not operable and both divisions of emergency electrical power were susceptible to a flooding event.

The inspectors determined that this issue was of more than minor safety significance because the open flood barrier was associated with the Configuration Control attribute of the Mitigating Systems Cornerstone and adversely impacted the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the licensee's failure to ensure closure of required flood barriers adversely impacted the reliability of the fuel oil transfer pumps that are required to support emergency diesel generator operation during flooding events.

The inspectors utilized Exhibit 2, "Mitigating Systems Screening Questions," of IMC 0609, "Significance Determination Process," Appendix A, dated June 19, 2012, to evaluate the significance of the issue. The inspectors answered the Section B question as "Yes" because the inspectors determined that the finding involved the degradation of equipment specifically designed to mitigate a flooding event. The inspectors then used Exhibit 4 of the same Appendix to evaluate the significance. The inspectors determined that with the flood door open, this condition alone during a turbine building flood event would degrade two trains of a multi-train system. Specifically, the turbine building flood would impact the diesel fuel transfer pumps for both Unit 1 emergency diesel generators. Therefore, a Detailed Risk Evaluation was required.

To evaluate the risk significance of this finding, the Senior Reactor Analysts (SRAs) identified two cases requiring evaluation. In Case 1, a random break in either the Circulating Water (CW) piping or the CW expansion joints of the main condenser results in a reactor trip, followed by a consequential loss of offsite power (LOOP) on the affected Unit, followed by a consequential LOOP on the other Unit. In Case 2, a seismic event results in a LOOP on both Units and a failure of either the CW piping or the CW expansion joints.

Case 1: Random Break in CW Piping or CW Expansion Joints Followed by Dual Unit LOOP (DLOOP)

The frequency of a break in either the CW piping or the CW expansion joints was evaluated using Electric Power Research Institute (EPRI) Report 3002000079, "Pipe Rupture Frequencies for Internal Flooding Probabilistic Risk Assessments," Revision 3. Using Table ES-2 in the EPRI report, the following failure rate information was obtained:

System	Description	Value
CW Piping	Frequency of Piping Break Causing a Major Flood (i.e., Greater than 2000 gpm Leak)	7.95E-7/year/foot
CW Expansion Joints (EJs)	Frequency of Major Flood (i.e., Greater than 2000 gpm Leak) with Flood Rate ≤ 10,000 gpm	9.17E-6/year/EJ
	Frequency of Major Flood with Flood Rate ≥ 10,000 gpm	6.08E-6/year/EJ
	Total Frequency of CW Expansion Joint Major Flood	1.53E-5/year/EJ

The following information and assumptions were used to obtain the frequency of a major flooding event in the turbine building due to a break in either the CW piping or the CW expansion joint:

- there is approximately 550 feet of CW piping per Unit in the turbine building (i.e., 1100 feet total);
- there are eight CW expansion joints per Unit; and
- a flooding event on either Unit will affect both Units.

Using the above information, the initiating event frequency (IEF) of a major flooding event in the turbine building due to a break in either the CW piping or the CW expansion joint is given by:

$$IEF = [(7.95E-7/year/ft) \times (550 \text{ ft/Unit}) + (1.53E-5/year/exp \text{ joint}) \times (8 \text{ exp joints/Unit})] \times [2 \text{ Units}] = 1.12E-3/year.$$

The Byron Standardized Plant Analysis Risk (SPAR) model version 8.27 and Systems Analysis Programs for Hands-on Integrated Reliability Evaluations (SAPHIRE) version 8.1.4 software was used to obtain the probability of a DLOOP following a reactor trip. From the SPAR model, the following information was obtained:

SPAR Model Designation	Description	Value
ZT-VCF-LP-GT	Probability of a LOOP Given a Reactor Trip	5.29E-3
ZT-LOOP-SITE-SC	Probability of a Dual Unit LOOP (Switchyard-Centered)	1.146E-1

The exposure time for the finding was assessed to be three hours and six minutes, from 6:28 a.m. until 9:34 a.m. on August 2, 2016. Using the above information, the probability of a DLOOP following a reactor trip was obtained as:

$$\begin{aligned} \text{DLOOP} &= [\text{ZT-VCF-LP-GT}] \times [\text{ZT-LOOP-SITE-SC}] \\ &= [5.29\text{E-}3] \times [1.146\text{E-}1] \\ &= 6.1\text{E-}4 \end{aligned}$$

Taking into account that the exposure time is 3.1 hours ($3.54\text{E-}4$ years), and assuming that a DLOOP with a failure of both emergency diesel generators (EDGs) would result in a core damage event, the delta core damage frequency (ΔCDF) for Case 1 was obtained as the product of the following factors:

$$\begin{aligned} \text{Case 1 } \Delta\text{CDF} &= [\text{IEF}] \times [\text{DLOOP}] \times [\text{Exposure Time}] \\ &= [1.12\text{E-}3/\text{year}] \times [6.1\text{E-}4] \times [3.54\text{E-}4] \\ &= 2.4\text{E-}10/\text{year} \end{aligned}$$

Case 2: Seismic Event That Results in a DLOOP and a Break in CW Piping or CW Expansion Joints

A seismic event can result in the failure of either the CW piping or the CW expansion joints resulting in turbine building flooding. It is expected that a seismic event will also result in a DLOOP. Since DLOOP is a consequence of the initiator, the emergency diesel generator function is required. To obtain a bounding estimate of the ΔCDF , the frequency of a seismic event sufficient to cause plant damage is multiplied by the probability of failure of either the CW piping or the CW expansion joints due to the seismic event.

Using guidance from NRC's Risk Assessment Standardization Project (RASP) handbook, only the "Bin 2" seismic events were assumed to represent a ΔCDF . "Bin 2" is defined in the RASP handbook as seismic events with intensities greater than 0.3g but less than 0.5g. Earthquakes of lesser severity are unlikely to result in large pipe failures and earthquakes of a larger magnitude could result in major structural damage throughout the plant which would not be representative of a delta risk. The IEF of an earthquake in "Bin 2" was estimated to be $1.6\text{E-}5/\text{year}$ for Byron using Table 4A-1 of Section 4 of the RASP handbook. To estimate the seismic capacity of the CW piping and the CW expansion joints, an evaluation of the seismic capacity for CW piping and expansion joints for another Westinghouse plant was referenced. For this plant, it stated that the CW piping and the CW expansion joints had high seismic capacity, and a flooding assessment due to seismic concerns was screened from the assessment. However, making the conservative assumption that the high confidence of low probability of failure (HCLPF) capacity for the CW piping and the CW expansion joints was 0.3g, a failure probability of $3.9\text{E-}2$ was obtained for the CW system.

Taking into account the exposure time of 3.1 hours ($3.54\text{E-}4$ years), and assuming that a DLOOP with a failure of both EDGs would result in a core damage event, a bounding value for the ΔCDF for Case 2 is obtained as the product of the following factors:

$$\begin{aligned} \text{Case 2 } \Delta\text{CDF} &= [\text{IEF}] \times [\text{DLOOP}] \times [\text{CW Failure Probability}] \times [\text{Exposure Time}] \\ &= [1.6\text{E-}5/\text{year}] \times [1.0] \times [3.9\text{E-}2] \times [3.54\text{E-}4] \\ &= 2.2\text{E-}10/\text{year} \end{aligned}$$

A bounding Δ CDF of $2.2E-10/\text{year}$ was estimated for seismically-induced flooding of the CW piping and CW expansion joints. The final Δ CDF associated with the finding is obtained as the sum of the delta CDF for both Case 1 and Case 2:

$$\Delta\text{CDF} = [2.4E-10/\text{year}] + [2.2E-10/\text{year}] = 4.6E-10/\text{year}$$

Since the total estimated change in core damage frequency was less than $1.0E-7/\text{year}$, the issue was screened as Green using IMC 0609 Appendix H, "Containment Integrity Significance Determination Process," for large early release frequency (LERF). Based on the Detailed Risk Evaluation, the inspectors determined that the finding was of very low safety significance (Green).

This finding had a cross-cutting aspect in the Avoiding Complacency element of the Human Performance Area because individuals accessing the room through the doorway failed to challenge the door to ensure proper closure in a manner that would have revealed the door was not properly latched. (IMC 0310 H.12)

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

CC-AA-201, "Plant Barrier Control Program," Revision 11, provided requirements for maintaining a flood barrier and specified in Step 3.6 and Step 3.7.2.4 that doors shall be placed in the required position after use. BAP 1100-3A3, "Pre-evaluated Plant Barrier Matrix," Revision 39, in Note H16 to the table specified that this flood door be closed in Modes 1 – 4 except for passage.

Contrary to the above, a station employee did not ensure that the flood barrier door to the 1B DOST room was securely closed after exiting the room in that on September 14, 2016, the door was discovered open and had been unattended for approximately three hours and six minutes. When the main control room was notified of the open door, an operator was dispatched to evaluate the condition of the door and both diesel generators were immediately declared inoperable per station procedure. The door was found to be fully functional and the operator closed and dogged the door to restore the barrier and diesel operability. Additional detail regarding the local door alarm for this door is included in Section 4OA2 of this report.

Because the violation was of very low safety significance and it was entered into the licensee's CAP as IR 02699674, this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy. **(NCV 05000454/2016003-01: DOST Flood Barrier Door Left Open).**

1R11 Licensed Operator Requalification Program (71111.11)

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

a. Inspection Scope

On September 13, 2016, the inspectors observed a crew of licensed operators in the plant's simulator during licensed operator requalification training. The inspectors verified that operator performance was adequate, evaluators were identifying and documenting

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

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

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

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

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 19, 2016, the inspectors observed operating Crew D in the main control room executing a troubleshooting plan for a fuel oil leak on the 2A auxiliary feedwater (AF) pump diesel and subsequent surveillance run. In addition, the crew conducted a reactivity brief for lowering power on Unit 1 in support of switchyard Bus 7 work activities and conducted a brief for hanging the clearance order to support that work. These activities were related to increased risk. The inspectors evaluated the following areas:

- licensed operator performance;
- crew's clarity and formality of communications including recognition of risk impact;
- prioritization, interpretation, and verification of annunciator alarms;
- correct use and implementation of procedures;
- control board manipulations; and
- engagement, oversight and direction from supervisors.

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

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

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12)

.1 Routine Quarterly Evaluations

a. Inspection Scope

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

- 6900 volt and 4160 volt electric power distribution, control, indication, alarms and protection (Function AP-02);
- 480 volt electric power, control, indication, alarms and protection (Functions AP-04 and 05); and
- Radiation monitoring system (RMS) Loop 3 communication failures (Function PR-8).

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

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

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

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

b. Findings

No findings were identified.

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

.1 Maintenance Risk Assessments and Emergent Work Control

a. Inspection Scope

The inspectors reviewed the licensee's evaluation and management of plant risk for the maintenance and emergent work activities affecting risk-significant and safety-related

equipment listed below to verify that the appropriate risk assessments were performed prior to removing equipment for work:

- 1B RH subsystem out-of-service for planned maintenance, 1B AF pump surveillances, and 1B containment spray (CS) pump surveillances during the week of July 25, 2016;
- Emergent through-weld leak on ASME Class III SX cross-connect drain valve 2SX035 August 16, 2016;
- 2A RH subsystem out-of-service for planned maintenance, 125 Vdc (DC) bus 111 cross-tied to 125 Vdc bus 211 while charger 111 out-of-service for planned maintenance, 0D essential service water cooling tower (SXCT) fan and cell out-of-service for planned maintenance, and 1A CS pump out-of-service for planned maintenance during the week of September 12, 2016; and
- Switchyard ring bus open during crosstie Bus 7 work in support of the new Grand Prairie line, Unit 1 engineered safeguards feature (ESF) relay testing, 0B fire pump out-of-service for planned maintenance, emergent repair of 0B normal service water pump, 0D SXCT fan and cell out-of-service for planned maintenance, and system auxiliary transformers 242–1 and 242–2 out-of-service for planned maintenance during the week of September 26, 2016.

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 the plant risk was promptly reassessed and managed. The inspectors reviewed the scope of maintenance work, discussed the results of the assessment with the licensee's probabilistic risk analyst or shift technical advisor, and verified plant conditions were consistent with the risk assessment. The inspectors also reviewed TS requirements and walked down portions of redundant safety systems, when applicable, to verify risk analysis assumptions were valid and applicable requirements were met.

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

b. Findings

No findings were identified.

1R15 Operability Determinations and Functional Assessments (71111.15)

.1 Operability Evaluations

a. Inspection Scope

The inspectors reviewed the following issues:

- 1D main steam isolation valve (MSIV) air oil pump (AOP) unable to control accumulator pressure;
- SX vacuum relief valves leaking;
- Degraded filter elements on 2A DG starting air system;
- 2B DG fuel oil leak after maintenance;

- Fuel oil supply line leak to 1B AF pump diesel engine; and
- Degraded fill in SXCT Cell “G.”

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 independently determine whether the components or systems were operable. The inspectors determined, where appropriate, compliance with bounding limitations associated with the evaluations. Additionally, the inspectors reviewed a sample of corrective action documents to verify that the licensee was identifying and correcting any deficiencies associated with operability evaluations.

These operability inspections constituted six samples as defined in IP 71111.15–05.

b. Findings

Introduction: A finding of very low safety significance (Green) and an associated NCV of TS 5.4.1.a, “Written Procedures,” was self-revealed on August 24, 2016, when a fuel oil leak of approximately one-eighth gallon per minute was identified to be coming from a tubing connection after the 2B DG was started for routine surveillance testing. Technicians replaced a fuel oil relay during the previous shift and did not use the procedurally required tools to track alterations made to each individual input line to ensure the required configuration control was maintained as required by MA-AA-716-100, “Maintenance Alteration Process.”

Discussion: At 7:21 p.m. on August 23, 2016, instrument maintenance technicians completed a replacement of 2PY-DG8035B, the 2B DG fuel oil pump inlet pressure indicator ratio relay, using work order (WO) 01812751. This relay is mounted on the wall of the diesel generator room and the tubing is 3/8-inch stainless steel tubing connected to the relay via threaded fittings downstream of normally open isolation valve 2DG5402B. The technicians experienced difficulty lining up the tubing connections and loosened several additional fitting connections. The technicians then continued the work to conclusion.

At 9:30 a.m. on August 24, 2016, operators started the 2B diesel generator for surveillance testing with the diesel generator system engineer present to support the testing. A leak was observed by the test personnel and estimated to be about one-eighth of a gallon per minute. Fuel oil was identified to be spraying onto the wall and onto the floor. Fuel oil pump suction pressure was observed to be normal with the diesel running. Operators secured the diesel generator to effect repairs at 9:44 a.m. The isolation valve was closed and the fitting was tightened to stop the leak. Following the repair, the diesel generator was restarted, the leak was verified to be fixed and the surveillance test was resumed. Engineering confirmed by calculation that during the time period that the loose fitting existed the diesel generator was capable of carrying the required load for the time credited during a design basis event, and therefore remained operable.

The inspectors determined that the documentation of the work did not indicate that the technicians used a systematic approach to track the fitting adjustments to ensure that all fittings were properly tightened. After interviewing the technicians, the licensee concluded that the technicians did not track the loosening and tightening of the fittings as required by MA-AA-716-100.

Analysis: The inspectors determined that the failure to track the configuration of the fittings to ensure all fittings were tightened after maintenance was a performance deficiency that warranted review in the SDP. Alterations to plant configuration that occur during maintenance were required to be documented in the work instructions or on the Maintenance Alteration Log in accordance with MA-AA-716-100, "Maintenance Alteration Process." Neither process was used to track the fitting loosened during the relay replacement.

The inspectors determined that the issue was more than minor because it was associated with the Configuration Control attribute of the Mitigating Systems Cornerstone and adversely impacted the cornerstone objective of ensuring the availability, reliability, and capability of systems to respond to initiating events to prevent undesirable consequences. Specifically, the fitting could have loosened further and increased the size of the fuel leak or resulted in a fire that impacted diesel generator availability during a design basis event.

The finding was determined to be of very low safety significance, or Green, in accordance with IMC 0609, "Significance Determination Process," Attachment 0609.04, "Initial Characterization of Findings," Appendix A, "The Significance Determination Process (SDP) For Findings at Power" because the inspectors answered Exhibit 2 – Mitigating Systems Question A.1 as "Yes" since the diesel generator remained operable and functional until the fitting was repaired.

This finding had a cross-cutting aspect in the Avoiding Complacency element of the Human Performance Area because judicious implementation of human performance error prevention tools could have prevented the failure to properly tighten the fitting even if the Alterations Log was not used as required. (IMC 0310 H.12)

Enforcement: Technical Specification 5.4.1.a, "Written Procedures" states that written procedures shall be established, implemented, and maintained covering the applicable procedures recommended in Regulatory Guide 1.33, Revision 2, Appendix A, February 1978. Appendix A lists administrative procedures for equipment control.

The stated purpose of licensee procedure MA-AA-716-100, "Maintenance Alteration Process," was "To provide administrative controls to ensure equipment integrity when performing maintenance alterations associated with repair, replacement, or surveillance activities on plant equipment, when the alterations are not controlled by other approved procedures or the Work Control process." The procedure specified that the Maintenance Alteration Log included in the procedure as Attachment 1 was required to be used to document alterations when manipulations were not specifically directed and documented by other approved procedures, surveillances, or checklists.

Contrary to the above, on August 23, 2016, technicians replacing 2PY-DG8035B, the 2B DG fuel oil pump inlet pressure indicator ratio relay, using WO 01812751, failed to document manipulation of multiple fittings when those manipulations were not directed and documented by the work instructions or other methods.

After the work activity was finished, one fitting was not tightened and resulted in a fuel oil leak in the diesel generator room when the diesel generator was started on August 24 for surveillance testing. The leak was promptly repaired by tightening the fitting after the diesel generator was shut down. The technicians reviewed human performance error prevention techniques, including proper use of the Maintenance Alterations Log, with supervisors. Because this violation was of very low safety significance and was entered into the licensee's CAP as IR 02707888, this violation is being treated as an NCV, consistent with Section 2.3.2 of the Enforcement Policy (**NCV 05000455/2016003-02: Failure to Use Alteration Log Resulted in Fuel Oil Leak**).

1R18 Plant Modifications (71111.18)

.1 Plant Modifications

a. Inspection Scope

The inspectors reviewed the following modification:

- EC 406694, "Procedurally Controlled TCC (Temporary Configuration Change) to Disable OAR-039 Interlock with the Fuel Handling Building Crane"

The inspectors reviewed the temporary equipment configuration change and associated 10 CFR 50.59 safety evaluation screening against the design basis, the UFSAR, and the TSSs, as applicable, to verify that the modification did not affect the operability or availability of the affected system. 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 modification did not impact the operability of any interfacing systems. The inspectors verified that the relevant procedure was properly updated and the appropriate radiation protection controls were in place. Lastly, the inspectors discussed the plant modification with reactor services and radiation protection personnel to ensure that the individuals were aware of how the operation with the plant modification in place could impact performance.

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

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19)

.1 Post-Maintenance Testing

a. Inspection Scope

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

- 1D MSIV packing leak;

- Diaphragm replacement for containment isolation valve 2RE9160A;
- Actuator of component cooling outlet isolation valve for RH heat exchanger 1B, 1CC9412B, exceeded maximum torque thrust limit; and
- 2B AF exhaust manifold leak.

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

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

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22)

.1 Surveillance Testing

a. Inspection Scope

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

- 2BOSR 0.1-1,2,3; "Unit Two Mode 1, 2 & 3 Shiftly and Daily Operating Surveillance" (routine);
- 0BOSR 10.b.6-1; "Diesel Fire Pump Monthly Surveillance" (routine);
- 1BOSR 5.5.8.RH.5-2a; "Unit One Group A Inservice Testing (IST) Requirements for Residual Heat Removal Pump 1RH01PB" (IST);
- 2BOSR 8.1.2-1, "Unit Two 2A Diesel Generator Operability Surveillance" (routine);
- 1BOSR 8.1.2-1, "Unit One 1A Diesel Generator Operability Surveillance" (routine);
- 1BOSR 5.5.8.AF.5-2b; "Unit One Group B Inservice Testing (IST) Requirements for Diesel Driven Auxiliary Feedwater Pump 1AF01PB" (IST);

- 2BOSR 5.5.8.SX.5–2c; “Unit Two Comprehensive Inservice Testing (IST) Requirements for the Essential Service Water (SX) Pump 2SX01PB and Unit 2 SX Pumps Discharge Check Valves” (IST); and
- 2BOSR 5.5.8.DO–1; “Unit Two Test of the Diesel Oil Transfer System” (IST).

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

- did preconditioning occur;
- were the effects of the testing adequately addressed by control room personnel or engineers prior to the commencement of the testing;
- were acceptance criteria clearly stated, sufficient to demonstrate operational readiness, and consistent with the system design basis;
- was plant equipment calibration correct, accurate, and properly documented;
- were as-left setpoints within required ranges; and was the calibration frequency in accordance with TSs, the UFSAR, plant procedures, and applicable commitments;
- was measuring and test equipment calibration current;
- was the test equipment used within the required range and accuracy, and were applicable prerequisites described in the test procedures satisfied;
- did test frequencies meet TS requirements to demonstrate operability and reliability;
- were tests performed in accordance with the test procedures and other applicable procedures;
- were jumpers and lifted leads controlled and restored where used;
- were test data and results accurate, complete, within limits, and valid;
- was test equipment removed following testing;
- where applicable for IST activities, was testing performed in accordance with the applicable version of Section XI of the ASME Code and were reference values consistent with the system design basis;
- was the unavailability of the tested equipment appropriately considered in the performance indicator 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 four routine surveillance testing samples and four in-service test samples as defined in IP 71111.22, Sections–02 and–05.

b. Findings

No findings were identified.

1EP2 Alert and Notification System Evaluation (71114.02)

.1 Alert and Notification System Evaluation

a. Inspection Scope

The inspectors reviewed documents and held discussions with Emergency Preparedness (EP) staff regarding the operation, maintenance, and periodic testing of the primary and backup Alert and Notification System (ANS) in the plume pathway Emergency Planning Zone. The inspectors reviewed monthly trend reports and siren test failure records from September 2014 to September 2016. Information gathered during document reviews and interviews were used to determine whether the ANS equipment was maintained and tested in accordance with Emergency Plan commitments and procedures. Documents reviewed are listed in the Attachment to this report.

This ANS evaluation inspection constituted one sample as defined in Inspection Procedure (IP) 71114.02.

b. Findings

No findings were identified.

1EP3 Emergency Response Organization Staffing and Augmentation System (71114.03)

.1 Emergency Response Organization Staffing and Augmentation System

a. Inspection Scope

The inspectors reviewed and discussed with plant EP management and staff the Emergency Plan commitments and procedures that addressed the primary method of initiating an Emergency Response Organization (ERO) activation to augment the on-shift staff as well as the provisions for maintaining the plant's ERO team and qualification lists. The inspectors reviewed some information regarding the backup method of ERO activation and augmentation. The inspectors reviewed reports and a sample of CAP records of unannounced off-hour augmentation drills and call-in tests, which were conducted from September 2014 through September 2016, to determine the adequacy of the drill critiques and associated corrective actions. The inspectors also reviewed a sample of the training records of approximately seven ERO personnel, who were assigned to key and support positions, to determine the status of their training as it related to their assigned ERO positions. Documents reviewed are listed in the Attachment to this report.

This ERO augmentation testing inspection constituted a partial sample. The inspection sample will be completed by the end of the calendar year 2016, with the review of the backup method of ERO activation and augmentation.

b. Findings

No findings were identified.

1EP5 Maintenance of Emergency Preparedness (71114.05)

.1 Maintenance of Emergency Preparedness

a. Inspection Scope

The inspectors reviewed a sample of nuclear oversight staff's audits of the EP Program to determine whether these independent assessments met the requirements of Title 10 of the *Code of Federal Regulations* 50.54(t). The inspectors also reviewed critique reports and samples of CAP records associated with the 2015 Biennial Exercise, as well as various EP drills conducted in 2014, 2015, and 2016; in order to determine whether the licensee fulfilled drill commitments and to evaluate the licensee's efforts to identify, track, and resolve issues identified during these activities. The inspectors reviewed a sample of EP items and corrective actions related to the licensee's EP Program and activities to determine whether corrective actions were completed, in accordance with the site's CAP. Documents reviewed are listed in the Attachment to this report.

This correction of EP weaknesses and deficiencies inspection constituted one sample as defined in Inspection Procedure (IP) 71114.05.

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 July 13, 2016, 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 emergency preparedness drill inspection constituted one sample as defined in IP 71114.06-06.

b. Findings

No findings were identified.

2. RADIATION SAFETY

2RS8 Radioactive Solid Waste Processing and Radioactive Material Handling, Storage, and Transportation (71124.08)

.1 Radioactive Material Storage

a. Inspection Scope

The inspectors selected areas where containers of radioactive waste were stored, and evaluated whether the containers were labeled in accordance with 10 CFR 20.1904, or controlled in accordance with 10 CFR 20.1905.

The inspectors assessed whether the radioactive material storage areas were controlled and posted in accordance with the requirements of 10 CFR Part 20. For materials stored or used in the controlled or unrestricted areas, the inspectors evaluated whether they were secured against unauthorized removal and controlled in accordance with 10 CFR 20.1801 and 10 CFR 20.1802.

The inspectors evaluated whether the licensee established a process for monitoring the impact of low-level radioactive waste storage that was sufficient to identify potential unmonitored, unplanned releases or nonconformance with waste disposal requirements.

The inspectors evaluated the licensee's program for container inventories and inspections. The inspectors selected containers of stored radioactive material, and assessed these containers for signs of swelling, leakage, and/or deformation.

This inspection constituted one complete sample as defined in IP 71124.08–05.

b. Findings

No findings were identified.

.2 Radioactive Waste System Walkdown

a. Inspection Scope

The inspectors walked down accessible portions of select radioactive waste processing systems to assess whether the current system configuration and operation agreed with the descriptions in plant and/or vendor manuals.

The inspectors reviewed administrative and/or physical controls to assess whether equipment which was not in service or abandoned in place would contribute to an unmonitored release path and/or affect operating systems or be a source of unnecessary personnel exposure. The inspectors assessed whether the licensee reviewed the safety significance of systems and equipment abandoned in place in accordance with 10 CFR 50.59.

The inspectors reviewed the adequacy of changes made to the radioactive waste processing systems since the last inspection. The inspectors evaluated whether changes from what is described in the Final Safety Analysis Report were reviewed and documented in accordance with 10 CFR 50.59 or that changes to vendor equipment were made in accordance with vendor manuals. The inspectors also assessed the impact of these changes on radiation doses to occupational workers and members of the public.

The inspectors selected processes for transferring radioactive waste resin and/or sludge discharges into shipping/disposal containers and assessed whether the waste stream mixing, sampling, and waste concentration averaging were consistent with the process control program, and provided representative samples of the waste product for the purposes of waste classification.

The inspectors evaluated whether tank recirculation procedures provided sufficient mixing.

The inspectors assessed whether the licensee's process control program correctly described the current methods and procedures for dewatering and waste stabilization.

This inspection constituted one complete sample as defined in IP 71124.08–05.

b. Findings

No findings were identified.

.3 Waste Characterization and Classification

a. Inspection Scope

For select waste streams, the inspectors assessed whether the licensee's radiochemical sample analysis results were sufficient to support radioactive waste characterization as required by 10 CFR Part 61. The inspectors evaluated whether the licensee's use of scaling factors and calculations to account for difficult-to-measure radionuclides was technically sound and based on current 10 CFR Part 61 analysis.

The inspectors evaluated whether changes to plant operational parameters were taken into account to: (1) maintain the validity of the waste stream composition data between the sample analysis update; and (2) assure that waste shipments continued to meet the requirements of 10 CFR Part 61.

The inspectors evaluated whether the licensee had established and maintained an adequate quality assurance program to ensure compliance with the waste classification and characterization requirements of 10 CFR 61.55 and 10 CFR 61.56.

This inspection constituted one complete sample as defined in IP 71124.08–05.

b. Findings

No findings were identified.

.4 Shipment Preparation

a. Inspection Scope

The inspectors observed radiation workers during the conduct of radioactive waste processing and radioactive material shipment preparation and receipt activities.

The inspectors observed shipment packaging, surveying, labeling, marking, placarding, vehicle checks, emergency instructions, disposal manifest, shipping papers provided to the driver, and licensee verification of shipment readiness. The inspectors assessed whether shippers were knowledgeable of the shipping regulations and demonstrated adequate skills to accomplish package preparation requirements. The inspectors evaluated whether the licensee was maintaining shipping procedures in accordance with current regulations. The inspectors assessed whether the licensee was meeting the expectations in NRC Bulletin 79-19, "Packaging of Low-Level Radioactive Waste for Transport and Burial," and 49 CFR Part 172, Subpart H, "Training."

The inspectors evaluated whether the requirements for Type B shipment Certificates of Compliance had been met. The inspectors determined whether the user was a registered package user and had an NRC approved quality assurance program. The inspectors assessed whether procedures for cask loading and closure were consistent with vendor procedures.

The inspectors assessed whether non-Type B shipments were made in accordance with the package quality documents.

The inspectors assessed whether the receiving licensee was authorized to receive the shipment packages.

This inspection constituted one complete sample as defined in IP 71124.08-05.

b. Findings

Introduction: A self-revealed finding of very low safety significance (Green) and an associated NCV of 10 CFR 71.5(a) and 49 CFR 171.1(b)(12) was identified when a Low Specific Activity II (LSA II) shipment from the licensee arrived at a waste processing facility with a breach in the shipping package. Specifically, the licensee failed to block and brace the shipment to prevent the load from shifting. This action resulted in the load shifting during transportation to the waste processing facility allowing a piece of scrap metal to breach the wall of the shipping package.

Description: On May 1, 2016, the licensee shipped Radioactive Waste (Radwaste) Shipment 16-009 (RWS 16-009) to Bear Creek Processing Facility in Oak Ridge, Tennessee. The shipment was classified as LSA II and contained various forms of dry activated waste. During transportation, a load shift occurred causing a breach in the side wall of the shipping package. This load shift was caused by inadequate blocking and bracing practices that were used by the licensee when the shipment was originally loaded into the container. The package breach was identified by the waste processing facility. The waste processing facility performed a receipt of shipment survey of the package and identified no removable contamination on the package surface and no loss of content from the package. There were also no external radiation dose levels that exceeded NRC or DOT limits. The waste processing facility contacted the licensee

stating that a shipment arrived with a breach in the shipping package. The Radwaste Processing Facility was able to send photographs of the shipping package to the licensee. From the images, the licensee determined that the most likely cause of the breach was from scrap metal in the container that was near the breach.

Analysis: The inspectors determined that the licensee's failure to properly block and brace RWS 16-009 was within the licensee's ability to foresee and correct and should have been prevented, therefore constituting a performance deficiency. Specifically, the failure to properly block and brace the Radwaste Shipment caused the load to shift during transportation, which allowed a piece of scrap metal to breach the side wall of the shipping package.

The performance deficiency was determined to be more than minor in accordance with IMC 0612, Appendix B, "Issue Screening," because the performance deficiency was associated with the Program and Process attribute of the Public Radiation Safety Cornerstone and adversely impacted the cornerstone objective of ensuring adequate protection to public health and safety from exposure to radiation from routine civilian nuclear operations. Specifically, the breach of the transportation package by its content could lead to the inadvertent spread of radioactive contamination in the public domain if conditions had been slightly altered.

The finding was determined to be of very low safety significance, or Green, in accordance with IMC 0609, Appendix D, "Public Radiation Safety Significance Determination Process," dated February 12, 2008, because: (1) the finding did not involve radioactive shipment above radiation limits; (2) a certificate of compliance issue; (3) the failure to make emergency notifications; or (4) a low-level burial issue. A breach of the transportation package occurred during transit. However, the shipment contained less than a Type A quantity of material (LSA II shipment), and there was no loss of package contents or radioactive contamination. Consequently, the inspectors determined that the finding was of very low safety significance (Green).

The inspectors concluded that the cause of the finding involved a cross-cutting component in the Human Performance aspect of Resources due to inadequate procedures (IMC 0610 H.1). Specifically, the licensee's procedures that pertained to loading Radwaste Shipments did not contain instructions on how to adequately block and brace objects that contained a heavier mass (scrap metal, etc.) to prevent movement when loaded into sea land containers with various forms of Dry Activated Waste.

Enforcement: Title 10 CFR 71.5(a) stated, in part, that, "each licensee who transports licensed material outside the site of usage, as specified in the NRC license, or where transport is on public highways, or who delivers licensed material to a carrier for transport, shall comply with the applicable requirements of the DOT regulations in 49 CFR Parts 107, 171 through 180, and 390 through 397, appropriate to the mode of transport."

Specifically, 49 CFR 171.1(b)(12) stated, in part, that, "Requirements in the Hazardous Materials Regulations (HMR) apply to each person who offers a hazardous material for transportation in commerce, causes a hazardous material to be transported in commerce, or transports a hazardous material in commerce and who performs or is responsible for performing a pre-transportation function, including each person performing pre-transportation functions under contract with any department, agency, or

instrumentality of the executive, legislative, or judicial branch of the Federal government. Pre-transportation functions include, but are not limited to, the following....Loading, blocking and bracing a hazardous materials package in freight or transport vehicle.”

Contrary to the above, on May 1, 2016, the licensee failed to properly block and brace Radwaste Shipment 16-009 which caused a load shift during transportation to the waste processing facility in Oak Ridge, Tennessee. The shifting load caused a piece of scrap metal that was within the shipping contents to cause a breach in the side wall of the shipping package. When the package arrived at the Radwaste Facility, the waste processing facility performed a receipt of shipment survey of package and identified no removable contamination on the package surface and no loss of content from the shipping package. There were also no external radiation dose levels that exceeded NRC or DOT limits. The waste processing facility contacted the licensee stating that a shipment arrived with a breach in the shipping package. Because this violation was of very low safety significance and was entered into the licensee’s CAP as IR 02665985, this violation is being treated as a NCV, consistent with Section 2.3.2 of the Enforcement Policy (**NCV 05000454/2016003–03; 05000455/2016003–03: Failure to Properly Block and Brace a Radioactive Shipment for Transport**).

.5 Shipping Records

a. Inspection Scope

The inspectors reviewed select shipments to evaluate whether the shipping documents indicated the proper shipper name; emergency response information and a 24-hour contact telephone number; accurate curie content and volume of material; and appropriate waste classification, transport index, and UN number. The inspectors assessed whether the shipment marking, labeling, and placarding was consistent with the information in the shipping documentation.

This inspection constituted one complete sample as defined in IP 71124.08–05.

b. Findings

No findings were identified.

.6 Identification and Resolution of Problems

a. Inspection Scope

The inspectors assessed whether problems associated with radioactive waste processing, handling, storage, and transportation, were being identified by the licensee at an appropriate threshold, were properly characterized, and were properly addressed for resolution. Additionally, the inspectors evaluated whether the corrective actions were appropriate for a selected sample of problems documented by the licensee that involve radioactive waste processing, handling, storage, and transportation.

This inspection constituted one complete sample as defined in IP 71124.08–05.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

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

4OA1 Performance Indicator Verification (71151)

.1 Mitigating Systems Performance Index—Heat Removal System

a. Inspection Scope

The inspectors sampled licensee submittals for the Mitigating Systems Performance Index - Heat Removal System performance indicator (PI) for Byron Station, Units 1 and 2, for the period from the third quarter of 2015 through the second quarter of 2016. To determine the accuracy of the PI data reported during those periods, PI 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, issue reports, event reports, mitigating systems performance index (MSPI) derivation reports, and NRC Integrated Inspection Reports for the period of July 1, 2015, through June 30, 2016, 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 issue report database to determine if any problems had been identified with the PI data collected or transmitted for this indicator.

This inspection constituted two 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 third quarter of 2015 through the second quarter of 2016. To determine the accuracy of the PI data reported during those periods, PI guidance contained in NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, dated August 31, 2013, was used. The inspectors reviewed the licensee's operator narrative logs, issue reports, MSPI derivation reports, event reports and NRC Integrated Inspection Reports for the period of July 1, 2015, through June 30, 2016, 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 issue report database to determine if any problems had been identified with the PI data collected or transmitted for this indicator.

This inspection constituted two MSPI cooling water system samples as defined in IP 71151–05.

b. Findings

No findings were identified.

.3 Drill/Exercise Performance

a. Inspection Scope

The inspectors sampled licensee submittals for the Drill/Exercise Performance (DEP) PI for the period from the second quarter of 2015 through the second quarter of 2016. PI definitions and guidance contained in NEI 99–02, “Regulatory Assessment Performance Indicator Guideline,” Revision 7, were used to determine the accuracy of the PI data reported during those periods. The inspectors reviewed the licensee’s records and processes associated with the PI to verify the licensee accurately reported the DEP indicator in accordance with licensee procedures and NEI guidance. Specifically, the inspectors reviewed licensee records, processes, and procedural guidance for assessing opportunities, including control room simulator training sessions, the 2015 Biennial Exercise, and other drills during this period. The inspectors also reviewed the CAP to determine if problems had been identified and corrected. Specific documents reviewed are listed in the Attachment to this report.

This inspection constitutes one DEP sample as defined in IP 71151.

b. Findings

No findings were identified.

.4 Emergency Response Organization Drill Participation

a. Inspection Scope

The inspectors sampled licensee submittals for the ERO Drill Participation PI for the period from the second quarter of 2015 through the second quarter of 2016. The PI data reported during those periods and PI definitions and guidance contained in NEI 99–02, “Regulatory Assessment Performance Indicator Guideline,” Revision 7, were used to determine the accuracy. The inspectors reviewed the licensee’s records associated with the PI to verify that the licensee accurately reported the indicator in accordance with relevant procedures and NEI guidance. Specifically, the inspectors reviewed licensee records and processes, including procedural guidance on assessing opportunities for the PI, performance during the 2015 Biennial Exercise, drills, and revisions of the roster of personnel assigned to key ERO positions. The inspectors also reviewed the CAP to determine if problems had been identified and corrected. Specific documents reviewed are listed in the Attachment to this report.

This inspection constitutes one ERO drill participation sample as defined in IP 71151.

b. Findings

No findings were identified.

.5 Alert and Notification System Reliability

a. Inspection Scope

The inspectors sampled licensee submittals for the ANS PI for the period from the second quarter of 2015 through the second quarter of 2016. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, were used. The inspectors reviewed the licensee's records associated with the PI to verify that the licensee accurately reported the indicator in accordance with relevant procedures and NEI guidance. Specifically, the inspectors reviewed licensee records and processes for assessing opportunities for the PI and results of periodic ANS operability tests. The inspectors also reviewed the CAP to determine whether the problems had been identified and corrected. Specific documents reviewed are listed in the Attachment to this report.

This inspection constitutes one ANS sample as defined in IP 71151.

b. Findings

No findings were identified.

4OA2 Identification and Resolution of Problems (71152)

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

a. Inspection Scope

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

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

b. Findings

No findings were identified.

.2 Annual Follow-up of Selected Issues: Resolution of Nonconforming Condition of Reactor Pressure Vessel Head Flange

a. Inspection Scope

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

- IR 02555756, B1R20M5 Imprint in the Top of the Reactor Head Flange

The subject IR documented an issue where an allen wrench tool was left on the head flange between studs 24 and 25 and when the stud tensioner was used on stud 25, an imprint of the tool was pressed into the top of the head flange. The inspectors had previously reviewed the as-found condition and initial operability evaluation for this issue including review of Operability Evaluation 15-002 (EC 403292), Unit 1 Reactor Head Flange Impression, Revisions 0 and 1. The inspectors documented the review and an associated finding for inaccurate technical information that the licensee included in Revision 0 of the operability evaluation in NRC IR 05000454(455)/2015004. For this sample, the inspectors verified the following attributes during their review of the licensee's corrective actions for the above issue reports and other related documents:

- consideration of the extent of condition, generic implications, common cause, and previous occurrences;
- classification and prioritization of the resolution of the problem commensurate with safety significance;
- identification of the root and contributing causes of the problem;
- identification of corrective actions, which were appropriately focused to correct the problem;
- completion of corrective actions in a timely manner commensurate with the safety significance of the issue (including the analysis performed to resolve the non-conforming condition);
- effectiveness of corrective actions taken to preclude repetition; and
- communication of applicable lessons learned to the appropriate organizations.

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

b. Findings

No findings were identified.

.3 Annual Follow-up of Selected Issues: 1B Diesel Oil Storage Tank Watertight Door Ajar Alarm Discovered Not Working

a. Inspection Scope

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

- IR 02699683; 0DSSD192 Watertight Door Ajar Alarm Is Not Working

The subject IR documented an issue discovered after internal flood barrier door 0DSSD192 was left open and unattended. A finding associated with the open door is discussed in Section 1R06 of this report.

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

- complete and accurate identification of the problem in a timely manner; commensurate with its safety significance and ease of discovery;
- consideration of the extent of condition, generic implications, common cause, and previous occurrences;
- identification of the root and contributing causes of the problem;

- identification of corrective actions, which were appropriately focused to correct the problem; and
- evaluation of applicability for operating experience and communication of applicable lessons learned to appropriate organizations.

The inspectors verified that the licensee entered the issue into the CAP upon identification of the issue. The inspectors identified that, following the documentation of the IR, the licensee performed an extent of condition review to identify if any other watertight door ajar alarms were not working and reviewed past IRs and work orders to identify previous instances of failed alarms. The inspectors reviewed the licensee's performed and planned corrective actions for the failure as well as the extent of condition review, and also reviewed the licensee's site-wide communication pamphlet that discussed the issue with the door and the alarm.

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

b. Findings

No findings were identified.

4OA6 Management Meetings

.1 Exit Meeting Summary

On October 20, 2016, the inspectors presented the inspection results to Mr. T. Chalmers, Byron Plant Manager, 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

Interim exits were conducted for:

- the inspection results of the Radiation Safety Program inspection with Mr. M. Kanavos, Site Vice President, on July 1, 2016.
- the inspection results of the Emergency Preparedness Program inspection with Mr. M. Kanavos, Site Vice President, on September 30, 2016.

The inspectors confirmed that none of the potential report input discussed was considered proprietary. Proprietary material received during the inspection was returned to the licensee.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

M. Kanavos, Site Vice President
R. Lloyd, Emergency Preparedness Manager
D. Spitzer, Regulatory Assurance Manager
R. Kartheiser, Emergency Preparedness Coordinator
S. Kerr, Projects Manager
J. Armstrong, Organizational Effectiveness Manager
T. Faley, Acting Maintenance Director
E. Hernandez, Operation Director
P. Boyle, Work Management Director
H. Welt, Engineering Senior Manager
K. McGuire, Chemistry Manager
B. Barton, Radiation Protection Manager
G. Contrady, NRC Coordinator
L. Zurawski, NRC Coordinator

U.S. Nuclear Regulatory Commission

E. Duncan, Chief, Reactor Projects Branch 3

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

05000454/2016003-01	NCV	DOST Flood Barrier Door Left Open
05000455/2016003-02	NCV	Failure to Use Alteration Log Resulted in Fuel Oil Leak
05000454/2016003-03 05000455/2016003-03	NCV	Failure to Properly Block and Brace a Radioactive Shipment for Transport

Closed

05000454/2016003-01	NCV	DOST Flood Barrier Door Left Open
05000455/2016003-02	NCV	Failure to Use Alteration Log Resulted in Fuel Oil Leak
05000454/2016003-03 05000455/2016003-03	NCV	Failure to Properly Block and Brace a Radioactive Shipment for Transport

LIST OF DOCUMENTS REVIEWED

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

1R01 Adverse Weather Protection

- OBOA ENV-2, Revision 103; Rock River Abnormal Water Level Unit 0
- UFSAR Section 3.4, Water Level (Flood) Design

1R04 Equipment Alignment

- BOP RH-M1A, Revision 9; Train "A" Residual Heat Removal System Valve Lineup
- BOP RH-E1A, Revision 3; Residual Heat Removal System Train "A" Electrical Lineup
- M-61, Sheet 3, Revision AK; Diagram of Safety Injection
- M-61, Sheet 4, Revision AZ; Diagram of Safety Injection
- M-62, Revision BF, Diagram of Residual Heat Removal
- BOP DG-E1, Revision 8; Unit 1 Diesel Generator Electrical Lineup
- BOP DG-E1B, Revision 3; Unit 1 Diesel Generator Train "B" Electrical Lineup
- BOP DG-M1B, Revision 13; Train "B" Diesel Generator System Valve Lineup

1R05 Fire Protection

- Pre-Fire Plan, Fire Zone 11.2-0 North; Auxiliary Building 346'-0" Elevation General Area – North
- Pre-Fire Plan, Fire Zone 11.2-0 Northwest; Auxiliary Building 346'-0" Elevation General Area – Northwest – Blue Tool Room
- Pre-Fire Plan, Fire Zone 11.2-0 West; Auxiliary Building 346'-0" Elevation General Area – West
- Pre-Fire Plan, Fire Zone 11.2-0 Southwest; Auxiliary Building 346'-0" Elevation General Area – Southwest
- Pre-Fire Plan, Fire Zone 11.2-0 South; Auxiliary Building 346'-0" Elevation General Area – South
- Pre-Fire Plan, Fire Zone 11.3-0 South; Auxiliary Building 364'-0" Elevation General Area – South
- Pre-Fire Plan, Fire Zone 11.3-0 West; Auxiliary Building 364'-0" Elevation General Area – West
- Pre-Fire Plan, Fire Zone 11.3-0 North; Auxiliary Building 364'-0" Elevation General Area – North
- Pre-Fire Plan, Fire Zone 5.5-1; Auxiliary Building 451'-0" Elevation Unit 1 Auxiliary Electrical Room
- Pre-Fire Plan, Fire Zone 5.5-2; Auxiliary Building 451'-0" Elevation Unit 2 Auxiliary Electrical Room
- Pre-Fire Plan, Fire Zone 2.1-0; Control Room 451'-0" Elevation Control Room

1R06 Flooding

- IR 02699674; Water Tight Door for 1B DOST Room (ODSD648) Found Open
- Event Notice 52148; Watertight Door Discovered Open and Unattended

- EC 406351; Diesel Oil Storage Tank Room Watertight Door Not Closed
- UFSAR Section 10.4.5, Circulating Water System

1R11 Licensed Operator Requalification Program

- Evaluation Scenario for week of July 13, 2016

1R12 Maintenance Effectiveness

- a(2) Determination for System AP-02 (Provide power, control, protection, indication, and alarms for 6900v and 4160v Non-ESF loads) dated 7/8/2016
- IR 02492862; Maintenance Rule Unavailability Criteria for AP-02 Function is Exceeded
- a(2) Determination for System AP-04 (Provide power, control, protection, indication, and alarms for 480V Non-ESF Substation Loads)
- a(2) Determination for System AP-05 (Provide power, control, protection, indication, and alarms for 480V/ESF Motor Control Centers)
- IR 01634785; 150 Amp Molded Case Circuit Breaker "B" Phase Not Tripping
- Power Labs Report, BYR-14420; HFB Breaker B Phase Could Not Be Tested
- IR 01635318; 5 AMP Molded Case Circuit Breaker "A" Phase Trip High
- a(2) Determination for System PR-08 (Provide PR system communications between the safety-related and non-safety related PR skids and the Main Control Room)
- WO 0498093; RMS Loop 3 Loss of Communications
- IR 2510551; Loss of Communications on Loop 3 of RMS
- Multiple IRs on Loss of Loop 3 Communications (IR 2528261, 2528881, 2531595, 2531777, 2534811, 2680497, 2681507, 2680714, 2701812, 2705114, 2706894, and 2711046)

1R13 Maintenance Risk Assessments and Emergent Work Control

- OP-BY-108-117-1000, Revision 6; Byron Protected Equipment Program
- IR 2704898; Leak at Weld Defect
- Revision 2 of Week 8/25/16 Online Risk Assessment
- WO 01945918; Leak at Weld Defect
- Work Week Risk Profile for week of 7/25/2016
- Revision 4 of Week 9/26/2016 Online Risk Assessment

1R15 Operability Determinations and Functional Assessments

- IR 02680622; 1D MSIV AOP Unable to Control Accumulator Pressure
- EC 354038; Replacement MSIV Accumulators – Re-rate to 5500# and Evaluate Mounting Differences
- IR 02677036; Vacuum Relief Valve 0SX169E Leaking
- Exelon Power Labs Report, BYR-65970, dated 07/14/2016; Failure Analysis of 0SX169E/0SX169F Vacuum Breaker Cover Cracking for Byron Station
- WO 01774125; Unit 1 (SX-3-8) VT XI [Visual Test, Section XI (1A/1B Pump Running)]
- WO 01938033; Extent of Condition for SX Vacuum Breakers
- IR 2689594; Severe Degradation of Filter Elements
- M-152, Sheet 18, Revision R; Diagram of Starting Air
- IR 2715090; 1B AF Pump Fuel Oil Supply Line Leak
- IR 2707888; 2B DG Fuel Oil Leak
- MA-AA-716-100, Revision 12; Maintenance Alteration Process
- WO 01812751; Perform Required Replacement of Ratio Relay

- Regulatory Guide 1.33 Revision 2, Appendix A; Typical Procedures For Pressurized Water Reactors and Boiling Water Reactors
- IR 2707553; SXCT Fill Degradation – Cell G
- IR 1108504; SXCT – Clay Tile Damage

1R18 Plant Modifications

- EC 406694, Revision 0; Procedurally Controlled TCC to Disable 0AR-039 Interlock with the Fuel Handling Building Crane”
- IR 02720150; Crane Rad Monitor Not Functioning Correctly
- WO 01955779; Crane Rad Monitor Not Functioning Properly
- BFP FH-20, Revisions 31 and 32; Operations of the Fuel Handling Building Crane
- 50.59 Screening 6D-16-025, Revision 0; Byron Procedure BFP FH-20 Revision 31

1R19 Post-Maintenance Testing

- WO 01926038; Evaluate Potential Need for LLRT (Replace Valve Diaphragm – 2RE9160A)
- 2BOSR 0.5-2.RE.3, Revision 3; Unit 2 Reactor Coolant Drain Tank Containment Isolation Valve Indication Test
- 2BOSR 6.1.1-10, Revision 11; Unit Two Primary Containment Type C Local Leak Rate Test and IST Tests of Reactor Building Drains and Vents System
- 2BOSR 6.3.5-9, Revision 5; Unit Two Reactor Coolant Drain Tank Containment Isolation Valve Stroke Test
- Vendor Drawing SD-C-102872, Revision H; 1” Grinnell Nuclear Diaphragm Valve Air Operated – High Pressure
- BMP 3100-41, Revision 11; ITT Grinnell Air Operated Diaphragm Valve Repair
- NUREG 1482, Revision 2; Guidelines for Inservice Testing at Nuclear Power Plants; Section 4.4.2, Post-Maintenance Testing After Stem Packing Adjustments and Backseating Valves to Prevent Packing Leakage
- IR 02682714; 1D MSIV Packing Leak
- WO 01890495; 1D MSIV Packing Leak
- Risk Assessment BYR-1-2016-0408, Revision 0; 1D MDIV Packing Leak ODM [Operational Decision-Making]
- IR 02697104; As-found Thrust Value for 1CC9412B Exceeded Max Limit
- BHP 4200-116, Revision 9; Diagnostic Testing and Inspection of Motor Operated Valves
- WO 01790752; MOV PM, Actuator Inspection, Diagnostic Testing
- WO 01940244; 2B AF Southeast Exhaust Manifold Porting Smoke/Vapor During Run
- BOP AF-7T1, Revision 26; Diesel Driven Feedwater Pump Operating Log
- IR 02693982, 2B AF Southeast Exhaust Manifold Porting Smoke/Vapor During Run
- IR 02704632; Fuel Oil Leak on 2B AF Diesel

1R22 Surveillance Testing

- BAR 0-34-A9, Revision 104; Aux Bldg Press High Low
- 2BOSR 0.1-1,2,3, Revision 76; Unit Two Mode 1, 2 & 3 Shiftly and Daily Operating Surveillance
- Test Report Package for Calibration of Containment Inside/Outside Differential Pressure Loop (VP), Revision 1
- BOP VQ-6, Revision 7; Containment Mini-Purge System Operation
- Test Report Package for Calibration of Containment Pressure Protection Channel IV (SI), Revision 4
- M-2104, Sheet 24, Revision B; HVAC/C&I Diagram Primary Containment System-VP

- IR 01276325; 2PDI-VP236/231 not Responding to Containment Pressure Changes
- BAR 2-3-D4, Revision 51; CNMT Press High
- BAR 0-31-D10, Revision 3; CNMT Internal Press High
- IR 01276694; 2PT-VP205A Investigation
- 2BOL 6.4, Revision 4; LCOAR Containment Pressure Tech Spec LCO # 3.6.4
- M-831, Sheet 3, Revision T; Instrument Locations Elevation 426'-0" Auxiliary Building Byron Station Unit 2
- WO 01920558; 1RH01PB Group A IST Requirements for Residual Heat Removal Pump
- 1BOSR 5.5.8.RH.5-2a, Revision 7; Unit One Group A Inservice Testing (IST) Requirements for Residual Heat Removal Pump 1RH01PB
- 0BOSR 10.b.6-1, Revision 22; Diesel Fire Pump Monthly Surveillance
- WO 01934662; Diesel Fire Pump Surveillance
- BYR97-119, Revision 2; Hydraulic Calculation for Fire Protection System Area 2-T2 Diesel Oil Storage Tank Room 2A
- BYR97-118, Revision 2; Hydraulic Calculation for Fire Protection System Area 2-T1 Diesel Oil Storage Tank Room 2B
- IR 02644403; 0B Diesel Driven Fire Pump Performance
- 0BVSR 3.10.b.13-1, Revision 2; Sequential Start of the Primary & Secondary Fire Pumps
- WO 01900996; 1A Diesel Generator Operability Surveillance
- 1BOSR 8.1.2-1, Revision 28; Unit One 1A Diesel Generator Operability Surveillance
- WO 01928765; Slave Relay Train A SI-K611/DG, VA
- 2BOSR 8.1.2-1, Revision 34; Unit Two 2A Diesel Generator Operability Surveillance
- WO 01920557; LR-1AF01PB Group B IST Requirements for Diesel Driven AF Pump
- 1BOSR 5.5.8.AF.5-2b, Revision 6; Unit One Group B Inservice Testing (IST) Requirements for Diesel Driven Auxiliary Feedwater Pump 1AF01PB
- 1BOSR 5.5.8.AF.5-2b, Revision 7; Unit One Group B Inservice Testing (IST) Requirements for Diesel Driven Auxiliary Feedwater Pump 1AF01PB
- IR 02698883; Validate Calibration of 1PI-SX216
- IR 02698086; Gage Line Blocked for SX Pressure to 1B AF Pump
- IR 02703741; Testing of the DDAF XS Booster Pump
- IR 02698888; 1B AF Pump SX Booster Pump Surveillance Failed
- EC 344237; Byron AF and SX Booster Pumps Hydraulic Reference
- EC 363182, Revision 0; Evaluate Diesel Driven Auxiliary Feedwater Pump Engine Driven Pump Booster Pump (1SX04P) Performance
- WO 01934539; LR-2SX01PB Comprehensive IST Req for Essential Service Water
- 2BOSR 5.5.8.SX.5-2c, Revision 8; Unit Two Comprehensive Inservice Testing (IST) Requirements for the Essential Service Water (SX) Pump 2SX01PB and Unit 2 SX Pumps Discharge Check Valves
- Certificate of Calibration 0010947839; Flowmeter Panametrics PT878; March 16, 2016
- WO 01523776; Component Cooling Heat Exchanger - Inlet Flow Loop 0SX-044
- WO 01615163; Component Cooling Heat Exchanger Inlet Flow Loop 2SX-031
- M-42, Sheet 1A, Revision AQ; Diagram of Essential Service Water
- M-42, Sheet 1B, Revision AS; Diagram of Essential Service Water
- M-42, Sheet 2A, Revision BC; Diagram of Essential Service Water
- M-42, Sheet 2B, Revision BC; Diagram of Essential Service Water
- WO 01947011; Unit 2 Train B – Test of the Diesel Oil Transfer System
- 2BOSR 5.5.8.DO-1, Revision 1; Unit Two Test of the Diesel Oil Transfer System
- M-50, Sheet 1A, Revision AS; Diagram of Diesel Fuel Oil
- M-50, Sheet 1D, Revision AP; Diagram of Diesel Fuel Oil

1EP2 Alert and Notification System Evaluation

- Offsite Emergency Plan Alert and Notification System Addendum for Byron Station; Dated May 2013
- U.S. Department of Homeland Security, FEMA Letter; Backup Alert and Notification System; Dated December 10, 2012
- EP-AA-1000; Exelon Nuclear Standardized Radiological Emergency Plan Section E; Revision 28
- EP-AA-1002; Exelon Nuclear Radiological Emergency Plan Annex for Byron Station, Section 4; Revision 34
- Byron Station Warning System Annual Maintenance & Operational Reports; September 2015 – September 2016
- Byron Station Monthly Siren Availability Reports; September 2014 – September 2016
- Byron Semi-Annual Siren Reports; September 2014 – September 2016
- 2015/2016 Emergency Planning for the Byron Area (Community Information Booklet)
- IR 02607053; Inadvertent Actuation of Emergency Response Sirens; Dated January 3, 2016
- IR 02607341; EP-Siren Failures (BY11, BY35); Dated January 4, 2016
- IR 02651851; EP-Siren Failure (BY44); Dated April 5, 2016
- IR 02668507; EP Siren Failure (BY39); Dated May 12, 2016

1EP3 Emergency Reponse Organization Staffing and Augmentation

- EP-AA-1000; Exelon Nuclear Standardized Radiological Emergency Plan, Sections B and N; Revision 28
- EP-AA-1002; Exelon Nuclear Radiological Emergency Plan Annex for Byron Station, Section 2; Revision 34
- EP-AA-1002; Exelon Nuclear Radiological Emergency Plan Annex for Byron Station, Addendum 1, On-Shift Staffing Technical Basis; Revision 1
- TQ-AA-113; ERO Training and Qualification; Revision 29
- 2016 EP Emergency Team's "On Call" Schedule (Calendar)
- Quarterly Unannounced Off-Hours Call-In Augmentation Drill Results; December 2014 – September 2016
- Emergency Response Organization Call-Out Roster; Dated September 19, 2016
- IR 02533241; Shift Staffing Less Than Desired Per BAP 32D-1; Dated July 7, 2015
- IR 02650932; MMD Less Than 50% EP Pool Members Respiratory Qualified; Dated April 5, 2016
- IR 02679555; ERO Notification System Discrepancies during Unusual Event; Dated June 9, 2016
- IR 02694100; ERO Notification System - Loss of Communications Capability; Dated July 18, 2016

1EP5 Maintenance of Emergency Preparedness

- EP-AA-1000; Exelon Nuclear Standardized Radiological Emergency Plan Section D.3, Timely Classification of Events-Hostile Action; Revision 28
- EP-AA-1000; Exelon Nuclear Standardized Radiological Emergency Plan Section J, Protective Response; Revision 28
- EP-AA-1002; Exelon Nuclear Radiological Emergency Plan Annex for Byron Station, Section 3, Classification of Emergencies; Revision 34
- EP-AA-1002; Exelon Nuclear Radiological Emergency Plan Annex for Byron Station, Section 5.1, Emergency Response Facilities; Revision 34

- EP-AA-1002; Exelon Nuclear Radiological Emergency Plan Annex for Byron Station, Addendum 2, Evacuation Time Estimates for Byron Station Emergency Planning Zone; Revision 1
- EP-MW-124-1001-F-01; Control Room/Simulator Inventory Records; January 2016 - September 2016
- EP-MW-124-1001-F-02; CR/Simulator/TSC/OSC Equipment Test – TSC Software and Reference Document Inventory Records; January 2016 - September 2016
- EP-MW-124-1001-F-04; Operations Support Center Inventory Records; January 2016 - September 2016
- EP-MW-124-1001-F-05; Field Team Inventory Records; January 2016 - September 2016
- EP-MW-124-1001-F-08; Medical Response Kit Inventory Records; January 2016 – September 2016
- EP-MW-124-1001-F-14; Monthly NARS Communications Test Records; January 2016 - September 2016
- EP-MW-124-1001-F-15; Monthly ENS Communications Test Records; January 2016 - September 2016
- EP-MW-124-1001-F-17; Quarterly Director’s Hotline Test Records; January 2016 – September 2016
- EP-MW-124-1001-F-18; Quarterly Operations Status Line Test Records; January 2016 - September 2016
- EP-MW-124-1001-F-19; Quarterly Damage Control Line Test Records; January 2016 - September 2016
- EP-MW-124-1001-F-20; Quarterly Technical Support Line Test Records; January 2016 - September 2016
- EP-MW-124-1001-F-18; Quarterly Field Team Satellite Phone Test; January 2016 - September 2016
- Byron 2015 HAB NRC Graded Exercise Evaluation Report; Dated May 20, 2015
- Byron Nuclear Power Station 2014 Assembly & Accountability Drill Report; Dated December 15, 2014
- Byron Nuclear Power Station 2015 Assembly & Accountability Drill Report; Dated November 20, 2015
- Byron 2014 Medical and Health Physics Drill Findings and Observation Report; Dated August 29, 2014
- Byron 2015 Medical and Health Physics Drill Findings and Observation Report; Dated September 3 2015
- Byron 2016 Off-Year Exercise Evaluation Report; Dated May 25, 2016
- PI-AA-125; Corrective Action Program (CAP) Procedure; Revision 4
- PI-AA-126-1001-F-01 (AR 2625290); Focused Area Self-Assessment-NRC Baseline Inspection Assessment; Dated August 30, 2016
- NOSA-BYR-15-03; Emergency Preparedness Audit Report; Dated April 15, 2015
- NOSA-BYR-16-03; Emergency Preparedness Audit Report; Dated April 13, 2016
- Byron Station Unusual Event Report; Dated May 15, 2016
- Byron 2014 Medical and Health Physics Drill Findings and Observation Report; Dated August 29, 2014
- Byron 2014 Emergency Dose Approval Drill Evaluation Report; Dated December 12, 2014,
- October 29, 2014, Augmentation Drive-In Drill Results; Dated November 24, 2014
- IR 02446853; EPRV - Recommendation For Improvement – Validation of EALS; Dated February 3, 2015
- IR 02505482; NOS ID: Byron 2015 HAB Exercise Issues; Dated May 26, 2015
- IR 02606277; Potential Trend In EP Phone Failures; Dated December 31, 2015

- IR 02679551; Shift Personnel EP Unusual Event Response Lessons Learned; Dated June 9, 2016
- IR 02684652; Byron EP Off Year Exercise – Facility and Equipment Issues; Dated June 22, 2016

1EP6 Drill Evaluation

- Byron Training Drill Scenario Guide

2RS8 Radioactive Solid Waste Processing and Radioactive Material Handling, Storage, and Transportation

- BOP AB-112, Boric Acid Recycle Monitor Tank Recirculation, Rev 009
- BOP WX-112, Radwaste Monitor Tank Recirculation/Polishing, Rev 017
- CS-OP-PR- 009-161067, Bead Resin/Activated Carbon Dewatering Procedure for 14-215 or Smaller Liners Utilizing Self Engaging Dewatering System (Seds) at Byron Station, Rev 004
- NO-AA-10, Quality Assurance Topical Report (QATR), Rev 090
- RP-AA-401, Attachment 2, Combined ALARA Plan/Micro-ALARA Plan; Shipment of All Liners and HICs Including High Level Liners (Task 1) (ALARA Plan Number: BY-0-16-00232), Rev 020
- RP-AA-401, Attachment 2, Combined ALARA Plan/Micro-ALARA Plan; Shipment of High Level Liners with Added Controls (Task 2) (ALARA Plan Number: BY-01600232), Rev 020
- RP-AA-500-100, 1 Rev 005, Requirements for Radioactive Materials Stored Outdoors
- RP-AA-600, Radioactive Materials/Waste Shipments, Rev 014
- RP-AA-601, Surveying Radioactive Material Shipments, Rev 020
- RP-AA-602, Packaging of Radioactive Material Shipments, Rev 020
- RP-AA-603, Inspection and Loading of Radioactive Material Shipments, Rev 010
- RP-AA-605, 10 CFR 61 Program, Rev 010
- RP-BY-463, Controls for Radioactive Hic Movement, Rev 008
- RW-AA-1, Radwaste (No Site Approval), Rev 001
- RW-AA-10, Radwaste Process Description - No Site Approval Needed, Rev 005
- RW-AA-100, Process Control Program For Radioactive Wastes, Rev 011
- RW-AA-1000, Radwaste Monthly Report Guideline, Rev 007
- RW-AA-1001, Water Balance Guideline, Rev 003
- RW-AA-102, Radwaste Storage Facility/Daw Waste Container Inspections, Rev 005
- RW-AA-103, Request For Disposal Of Radioactive Waste, Rev 001
- RW-AA-104, Radwaste Storage Facility/Waste Container Inspections, Rev 005
- RW-AA-105, Guidelines for Operating an Interim on Site Low Level Radioactive Waste Storage Facility, Rev 008
- RW-AA-120, Radwaste Processing Input Control Program, Rev 002
- RWP BY-0-16-00232, Shipment Of All Liners/Hics Including High Level Liners, Rev 007
- RWP BY-0-16-00232, Task 1, Shipment of All Liners/Hics Including High Level Liners, Rev 007
- RWP BY-0-16-00232, Task 2, Shipment Of High Level Liners With Added Controls, Rev 007
- IR 01660566; IR 1499714 Content Inadequate For Proper Evaluation
- IR 01663376; NRC ID: RP Process Gaps And Improvements
- IR 02393292; Radwaste Shipment Cancelled Due to Unexpected Carrier
- IR 02411133; Radioactive Shipping Requirements Created Re-Work
- IR 02423077; 5-Day Advanced Notification Not Met For TN-Ram
- IR 02644976; Cab Failure For Radwaste Shipment
- IR 02649477; UN 2910 Shipment Lost By Fed Ex In Transit
- IR 02652545; Radwaste Shipment Minor Accident
- IR 02665985; Consignee Notified Byron Of Hole In Package Of Rad Shipment

- United States Nuclear Regulatory Commission Form 311, Quality Assurance Program Approval For Radioactive Material Packages NO.0008, Revision 13, April 04, 2016
- NRC Form 618, Certificate Of Compliance For Radioactive Material Packages, Certificate Number 9365, Revision Number 1, Docket Number 71-9365, Package Identification Number USA/9365/B(U)-96, July 27, 2015
- RWS 16-009, Radioactive Waste Shipment Number, May 1, 2016
- RWS 16-011, Radioactive Waste Shipment Number, May 17, 2016
- RWS 16-012, Radioactive Waste Shipment Number, June, 6, 2016
- RWS 16-013, Radioactive Waste Shipment Number, June 13, 2016
- RWS 16-014, Radioactive Waste Shipment Number, June 20, 2016
- RWS 16-015, Radioactive Waste Shipment Number, June 28, 2016
- RMS 16-037, Radioactive Material Shipment Number, April 28, 2016
- RMS 16-054, Radioactive Material Shipment Number, May 15, 2016
- RMS 16-062, Radioactive Material Shipment Number, May 31, 2016

40A1 Performance Indicator Verification

- MSPI Derivation Reports for AF, CC, and SX, for the period of July 2015 through June 2016
- BY-MSPI-001, Revision 16; Reactor Oversight Program MSPI Basis Document, Byron Nuclear Generating Station
- BY-MSPI-001, Revision 18; Reactor Oversight Program MSPI Basis Document, Byron Nuclear Generating Station
- BOP CC-10, Revision 32; Alignment of the U-0 CC Pump and U-0 CC HX to a Unit
- ER-AA-600-1047, Revision 10; Mitigating Systems Performance Index Basis Document
- LS-AA-2200, Revision 5; Mitigating System Performance Index Data Acquisition & Reporting
- IR 2442230; NRC ID: Discrepancies Updating MSPI Basis Document
- NRC Performance Indicator Data, Emergency Preparedness – Drill/Exercise Performance; Dated 2nd Quarter 2015 through 2nd Quarter 2016
- NRC Performance Indicator Data, Emergency Preparedness – ERO Readiness; Dated 2nd Quarter 2015 through 2nd Quarter 2016
- NRC Performance Indicator Data, Emergency Preparedness – Alert and Notification System Reliability; Dated 2nd Quarter 2015 through 2nd Quarter 2016
- NEI 99-02; Regulatory Assessment Performance Indicator Guideline; Revision 7

40A2 Identificaiton and Resolution of Problems

- IR 02555756; B1R20M5 Imprint in the Top of the Reactor Head Flange
- IR 02591835; Poorly Worded Corrective Action Does Not Correct Deficiency
- EC 406233, Revision 000; Issue WCAP18137-P Addenda to Unit1 Rx Vessel Stress Report to Evaluate Hex Key Impression in Flange from B1R20
- WCAP-18137-P, Revision 0; Stress Report Addendum for Byron Unit 1 – ASME Code Qualification of Closure Head Flange with Outside Surface Impressions
- Operability Evaluation 15-002, Revision 002 (EC 403292); Unit 1 Reactor Vessel Head Flange Impression
- IR 02707888; 2B DG Fuel Oil Leak
- WO 01812751; EWP IM Perform Required Replacement of Ratio Relay
- IR 02699674; Water Tight Door for 1B DOST Room (ODSD648) Found Open
- Event Notice 52148; Watertight Door Discovered Open and Unattended
- EC 406351; Diesel Oil Storage Tank Room Watertight Door Not Closed
- IR 02699683; 0DSSD192 Watertight Door Ajar Alarm Is Not Working
- WC-AA-120, Revision 1; Preventive Maintenance (PM) Database Revision Requirements

- WC-AA-120, Revision 2; Preventive Maintenance (PM) Database Revision Requirements
- PMID 00141414-01; IM Replace Batteries on Door Alarms Repair as Needed
- IR 01686589; Water Tight Door Alarm Buzzer Not Functioning
- IR 01673620; SD156 Door Open Indicating LT Audible Alarm Not Functioning
- IR 02564885; Audible Door Alarm Not Working
- IR 02627990; No Alarm or Indicating Light When Door is Open and Unsecured
- IR 01445785; Door Ajar Buzzer Not Working
- IR 01465811; Door SD191 Door "Open" Indicating Light Doesn't Illuminate
- IR 01572591; 0DSSD193 Water Tight Door Ajar Alarm Not Working
- WO 01657293; Watertight Door Alarm Battery Replacement & PM
- WO 01688177; Watertight Door Alarm Battery Replacement & PM
- WO 01709783; Watertight Door Alarm Battery Replacement & PM
- WO 01860026; Watertight Door Alarm Battery Replacement & PM
- IR 02716479; Sporadic Failure of 0DSSD191 Ajar Alarm
- IR 02716480; Sporadic Failure of 0DSSD192 Ajar Alarm
- IR 02716481; Sporadic Failure of 0DSSD193 Ajar Alarm
- IR 02716482; Sporadic Failure of 0DSSD194 Ajar Alarm
- IR 02716485; Sporadic Failure of 0DSSD156 Ajar Alarm
- IR 02716486; Sporadic Failure of 0DSSD157 Ajar Alarm

LIST OF ACRONYMS USED

ΔCDF	Delta Core Damage Frequency
AC	Alternating Current
ADAMS	Agencywide Documents Access and Management System
AF	Auxiliary Feedwater
ALARA	As-Low-As-Is-Reasonably-Achievable
ANS	Alert and Notification System
AOP	Air Oil Pump
AOP	Abnormal Operating Procedure
ASME	American Society of Mechanical Engineers
CAP	Corrective Action Program
CFR	Code of Federal Regulations
CW	Circulating Water
DEP	Drill/Exercise Performance
DG	Diesel Generator
DRP	Division of Reactor Projects
DG	Diesel Generator
DLOOP	Dual Unit LOOP
DOST	Diesel Oil Storage Tank
DOT	Department of Transportation
EDG	Emergency Diesel Generator
EP	Emergency Preparedness
EPRI	Electric Power Research Institute
ERO	Emergency Response Organization
HMR	Hazardous Materials Regulations
HPLCF	High Confidence of Low Probability of Failure
IEF	Initiating Event Frequency
IMC	Inspection Manual Chapter
IP	Inspection Procedure
IR	Inspection Report
ISI	Inservice Inspection
IST	Inservice Testing
LCO	Limiting Condition for Operation
LERF	Large Early Release Frequency
LOOP	Loss of Offsite Power
MSIV	Main Steam Isolation Valve
MSPI	Mitigating Systems Performance Index
NCV	Non-Cited Violation
NEI	Nuclear Energy Institute
NRC	U.S. Nuclear Regulatory Commission
PI	Performance Indicator
PI&R	Problem Identification and Resolution
PM	Planned or Preventative Maintenance
PMT	Post-Maintenance Testing
Radwaste	Radioactive Waste
RASP	Risk Assessment Standardization Project
RHR	Residual Heat Removal
RP	Radiation Protection
RWST	Refueling Water Storage Tank
SAPHIRE	Systems Analysis Programs for Hands-On Integrated Reliability Evaluations

SDP	Significance Determination Process
SPAR	Standardized Plant Analysis Risk
SRA	Senior Reactor Analyst
SSC	System, Structure, and Component
SX	Essential Service Water
SXCT	Essential Service Water Cooling Tower
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
WO	Work Order

B. Hanson

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Sincerely,

/RA/

Eric Duncan, Chief
Branch 3
Division of Reactor Projects

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