UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
2100 RENAISSANCE BLVD.
KING OF PRUSSIA, PA 19406-2713

February 9, 2017

EA-17-019

Mr. Bryan Hanson
Senior Vice President, Exelon Generation Company, LLC
President and Chief Nuclear Officer, Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: PEACH BOTTOM ATOMIC POWER STATION – INTEGRATED INSPECTION REPORT 05000277/2016004 AND 05000278/2016004 AND NOTICE OF ENFORCEMENT DISCRETION

Dear Mr. Hanson:

On December 31, 2016, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Peach Bottom Atomic Power Station (PB), Units 2 and 3. On January 12, 2017, the NRC inspectors discussed the results of this inspection with Mr. Michael Massaro, Peach Bottom Site Vice President, and other members of your staff. The results of this inspection are documented in the enclosed report.

NRC inspectors documented one finding of very low safety significance (Green) in this report. This finding involved a violation of NRC requirements. The NRC is treating this violation as a non-cited violation (NCV) consistent with Section 2.3.2.a of the Enforcement Policy.

Separately, the inspectors reviewed Licensee Event Report (LER) 05000277/2016-001-00 that described the details associated with a leak in the high pressure service water system. Although this issue constituted a violation of technical specifications, the NRC concluded that the issue was not within Exelon's ability to foresee and correct. Exelon's actions did not contribute to the degraded condition, and actions taken were reasonable to address these matters. As a result, the NRC did not identify a performance deficiency. A risk evaluation was performed and the issue was determined to be of very low safety significance. Based on the results of the NRC's inspection and assessment, I have been authorized, after consultation with the Director, Office of Enforcement and the Regional Administrator, to exercise enforcement discretion in accordance with NRC Enforcement Policy Section 2.2.4, "Using Traditional Enforcement to Disposition Violations Identified at Power Reactors," and Section 3.10, "Reactor Violations With No Performance Deficiencies."

If you contest the violation or significance of the NCV, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region I; the Director, Office of Enforcement; and the NRC Resident Inspector at Peach Bottom.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at http://www.nrc.gov/reading-rm/adams.html and the NRC's Public Document Room in accordance with Title 10 *Code of Federal Regulations* (CFR) 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

/RA/

Michael L. Scott, Director
Division of Reactor Projects

Docket Nos. 50-277 and 50-278
License Nos. DPR-44 and DPR-56

Enclosure:
Inspection Report 05000277/2016004
and 05000278/2016004
w/Attachment: Supplementary Information

cc w/encl: Distribution via ListServ

SUBJECT: PEACH BOTTOM ATOMIC POWER STATION – INTEGRATED INSPECTION REPORT 05000277/2016004 AND 05000278/2016004 AND NOTICE OF ENFORCEMENT DISCRETION DATEDFEBRUARY 9, 2017

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REGION I

Docket Nos.:	50-277 and 50-278
License Nos.:	DPR-44 and DPR-56
Report No.:	05000277/2016004 and 05000278/2016004
Licensee:	Exelon Generation Company, LLC
Facility:	Peach Bottom Atomic Power Station, Units 2 and 3
Location:	Delta, Pennsylvania
Dates:	October 1, 2016 through December 31, 2016
Inspectors:	J. Heinly, Senior Resident Inspector B. Smith, Resident Inspector P. Boguszewski, Reactor Engineer J. DeBoer, Emergency Preparedness Inspector B. Dionne, Health Physicist J. Kulp, Senior Reactor Inspector S. Pindale, Senior Reactor Inspector A. Turilin, Project Engineer
Approved By:	Michael L. Scott, Director Division of Reactor Projects

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SUMMARY

Inspection Report 05000277/2016004, 05000278/2016004; 10/01/2016 – 12/31/2016;
Peach Bottom Atomic Power Station (PB), Units 2 and 3; Post-Maintenance Testing (PMT).

This report covered a three-month period of inspection by resident inspectors and announced baseline inspections performed by regional inspectors. The inspectors identified one non-cited violation (NCV), which was of very low safety significance (Green). The significance of most 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 (SDP)," dated November 15, 2016. Cross-cutting aspects are determined using IMC 0310, "Aspects Within Cross-Cutting Areas," dated December 4, 2014. All violations of the Nuclear Regulatory Commission (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," Revision 6.

Cornerstone: Barrier Integrity

- Green. The inspectors identified a finding of very low safety significance (Green) involving a non-cited violation (NCV) of 10 CFR 50 Appendix B Criterion XVI, "Corrective Action," because Exelon did not adequately identify and correct a condition adverse to quality associated with the containment atmospheric dilution (CAD) piping system. Specifically, in 2012, Exelon did not adequately identify the source of foreign material (FM) and implement corrective actions to remove the FM from the CAD piping which resulted in the failure of the CHK-2-07C-40145 containment isolation valve to close in 2016. Exelon documented the issue in issue report (IR) 2735344 and promptly replaced the valve and restored the valve to operable. As an interim corrective action, Exelon plans to increase the local leak-rate test (LLRT) frequency and replacement of the check valve to maintain reasonable assurance of operability. Exelon is implementing a detailed troubleshooting plan to identify the source of FM and perform corrective actions to address the condition adverse to quality.

  The performance deficiency (PD) is more than minor because it was associated with the containment barrier performance attribute of the barrier integrity cornerstone and it adversely impacted the cornerstone objective to provide reasonable assurance that physical design barriers (containment) protect the public from radionuclide releases caused by accidents or events. The inspectors evaluated the finding using IMC 0609, Attachment 4, "Initial Characterization of Findings," and Appendix A, "The SDP for Findings at-Power," Exhibit 3, and the inspectors determined this finding to be of very low safety significance (Green) because the degraded condition did not represent an actual open pathway in the physical integrity of containment, and did not involve an actual reduction in function of hydrogen igniters in the reactor containment. The inspectors determined that a cross cutting aspect does not apply because the performance deficiency occurred greater than three years ago and is not indicative of current plant performance. (Section 1R19)

Other Findings

None.

REPORT DETAILS

Summary of Plant Status

Unit 2 began the inspection period at 98 percent rated thermal power (RTP) in end-of-cycle coastdown. On October 23, 2016, operators commenced a shutdown from 93 percent RTP and entered into refueling outage (P2R21). On November 9, 2016, the Unit 2 mode switch was placed in start-up and the main generator was synchronized to the electrical grid on November 11, 2016. On November 14, 2016, Unit 2 was returned to 100 percent RTP and remained at 100 percent RTP until the end of the inspection period except for brief periods to support planned testing and control rod pattern adjustments.

Unit 3 began the inspection period at 100 percent RTP. On October 15, 2016, operators reduced power to 18 percent RTP to perform planned maintenance on the '3C' reactor feedpump. On October 16, 2016, Unit 3 was returned to 100 percent RTP and remained at 100 percent RTP until the end of the inspection period except for brief periods to support planned testing and control rod pattern adjustments.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection (71111.01 – 1 sample)

Winter Readiness – Seasonal Extreme

a. Inspection Scope

The inspectors reviewed PB's readiness for the cold weather conditions during the week of November 28, 2016. The review focused on the emergency diesel generators (EDGs), the river water intake structure traveling screens, the emergency cooling tower (ECT), the circulating water pump house, and associated support equipment. The inspectors reviewed the Updated Final Safety Analysis Report (UFSAR), Technical Specifications (TSs), and the Corrective Action Program (CAP) to determine the temperatures or other seasonal weather conditions that could challenge these systems. The review ensured PB personnel had prepared adequately for the weather-related challenges. The inspectors reviewed station procedures, including PB's seasonal weather preparation procedure, and applicable operating procedures. The inspectors performed walkdowns of the selected systems to ensure station personnel identified issues that could challenge the operability of the systems during cold weather conditions.

b. Findings

No findings were identified.

1R04 Equipment Alignment

.1 Partial System Walkdowns (71111.04Q – 3 samples)

a. Inspection Scope

The inspectors performed partial walkdowns of the following systems:

- Unit 2 residual heat removal (RHR) while in shutdown cooling mode on October 27, 2016
- Unit 3 'A' high pressure service water (HPSW) loop with the 'B' HPSW loop out of service (OOS) on November 15, 2016
- Unit 2 and Unit 3 off-site source with 343SU bus OOS on November 30 – December 3, 2016

The inspectors selected these systems based on their risk-significance relative to the reactor safety cornerstones at the time they were inspected. The inspectors reviewed applicable operating procedures, system diagrams, the UFSAR, TSs, work orders (WOs), IRs, and the impact of ongoing work activities on redundant trains of equipment in order to identify conditions that could have impacted the system's performance of its intended safety functions. The inspectors also performed field walkdowns of accessible portions of the systems to verify system components and support equipment were aligned correctly and were operable. The inspectors examined the material condition of the components and observed operating parameters of equipment to verify that there were no deficiencies. The inspectors also reviewed whether Exelon staff had properly identified equipment issues and entered them into the CAP for resolution with the appropriate significance characterization.

b. Findings

No findings were identified.

.2 Full System Walkdown (71111.04S – 1 sample)

a. Inspection Scope

During the week of October 31, 2016, the inspectors performed a complete system walkdown of accessible portions of the Unit 2 'A' core spray (CS) system to verify the existing equipment lineup was correct. The inspectors reviewed operating procedures, surveillance tests (STs), drawings, equipment line-up check-off lists, and the UFSAR to verify the system was aligned to perform its required safety functions. The inspectors also reviewed electrical power availability, component lubrication and equipment cooling, hanger and support functionality, and operability of support systems. The inspectors performed field walkdowns of accessible portions of the system to verify as-built system configuration matched plant documentation, and that system components and support equipment remained operable. The inspectors confirmed that systems and components were aligned correctly, free from interference from temporary services or isolation boundaries, environmentally qualified, and protected from external threats. The inspectors also examined the material condition of the components for degradation and observed operating parameters of equipment to verify that there were no deficiencies. Additionally, the inspectors reviewed a sample of related IRs and WOs to ensure Exelon appropriately evaluated and resolved any deficiencies.

b. Findings

No findings were identified.

1R05 Fire Protection (71111.05Q – 5 samples)

Resident Inspector Quarterly Walkdowns

a. Inspection Scope

The inspectors conducted tours of the areas listed below to assess the material condition and operational status of fire protection features. The inspectors verified that Exelon controlled combustible materials and ignition sources in accordance with administrative procedures. The inspectors verified that fire protection and suppression equipment was available for use as specified in the area pre-fire plan, and passive fire barriers were maintained in good material condition. The inspectors also verified that station personnel implemented compensatory measures for OOS, degraded or inoperable fire protection equipment, as applicable, in accordance with procedures.

- Unit 2 reactor building 135' elevation on October 25, 2016
- Unit 2 'A' and 'C' RHR heat exchanger and pump rooms elevation 91'-6" on October 27, 2016
- Unit 2 drywell on October 31, 2016
- Unit 2 reactor building torus room 91'-6" elevation on October 31, 2016
- Unit 2 reactor building 165' elevation on November 22, 2016

b. Findings

No findings were identified.

1R07 Heat Sink Performance (71111.07A – 1 sample)

a. Inspection Scope

The inspectors reviewed the '3D' high pressure service water (HPSW) motor oil cooler on November 15 -16, 2016, to determine its readiness and availability to perform its safety functions. The inspectors reviewed the design basis for the component and verified PB's commitments to NRC Generic Letter (GL) 89-13, "Service Water System Requirements Affecting Safety-Related Equipment." The inspectors discussed the results of the most recent inspection with engineering staff and reviewed pictures of the as-found and as-left conditions. The inspectors verified that PB initiated appropriate corrective actions for identified deficiencies. The inspectors also verified that the heat transfer capability of the heat exchanger exceeded the minimum design requirements.

b. Findings

No findings were identified.

1R08 In-service Inspection (71111.08 – 1 sample)

a. Inspection Scope

From October 31, 2016 to November 4, 2016, the inspectors conducted an inspection and review of in-service inspection (ISI) activities in order to assess the effectiveness of Exelon's program for monitoring degradation of the reactor coolant system boundary, risk-significant piping boundaries, and the containment system boundaries during the PB Unit 2, 21st refueling outage (RFO).

Non-destructive Examination and Welding Activities (IP Section 02.01)

The inspectors observed a sample of in-process non-destructive examinations (NDE), reviewed completed documentation, and interviewed Exelon personnel to verify that the NDE activities performed as part of the fourth interval, third period, of the PB Unit 2 ISI program were conducted in accordance with the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, 2001 Edition with the 2003 Addenda. For augmented examinations, the inspectors verified that activities were performed in accordance with Exelon's augmented inspection program and procedures, and with applicable industry guidance documents. The inspectors verified that indications and defects, if present, were dispositioned in accordance with the ASME Code or an NRC approved alternative, and verified that relevant indications were compared to previous examinations to determine if any changes had occurred.

Activities included a review of ultrasonic testing (UT), magnetic particle (MT), radiographic testing (RT), liquid penetrant testing (PT) and visual testing (VT). The inspectors reviewed certifications of the NDE technicians performing the examinations and verified that the inspections were performed in accordance with qualified NDE procedures and industry guidance. For UT and MT activities, the inspectors also verified the calibration of equipment used to perform the examinations. The inspectors verified that the test results were reviewed and evaluated by certified Level III NDE personnel and that the parameters used in the test were in accordance with the limitations, precautions, and prerequisites specified in the test procedure.

ASME Code Required Examinations:

- Direct observation of the manual UT of the high pressure coolant injection (HPCI) 10" steam line elbow to pipe and pipe to flange welds (23-O-45, 23-O-46)

- Direct observation of the manual MT and VT-3 of the HPCI discharge line pipe rigid restraint (23DDN-H8)

- Direct observation of manual UT of the 'D' main steam line elbow to pipe weld (1-D-7)

- Documentation review of the RT and PT of two shop welds (12-I-2 and 12-I-3) performed as part of a modification and repair activity in the reactor water cleanup system

- Documentation review of the VT of the drywell interior penetrations and surfaces. The inspectors independently examined the condition of the drywell surfaces at all accessible floor elevations and compared those documented exams to the inspector walkdowns

Other Augmented, License Renewal or Industry Initiative Examinations:

- Review of the remote enhanced VT records of the reactor vessel internals recorded during in-vessel visual inspection activities in accordance with BWRVIP-41 Revision 4, BWRVIP-43 Revision 0, and BWRVIP-18 Revision 2. Specifically, the inspectors reviewed CS header transition box welds and jet pump welds, including the riser elbow to thermal weld (RS-1) and adapter backing ring welds (AD-3b.)

Review of Previous Indications

The inspectors did not review any previous indications because there were no relevant indications from the previous RFO that required evaluation for continued service.

Welding on Pressure Boundary Systems

The inspectors reviewed the pressure boundary risk-significant welding activity, including the associated NDE, of a modification to the reactor water cleanup system. The modification replaced carbon steel piping and a check valve with stainless steel piping. Specifically, the scope of the activity was to replace carbon steel piping that was degraded by flow accelerated corrosion and a check valve no longer in service with a section of straight stainless steel pipe. The inspectors performed a documentation review of the welding activities conducted before the outage to verify that the welding, RT, PT and UT examinations, and final acceptance were performed in accordance with the ASME Code requirements. The inspectors reviewed the weld procedure specification to ensure it contained the required essential and supplemental essential weld variables and that those variables were within the ranges demonstrated by the supporting qualification record. The modification was performed under WO C0260531.

Identification and Resolution of Problems (IP Section 02.05)

The inspectors reviewed a sample of PB Nuclear Station Unit 2 corrective action reports, which identified NDE indications, deficiencies, and other non-conforming conditions since the previous RFO and during the current outage. The inspectors verified that non-conforming conditions were properly identified, characterized, evaluated, and that corrective actions were identified and entered into the CAP for resolution.

b. Findings

No findings were identified.

1R11 Licensed Operator Requalification Program and Licensed Operator Performance (71111.11Q – 2 samples)

.1 Quarterly Review of Licensed Operator Requalification Testing and Training

a. Inspection Scope

The inspectors observed a licensed operator requalification training scenario for a simulated fire in the Unit 2 HPCI room and subsequent event declarations on October 3, 2016. The inspectors evaluated operator performance during the simulated event and verified completion of risk significant operator actions, including the use of abnormal and emergency operating procedures. The inspectors assessed the clarity and effectiveness of communications, implementation of actions in response to alarms and degrading plant conditions, and the oversight and direction provided by the control room supervisor. The inspectors verified the accuracy and timeliness of the emergency classifications made by the shift manager and the TS action statements entered by the shift technical advisor. Additionally, the inspectors assessed the ability of the crew and training staff to identify and document crew performance problems.

b. Findings

No findings were identified.

.2 Quarterly Review of Licensed Operator Performance in the Main Control Room

a. Inspection Scope

The inspectors observed licensed operator performance from the main control room during the RFO P2R21 shutdown on October 23 through October 24, 2016, and for startup from RFO P2R21 on November 9 through November 13, 2016. The inspectors observed use of and compliance with procedures, crew communications, interpretation, diagnosis, and understanding of plant alarms, use of human error prevention techniques, documentation of activities, and management oversight of the evolution to verify that the crew was following procedures and plant expectations for conduct of operations.

The inspectors observed control room briefings and power changes. Additionally, the inspectors observed power changes to verify that procedure use, crew communications, and coordination of activities between work groups similarly met established expectations and standards.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12Q – 2 samples)

a. Inspection Scope

The inspectors reviewed the samples listed below to assess the effectiveness of maintenance activities on structures, systems, and components (SSCs) performance and reliability. The inspectors reviewed system health reports, CAP documents, maintenance WOs, and maintenance rule (MR) basis documents to ensure that Exelon was identifying and properly evaluating performance problems within the scope of the MR. For each sample selected, the inspectors verified that the SSC was properly

scoped into the MR in accordance with 10 CFR 50.65 and verified that the (a)(2) performance criteria established by the Exelon staff was reasonable. As applicable, for SSCs classified as (a)(1), the inspectors assessed the adequacy of goals and corrective actions to return these SSCs to (a)(2) status. Additionally, the inspectors ensured that Exelon staff was identifying and addressing common cause failures that occurred within and across MR system boundaries.

- Unit 2 pipe support snubber maintenance issues during the refueling outage in November 2016
- Main steam isolation valve (MSIV) local leak rate test (LLRT) performance history during the week of December 12, 2016

b. Findings

No findings were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13 – 6 samples)

a. Inspection Scope

The inspectors reviewed station evaluation and management of plant risk for the maintenance and emergent work activities listed below to verify that Exelon performed the appropriate risk assessments prior to removing equipment for work. The inspectors selected these activities based on potential risk significance relative to the Reactor Safety cornerstones. As applicable for each activity, the inspectors verified that Exelon personnel performed risk assessments as required by 10 CFR 50.65(a)(4) and that the assessments were accurate and complete. When Exelon performed emergent work, the inspectors verified that operations personnel promptly assessed and managed plant risk.

The inspectors reviewed the scope of maintenance work and discussed the results of the assessment with the station's probabilistic risk analyst to verify plant conditions were consistent with the risk assessment. The inspectors also reviewed the TS requirements and inspected portions of redundant safety systems, when applicable, to verify risk analysis assumptions were valid and applicable requirements were met.

- Elevated risk for Unit 2 and Unit 3 emergency service water 'A' pipe replacement on October 5, 2016
- Elevated risk for Unit 2 'B' station battery discharge performance test on October 26, 2016
- Elevated risk during Unit 2 shutdown cooling operations on October 26, 2016
- Elevated risk for Unit 2 during operation with a potential for draining the reactor vessel (OPDRV) window and replacement of control rod drive mechanisms on October 29 and October 30, 2016
- Elevated risk for E-324 bus outage on November 2, 2016
- Elevated risk for Unit 2 containment de-inerted during unit startup on November 10, 2016

b. Findings

No findings were identified.

1R15 Operability Determinations and Functionality Assessments (71111.15 – 6 samples)

a. Inspection Scope

The inspectors reviewed operability determinations (ODs) for the following degraded or non-conforming conditions based on the risk significance of the associated components and systems:

- Unit 2 'D' MSIV poppet weight discrepancy in the pipe support design calculation on November 3, 2016
- Unit 2 'K' safety/relief valve abnormal wear on November 4, 2016
- Unit 2 oxygen analyzer isolation valve control switch Part 21 evaluation on November 7, 2016
- Unit 2 RHR time delay relay out of calibration on November 7, 2016
- Unit 2 AO-2519 valve air operated actuator damaged on November 9, 2016
- Unit 2 HPCI electronic governor remote setting not set correctly on December 9, 2016

The inspectors evaluated the technical adequacy of the ODs to assess whether 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 Exelon's evaluations to determine whether the components or systems were operable. The inspectors confirmed, where appropriate, compliance with bounding limitations associated with the evaluations, including compliance with in-service testing requirements. Where compensatory measures were required to maintain operability, such as in the case of operator workarounds, the inspectors determined whether the measures in place would function as intended and were properly controlled by Exelon.

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.18 – 1 sample)

Permanent Modifications

a. Inspection Scope

The inspectors reviewed the 'B' recirculation pump motor replacement modification to determine whether the modification affected the safety function of systems that are important to safety. The inspectors reviewed 10 CFR 50.59 documentation and post-modification testing results, and conducted field walkdowns of the modification to verify that the permanent modification did not degrade the design bases, licensing bases, and performance capability of the affected system.

b. Findings

No findings were identified

1R19 Post-Maintenance Testing (71111.19 – 6 samples)

a. Inspection Scope

The inspectors reviewed the PMTs for the maintenance activities listed below to verify that procedures and test activities tested the safety functions that may have been affected by the maintenance activity, that the acceptance criteria in the procedure were consistent with the information in the applicable licensing basis and/or design basis documents, and that the test results were properly reviewed and accepted and problems were appropriately documented. The inspectors also walked down the affected job site, observed the pre-job brief and post-job critique where possible, confirmed work site cleanliness was maintained, and witnessed the test or reviewed test data to verify quality control hold point were performed and checked, and that results adequately demonstrated restoration of the affected safety functions.

- Unit 2 and Unit 3 'A' emergency service water (ESW) PMT following pipe replacement on October 7, 2016
- Unit 2 and Unit 3 ESW MO-2972 motor operated valve diagnostic testing following valve replacement on November 2, 2016
- Unit 2 HPCI full flow test following overhaul inspection on November 4, 2016
- Unit 2 digital electro-hydraulic control (DEHC) PMT following installation on November 9 – 12, 2016
- Unit 2 containment atmosphere dilution (CAD) check valve replacement and LLRT on November 9, 2016
- Unit 3 AO-3-3519 testing after actuator replacement on December 1, 2016

b. Findings

Introduction. The inspectors identified a finding of very low safety significance (Green) involving a NCV of 10 CFR 50 Appendix B Criterion XVI, "Corrective Action," because Exelon did not adequately identify and correct a condition adverse to quality associated with the CAD piping system. Specifically, in 2012, Exelon did not adequately identify the source of foreign material (FM) and implement corrective actions to remove the FM from the CAD piping which resulted in the failure of the CHK-2-07C-40145 containment isolation valve to close in 2016.

Description. PB Unit 2 CAD system is designed to maintain combustible gas concentrations within the primary containment flammability limits following a postulated loss of coolant accident. The system dilutes the hydrogen and oxygen in primary containment with the addition of nitrogen. CHK-2-07C-40145 is one of eight CAD system nitrogen supply check valves to containment and is a primary containment isolation valve.

On August 14, 2012, Exelon performed a planned LLRT of the isolation function of check valve CHK-2-07C-40145. The valve failed to properly seat, exceeded the LLRT acceptance criteria and was declared inoperable. Subsequently, Exelon replaced the valve and performed a satisfactory as-left LLRT and declared the valve operable. Exelon documented the issue under IR 1400542 and performed a cause evaluation.

The cause evaluation determined that FM had been inadvertently introduced into the CAD piping system and degraded the valves seating surface which directly lead to the failure of the valve. Exelon developed an action to perform a flush of the system piping to remove the FM. The action was classified as an enhancement action in Exelon's CAP and on December 5, 2013, the action was inappropriately closed with no work performed.

On November 1, 2016, CHK-2-07C-40145 valve failed to properly seat and exceeded its operability LLRT acceptance criteria, similar to the November 2012 failure. Exelon documented the issue in IR 2735344 and promptly replaced the valve and restored the valve to operable. Exelon initiated a cause evaluation and determined that the failures in 2012 and 2016 were a direct result of the FM in the CAD piping which fouled the valve seating surface. The failed check valve was sent to a lab for testing and it was determined that the FM was rust oxide. Therefore, Exelon created a detailed troubleshooting plan to determine the source of the rust in the CAD system since a majority of the piping is stainless steel and contains dry compressed nitrogen. As an interim corrective action, Exelon plans to increase the LLRT frequency and replacement frequency of the check valve to maintain reasonable assurance of operability.

The inspectors review identified that Exelon had not adequately identified the source of the FM after the 2012 failure and had inappropriately discounted CAD piping that had the potential to supply the rust oxide. In addition, the inspectors identified that the proposed corrective actions to remove the FM were incorrectly classified as enhancement activities. As such, the proposed flush activities were permitted, by Exelon's CAP, to be closed without any work performed. Therefore, the inspectors determined that Exelon had a reasonable opportunity to identify the rust oxide impact on the valve and perform adequate corrections such that the 2016 failure would have been precluded. Exelon entered this issue into their CAP under IR 2735344.

Analysis. The inspectors determined that Exelon's failure to adequately identify and correct a condition adverse to quality in the CAD system piping, which resulted in a repeat failure of the CHK-207C-40145 containment isolation valve, was a performance deficiency that was reasonably within Exelon's ability to foresee and correct. Specifically, Exelon did not adequately identify and correct the rust oxide FM condition inside the CAD system piping after the 2012 failure which resulted in an additional failure of the valve to close on November 1, 2016. The PD is more than minor because it was associated with the containment barrier performance attribute of the barrier integrity cornerstone and it adversely impacted the cornerstone objective to provide reasonable assurance that physical design barriers (containment) protect the public from radionuclide releases caused by accidents or events. The inspectors evaluated the finding using Manual Chapter 0609, Attachment 4, "Initial Characterization of Findings," and Appendix A, "The SDP for Findings at-Power," Exhibit 3, and the inspectors determined this finding to be of very low safety significance (Green) because the degraded condition did not represent an actual open pathway in the physical integrity of containment, and did not involve an actual reduction in function of hydrogen igniters in the reactor containment. The inspectors determined that a cross cutting aspect does not apply because the performance deficiency occurred greater than three years ago and is not indicative of current plant performance.

Enforcement. 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," requires that measures be established to assure that conditions adverse to quality are promptly identified and corrected. Contrary to the above, from November 2012 to November 2016, Exelon failed to promptly identify and correct a condition adverse to quality in the CAD piping system which resulted in a repeat failure of CHK-2-07C-40145. Specifically, Exelon did not adequately identify and correct the rust oxide FM condition inside the CAD system piping in 2012 which resulted in an additional failure of the CHK-207C-40145 containment isolation valve to close on November 1, 2016. Since this deficiency was considered of very low safety significance (Green), and was entered into the CAP for resolution under IR 2735344, this violation is being treated as an NCV, consistent with the NRC's Enforcement Policy. **(NCV 05000277/2016004-01, Failure to Identify and Remove FM in CAD System Piping)**

1R20 Refueling and Other Outage Activities (71111.20 – 1 sample)

Unit 2 Refueling Outage (P2R21) (1 sample)

a. Inspection Scope

The inspectors reviewed the station's work schedule and outage risk plan for the Unit 2 RFO (P2R21), conducted October 23, 2016 to November 13, 2016. The inspectors reviewed Exelon's development and implementation of outage plans and schedules to verify that risk, industry experience, previous site-specific problems, and defense-in-depth were considered. During the outage, the inspectors observed portions of the shutdown and cooldown processes and monitored controls associated with the following outage activities:

- Configuration management, including maintenance of defense-in-depth, commensurate with the outage plan for the key safety functions and compliance with the applicable TSs when taking equipment OOS
- Implementation of clearance activities and confirmation that tags were properly hung and that equipment was appropriately configured to safely support the associated work or testing
- Installation and configuration of reactor coolant pressure, level, and temperature instruments to provide accurate indication and instrument error accounting
- Status and configuration of electrical systems and switchyard activities to ensure that TSs were met
- Monitoring of decay heat removal operations
- Impact of outage work on the ability of the operators to operate the spent fuel pool cooling system
- Reactor water inventory controls, including flow paths, configurations, alternative means for inventory additions, and controls to prevent inventory loss
- Activities that could affect reactivity
- Maintenance of secondary containment as required by TSs
- Fatigue management
- Refueling activities, including fuel handling and fuel receipt inspections
- Tracking of startup prerequisites, walkdown of the drywell (primary containment) to verify that debris had not been left which could block the emergency core cooling system suction strainers, and startup and ascension to full power operation
- Identification and resolution of problems related to refueling outage activities

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22 – 4 samples)

a. Inspection Scope

The inspectors observed performance of STs and/or reviewed test data of selected risk-significant SSCs to assess whether test results satisfied TSs, the UFSAR, and Exelon procedure requirements. The inspectors verified that test acceptance criteria were clear, tests demonstrated operational readiness and were consistent with design documentation, test instrumentation had current calibrations and the range and accuracy for the application, tests were performed as written, and applicable test prerequisites were satisfied. Upon test completion, the inspectors considered whether the test results supported that equipment was capable of performing the required safety functions. The inspectors reviewed the following STs:

- Unit 2 'A', 'B', 'C', and 'D' MSIV LLRT on October 24, 2016 (CIV)
- Unit 2 'B' 125/250 volts direct current modified battery discharge performance test on October 26, 2016
- Unit 2 E-22 loss of offsite power (LOOP)/loss-of-coolant accident (LOCA) testing on October 31, 2016
- Unit 3 reactor building to torus vacuum breaker testing on November 28, 2016

b. Findings

No findings were identified.

Cornerstone: Emergency Preparedness

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

a. Inspection Scope

Exelon implemented various changes to the PB Emergency Action Levels (EALs), Emergency Plan, and Implementing Procedures. Exelon had determined that, in accordance with 10 CFR 50.54(q)(3), any change made to the EALs, Emergency Plan, and its lower-tier implementing procedures, had not resulted in any reduction in effectiveness of the Plan, and that the revised Plan continued to meet the standards in 50.47(b) and the requirements of 10 CFR 50 Appendix E.

The inspectors performed an in-office review of all EAL and Emergency Plan changes submitted by Exelon as required by 10 CFR 50.54(q)(5), including the changes to lower-tier emergency plan implementing procedures, to evaluate for any potential reductions in effectiveness of the Emergency Plan. This review by the inspectors was not documented in an NRC safety evaluation report and does not constitute formal NRC approval of the changes. Therefore, these changes remain subject to future NRC inspection in their entirety. The requirements in 10 CFR 50.54(q) were used as reference criteria.

b. Findings

No findings were identified.

1EP6 Drill Evaluation (71114.06 – 1 sample)

Emergency Preparedness Drill/Simulator Evaluation/Observation

a. Inspection Scope

The inspectors evaluated the shift manager\emergency director's emergency preparedness (EP) implementation during a licensed operator out-of-the-box simulator training on October 3, 2016, which simulated a fire in the HPCI room complicated by other equipment failures. The inspectors observed emergency response operations in the simulator to determine whether event classifications and notifications were performed in accordance with approved procedures. The inspectors also attended the control room simulator drill critique to compare inspector observations with those identified by Exelon staff in order to evaluate whether Exelon staff were properly identifying emergency preparedness weaknesses and entering them into the CAP.

b. Findings

No findings were identified.

2. RADIATION SAFETY

Cornerstone: Occupational and Public Radiation Safety

2RS1 Radiological Hazard Assessment and Exposure Controls (71124.01 – 3 samples)

a. Inspection Scope

The inspectors reviewed Exelon's performance in assessing and controlling radiological hazards in the workplace. The inspectors used the requirements contained in 10 CFR 20, TSs, applicable Regulatory Guides (RGs), and the procedures required by TSs as criteria for determining compliance.

Instructions to Workers (1 sample)

The inspectors reviewed high radiation area (HRA) radiation work permit (RWP) controls and use; observed containers of radioactive materials and assessed whether the containers were labeled and controlled in accordance with requirements.

The inspectors reviewed several occurrences where a worker's electronic personal dosimeter (EPD) alarmed. The inspectors reviewed Exelon's evaluation of the incidents, documentation in the CAP, and whether compensatory dose evaluations were conducted, when appropriate. The inspectors verified follow-up investigations of actual radiological conditions for unexpected radiological hazards were performed.

Radiological Hazards Control and Work Coverage (1 sample)

The inspectors evaluated in-plant radiological conditions and performed independent radiation measurements during facility walkdowns and observation of radiological work activities. The inspectors assessed whether posted surveys; RWPs; worker radiological briefings and radiation protection job coverage; the use of continuous air monitoring, air sampling and engineering controls; and dosimetry monitoring were consistent with the present conditions. The inspectors examined the control of highly activated or contaminated materials stored within the spent fuel pools and the posting and physical controls for selected HRAs and locked high radiation areas (LHRAs) to verify conformance with the occupational performance indicator (PI).

Radiation Worker Performance and Radiation Protection Technician Proficiency (1 sample)

The inspectors evaluated radiation worker performance with respect to radiation protection work requirements. The inspectors evaluated radiation protection technicians in performance of radiation surveys and in providing radiological job coverage.

b. Findings

No findings identified.

2RS2 Occupational As Low As Reasonably Achievable (ALARA) Planning and Controls (71124.02 – 3 samples)

a. Inspection Scope

The inspectors assessed Exelon's performance with respect to maintaining occupational individual and collective radiation exposures ALARA. The inspectors used the requirements contained in 10 CFR 20, RGs 8.8 and 8.10, TSs, and procedures required by TSs as criteria for determining compliance.

Verification of Dose Estimates and Exposure Tracking Systems (1 sample)

The inspectors reviewed the current annual collective dose estimate; basis methodology; and measures to track, trend, and reduce occupational doses for ongoing work activities. The inspectors evaluated the adjustment of exposure estimates, or re-planning of work.

Source Term Reduction and Control (1 sample)

The inspectors reviewed the current plant radiological source term and historical trend, plans for plant source term reduction, and contingency plans for changes in the source term as the result of changes in plant fuel performance or changes in plant primary chemistry.

The inspectors observed radiological work activities and evaluated the use of shielding and other engineering work controls based on the radiological controls and ALARA plans for those activities.

Radiation Worker Performance (1 sample)

The inspectors observed radiation worker and radiation protection technician performance during radiological work to evaluate worker ALARA performance according to specified work controls and procedures. Workers were interviewed to assess their knowledge and awareness of planned and/or implemented radiological and ALARA work controls.

b. Findings

No findings were identified.

2RS3 In-Plant Airborne Radioactivity Control and Mitigation (71124.03 – 3 samples)

a. Inspection Scope

The inspectors reviewed the control of in-plant airborne radioactivity and the use of respiratory protection devices in these areas. The inspectors used the requirements in 10 CFR 20, RG 8.15, RG 8.25, NUREG/CR-0041, TS, and procedures required by TS as criteria for determining compliance.

Engineering Controls (1 sample)

The inspectors reviewed operability and use of both permanent and temporary ventilation systems, and the adequacy of airborne radioactivity radiation monitoring in the plant based on location, sensitivity, and alarm set-points.

Use of Respiratory Protection Devices (1 sample)

The inspectors reviewed the adequacy of Exelon's use of respiratory protection devices in the plant to include applicable ALARA evaluations, respiratory protection device certification, respiratory equipment storage, air quality testing records, and individual qualification records.

Problem Identification and Resolution (1 sample)

The inspectors evaluated whether problems associated with the control and mitigation of in-plant airborne radioactivity were identified at an appropriate threshold and addressed by Exelon's CAP.

b. Findings

No findings identified.

2RS4 Occupational Dose Assessment (71124.04 – 5 samples)

a. Inspection Scope

The inspectors reviewed the monitoring, assessment, and reporting of occupational dose. The inspectors used the requirements in 10 CFR 20, RGs, TSs, and procedures required by TSs as criteria for determining compliance.

Source Term Characterization (1 sample)

The inspectors reviewed the plant radiation characterization (including gamma, beta, alpha, and neutron) being monitored. The inspector verified the use of scaling factors to account for hard-to-detect radionuclides in internal dose assessments.

External Dosimetry (1 sample)

The inspectors reviewed: dosimetry National Voluntary Laboratory Accreditation Program (NVLAP) accreditation; onsite storage of dosimeters; the use of "correction factors" to align EPD results with NVLAP dosimetry results; dosimetry occurrence reports; and CAP documents for adverse trends related to external dosimetry.

Internal Dosimetry (1 sample)

The inspectors reviewed: internal dosimetry procedures; whole body counter measurement sensitivity and use; adequacy of the program for whole body count monitoring of plant radionuclides or other bioassay technique; adequacy of the program for dose assessments based on air sample monitoring and the use of respiratory protection; and internal dose assessments for any actual internal exposure.

Special Dosimetric Situations (1 sample)

The inspectors reviewed: Exelon's worker notification of the risks of radiation exposure to the embryo/fetus; the dosimetry monitoring program for declared pregnant workers; external dose monitoring of workers in large dose rate gradient environments; and dose assessments performed since the last inspection that used multi-badging, skin dose or neutron dose assessments.

Problem Identification and Resolution (1 sample)

The inspectors evaluated whether problems associated with occupational dose assessment were identified at an appropriate threshold and properly addressed in the CAP.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

4OA2 Problem Identification and Resolution (71152 – 2 samples)

.1 Routine Review of Problem Identification and Resolution Activities

a. Inspection Scope

As required by Inspection Procedure 71152, "Problem Identification and Resolution," the inspectors routinely reviewed issues during baseline inspection activities and plant status reviews to verify that Exelon entered issues into the CAP at an appropriate threshold, gave adequate attention to timely corrective actions, and identified and addressed adverse trends. In order to assist with the identification of repetitive equipment failures and specific human performance issues for follow-up, the inspectors

performed a daily screening of items entered into the CAP and periodically attended condition report screening meetings. The inspectors also confirmed, on a sampling basis, that, as applicable, for identified defects and non-conformances, Exelon performed an evaluation in accordance with 10 CFR Part 21.

b. Findings

No findings were identified

.2 Annual Sample: Standby Liquid Control System Surveillance Test Failure (1 sample)

a. Inspection Scope

The inspectors performed an in-depth review of Exelon's evaluation and corrective actions associated with a standby liquid control (SLC) system ST failure. Specifically, on September 28, 2015, the 'B' SLC pump failed to inject demineralized water into the reactor pressure vessel during the performance of ST-O-011-405-3, "SBL Control System 'B' Loop Injection Test." Each of the two SLC pumps are tested every 48 months (one is tested each RFO on an alternating pump basis).

The inspectors assessed Exelon's problem identification threshold, problem analysis, extent of condition reviews, compensatory actions, and the prioritization and timeliness of their corrective actions to determine whether they were appropriately identifying, characterizing, and correcting problems associated with this issue and whether the planned or completed corrective actions were appropriate. The inspectors compared the actions taken to the requirements of Exelon's CAP and 10 CFR Part 50, Appendix B. The inspectors reviewed associated documents, conducted a tour of the SLC system, and interviewed engineering personnel, to assess the reasonableness of Exelon's evaluation and of the planned and completed corrective actions.

b. Findings

No findings were identified.

Exelon evaluated the potential causes of the September 28, 2015, test failure which included a possible line blockage by equipment malfunction, by FM, or by valve alignment error. It was apparent that the cause was to be attributed to a complete line blockage based upon pressure not fully dissipating in the discharge piping until operator intervention after the one-minute pump operation was terminated.

The SLC system consists of two SLC pumps in parallel and two discharge line explosive-operated (squib) valves, also in parallel, followed by two in-series isolation valves (HV-3-11-15 and HV-3-11-18) when the two loops combine into one injection path. During the test, the SCL pump 'B' relief valve lifted (relief setpoint is 1450 psig) in response to a high discharge pressure (i.e., the flowpath was blocked), and after the pump was shutdown, pressure slowly decayed from about 1300 to 1100 psig until operators manipulated the SLC system common outboard manual isolation valve (HV-3-11-15) which promptly depressurized the discharge line.

The inspectors reviewed Exelon's associated evaluation (IR 2561427), which included an internal boroscope examination of HV-3-11-15 (because it was manipulated during the test). During the examination, the valve was cycled open and closed with no identified issues, and it was also confirmed that no FM was present in the valve body and upstream or downstream of the valve. Exelon also reviewed prior outage activities when the SLC system tank was drained in support of extended power uprate activities to assess potential foreign material. FM was ruled out as a cause.

Exelon's evaluation ultimately focused on HV-3-11-15 and the squib valve as the most likely causes of the test failure. The squib valve was removed and sent out for detailed failure analysis. The inspectors reviewed the analysis, which concluded that the squib valve functioned properly; the analysis was thorough and reasonable. Exelon conducted separate interviews/investigations of the operators involved in the test; and ruled out that a mis-positioning of HV-3-11-15, either intentionally or unintentionally, was involved.

Since neither a squib valve malfunction nor a mis-positioning of HV-3-11-15 was confirmed, Exelon concluded that the apparent cause was indeterminate. They determined that the most probable cause of this event was a blockage in the pump discharge line, however, extensive testing has been completed and actions taken to eliminate all possible causes. Accordingly, in accordance with procedure PI-AA-125-1003, "Apparent Cause Evaluation Manual," a risk assessment was performed. The risk assessment concluded that, based on inspections and a demonstration that no blockage existed, the redundancy of pumps and explosive valves that minimize the potential for common failure, and both trains were tested to verify expected flow rates prior to plant startup, that the SLC system was operable prior to start-up from the refueling outage. Exelon staff also provided additional communication/guidance to operators reinforcing proper component manipulation techniques and management expectations.

Notwithstanding the indeterminate cause of the event, Exelon's review evaluated the operability of the SLC system. The inspectors reviewed Exelon's evaluation and found it to be acceptable, and they took sufficient actions to demonstrate operability of the SLC system. However, the inspectors identified some minor weaknesses in Exelon's response to this event. First, the IR evaluation associated with this event recommended that the surveillance procedure be reviewed to possibly revise the test sequence to ensure that the test tank has water in it prior to being aligned to the pump suction, however, it did not appear that the activity was assigned. The inspectors also noted that an operator assigned to verify that the relief valve did not lift during the test signed off that it had not lifted, however, it was determined that the relief valve did, in fact, actuate.

Exelon concluded that observing the relief valve while the pump operates may not be an accurate method to determine whether the relief valve actuates based upon 1) the relief valve and associated piping configuration, 2) the inability to observe flow, and 3) high noise in the area during pump operation. Finally, Exelon's review of the operator interviews identified an issue associated with a flush of the 'A' SLC pump as part of the September 28, 2015, test (lack of flow through the pump, due to introduced air from the test tank; considered a minor issue by the inspectors and promptly corrected by Exelon). While a reviewer of the statements took the appropriate action and initiated an IR when discovered (IR 2576049), that IR did not address the fact that the field personnel did not initiate an IR at the time the problem occurred. In response to these concerns, Exelon initiated IR 2728292 for further evaluation.

.3 Semi-Annual Trend (1 sample)

a. Inspection Scope

The inspectors performed a semi-annual review of site issues to identify trends that might indicate the existence of more significant safety issues. As part of this review, the inspectors included repetitive or closely-related issues that were documented by Exelon in trend reports, site PIs, major equipment problem lists, system health reports, MR assessments, and maintenance or CAP backlogs. The inspectors also reviewed Exelon's CAP database for the third and fourth quarters of 2016 to assess IRs written in various subject areas (equipment problems, human performance issues, etc.), as well as individual issues identified during the NRC's daily IR review (Section 4OA2.1). The inspectors reviewed the Exelon quarterly trend reports for the past two quarters to verify that Exelon personnel were appropriately evaluating and trending adverse conditions in accordance with applicable procedures.

b. Findings and Observations

No findings were identified.

The inspectors evaluated a sample of IRs generated during the past two quarters by departments that provide input to the quarterly trend reports. The inspectors determined that, in most cases, the issues were appropriately evaluated by Exelon staff for potential trends and resolved within the scope of the CAP. The inspectors identified adverse trends existed in material storage requirements and external flood barrier material and administrative controls.

The station and the NRC inspectors identified an increased number of material storage issues during the second half of 2016. Exelon defines material storage requirements in their procedures MA-AA-716-026, "Station Housekeeping/Material Condition Program," and OP-AA-201-09, "Control of Transient Combustible Material." During routine plant walkdowns, the inspectors identified multiple examples of material inappropriately stored in safety related structures as well as combustible material being left unattended in transient combustible free zones. The station confirmed that a trend existed and entered the issue into their CAP under IR 3953954. The station has taken actions to educate personnel on the proper material storage requirements and increased management engagement to improve performance. The inspectors determined that the material storage issues were minor because they did not impact any safety-related SSC's or exceed any combustible loading limits in the PB Fire Protection Program.

The inspectors identified numerous flood barrier material and administrative control issues primarily focused with the safety related pump structure. Specifically, the inspectors identified flood barrier bypasses due to degraded conduits, conduit seals and a plant modification to the diesel driven fire pump fuel oil system that did not appropriately consider flood protection. In addition, the inspectors identified that Exelon did not consistently implement administrative controls to maintain external flood barriers during planned work as required by CC-PB-104, "Hazard Barrier Control Program." Exelon identified the adverse trend and entered the issues into the CAP under IRs 2711402 and 2711839. The station developed a multi-discipline team to review all aspects of their external flood protection in the safety-related pump house.

The station has taken corrective actions to enhance station sensitivity to flood protection features material conditions and clarify guidance for barrier breach controls for planned work on external flood barriers. The inspectors determined that the issues were minor because the identified flood bypasses remained within the safety related pump structure's sump pump capacity and operability of the ultimate heat sink was preserved.

The inspectors discussed these issues with various station personnel, including station management. Station management acknowledged the issues, and verified they were captured in the CAP. The inspectors determined that Exelon has implemented corrective actions commensurate with the safety significance. The inspectors will continue to evaluate the long term effectiveness of the corrective actions in addressing the adverse trends.

4OA3 Follow-Up of Events and Notices of Enforcement Discretion (71153 – 2 samples)

.1 (Closed) Licensee Event Report (LER) 05000277/2016-001-00: Leak in High Pressure Service Water Pipe Results in Condition Prohibited by TS

Description Exelon's HPSW system is a safety-related system that provides cooling water to the four heat exchangers in the RHR system during post-accident conditions. On September 12, 2016, Exelon completed a past operability evaluation, IR 2704854, concerning a flaw on a 1" diameter stainless steel pipe weld previously identified on August 16, 2016. Exelon's evaluation concluded that the flaw had rendered the '2C' HPSW subsystem inoperable and determined that this constituted a violation associated with Unit 2 TS LCOs 3.5.1, 3.6.2.3.A, 3.6.2.4.A, 3.6.2.5.A, 3.7.1, and 3.7.3.B for one Unit 2 RHR and one Unit 2 HPSW subsystem being inoperable due to flooding potential in the '2C' RHR room.

The 1" diameter pipe supplies sample water to the '2C' HPSW radiation monitor sample pump and a catastrophic failure of the pipe weld during a design basis seismic event would cause an un-isolable leak and result in the flooding of the '2C' RHR pump room, adversely impacting the operation of the equipment in the room. The leak was on a socket joint weld that connects the 1" sample line to the 18" HPSW return pipe to the discharge canal. Due to the length of the flaw, Exelon determined that the 1" pipe weld would fail during a design basis seismic event. Exelon determined that the flaw was caused by high cycle fatigue stresses on the socket weld from vibration.

The inspectors reviewed the cause evaluation and did not identify any performance deficiency. The piping design configuration, modified in 1993, did not specifically address the vibration affects from the HPSW line. In addition, a weld with a 2 to1 length to depth ratio was not used with the socket weld in order to mitigate stress from vibration. The inspectors noted that Exelon Standard NES-MS-03.04, Revision 1, "Small Bore Piping Design for High Cycle Fatigue," which was issued in 2000, subsequent to the 1993 design modification, states that "all new socket welds on piping systems, determined to be subject to high cycle fatigue, shall have 2 to 1 weld leg lengths." It further discusses system piping support designs, such as tie back supports, which have been shown to be a reliable method of eliminating high cycle fatigue failure caused by vibrations. However, since the design standard only applies to new designs and the original piping configuration met the applicable design requirements at the time of installation, the inspectors determined that it was not reasonable for Exelon to have foreseen and corrected the flaw in the socket weld.

Corrective actions performed by Exelon after the identification of the flaw on August 16, 2016, included replacing the affected section of pipe, utilizing a 2-to-1 weld length on the socket to mitigate vibration effects, and specifying long term plans to modify the piping restraint to reduce cyclic stresses on this weld. The inspectors determined Exelon's actions to identify and address the condition adverse to quality were reasonable.

Enforcement. Unit 2 TSs 3.5.1, 3.6.2.3.A, 3.6.2.4.A, 3.6.2.5.A, 3.7.1, and 3.7.3.B require each Unit 2 RHR and HPSW subsystems to be restored to operable within 7 days or to be in Mode 3 within 12 hours. Contrary to these TS requirements, the Unit 2 'C' RHR and HPSW subsystems were determined by Exelon to have been inoperable for reasonably longer than their 7 day allowed outage time when a flaw was identified on August 16, 2016. The inspectors determined that this violation was more than minor, but not the result of a performance deficiency. Specifically, the inspectors concluded that it was not reasonable for Exelon to have identified the violation prior to its occurrence. Furthermore, Exelon met all applicable design standards at the time of the 1993 design modification and corrective actions taken were in accordance with all new applicable standards.

In accordance with the NRC Enforcement Policy guidance and IMC 0612, this violation is being treated under the traditional enforcement process and best characterized as a Severity Level (SL) IV (very low safety significance) violation, similar to example 1.d in the NRC Enforcement Policy, Section 6.1, "Reactor Operations." Although a performance deficiency was not identified, to verify that the issue was of very low safety significance, the inspectors considered risk insights obtained by using IMC 0609, Significance Determination Process, Appendix A, Exhibit 1, "Initiating Event Screening Questions." The inspectors determined that a more detailed risk evaluation (DRE) was warranted since the violation involved an internal flooding initiator. A Region I senior reactor analyst (SRA) performed the DRE using Systems Analysis Programs for Hands-On Evaluation Revision 8.1.4 and the Standardized Plant Analysis Risk Model for Peach Bottom 2, Version 8.27. The SRA made conservative bounding assumptions to evaluate the risk significance of the issue, including: the socket joint weld on the HPSW return pipe was assumed to fail for postulated Seismic events ranging from .075g to greater than 1g peak ground acceleration; the fault would impact the functionality of the '2C' RHR pump, the '2C' RHR heat exchanger, and the conservative assumption that the '2A' RHR heat exchanger could be isolated in the response to the event; the exposure time was taken as one year; and the truncation was set at 1E-12. The dominant core damage sequences involved Seismic events from (0.75g-1.0g) which would result in small break loss-of-coolant accidents, concurrent with a loss-of-offsite-power, with failure of low pressure late injection systems. The SRA determined that the estimated very conservative increase in core damage frequency (CDF) associated with the issue was 1.17E-8/year or of very low safety significance (Green). Therefore, the inspectors considered that the SL IV characterization was appropropriate.

Because this issue: (1) is of very low safety significance; (2) has been determined not reasonable for Peach Bottom to be able to foresee and prevent, and as such no performance deficiency exists; and, (3) has been entered into Peach Bottom's CAP as IR 2704854; the NRC has decided to exercise enforcement discretion in accordance with Sections 2.2.4 and 3.10 of the NRC Enforcement Policy and refrain from issuing enforcement action for the violation of TS (EA-17-019). Furthermore, because Peach Bottom's actions did not contribute to this violation, it will not be considered in the assessment process or the NRC's Action Matrix. This LER is closed.

.2 (Closed) LER 05000278/2016-001-00: Leak in HPCI Drain Pipe Results in a Loss of Safety Function

On September 26, 2016, Exelon discovered a water leak on a 3/4" diameter ASME Code Class 2 drain line for the Unit 3 HPCI turbine. As a result, the HPCI system was declared inoperable. Exelon performed a cause evaluation and determined the flaw was the result of an erosion process caused by an orifice installed in the incorrect orientation in the drain line. The orifice was installed during the original construction and there were no reasonable indications to identify the condition prior to the leak occurring. The pipe section was replaced and the HPCI system was declared operable on September 28, 2016. The inspectors did not identify any new issues or performance deficiencies during the review of the LER. This LER is closed.

4OA5 Other Activities

Institute of Nuclear Power Operations Report Review

a. Inspection Scope

The inspectors reviewed the final report for the PB Institute of Nuclear Power Operations (INPO) / World Association of Nuclear Operators (WANO) plant assessment conducted in spring 2016. The inspectors reviewed this report to ensure that any issues identified were consistent with NRC perspectives of PB performance and to determine if INPO/WANO identified any significant safety issues that required further NRC follow-up.

b. Findings

No findings were identified.

4OA6 Meetings, Including Exit

Quarterly Resident Exit Meeting Summary

On January 12, 2017, the inspectors presented the inspection results to Mr. Michael Massaro, Peach Bottom, Site Vice President and other members of Exelon's staff. The inspectors verified that no proprietary information was retained by the inspectors or documented in this report.

On February 2, 2017, the inspectors re-exited the inspection results documented in section 4OA3.1 of this report to Mr. James Armstrong, Peach Bottom, Regulatory Assurance Manager and other members of Exelon's staff. The inspectors verified that no proprietary information was retained by the inspectors or documented in this report.

ATTACHMENT: SUPPLEMENTARY INFORMATION

SUPPLEMENTARY INFORMATION

KEY POINTS OF CONTACT

Exelon Generation Company Personnel

M. Massaro, Site Vice President
P. Navin, Plant Manager
N. Alexakos, Emergency Preparedness Manager
J. Armstrong, Regulatory Assurance Manager
P. Breidenbaugh, Maintenance Director
C. Crabtree, Chemistry Groundwater Task Manager
D. Dullum, Regulatory Assurance Engineer
J. Fogarty, Nuclear Steam Supply Systems Manager
S. Kame, IVVI Program Owner
C. Hawkins, Exelon Level III Examiner
D. Henry, Engineering Director
D. Hilt, Shift Operations Superintendent
R. Holmes, Radiation Protection Manager
P. Kester, Engineer
J. Koester, Fire Marshall
M. Lefever, System Manager
J. Lucas, Engineer
H. McCrory, Radiation Protection Supervisor
B. Miller, Engineer
W. Reynolds, Engineering Programs Manager
M. Retzer, Systems Engineering Senior Manager
M. Rector, Engineering Response Team Manager
R, Ridge, Health Physicist
B. Rufo, ISI Program Owner
D. Turker, Operations Director
S. Valliere, Senior Site NDE Specialist
M. Weidman, Work Management Director
C. Weichler, Manager of Operations Support and Services

LIST OF ITEMS OPENED, CLOSED, DISCUSSED, AND UPDATED

Opened/Closed

05000277/2016004-01	NCV	Failure to Identify and Remove FM in CAD System Piping (Section 1R19)

Closed

05000277/2016-001-00	LER	Leak in HPSW Pipe Results in Condition Prohibited by TS (Section 4OA3)
05000278/2016-001-00	LER	Leak in HPCI Drain Pipe Results in a Loss of Safety Function (Section 4OA3)

LIST OF DOCUMENTS REVIEWED

* -- Indicates NRC-identified

Section 1R01: Adverse Weather Protection

Procedures
MA-PB-1003, Winter Readiness and Storm Response Guidelines for the PB Facility, Revision 11
OP-AA-108-111-1001, Severe Weather and Natural Disaster Guidelines, Revision 15
OP-PB-108-111-1001, Preparation for Severe Weather, Revision 16

IR
*3956223

Miscellaneous
Peach Bottom Certification Letter for Winter Readiness

Section 1R04: Equipment Alignment

Procedures
AO 10.4-2, RHR System, Fuel Pool to Reactor Mode, Revision 32
COL 14.1.A-2A, Core Spray (CS) System Loop A, Revision 13
SO 32.1.A-3, HPSW System Startup and Normal Operations, Revision 18
SO 53.7.A, Index for 13KV Startup Source and Bus Outages When Three Energized Startup Sources are In Service, Revision 19
SO 53.7.A, Removal of 343SU SWGR 00A04 and 343SU XFMR 00X011 From Service, Revision 1
ST-O-32-350-3, HPSW Valve Alignment Verification
ST-O-54-951-2, Offsite and Onsite Electrical Power Breaker Alignment and Power Availability Check With A Start-Up Source and/or EDG Inoperable, Revision 7

Drawings
E-1, Single Line Diagram Station, Revision 56
M-361, Sheet 1, P&I Diagram RHR System, Revision 86
SIM-361, Sheet 1, Simplified Diagram RHR System, Revision 0
M-362, Sheet 1, P&I Diagram CS Cooling System, Revision 64

IRs
*2737365 3946537

WO
R1262167

Miscellaneous
DBD P-S-09, RHR System, Revision 19
DBD P-S-44, CS System, Revision 12
Q1-2016 CS System Health Report

Section 1R05: Fire Protection

Procedures
OP-AA-201-009, Control of Transient Combustible Material, Revision 19
PF-1, Unit 2 Reactor Building, 2A and 2C RHR Pump and HX Room – Elevation 91'-6", Revision 5
PF-5C, Unit 2 Reactor Building, Torus Room – Elevation 91'-6", Revision 5
PF-5P, Unit 2 Reactor Building, General Area South – Elevation 135', Revision 6
PF-5J, Unit 2 Reactor Building, General Area – Elevation 165', Revision 6
PF-24, Unit 2 Reactor Building, Drywell Area, Revision 5

IRs
*2733435 *2742435 *3951814 395355

Miscellaneous
DBD P-T-10, Fire Safe Shutdown, Revision 13
A-166, Fire Detection and Suppression Floor Plan at Elevation 91'6"
A-167, Fire Detection and Suppression Floor Plan at Elevation 116'0"
Fire Protection Suite- Fire Zone Loading Calculation for Active Transient Permits
Transient Combustible Permits

Section 1R07: Heat Sink Performance

Procedures
MA-AA-716-012, Post-Maintenance Activities, Revision 21
RT-O-032-310-3, HPSW Oil Cooler Heat Transfer Capability Test, Revision 13

IR
3946506

WO
C0255983

Miscellaneous
ECR 14-00317, Replacement of HPSW Pump Motor Oil Coolers, Revision 1
PM-0824, Develop an Equation to Extrapolate, from Actual Data, the Maximum Anticipated Bearing Oil Temperature on the HPSW Pump Motors, Revision 2

Section 1R08: In-Service Inspection

Procedures
ER-AA-335-002, PT Examination, Revision 9
ER-AA-335-005, RT Examination, Revision 5
ER-AA-335-003, MT Examination, Revision 7
ER-AA-335-016, VT-3 Visual Examination of Component Support, Attachments and Interiors of Reactor Vessels, Revision 9
CC-AA-501, Exelon Nuclear Welding Program, Revision 2
ER-AA-335-010, Guidelines for ASME Code Allowable Flaw Evaluation and ASME Code Coverage Calculations, Revision 6
ER-AA-335-105-2003, VT-2 Visual Examination in Accordance with ASME 2001 Edition, 2003 Addenda, Revision 0

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LIST OF ACRONYMS

ALARA	as low as reasonably achievable
ASME	American Society of Mechanical Engineers
CAD	containment atmospheric dilution
CAP	corrective action program
CFR	*Code of Federal Regulations*
CR	condition report
CS	core spray
DEHC	digital electro-hydraulic control
EAL	emergency action level
ECT	emergency cooling tower
EDG	emergency diesel generator
EPD	electronic personnel dosimeter
ESW	emergency service water
FM	foreign material
GL	Generic Letter
HPCI	high pressure coolant injection
HPSW	high pressure service water
HRA	high radiation area
IMC	inspection manual chapter
IR	issue report
ISI	in-service inspection
LER	licensee event report
LHRA	locked high radiation area
LLRT	local leak-rate test
LOCA	loss-of-coolant accident
LOOP	loss of offsite power
MR	maintenance rule
MSIV	main steam isolation valve
MT	magnetic particle testing
NCV	non-cited violation
NDE	non-destructive examination
NRC	Nuclear Regulatory Commission
NVLAP	National Voluntary Laboratory Accreditation Program
OD	operability determination
OOS	out of service
PARS	publicly available records
PB	Peach Bottom Atomic Power Station
PD	performance deficiency
PI	performance indicator
PMT	post-maintenance testing
PT	liquid penetrant testing
RFO	refueling outage
RG	regulatory guide
RHR	residual heat removal
RP	radiation protection
RT	radiographic testing
RTP	rated thermal power
RWP	radiation work permit
SDP	significance determination process
SLC	standby liquid control
SSCs	structures, systems, and components

ST	surveillance test
TS	technical specification
UFSAR	Updated Final Safety Analysis Report
UT	ultrasonic testing
VT	visual testing
WOs	work orders