UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
2100 RENAISSANCE BLVD., SUITE 100
KING OF PRUSSIA, PA 19406-2713

February 9, 2016

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

SUBJECT: CALVERT CLIFFS NUCLEAR POWER PLANT – INTEGRATED INSPECTION REPORT 05000317/2015004 AND 05000318/2015004

Dear Mr. Hanson:

On December 31, 2015, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Calvert Cliffs Nuclear Power Plant (CCNPP), Units 1 and 2. The enclosed inspection report documents the inspection results, which were discussed on January 20, 2016, with Mr. Mark Flaherty, Plant Manager, and other members of your staff.

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

This report documents two findings of very low safety significance (Green), both of which were violations of NRC requirements. Additionally, two licensee-identified violations, which were determined to be of Severity Level IV, are listed in this report. However, because of the very low safety significance and because they are entered into your corrective action program, the NRC is treating these findings as non-cited violations (NCVs), consistent with Section 2.3.2.a of the NRC Enforcement Policy.

If you contest the NCVs in this report, 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, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at CCNPP. In addition, if you disagree with the cross-cutting aspect assigned to any finding, or a finding not associated with a regulatory requirement 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 I, and the NRC Resident Inspector at CCNPP.

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 2.390 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 component of the NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC website at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Anthony Dimitriadis, Chief
Reactor Projects Branch 1
Division of Reactor Projects

Docket Nos. 50-317 and 50-318
License Nos. DPR-53 and DPR-69

Enclosure:
Inspection Report 05000317/2015004 and 05000318/2015004
w/Attachment: Supplementary Information

cc w/encl: Distribution via ListServ

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 2.390 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 component of the NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC website at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Anthony Dimitriadis, Chief
Reactor Projects Branch 1
Division of Reactor Projects

Docket Nos. 50-317 and 50-318
License Nos. DPR-53 and DPR-69

Enclosure:
Inspection Report 05000317/2015004 and 05000318/2015004
w/Attachment: Supplementary Information

cc w/encl: Distribution via ListServ

DISTRIBUTION: (via email)
DDorman, RA
DLew, DRA
MScott, DRP
JColaccino, DRP
RLorson, DRS
BSmith, DRS
ADimitriadis, DRP
ARosebrook, DRP
ASiwy, DRP
RClagg, DRP, SRI
CRoettgen, DRP, RI
CFragman, DRP, AA
CSantos, RI OEDO
RidsNrrPMCalvertCliffs Resource
RidsNrrDorlLpl1-1 Resource
ROPReports Resource

DOCUMENT NAME: \\nrc.gov\nrc\R1\Office\DRP\BRANCH1\Calvert_Cliffs\Inspection Reports\CC IR 2015-004\CCNPP IIR 2015-004 final.docx
ADAMS Accession No. **ML16041A289**

☑ SUNSI Review		☑ Non-Sensitive ☐ Sensitive		☑ Publicly Available ☐ Non-Publicly Available	
OFFICE	RI/DRP	RI/DRP	RI/DRP		
NAME	RClagg/RLC via email	ARosebrook/AAR	ADimitriadis/AD		
DATE	2/9/16	2/9/16	2/9/16		

OFFICIAL RECORD COPY

U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket Nos.	50-317 and 50-318
License Nos.	DPR-53 and DPR-69
Report Nos.	05000317/2015004 and 05000318/2015004
Licensee:	Exelon Generation Company, LLC (Exelon)
Facility:	Calvert Cliffs Nuclear Power Plant, Units 1 and 2
Location:	Lusby, MD
Dates:	October 1, 2015 through December 31, 2015
Inspectors:	R. Clagg, Senior Resident Inspector C. Roettgen, Resident Inspector H. Anagnostopoulos, Health Physicist C. Highley, Project Engineer K. Mangan, Senior Reactor Inspector P. Ott, Operations Engineer S. Pindale, Senior Reactor Inspector P. Presby, Senior Operations Engineer J. Schoppy, Senior Reactor Inspector
Approved by:	Anthony Dimitriadis, Chief Reactor Projects Branch 1 Division of Reactor Projects

TABLE OF CONTENTS

SUMMARY 3

REPORT DETAILS 6

1. REACTOR SAFETY 6
   - 1R01 Adverse Weather Protection 6
   - 1R04 Equipment Alignment 7
   - 1R05 Fire Protection 10
   - 1R07 Heat Sink Performance 10
   - 1R11 Licensed Operator Requalification Program 11
   - 1R12 Maintenance Effectiveness 13
   - 1R13 Maintenance Risk Assessments and Emergent Work Control 14
   - 1R19 Post-Maintenance Testing 15
   - 1R20 Refueling and Other Outage Activities 15
   - 1R22 Surveillance Testing 16

2. RADIATION SAFETY 16
   - 2RS4 Occupational Dose Assessment 16

4. OTHER ACTIVITIES 17
   - 4OA1 Performance Indicator (PI) Verification 17
   - 4OA2 Problem Identification and Resolution 19
   - 4OA3 Follow-Up Events and Notices of Enforcement Discretion 24
   - 4OA6 Meetings, Including Exit 28
   - 4OA7 Licensee-Identified Violations 29

ATTACHMENT: SUPPLEMENTARY INFORMATION 30

SUPPLEMENTARY INFORMATION A-1

KEY POINTS OF CONTACT A-1

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED A-1

LIST OF DOCUMENTS REVIEWED A-2

LIST OF ACRONYMS A-9

SUMMARY

Inspection Report 05000317/2015004 and 05000318/2015004; 10/01/2015 – 12/31/2015; Calvert Cliffs Nuclear Power Plant (CCNPP), Units 1 and 2; Equipment Alignment and Follow-Up Events and Notices of Enforcement Discretion.

This report covered a three-month period of inspection by resident inspectors and announced baseline inspections performed by regional inspectors. The inspectors identified two non-cited violations (NCVs), which were 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," 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 U.S. Nuclear Regulatory Commission (NRC) requirements are dispositioned in accordance with the NRC's Enforcement Policy, dated February 4, 2015. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 5.

Cornerstone: Mitigating Systems

- Green. The inspectors identified a Green NCV of Technical Specification (TS) 5.4.1.a for Exelon's failure to implement procedures as required by Regulatory Guide (RG) 1.33, Appendix A, Section 1, "Administrative Procedures," during replacement of the 11 service water (SRW) pump motor, resulting in the SRW pump room door, a high energy line break (HELB) barrier, being impaired. This rendered the safety-related equipment protected by the HELB barrier inoperable. The inspectors determined that the failure to properly implement Exelon procedures EN-1-135, "Control of Barriers," Revision 00202, and CC-AA-201, "Plant Barrier Control Program," Revision 11, was a performance deficiency that was reasonably within Exelon's ability to foresee and prevent. Upon identification, Exelon staff entered this issue into their corrective action program (CAP) as issue report (IR) 2586773. Exelon's immediate corrective actions included halting of impairing hazard barriers without considering the degraded barrier's effect on equipment operability.

  The inspectors reviewed IMC 0612, Appendix B, "Issue Screening," and determined the performance deficiency was more than minor because it adversely affected the equipment performance attribute of the Mitigating Systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, Exelon's actions in blocking open the HELB barrier resulted in a condition where structures, systems, and components (SSCs) necessary to mitigate the effects of a HELB may not have functioned as required; therefore, the reliability of these protected SSCs was adversely impacted. In accordance with IMC 0609, Attachment 4, "Initial Characterization of Findings," issued on June 19, 2012, and IMC 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," Exhibit 2, "Mitigating Systems Screening Questions," issued on June 19, 2012, the inspectors determined that a detailed risk evaluation was necessary to disposition the significance of this finding because the finding represented a loss of the SRW system. A regional Senior Reactor Analyst (SRA) performed a detailed risk evaluation using an exposure interval of 10 minutes as the maximum time the condition was allowed in the plant. Using these inputs yielded an initiating event frequency of 4E-9/year. From discussions with the inspectors, the analyst confirmed a list of affected equipment. The analyst bounded the scenario by assuming all mitigating equipment would be lost which gave a maximum change in core

damage frequency of 4E-9/year. Since the bounded change in core damage frequency was less than 1E-6, the finding was determined to be of very low safety significance (Green). The inspectors determined that the finding had a cross-cutting aspect in the area of Human Performance, Work Management, because Exelon did not implement a process of planning, controlling, and executing work activities such that nuclear safety was the overriding priority. Specifically, Exelon's process for planning and controlling maintenance did not identify the applicability of Exelon procedure CC-AA-201. [H.5] (Section 1R04)

- Green. The inspectors documented a self-revealing Green NCV of TS 5.4.1.a for Exelon's failure to implement procedures as required by RG 1.33, Appendix A, Section 8, "Procedures for Control of Metering and Testing Equipment and for Surveillance Tests, Procedures, and Calibrations," during maintenance which resulted in a manual isolation valve (1HVFW-1804) being incorrectly placed in the closed position. This human performance error isolated the number 12 steam generator (SG) wide range level transmitter (1LT1124C) and subsequently rendered the auxiliary feedwater actuation system (AFAS) sensor channel ZF inoperable for 33 hours and 39 minutes, a condition prohibited by TS 3.3.4, "Engineered Safety Features Actuation System (ESFAS) Instrumentation." The inspectors determined that the failure to properly implement procedure STP M-525AT-1 and place 1HVFW-1804 in its required position was a performance deficiency that was reasonably within Exelon's ability to foresee and prevent. Upon identification, Exelon staff entered this issue into their CAP as condition report (CR)-2014-003320. Exelon's immediate corrective action was to enter TS 3.3.4.A, to determine and correct the cause, and to retest the system for proper operation.

  The inspectors reviewed IMC 0612, Appendix B, "Issue Screening," and determined the issue is more than minor because it adversely affected the configuration control attribute of the Mitigating Systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, Exelon operated with manual isolation valve, 1HVFW-1804 closed which resulted in the inoperability of the AFAS sensor channel ZF for approximately 33 hours and 39 minutes. In accordance with IMC 0609, Attachment 4, "Initial Characterization of Findings," issued on June 19, 2012, and IMC 0609, Appendix A, "The Significance Determination Process for Findings at Power," Exhibit 2, "Mitigating Systems Screening Questions," issued on June 19, 2012, the inspectors determined that a detailed risk evaluation was necessary to disposition the significance of this finding because the finding represented an actual loss of function of at least a single train of AFAS for greater than its TS allowed outage time. A regional SRA performed a detailed risk evaluation. The finding was determined to be of very low safety significance (Green) because the redundant AFAS sensor was operable and functional to ensure actuation of the system if it had been required, therefore there was no loss of the system function. Additionally, the unit was in Mode 3 with very low decay heat levels during the time the ZF sensor channel was determined to be inoperable and plant procedures exist to manually start the AFW system if failure of automatic actuation were to occur. The inspectors determined that the finding has a cross-cutting aspect in the area of Human Performance, Challenge the Unknown, because Exelon did not stop when faced with an uncertain condition about the position of 1HVFW-1804. Specifically, personnel conducting the second verification did not appropriately question the position of isolation valve 1HVFW-1804 because of the higher experience level of the personnel conducting the first verification. [H.11] (Section 4OA3)

Other Findings

Two violations of Severity Level IV, which were identified by Exelon, were reviewed by the inspectors. Corrective actions taken or planned by Exelon have been entered into Exelon's CAP. These violations and corrective action tracking numbers are listed in Section 4OA7 of this report.

REPORT DETAILS

Summary of Plant Status

Unit 1 began the inspection period at 100 percent power. On December 11, 2015, operators reduced power to 83 percent for main turbine valve testing. The operators returned the unit to full power on December 12. The unit remained at or near 100 percent power for the remainder of the inspection period.

Unit 2 began the inspection period at 100 percent power. On October 2, 2015, operators reduced power to 83 percent for main turbine valve testing. The operators returned the unit to full power on October 3. On December 1, 2015, operators manually scrammed the unit in response to the loss of the 22 steam generator feedwater pump (SGFP). On December 2, the unit began to startup, but two control element assemblies were dropped due to faulty equipment. The unit was taken to Mode 5 for repairs. Unit startup began on December 6 and the unit reached 100 percent power on December 7. The unit remained at or near 100 percent power for the remainder of the inspection period.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection (71111.01 – 2 samples)

.1 Readiness for Impending Adverse Weather Conditions

a. Inspection Scope

The inspectors performed a review of Exelon's readiness for Hurricane Joaquin and high winds forecasted for October 3, 2015. The inspectors reviewed the implementation of adverse weather preparation procedures before the onset of this adverse weather condition. The inspectors verified that operator actions defined in Exelon's adverse weather procedure maintained the readiness of essential systems. The inspectors discussed readiness and staff availability for adverse weather response with operations and work control personnel. Documents reviewed for each section of this inspection report are listed in the Attachment.

b. Findings

No findings were identified.

.2 Readiness for Seasonal Extreme Weather Conditions

a. Inspection Scope

The inspectors performed a review of Exelon's readiness for the onset of seasonal low temperatures on December 3, 2015. The review focused on the 12 condensate storage tank, emergency diesel generators (EDG), and diesel fuel oil storage. The inspectors reviewed the Updated Final Safety Analysis Report (UFSAR), TS, control room logs, and

the CAP to determine what temperatures or other seasonal weather could challenge these systems, and to ensure Exelon personnel had adequately prepared for these challenges. The inspectors reviewed station procedures, including Exelon'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

Partial System Walkdowns (71111.04Q – 4 samples)

a. Inspection Scope

The inspectors performed partial walkdowns of the systems listed below. 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 procedures, system diagrams, the UFSAR, TS, 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.

- 21 Emergency core cooling system train during 22 containment spray (CS) pump out of service for maintenance, October 12, 2015
- 21 Low pressure safety injection train during 22 low pressure safety injection pump motor replacement, October 14, 2015
- 12 SRW during 11 saltwater (SW) maintenance outage and 11 SRW pump motor replacement, October 21, 2015
- 2A EDG and 21 480V AC busses during 2B EDG out of service for maintenance, November 5, 2015

b. Findings

Introduction: The inspectors identified a Green NCV of TS 5.4.1.a for Exelon's failure to implement procedures as required by RG 1.33, Appendix A, Section 1, "Administrative Procedures," during replacement of the 11 SRW pump motor, resulting in the SRW pump room door, a HELB barrier, being impaired. This rendered the safety-related equipment protected by the HELB barrier inoperable.

Description: On October 20, 2015, Exelon replaced the 11 SRW pump motor which required the opening of a HELB barrier, specifically Door 214, Heater Bay to SRW Pump Room (Unit 1), separating the turbine building from the SRW Pump Room and the installation of a chain fall through this barrier. The motor driven 13 auxiliary feedwater (AFW) pump, saltwater air compressors (SWACs), and all three SRW pumps are located in the SRW pump room and are protected from a HELB in the turbine building by the barrier that was opened for the SRW pump motor replacement. During the planning process, Exelon determined that the equipment located inside the SRW pump room would remain operable as long as the time the HELB barrier was allowed to remain open was limited to five minutes and Exelon personnel remained stationed at the door throughout the time it was open. The inspectors interviewed Exelon personnel and noted that the time the barrier was impaired was approximately three and a half minutes during both the removal and installation of the SRW pump motor. The inspectors also noted that a member of the Exelon staff was continually stationed at the door to restore the barrier to its design basis configuration during any plant event or transient.

The inspectors reviewed CCNPP UFSAR, Revision 47, Table 10A-6, "Mechanical and Electrical Equipment Required to Place the Plant in a Safe Shutdown Condition and Maintain it in a Safe Shutdown Condition," and noted that the table identifies the motor driven AFW pump, the SRW pumps, and components that rely on the SWACs for proper operation, as equipment located outside those areas which experience a steam environment during a HELB in the turbine building. The inspectors reviewed Exelon procedure EN-1-135, "Control of Barriers," Revision 00202, and noted that Attachment 1 lists Door 214 as a HELB door. Procedure EN-1-135, Section 5.3, also states, in part, that a HELB door can be held open, but not blocked open for maintenance. The inspectors also noted that EN-1-135, Section 5.5.B.7, requires that, "When a HELB barrier is removed or otherwise made incapable of performing its design function, the equipment protected by the HELB barrier will need to be considered inoperable." The inspectors reviewed Exelon procedure CC-AA-201, "Plant Barrier Control Program," Revision 11, and noted that Section 3.2 states, "Stations must continue to comply with the plant TSs, particularly the operability provisions applicable to the protected equipment, and other administrative requirements that may place limitations on continued reactor operation with a barrier impaired." CC-AA-201 defines an impaired barrier in Section 2.5 as, "A barrier that is inoperable such that it cannot fully perform its intended design function." The inspectors also noted that Regulatory Issue Summary 2001-09, "Control of Hazard Barriers," is listed as a reference in EN-1-135 and CC-AA-201. The inspectors reviewed Regulatory Issue Summary 2001-09 and noted that it discusses the need to comply with TS limiting conditions for operation (LCOs) or the possible need for compensatory measures to maintain operability of equipment that is designed to mitigate a HELB event when a HELB barrier protecting that same equipment is removed. The inspectors reviewed Exelon calculation, CA08772, "Calvert Cliffs MSLB in Turbine Bldg. El. 27'," and noted that the temperature and pressure in the vicinity of the Door 214 would reach uninhabitable conditions within 2.2 seconds during a HELB in the turbine building. The inspectors concluded that this time is significantly less than that required to safely set the SRW pump motor down and remove the chain falls from the barrier. The personnel stationed to return the impaired HELB barrier to its design basis configuration during a main steam line break in the Unit 1 turbine building would be ineffective in protecting equipment in the SRW pump room and did not constitute an acceptable compensatory measure, thus the barrier was impaired (blocked) while the chain fall was installed.

The inspectors noted that Exelon did not enter any TS LCOs or complete an operability determination for the motor driven AFW pump, SWACs, nor the SRW pumps during the time the SRW pump room HELB barrier was blocked open. The inspectors concluded that impairing the SRW pump room HELB barrier for SRW pump motor replacement without appropriate compensatory measures rendered the motor driven 13 AFW pump, SWACs, and the SRW pumps inoperable as required by Exelon procedures EN-1-135 and CC-AA-201. Exelon failed to consider this equipment inoperable for this maintenance which resulted in the failure to enter appropriate TS LCOs and to recognize that blocking the SRW pump room door would cause entry into TS 3.0.3 due to the inoperability of all Unit 1 SRW pumps with no corresponding TS action statement. The inspectors also noted that Exelon procedure WC-AA-106, "Work Screening and Processing," Revision 15, requires that work resulting in entry into TS 3.0.3 shall be screened to an outage. Upon identification, Exelon staff entered this issue into their CAP as IR 2586773.

Analysis: The inspectors determined that the failure to properly implement Exelon procedures EN-1-135, "Control of Barriers," Revision 00202, and CC-AA-201, "Plant Barrier Control Program," Revision 11, was a performance deficiency which was reasonably within its ability to foresee and prevent. The inspectors reviewed IMC 0612, Appendix B, "Issue Screening," and determined the issue is more than minor because it adversely affected the equipment performance attribute of the Mitigating Systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, Exelon's actions in blocking open the HELB barrier resulted in a condition where SSCs necessary to mitigate the effects of a HELB may not have functioned as required; therefore, the reliability of these protected SSCs was adversely impacted. In accordance with IMC 0609, Attachment 4, "Initial Characterization of Findings," issued on June 19, 2012, and IMC 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," Exhibit 2, "Mitigating Systems Screening Questions," issued on June 19, 2012, the inspectors determined that a detailed risk evaluation was necessary to disposition the significance of this finding because the finding represented a loss of the SRW system. A regional SRA performed a detailed risk evaluation to evaluate the HELB concern. The SRA identified the approximate frequency for a steam line piping break. Data from NUREG/CR-6928, "Industry-Average Performance for Components and Initiating Events at U.S. Commercial Nuclear Power Plants," updated in 2010, specified the mean frequency for a large leak pipe fault as 2.5E-11/ft-hour. The amount of piping which could initiate the HELB event was assumed to be 1000 feet. The SRA used an exposure interval of 10 minutes as the maximum time the condition was allowed in the plant. Using these inputs yielded an initiating event frequency of 4E-9/year. From discussions with the inspectors, the SRA confirmed a list of affected equipment. The SRA bounded the scenario by assuming all mitigating equipment would be lost which gave a maximum change in core damage frequency of 4E-9/year. Since the bounded change in core damage frequency was less than 1E-6, the finding was determined to be of very low safety significance (Green).

The inspectors determined that the finding has a cross-cutting aspect in the area of Human Performance, Work Management, because Exelon did not implement a process for planning, controlling, and executing work activities such that nuclear safety was the overriding priority. Specifically, Exelon's process for planning and controlling maintenance did not identify the applicability of Exelon procedure CC-AA-201. [H.5]

Enforcement: TS 5.4.1.a states, in part, that written procedures shall be implemented covering the applicable procedures recommended in RG 1.33, Appendix A, of which Section 1 specifies administrative procedures for control of equipment during safety-related activities. Contrary to this, on October 20, 2015, on two occasions, Exelon failed to implement barrier controls in accordance with EN-1-135, and CC-AA-201 for the control of hazard barriers. Specifically, Exelon blocked a HELB barrier without entering applicable TS LCOs or implementing appropriate compensatory measures to maintain the operability of safety-related equipment in the room normally protected by the barrier. Exelon's immediate corrective actions included halting of impairing hazard barriers without considering the degraded barrier's effect on equipment operability. Because this violation is of very low safety significance (Green) and has been entered into Exelon's CAP (IR 2586773), this violation is being treated as an NCV, consistent with Section 2.3.2.a of the NRC Enforcement Policy. **(NCV 05000317/2015004-01: Failure to Implement Procedures for the Control of Hazard Barriers During Maintenance)**

1R05 Fire Protection

Resident Inspector Quarterly Walkdowns (71111.05Q – 2 samples)

a. Inspection Scope

The inspectors conducted a tour 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 out of service, degraded, or inoperable fire protection equipment, as applicable, in accordance with procedures.

- Unit 2, 27' Switchgear Room, Fire Area 18, November 5, 2015
- Unit 2, Purge Air Room, Fire Area 18A, November 5, 2015

b. Findings

No findings were identified.

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

a. Inspection Scope

The inspectors reviewed the 22 component cooling heat exchanger to determine its readiness and availability to perform its safety functions. The inspectors reviewed the design basis for the component and reviewed the results of previous inspections of the 22 component cooling heat exchanger. The inspectors discussed the results of the most recent inspection with engineering staff and reviewed pictures of the as-left conditions. The inspectors verified that Exelon initiated appropriate corrective actions for identified deficiencies. The inspectors also verified that the number of tubes plugged within the heat exchanger did not exceed the maximum amount allowed.

b. Findings

No findings were identified.

1R11 Licensed Operator Requalification Program and Licensed Operator Performance (71111.11Q – 4 samples; 71111.11B – 1 sample)

.1 Quarterly Review of Licensed Operator Requalification Testing and Training

a. Inspection Scope

The inspectors observed licensed operator simulator training on November 24, 2015, which involved a scenario of a SG tube rupture and a main steam break inside containment that resulted in an Alert declaration. 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 manager. 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 (MCR)

a. Inspection Scope

The inspectors observed licensed operators in the MCR performing activities during the events below. The inspectors observed procedure use and adherence, crew communications, and coordination of activities between work groups to verify that established expectations and standards were met.

- Unit 2, Main turbine valve testing and power ascension, October 3, 2015
- Unit 2, Reactor startup and response to dropped control element assemblies, December 2, 2015
- Unit 2, Plant heatup and startup, December 6, 2015

b. Findings

No findings were identified.

.3 Biennial Review (71111.11B – 1 sample)

a. Inspection Scope

The following inspection activities were performed using NUREG-1021, "Operator Licensing Examination Standards for Power Reactors," Revision 10, and Inspection Procedure 71111.11, “Licensed Operator Requalification Program and Licensed Operator Performance.”

Examination Results

On December 23, 2015, the results of the annual operating tests were reviewed to determine if pass/fail rates were consistent with the guidance of NUREG-1021, "Operator Licensing Examination Standards for Power Reactors," Revision 10, and IMC 0609, Appendix I, “Operator Requalification Human Performance Significance Determination Process (SDP).” The review verified that the failure rate (individual or crew) did not exceed 20 percent.

- 2 out of 76 operators failed at least one section of the annual exam. The overall individual failure rate was 2.6 percent.
- 0 out of 15 crews failed the simulator test. The crew failure rate was 0.0 percent.

Written Examination Quality

The inspectors reviewed two written examinations administered during the 2015 examination cycle for qualitative and quantitative attributes as specified in Appendix B of Inspection Procedure 71111.11, “Licensed Operator Requalification Program.”

Operating Test Quality

Ten job performance measures (JPMs) and five scenarios were reviewed for qualitative and quantitative attributes as specified in Appendix C of Inspection Procedure 71111.11, “Licensed Operator Requalification Program.”

Licensee Administration of Operating Tests

Observations were made of the dynamic simulator exams and JPMs administered during the week of November 16, 2015. These observations included Exelon’s evaluations of crew and individual performance during the dynamic simulator scenarios and individual performance JPMs.

Examination Security

The inspectors assessed whether facility staff properly safeguarded exam material. Scenarios, JPMs, and written examinations were checked for excessive overlap of test items.

Remedial Training and Re-Examinations

The remediation plans for two senior reactor operators and one reactor operator for individual 2014 annual dynamic simulator scenario failures were reviewed. Remediation

and retesting were satisfactorily performed in accordance with site procedures. Two senior reactor operator cycle weekly written quiz failures were also reviewed to assess the effectiveness of the remedial training. Both the original failed quizzes and the remedial quizzes were reviewed to ensure the failed concepts were successfully remediated and retested in accordance with site procedures.

Conformance with Operator License Conditions

Medical records for 14 licensed operators were reviewed to assess conformance with license conditions.

Proficiency watch standing records were reviewed for all operators for the third quarter of 2015. Proficiency review included review of individual completed active license tracking logs in accordance with OP-AA-105-102, "NRC Active License Maintenance," Revision 11, and shift staffing reports from the electronic Shift Operations Management System.

The reactivation plan for one reactor operator license during the fourth quarter of 2015 was reviewed to assess the effectiveness of the reactivation process. The reactivation was successfully processed in accordance with site procedures.

Records for the participation of licensed operators in the requalification program from January 2014 through November 2015 were reviewed.

Simulator Performance

Simulator performance and fidelity was reviewed for conformance to the reference plant control room. Simulator test documentation was reviewed.

Problem Identification and Resolution

A review was conducted of recent operating history documentation found in inspection reports, Exelon's CAP, and the most recent NRC plant issues matrix. Specifically, the inspectors reviewed two root causes associated with configuration control issues and a recent dual unit trip associated with a grid disturbance. Also reviewed were two apparent causes associated with work control and a loss of reactor coolant system inventory event involving local leak rate testing. In all cases the inspectors ensured operations requalification training actions from the various root and apparent cause corrective actions were completed or in progress.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12Q – 4 samples)

a. Inspection Scope

The inspectors reviewed the samples listed below to assess the effectiveness of maintenance activities on SSC performance and reliability. The inspectors reviewed system health reports, CAP documents, maintenance WOs, and maintenance rule basis

documents to ensure that Exelon was identifying and properly evaluating performance problems within the scope of the maintenance rule. For each sample selected, the inspectors verified that the SSC was properly scoped into the maintenance rule in accordance with Title 10 of the *Code of Federal Regulations* (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). Additionally, the inspectors ensured that the Exelon staff was identifying and addressing common cause failures that occurred within and across maintenance rule system boundaries.

- Maintenance rule assessment of component cooling system from Licensee Event Report (LER) 2015-001 and IR 02439913 (IR 02550943)
- 12 MCR heating, ventilation, and air conditioning bearing failure (IR 02549932)
- Unit 2 backup instrument air pressure control valve failure (IR 02491558)
- Loss of data acquisition system channel B during 2Y05 maintenance (IR 02492113)

b. Findings

No findings were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13 – 2 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.

- Updated maintenance risk assessment for Unit 2 Yellow risk activities associated with 22 CS pump out of service for maintenance, October 12, 2015
- Maintenance risk assessment for Unit 1 Yellow risk activities associated with 11 SW train out of service for maintenance and 11 SRW pump motor replacement, October 20, 2015

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19 – 3 samples)

a. Inspection Scope

The inspectors reviewed the post-maintenance tests for the maintenance activities listed below to verify that procedures and test activities ensured system operability and functional capability. The inspectors reviewed the test procedure to verify that the procedure adequately tested the safety functions that may have been affected by the maintenance activity, that the acceptance criteria in the procedure were consistent with 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 briefs and post-job critique where possible, and confirmed work site cleanliness was maintained. Additionally, the inspectors witnessed the test or reviewed test data to verify quality control hold points were performed and checked, and that results adequately demonstrated restoration of the affected safety functions.

- WO C92967904, 21 CS cooler modification, October 30, 2015
- WO C92867744, Replace relay 2B EDG, November 5, 2015
- WO C93258919, 22 SGFP coupling replacement, December 2, 2015

b. Findings

No findings were identified.

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

a. Inspection Scope

Unit 2 began an unscheduled outage on December 1, 2015, due to a manual reactor trip following the loss of the 22 SGFP. During the forced outage period, December 1– 6, 2015, the inspectors evaluated 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 out of service
- Status and configuration of electrical systems and switchyard activities to ensure that TSs were met
- Activities that could affect reactivity
- Repair activities
- Containment walkdown and closeout prior to reactor startup
- Reactor and plant startup

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22 – 3 samples)

a. Inspection Scope

The inspectors reviewed the surveillance tests listed below. The inspectors observed performance of surveillance tests and/or reviewed test data of selected risk-significant SSCs to assess whether test results satisfied TS, 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.

- STP-O-027-1, "RCS Leakage Evaluation," October 1, 2015
- STP-O-73C-1, "Component Cooling Pump Quarterly Test," Revision 12, October 28, 2015 (in-service test)
- STP-O-9A-1, "AFAS Equipment Response Time Test," November 7, 2015

b. Findings

No findings were identified.

2. RADIATION SAFETY

Cornerstone: Public Radiation Safety and Occupational Radiation Safety

2RS4 Occupational Dose Assessment (71124.04 – 1 sample)

a. Inspection Scope

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

Inspection Planning

The inspectors reviewed radiation protection program audits, National Voluntary Laboratory Accreditation Program (NVLAP) dosimetry testing reports, and procedures associated with dosimetry operations.

External Dosimetry

The inspectors reviewed dosimetry NVLAP accreditation, onsite storage of dosimeters, the use of "correction factors" to align electronic personal dosimeter results with NVLAP dosimetry results, dosimetry occurrence reports, and CAP documents for adverse trends related to external dosimetry.

Internal Dosimetry

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, 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 exposures.

Special Dosimetric Situations

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

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

4OA1 Performance Indicator (PI) Verification (71151)

.1 Unplanned Scrams, Unplanned Power Changes, and Unplanned Scrams with Complications (6 samples)

a. Inspection Scope

The inspectors reviewed Exelon's submittals for the following Initiating Events Cornerstone PIs for the period of October 1, 2014, through September 30, 2015:

- Unit 1 unplanned scrams (IE01)
- Unit 2 unplanned scrams (IE01)
- Unit 1 unplanned power changes (IE03)
- Unit 2 unplanned power changes (IE03)
- Unit 1 unplanned scrams with complications (IE04)
- Unit 2 unplanned scrams with complications (IE04)

To determine the accuracy of the PI data reported during those periods, the inspectors used definitions and guidance contained in Nuclear Energy Institute (NEI) 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7. The inspectors

also reviewed Exelon's operator narrative logs, CRs, event reports, system health reports, and NRC integrated inspection reports to validate the accuracy of the submittals.

b. Findings

No findings were identified.

.2 Occupational Exposure Control Effectiveness (1 sample)

a. Inspection Scope

The inspectors reviewed Exelon submittals for the occupational radiological occurrences PI (OC01) for the period of October 1, 2014, through September 30, 2015. To determine the accuracy of the PI data reported during those periods, the inspectors used definitions and guidance contained in NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7. The inspectors reviewed electronic personal dosimetry accumulated dose alarms, dose reports, and dose assignments for any intakes that occurred during the time period reviewed to determine if there were potentially unrecognized PI occurrences. The inspectors conducted walkdowns of various locked high radiation area and very high radiation area entrances to determine the adequacy of the controls in place for these areas.

b. Findings

No findings were identified.

.3 Radiological Effluent TS/Offsite Dose Calculation Manual Radiological Effluent Occurrences (1 sample)

a. Inspection Scope

The inspectors reviewed Exelon submittals for the radiological effluent TS/Offsite Dose Calculation Manual radiological effluent occurrences PI (PR01) for the period of October 1, 2014, through September 30, 2015. To determine the accuracy of the PI data reported during those periods, the inspectors used definitions and guidance contained in NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7. The inspectors reviewed the public dose assessments for the PI for public radiation safety to determine if related data was accurately calculated and reported.

The inspectors reviewed the CAP database to identify any potential occurrences such as unmonitored, uncontrolled, or improperly calculated effluent releases that may have impacted offsite dose. The inspectors reviewed gaseous and liquid effluent summary data and the results of associated offsite dose calculations to determine if PI results were accurately reported.

b. Findings

No findings were identified.

4OA2 Problem Identification and Resolution (71152 – 4 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 IR screening meetings. The inspectors also confirmed, on a sampling basis, that, as applicable, for identified defects and non-conformances, Exelon staff performed an evaluation in accordance with 10 CFR 21.

b. Findings

No findings were identified.

.2 Semi-Annual Trend Review

a. Inspection Scope

The inspectors performed a semi-annual review of site issues, as required by Inspection Procedure 71152, "Problem Identification and Resolution," to identify trends that might indicate the existence of more significant safety issues. In this review, the inspectors included repetitive or closely-related issues that may have been documented by Exelon personnel outside of the CAP, such as trend reports, PIs, major equipment problem lists, system health reports, maintenance rule assessments, and maintenance or CAP backlogs. The inspectors also reviewed Exelon's CAP database for the period of July 1, 2015 through December 31, 2015 to assess CRs written in various subject areas (equipment problems, human performance issues, etc.), as well as individual issues identified during the NRC's daily CR review (Section 4OA2.1). The inspectors reviewed Exelon staff's quarterly trend reports 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 noted a trend in procedural violations, six NRC-identified or self-revealing findings involving violations of TS 5.4.1.a or 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," within the last two years. In addition, there have been multiple licensee-identified violations in this same area during this time period. There is not a clear trend in the specific nature of the violations, although four of the six violations involved a failure to implement procedures. The remaining two violations involved a failure to implement and maintain procedures. The failure to implement procedures is currently being addressed by the licensee in its operator fundamentals program which is also being monitored by the inspectors due to the role it

plays in corrective actions for the licensee's previous configuration control issues. The failures to implement and maintain procedures are currently being monitored by the inspectors to better understand the causal factors.

.3 Annual Sample: Control Room Post-Accident Ventilation Damper Failure

a. Inspection Scope

The inspectors performed an in-depth review of Exelon's evaluations and corrective actions associated with two control room post-loss of coolant incident (LOCI) filter discharge damper issues; one in September 2013, CR-2013-007736, 12 Post LOCI Filter Fan is Slowly Rotating, and another in November 2014, IR 02412861, '11 Post LOCI Fan Discharge Damper Leaks By." The first instance involved a failure of the 12 fan's discharge damper blade springs. The damper failed open and allowed the 12 fan to rotate backwards when the 11 fan was placed in service. The second issue was related to the redundant train's (11) fan discharge damper, wherein the damper was stuck in the fully open position, but there was no physical damage to any internal components. Slight mechanical agitation of the damper allowed it to move to its closed position. The inspectors evaluated Exelon's actions, including their extent of review condition that evaluated the design, configuration, and installation testing of the recently (2011) modified/installed post-LOCI filter system.

The inspectors assessed Exelon's problem identification threshold, problem analysis, extent of condition reviews, compensatory actions, and the prioritization and timeliness of its 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 50, Appendix B. The inspectors interviewed engineering personnel to assess the reasonableness of the planned and completed corrective actions. The inspectors also conducted a walkdown of the affected components to evaluate the effectiveness of Exelon's actions.

b. Findings and Observations

No findings were identified.

The control room post-LOCI ventilation system was replaced in 2011 with a larger system, capable of significantly higher flowrates (10,000 scfm per train vs. 2,000 scfm). The new fan motors were also significantly larger (25 hp vs. 3 hp). Accordingly, the vendor that designed the new system elected to use relatively light discharge dampers to eliminate the need to further increase the electrical load and sizing of the fan motors. In addition, the lighter, aluminum dampers were designed with springs to assist with opening the dampers to further reduce air flow drag.

Following the September 2013 event, Exelon determined the spring failure was due to cyclic bending with a total damper bend angle greater than needed for full flow. In response, Exelon replaced the springs and adjusted the blade stop to prevent excessive opening. Exelon also developed a preventive maintenance activity to perform an annual damper inspection, including the springs. Exelon also inspected the damper internals

and replaced the springs for the 11 train discharge damper. As part of an associated operability determination, a compensatory measure was also initiated to verify that the opposite train fan does not rotate backwards when either fan is started.

While running the 12 fan in November 2014, operators found that the 11 fan was rotating backwards. This was similar to the September 2013 event on the 11 fan except that there was no damage to the springs. Exelon determined in this instance, that the cause for the damper blade sticking was due to friction of the damper blade's impregnated bushings. Specifically, Exelon determined the damper shaft was relatively large compared to the light damper blades, causing the blades to stick open. In response to this second issue, Exelon conducted additional reviews of the damper design, and elected to remove the springs (coil-type springs which could potentially jam) and to implement a periodic bushing lubrication activity.

The inspectors found that Exelon implemented reasonable corrective actions following the September 2013 discharge damper failure and the November 2014 stuck damper. However, in evaluating Exelon's responses to both events, the inspectors found that the system engineer had expressed some concerns with the original design of the lighter discharge damper design. The site engineer had recommended using a more conventional design; however, the recommendation was rejected, in part due to cost considerations, including engineering costs related to motor sizing impact. Exelon's investigation identified this issue related to evaluating technical conscience attributes for the site and engineering, and initiated a separate CR for evaluation (CR-2013-008374). The inspectors also determined that, in general, Exelon did not challenge the vendor's claim that no preventive maintenance was required for the damper (i.e., no periodic internal inspection or lubrication). The inspectors noted there was no access port to the damper area as part of the original design. Exelon subsequently implemented appropriate preventive maintenance activities and installed access ports and train maintenance isolation capability in the new system.

.4 Annual Sample: Shift Technical Advisors (STA) Proficiency Lapsed

a. Inspection Scope

The inspectors performed an in-depth review of Exelon's evaluations and corrective actions associated with CR-2013-003963, STA Proficiency Lapsed. Specifically, two STAs did not completely satisfy their continuing training requirements which resulted in the expiration of their STA proficiency. STAs are required to successfully attend requalification training and pass an annual evaluation in the role of STA to maintain proficiency. The two STAs had not received a simulator evaluation since December 2011, which did not satisfy the annual simulator evaluation requirement. The subject CR was initiated by the licensee and the two STAs that failed to meet proficiency requirements were identified after operations training had conducted an evaluation record review. This evaluation record review was conducted following an inquiry by a STA who was uncertain if he satisfied the annual simulator evaluation requirement to maintain proficiency. The Operations Qualification Report at the time indicated the two individuals were qualified; however, an investigation of the qualification report structure revealed the simulator evaluation element was not included in the report structure and therefore provided an inaccurate qualification status.

The inspectors assessed Exelon's identification and documentation of the problem in the CAP, their cause analyses, extent of condition reviews, compensatory actions, and the prioritization and timeliness of Exelon's corrective actions to determine whether Exelon appropriately identified, characterized, and corrected the problems associated with this issue and whether the completed corrective actions were appropriate. The inspectors compared the actions taken to the requirements of Exelon's CAP and 10 CFR 50, Appendix B. In addition, the inspectors reviewed qualification records, performed qualification checks of incumbent personnel, observed STA simulator evaluations being performed, and interviewed operations and training personnel to assess the effectiveness of the implemented corrective actions.

b. Findings and Observations

No findings were identified.

The inspectors determined that Exelon appropriately identified the apparent cause, evaluated the extent of condition, performed compensatory actions, and completed corrective actions aimed at preventing reoccurrence. Exelon determined the apparent cause was that the existing qualification report was inadequate due to the omission of the STA annual simulator evaluation requirement from the qualification matrix. Corrective actions included establishing a proficiency code with a repeat interval of 12 months and an expiration date of the end of the year. Additional corrective actions included program procedure changes that established ownership for the tracking and coordination of annual STA simulator evaluations and ensured the qualification database was updated once the simulator evaluation was successfully completed.

The inspectors verified the programmatic changes were made and were effective by performing STA qualification checks and reviewing the inputted data in Exelon's Learning Management System. The inspectors also validated that the proficiency issue had not resulted in any operations shifts being manned without a qualified STA during the period of time that the two individuals had their proficiency lapse. The inspectors independently reviewed the electronic Shift Operations Management System reports for the dates the two individuals stood watch and verified that another qualified STA was also present. The inspectors determined that failing to meet STA proficiency requirements did not also impact senior reactor operator proficiency. The inspectors reviewed for extent of condition issues by reviewing and verifying proficiency records and performing qualification record checks for currently licensed operators.

The inspectors concluded Exelon's response and corrective actions were appropriate and effective.

.5 Annual Sample: Containment Spray Pump Cooling System Design Control

a. Inspection Scope

In June 2012, the NRC Component Design Bases Inspection (CDBI) team identified a finding of very low safety significance involving a NCV of 10 CFR 50, Appendix B, Criterion III, "Design Control," in that the Calvert Cliffs' staff did not ensure that design control measures verified or checked the adequacy of design of the CS pump cooling systems as documented in NRC Inspection Report 05000317 and 05000318/2012007. Specifically, the CDBI team determined that the seal cooling units installed on the CS

pumps would not provide sufficient cooling to the seals, there were discrepancies in the installed configuration of the bearing cooling system for the pumps, and calculations or test results were not available to demonstrate adequate cooling for the pump bearings at design basis accident conditions. The inspectors performed an in-depth review of Exelon's evaluations and corrective actions associated with the CS pump cooling systems (CR 2012-006012, CR 2012-006226, and CR 2012-007958).

The inspectors assessed Exelon's problem identification threshold, cause analysis, extent of condition reviews, compensatory actions, and the prioritization and timeliness of corrective actions to determine whether Exelon was 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 50, Appendix B. In addition, the inspectors performed field walkdowns and interviewed operations and engineering personnel to assess the effectiveness of the implemented corrective actions. Specifically, the inspectors walked down all four Unit 1 and Unit 2 CS pumps, including control room instrumentation, to independently assess the material condition, operating environment, and configuration control. The inspectors reviewed Exelon's CS seal cooling modification to verify that the design bases, licensing bases, and performance capability of the CS system had not been degraded by the modification. The inspectors reviewed the 10 CFR 50.59 screening and engineering evaluation associated with the modification, supporting calculations, post-modification test results, and associated maintenance WOs to verify that Exelon appropriately implemented the modification in accordance with design assumptions.

b. Findings and Observations

No findings were identified.

Exelon decided to replace the original CS pump seal coolers with new, passive, side-mounted, natural convection coolers to address the weaknesses in the original seal cooler design. The modification provided a high point vent, promoted more effective heat transfer as it moved the seal cooler heat exchanger further away from the relatively warm bearing housing and motor, and eliminated the heat source wrapped around the bearing housing allowing the bearing to run cooler. Exelon designed, implemented, and tested the modification (ECP-14-000580) to ensure that the new seal coolers were capable of cooling the seal flow down to temperatures acceptable to the seal manufacturer while not exceeding the emergency core cooling system pump room heat load capacity. Exelon's associated calculations verified that the new seal coolers were designed for the applicable seismic loads. Exelon's corrective actions also included a detailed bearing life analysis by the vendor to ensure continued CS pump operability under design basis conditions. In addition to the engineering evaluations and hardware modifications, Exelon performed an apparent cause evaluation (ACE) to identify and address any associated human performance and/or programmatic issues that caused or contributed to the CS pump seal cooler issues. The inspectors concluded that Exelon had taken timely and appropriate actions in accordance with Exelon's procedures and CAP, 10 CFR 50, Appendix B, and NRC IMC 0326, "Operability Determinations & Functionality Assessments for Conditions Adverse to Quality or Safety." The inspectors determined that Exelon's associated ACE and technical evaluations were sufficiently thorough and based on the best available information, sound judgment, the CS system design basis, and relevant operating experience. In general, Exelon's assigned

corrective actions were aligned with the identified causal factors, adequately tracked, appropriately documented, and completed as scheduled. Based on the documents reviewed, CS system walkdowns, and discussions with engineering personnel, the inspectors noted that Exelon personnel identified problems and entered them into the CAP at a low threshold.

The inspectors noted that maintenance WO C91919395, completed in January 2013, documented restoring the 11 CS shaft fan shroud to its proper as-designed location to maintain adequate directed flow onto the CS pump's housing. However, during a CS system walkdown on November 10, 2015, the inspectors identified that the 11 CS shaft fan shroud was once again positioned in the incorrect bolt holes and located outside its specified design location. In addition, based on a CAP and procedure review, the inspectors identified that Exelon had failed to adequately implement an ACE recommended corrective action (CA-2012-003503) to initiate a change to the CS pump overhaul procedure (PUMP-02) to correct an engineering document reference and provide details on shroud positioning requirements. Exelon personnel implemented the procedure change request; however, only corrections to the engineering document reference were made and did not include shroud positioning requirements. This resulted in maintenance personnel restoring the shroud to the incorrect position following the 11 CS pump overhaul in February 2014 (WO C92173175). Exelon promptly initiated corrective action IRs for the above two performance deficiencies (IR 02585806 and IR 02585813) and restored the shroud to its proper position on November 12, 2015 (WO C93243477). The inspectors independently screened the issues in accordance with IMC 0612, Appendix B, "Issue Screening," and IMC 0612, Appendix E, "Examples of Minor Issues," and determined that the issues were minor. Specifically, the issues did not result in a reasonable doubt of operability of the 11 CS pump and, even if left uncorrected, did not have the potential to lead to a more significant safety concern.

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

.1 Plant Event

a. Inspection Scope

For the plant event listed below, the inspectors reviewed and/or observed plant parameters, reviewed personnel performance, and evaluated performance of mitigating systems. The inspectors communicated the plant event to appropriate regional personnel, and compared the event details with criteria contained in IMC 0309, "Reactive Inspection Decision Basis for Reactors," for consideration of potential reactive inspection activities. As applicable, the inspectors verified that Exelon made appropriate emergency classification assessments and properly reported the event in accordance with 10 CFR 50.72 and 50.73. The inspectors reviewed Exelon's follow-up actions related to the event to assure that Exelon implemented appropriate corrective actions commensurate with their safety significance.

- Manual reactor trip of Unit 2 following loss of 22 SGFP, December 1, 2015

b. Findings

No findings were identified.

.2 (Closed) LER 05000317/2014-005-00: Condition Prohibited by Technical Specifications Due to Auxiliary Feedwater Actuation System Channel Inoperable Due to Human Performance Error

On March 14, 2014, with Unit 1 in Mode 3, control room operators observed that AFAS sensor channel ZF high level bistable for 12 SG was tripped and would not reset. The cause was due to 12 SG wide range level transmitter 1LT1124C being isolated due to its manual isolation valve (1HVFVV-1804) being mispositioned in the closed position. This rendered AFAS sensor channel ZF inoperable. Investigation determined that 1HVFVV-1804 was left closed following calibration of 1LT1124C on March 4, 2014. This condition existed within a mode of applicability for approximately 34 hours. TS Condition 3.3.4.A requires a 1 hour Action Statement to be perfromed. Since the 1 hour Action Statement was not performed, TS Condition 3.3.4.E should have been entered. It requires the unit to be placed in Mode 4 within 12 hours from entry into the Condition. The tripped unit was not in bypass in 1 hour nor was Unit 1 placed in Mode 4 in 12 hours from the time the AFAS channel was made inoperable. Therefore, the condition existed for a time longer than allowed by TSs. This represents a violation of NRC requirements for which the enforcement aspects are discussed below. This LER is closed.

Introduction: The inspectors documented a self-revealing Green NCV of TS 5.4.1.a for Exelon's failure to implement procedures as required by RG 1.33, Appendix A, Section 8, "Procedures for Control of Metering and Testing Equipment and for Surveillance Tests, Procedures, and Calibrations," during maintenance which resulted in a manual isolation valve (HVFW-1804) being incorrectly placed in the closed position. This human performance error isolated the number 12 SG wide range level transmitter (1LT1124C) and subsequently rendered the AFAS sensor channel ZF inoperable for 33 hours and 39 minutes, a condition prohibited by TS 3.3.4, "Engineered Safety Features Actuation System (ESFAS) Instrumentation."

Description: On March 4, 2014, with Unit 1 in Mode 6, Exelon performed STP M-525AT-1, "AFAS Steam Generator Level Transmitter Calibration Checks/Calibration," Revision 0203, for 1LT1124C. During system restoration, a manual isolation valve for 1LT1124C (1HVFW-1804) was left in the closed position. On March 13, 2014, at 6:05 am, Unit 1 entered Mode 3. During plant heatup on March 14, 2014, at 5:45 am, Exelon observed that the AFAS channel ZF sensor high level bistable was tripped and would not reset. At 6:35 am, Exelon declared AFAS sensor channel ZF inoperable, entered TS 3.3.4.A, and placed sensor channel ZF in bypass. Subsequent troubleshooting determined 1LT1124C was isolated due to 1HVFW-1804 being closed. Further investigation by Exelon revealed that the material condition of the valve resulted in the operators questioning the position of the valve during system restoration due to the operating handle being loose. At 3:44 pm, following restoration of 1HVFW-1804 to the correct position and retesting of 1LT1124C, Exelon declared the AFAS sensor channel ZF operable and exited TS condition 3.3.4.A. The inspectors reviewed STP M-525AT-1 and noted that step 6.8 required that 1HVFW-1804 be left in the open position at the completion of the procedure. The inspectors also noted that the mode of applicability for TS 3.3.4 is Mode 3, which Unit 1 entered at 6:05 am on March 13, 2014. This resulted in AFAS sensor channel ZF being inoperable for 33 hours and 39 minutes. The inspectors noted that TS 3.3.4.A requires that the affected sensor module be placed in bypass or trip within 1 hour and TS 3.3.4.E requires that the unit be placed in Mode 3 within 6 hours and Mode 4 within 12 hours if the required actions and associated completion times of TS 3.3.4.A are not met. The inspectors concluded that Exelon failed

to open manual isolation valve 1HVFW-1804 as required by procedure STP-525AT-1. This rendered AFAS sensor channel ZF inoperable and resulted in exceeding the TS allowed outage time of TS 3.3.4.A and TS 3.3.4.E for this channel. Additionally, the inspectors noted that TS 3.0.4 prohibits entry into a mode or condition of applicability for a TS for which an LCO is not met unless a risk assessment is conducted and risk mitigating actions are taken. No risk assessment was completed, nor risk mitigating actions taken for the AFAS channel being inoperable. Upon identification, Exelon staff entered this issue into their CAP as CR-2014-003320.

Analysis: The inspectors determined that the failure to properly implement procedure STP M-525AT-1 and place 1HVFW-1804 in its required position was a performance deficiency that was reasonably within Exelon's ability to foresee and prevent. The inspectors reviewed IMC 0612, Appendix B, "Issue Screening," and determined the issue is more than minor because it adversely affected the configuration control attribute of the Mitigating Systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, Exelon operated with 1HVFW-1804 closed which resulted in the inoperability of the AFAS sensor channel ZF for approximately 33 hours and 39 minutes with the plant in Mode 3. In accordance with IMC 0609, Attachment 4, "Initial Characterization of Findings," issued on June 19, 2012, and IMC 0609, Appendix A, "The Significance Determination Process for Findings at Power," Exhibit 2, "Mitigating Systems Screening Questions," issued on June 19, 2012, the inspectors determined that a detailed risk evaluation was necessary to disposition the significance of this finding because the finding represented an actual loss of function of at least a single train of AFAS for greater than its TS allowed outage time. A regional SRA performed a detailed risk evaluation. The finding was determined to be of very low safety significance (Green) because the redundant AFAS sensor was operable and functional to ensure actuation of the system if it had been required, therefore there was no loss of the system function. Additionally, the unit was in Mode 3 with very low decay heat levels during the time the ZF sensor channel was determined to be inoperable and plant procedures exist to manually start the AFW system if failure of automatic actuation were to occur.

The inspectors determined that the finding has a cross-cutting aspect in the area of Human Performance, Challenge the Unknown, because Exelon did not stop when faced with an uncertain condition about the position of 1HVFW-1804. Specifically, personnel conducting the second verification did not appropriately question the position of 1HVFW-1804 because of the higher experience level of the personnel conducting the first verification. [H.11]

Enforcement: TS 5.4.1.a states, in part, that written procedures shall be implemented covering the applicable procedures recommended in RG 1.33, Appendix A, of which Section 8 specifies procedures for control of metering and testing equipment and for surveillance tests, procedures, and calibrations. TS 3.3.4, "ESFAS Instrumentation", states "Four ESFAS sensor modules, associated measurement channels, and applicable automatic block removal features for each function in table 3.3.4-1 shall be operable." Procedure STP M-525AT-1 implements this requirement for TS 3.3.4, "ESFAS instrumentation," Condition A, "One or more functions with ESFAS sensor module or associated measurement channel inoperable," states, "Place affected sensor module in bypass or trip with one hour and restore affected sensor module and associated measurement channel to operable status within 48 hours or Place affected sensor module in trip within 48 hours." TS 3.3.4, Condition E, states, if "Required action and

associated completion time not met," then be in Mode 3 within 6 hours and be in Mode 4 within 12 hours. Contrary to this, from March 4, 2014, through March 14, 2014, Exelon failed to properly implement STP M-525AT-1. Specifically, Exelon failed to open manual isolation valve 1HVFW-1804 which resulted in AFAS sensor channel ZF being inoperable in Mode 3 for 33 hours and 39 minutes and a subsequent violation of TS 3.3.4.A and 3.3.4.E. Specifically, Exelon did not ensure that valve 1HVFW-1804 was open as required by procedure STP M-525T-1 and subsequently entered into Mode 3 when the TS 3.3.4 did not allow it. Exelon's immediate corrective action was to enter TS 3.3.4.A, determine and correct the cause, and retest the system for proper operation. Because this issue is of very low safety significance (Green) and has been entered into Exelon's CAP (CR-2014-003320), this violation is being treated as an NCV, consistent with Section 2.3.2.a of the Enforcement Policy. **(NCV-05000317/2015004-02: AFAS Channel Inoperable due to Valve Misposition)**

.3 (Closed) LER 05000317, 318/2015-001-00: Component Cooling and Shutdown Heat Exchanger Lineup Potential to Exceed Design Basis Temperatures

On January 22, 2015, it was determined that a certain line-up of component cooling and shutdown cooling heat exchangers could exceed the design basis outlet temperatures for the component cooling water (CCW) system following a design basis accident. Although not a safety concern at the time of discovery because of low ultimate heat sink temperatures, which cools CCW, in the past, the ultimate heat sink temperature had been high enough to create this condition. A review of control room logs for the previous three years identified periods of time where Unit 1 and Unit 2 were in an unanalyzed line-up with the ultimate heat sink temperatures greater than the maximum allowed. This condition resulted in both CCW loops being inoperable due to their cross-connected design. The cause of the event was the failure to evaluate some CCW system testing and maintenance line-ups to ensure consistency with the design assumptions. Corrective actions taken to date include revising several emergency operating and abnormal operating procedures to provide operators direction, and updating the TS Bases. Additional evaluation(s) will be performed to further define the operable basis for CCW configurations.

The inspectors reviewed actions taken by Exelon to address the CCW alignment concerns. The inspectors found that Exelon made modifications to the plant to allow operators to isolate the CCW heat exchangers and revised operating procedures to isolate the CCW heat exchanger in the event cooling water is lost to the heat exchanger. Additionally, Exelon changed its license through the 10 CFR 50.59 process in order to credit operator actions, in response to certain single failure events, to manually isolate the CCW system in order to ensure the CCW system would be placed in an analyzed lineup for all design basis events. Inspectors reviewed the implementation of the licensing change and changes to operating procedures in order to determine if Exelon's corrective actions were consistent with the design and licensing. The inspectors identified that a violation of TS 3.7.5.A had occurred. The enforcement aspects of this issue were previously discussed in an NRC inspection report as NCV 05000317, 318/2015-001-01. No new issues were identified. This LER is closed.

.4 (Closed) LER 05000317, 318/2015-002-00: Calvert Cliffs Unit 1 and Unit 2 Automatic Reactor Trips Due to Transmission System Disturbance

On April 7, 2015, Calvert Cliffs experienced a dual unit trip due to an off-site grid disturbance resulting in an undervoltage condition that caused all four Engineered Safety Features (ESF) buses to trip. Due to this condition, all of the EDGs started and loaded with the exception of 2B EDG which started but tripped due to a failed electronic speed switch in the startup circuitry. The associated 4 kV ESF bus was repowered from the normal power source. Additionally, while 2A EDG energized its respective 4 kV ESF bus, the associated shutdown sequencer failed to start the 21 SW pump which was subsequently manually started after approximately 12 minutes with no SW flow. The failed sequencer also failed to restart the 22 instrument air compressor leading to a low oil pressure lockout of the compressor. Also, the Unit 2 newly installed digital feedwater control system experienced a loss of power and shifted to a mode of operation for which no procedural guidance existed. This led to all Unit 2 feed regulating valves automatically shutting, and a subsequent AFAS actuation. Unit 1 tripped on loss of all power to generator excitation and all required safety systems responded as designed. Unit 2 tripped due to generator loss of load and is classified as an unplanned scram with complications as 24 4 kV ESF bus was de-energized for greater than 10 minutes. The failed 2B EDG speed switch and 2A EDG shutdown sequencer were replaced and tested with satisfactory results. Exelon initiated corrective actions to update procedures to combat a loss of main feedwater caused by a loss of power to the digital feedwater control system and for combating the loss of instrument air when the cause is a loss of power to the instrument air compressors.

Exelon identified that the failure to adequately establish, implement, and maintain procedures as required by RG 1.33, Appendix A, Section 6, for combatting the loss of instrument air and feedwater are minor violations of TS 5.4.1.a. Specifically, procedures in place at the time of the event did not provide guidance for resetting the main feedwater control system after a loss of power to digital control system. Also, procedures in place at the time of the event did not provide adequate guidance for restarting an instrument air compressor if the compressor was shut down due to a loss of power. These failures to comply with TS 5.4.1.a constitute minor violations that are not subject to enforcement action in accordance with the NRC's Enforcement Policy. The violations were determined to be minor because the inadequacies noted in Exelon's procedures did not raise the likelihood of events that upset plant stability and did not affect systems that respond to initiating events to prevent undesirable consequences.

Inspection of this event was previously documented in Special Inspection Report 05000317, 318/2015009. The inspectors did not identify any new issues during the review of the LER. This LER is closed.

4OA6 Meetings, Including Exit

Exit Meeting Summary

On January 20, 2016, the inspectors presented the inspection results to Mr. Mark Flaherty, Plant Manager, and other members of the Exelon staff. The inspectors verified that no proprietary information was retained by the inspectors or documented in this report.

4OA7 Licensee-Identified Violations

The following violations of Severity Level IV were identified by Exelon and are violations of NRC requirements which meet the criteria of the NRC Enforcement Policy for being dispositioned as NCVs.

- 10 CFR 55.25 states, in part, that if an operator develops a permanent physical or mental condition that causes the operator to fail to meet the requirements of 10 CFR 55.21, the facility licensee shall notify the Commission within 30 days of learning of the diagnosis, in accordance with 10 CFR 50.74(c) which states that the regional administrator shall be notified if a licensed operator develops a permanent disability or illness. Contrary to these requirements, as the result of Exelon's medical examination audit completed August 8, 2014, Exelon identified four cases in which a change in licensed operator medical conditions were not communicated to the NRC within the required 30 days. The results of the medical examination audit were documented in IR 2423780 and subsequent notifications were made to the NRC.

  This violation is subject to traditional enforcement because of the potential impact upon the regulatory process for issuing restrictions to operators' licenses. The inspectors determined that this issue meets the criteria for a Severity Level IV violation using example 6.4.d.1(a) from the NRC Enforcement Policy because no incorrect regulatory decision was made as the result of the failure of the licensee to report within 30 days. This is of very low safety significance because after NRC review of the subsequent notifications, no changes to license restrictions were required.

- 10 CFR 55.21 and 10 CFR 55.33 state, in part, that licensed operators are required to have a physical examination every two years to ensure that their medical condition and general health will not adversely affect the performance of assigned operator job duties or cause operational errors endangering public health and safety. As part of licensed operator medical evaluations, screening questions to identify potentially disqualifying medical conditions are required as specified in ANSI/ANS-3.4-1983, "Medical Certification and Monitoring of Personnel Requiring Operator Licenses for Nuclear Power Plants." Contrary to this requirement, as a result of Exelon's medical examination audit completed August 8, 2014, Exelon identified nine (9) licensed operators who were given an incomplete health questionnaire during their biennial medical examination. The questionnaire failed to request information about seven (7) potentially disqualifying health conditions from ANSI/ANS-3.4-1983 during a biennial medical examination. The omission of these seven potentially disqualifying conditions from the questionnaire resulted in an incomplete medical examination. Exelon identified that the cause was an incorrect revision to the site's medical examination process procedure. The revision issue was corrected in a subsequent revision and the audit documented that the nine licensed operators all completed medical evaluations with the correct screening questions within the next 18 months. The results of the medical examination audit were documented in IR 2423783.

This violation is subject to traditional enforcement because of the potential impact upon regulatory process because the operators' medical conditions are reviewed by the NRC when issuing or renewing operator licenses. The inspectors determined that this issue meets the criteria for a Severity Level IV violation using example 6.4.d.1(c) from the NRC Enforcement Policy because the operators who potentially did not meet ANSI/ANS-3.4, Section 5, due to an incomplete medical examination, subsequently were found to meet the health requirements for licensing. This is of very low safety significance because no incorrect regulatory decision was made as a result of the incomplete medical questionnaire and because no changes to license restrictions were required.

ATTACHMENT: SUPPLEMENTARY INFORMATION

SUPPLEMENTARY INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel
G. Gellrich, Site Vice President
M. Flaherty, Plant General Manager
P. Beavers, Training Director
C. Brevig, Radiation Protection Technician
J. Cabral, Engineer 3
R. Courtney, Supervisor, Radiation Protection
B. Erdman, Manager, Radiation Protection Tech Support
M. Fick, Principal Engineer, Regulatory Assurance
P. Furio, Principal Engineer, Regulatory Assurance
A. Kelly, Operations Training Manager
S. Reichard, Regulatory Specialist, Regulatory Assurance
H. Simpson, Associate Radiation Protection Specialist
L. Smith, Manager, Regulatory Assurance
T. White, Manager, Reactor Services
J. Wynn, System Manager
J. York, Manager, Radiation Protection

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened and Closed

05000317/2015004-01	NCV	Failure to Implement Procedures for the Control of Hazard Barriers During Maintenance (Section 1R04)
05000317/2015004-02	NCV	AFAS Channel Inoperable due to Valve Mis-position (Section 4OA3.2)

Closed

05000317/2014-005-00	LER	Condition Prohibited by Technical Specifications Due to Auxiliary Feedwater Actuation System Channel Inoperable Due to Human Performance Error (Section 4OA3.2)
05000317, 318/2015-001-00	LER	Component Cooling and Shutdown Heat Exchanger Lineup Potential to Exceed Design Basis Temperatures (Section 4OA3.3)

05000317, 318/2015-002-00	LER	Calvert Cliffs Unit 1 and Unit 2 Automatic Reactor Trips Due to Transmission System Disturbance (Section 4OA3.4)

LIST OF DOCUMENTS REVIEWED

Section 1R04: Equipment Alignment

Procedures:
EN-1-135, Control of Barriers, Revision 00202
OP-AA-108-115, Operability Determinations, Revision 16
CC-AA-201, Plant Barrier Control Program, Revision 11
WC-AA-106, Work Screening and Processing, Revision 15

Calculations:
CA08772, Calvert Cliffs MSLB in Turbine Bldg. El. 27'

Condition Reports:
AR 2586773

Section 1R05: Fire Protection

Procedures:
Fire Fighting Strategy Manual, Revision 0300
OP-CA-201-012-1001, On-line Fire Risk Management, Revision 000

Calculations:
CA02243, Combustible Loading Analysis, Revision 3

Section 1R07: Heat Sink Performance

Procedures:
ETP 01-005R Single Tube Thermal Performance Testing For 21 and 22 CCHX, Revision 00500

Work Order:
C91767228
C92531156

Miscellaneous:
EPRI's Single Tube Testing Apparatus, Eckert, T., Ovici, C., Mollerus, F. J., Warwood, B. K., (1992, April).
ECP-15-000207

Section 1R11: Licensed Operator Requalification Program and Licensed Operator Performance

Procedures:
Licensed Operator Requalification Training Program Manual, Revision 0902
OP-1-2, Plant Start Up from Cold Shutdown, Revision 29

OP-2-2, Plant Start Up from Hot Standby to Minimum Load, Revision 46
OP-3-2, Normal Power Operation, Revision 52
OP-AA-105-102, NRC Active License Maintenance, Revision 11
TQ-AA-150, Operator Training Programs, Revision 12

Simulator-Related Test Documents:
100% Steady-State Data Comparison Test (ANS 1E) for 2014
30% Steady-State Data Comparison Test (ANS 1E) for 2014
80% Steady-State Data Comparison Test (ANS 1E) for 2014
Results of 2014 Simulator Core Model Testing for Unit 1 Cycle 22
Simultaneous Trip of Both Main Feed Pumps (ANS 2B) for 2014
Trip of 11A Reactor Coolant Pump (ANS 2E) for 2014

Section 1R12: Maintenance Effectiveness

Procedures:
ER-AA-310-1001, Maintenance Rule Scoping, Revision 004
ER-AA-310, Implementation of the Maintenance Rule, Revision 9
ER-AA-310-1004, Maintenance Rule Performance Monitoring, Revision 13

Condition Reports:

AR 01860826	AR 02587593	AR 02491558
AR 02117189	AR 01853150	AR 02481928
AR 02408966	AR 01854220	AR 01850879

Section 1R19: Post-Maintenance Testing

Procedures:
FASTNER-01, Torqueing and Fastener Applications, Revision 00300
PUMP-11, Turbine Driven Steam Generator Feed Pump Overhaul, Revision 01300
FTM-03B, Rotating Equipment Alignment Using Laser Alignment Systems, Revision 00600

Work Orders:
C93258919

Section 1R22: Surveillance Testing

Procedures:
STP-O-73C-1, Component Cooling Pump Quarterly Test, Revision 12

Section 2RS4: Occupational Dose Assessment

Procedures
ITEC-646, Calibration of Ludlum Count Ratemeter Model 12 with Eberline Neutron Detector Model NRD, Revision 4
RP-AA-210, Dosimetry Issue, Usage, and Control, Revision 25
RP-AA-211, Personnel Dosimetry Performance Verification, Revision 11
RP-AA-220, Bioassay Program, Revision 10
RP-AA-220-1001, Collection and Handling of In-Vitro Bioassay Samples, Revision 1
RP-AA-221, Review, Correction, and Analysis of Whole Body Count Data, Revision 2
RP-AA-224, CEDE Dose Tracking Using Lapel Air Samplers, Revision 1

RP-AA-270, Prenatal Radiation Exposure, Revision 7
RP-AA-301, Radiological Air Sampling Program, Revision 8
RP-AA-376-1001, Radiological Posting, Labeling, and Marking Standard, Revision 12
RP-AA-460, Controls for High and Locked High Radiation Areas, Revision 26
RP-AA-460-001, Controls for Very High Radiation Areas, Revision 5
RP-AA-460-002, Additional High Radiation Exposure Control, Revision 2

Documents

AI-2014-000856-001	AR 01858255	AR 02454367
AI-2014-000935-016	AR 01858270	AR 02457288
AR 01703556	AR 01858336	AR 02459168
AR 01852869	AR 01858804	AR 02459326
AR 01853159	AR 01859047	AR 02461200
AR 01853966	AR 01859463	AR 02464491
AR 01854106	AR 01859673	AR 02473851
AR 01854198	AR 01860848	AR 02486061
AR 01854231	AR 01860856	AR 02487910
AR 01854923	AR 02010162	AR 02502706
AR 01854960	AR 02010227	AR 02504383
AR 01855460	AR 02321271	AR 02526687
AR 01855647	AR 02387536	AR 02556633
AR 01856486	AR 02401739	AR 02559323
AR 01856503	AR 02406102	CR-2013-007094
AR 01856545	AR 02407653	CR-2013-007526
AR 01857071	AR 02421053	CR-2013-007869
AR 01857167	AR 02423988	CR-2014-005056
AR 01857433	AR 02424280	CR-2014-006240
AR 01857445	AR 02449713	

Assessment of Background Dose Rates Local to CCNPP (no document ID, author, or date available)
BGE: 41-0201:12-001, Evaluation of Landauer Inlight/CR-39 Dosimeter Response to CCNPP Neutron Spectra, dated 5/31/2012
BGE: 43-0401: 14001, Evaluation of Gamma Portal Monitors As Passive Internal Monitors
Calibration Data Sheet, Ludlum Model 12 with Eberline NRD, S/N 83371, dated 11/4/2014
Check-In Self Assessment, AR 02431268-29, Pre-NRC Inspection Check-in, IP 71124.04, dated 10/2/2015.
DMC 2000S Electronic Dosimeter User's Manual, 15-00007, Revision 1
DMC 30000 Datasheet, Mirion Technologies, 1151199EN-G
Dry Storage Canister Radiological Surveys, 2015-0114, 0117, 0095, 0099, and 0103
EDE Evaluation Sheet for EID 40310, RWP CC-2-15-00704
EDE Evaluation Sheet for EID 8932, RWP 156
EDE Evaluation Sheet for EID 9660, RWP CC-2-15-00641
Generic Radiation Worker Training, Exelon-specific revisions, NANTeL, August 2015
Instruction Guide, Nuclear General Employee Training, N-NGET-RWT-I/R/RE, dated 6/25/2015
ISFSI Radiological Surveys, 2015-0085 to 2015-0088, dated 10/6/2015
Listing of RCA Exits with Accumulated Dose > 100 mrem, 24 Months
NVLAP Accreditation Report, NVLAP Lab Code 100518-0, Landauer, Inc., Effective 1/1/2015 to 12/31/2015
Radiological survey map 7-10, dated 9/12/2014
Radiological survey map 7-10, dated 9/25/2014

Radiological survey map C2-13E, dated 2/19/2015 1000
Radiological survey map C2-13E, dated 2/19/2015 1400
Radiological survey map C2-13F, dated 2/19/2015 1000
Radiological survey map C2-13F, dated 2/19/2015 1430
Radiological survey map C2-5A, dated 2/25/2015
Report of Test, Eberline PRS-2 NIST Calibration, S/N 371, dated 10/10/2014
RP-AA-270, Declaration of Pregnancy, EID# 418658
RP-AA-270, Declaration of Pregnancy, EID# 446908
RP-AA-270, Declaration of Pregnancy, EID# e16882
SA-2014-000021, NL-2009-000095-005, Assessment of Radiation Protection Program at Calvert Cliffs for Compliance with 10 CFR 20 (Annual Review), dated 2/7/2014
Tennessee Valley Authority NUPIC Audit 23484 of Teledyne Brown Engineering – Environmental Services, dated 3/10/2014
Typical MDA Values for Routine Subject Counting, Appendix VII to Canberra ABACOS-2000 Whole Body Counter Calibration Report, printed 1/7/2015
Whole Body Count Log, dated 7/25/2014 to 10/21/2015
Whole Body Counts, ID# ALDER0057, dated 2/28/2015 to 3/2/2015 (four total)
Whole Body Counts, ID# ASPEL2945, dated 2/22/2015 to 2/28/2015 (five total)
Whole Body Counts, ID# MOLEN9853, dated 3/5/2015 (two total)
Whole Body Counts, ID# SERSH4013, dated 2/24/2015 at 0704 and 1151

4OA1: Performance Indicator Verification

Procedures
LS-AA-2001, Collecting and Reporting of NRC Performance Indicator Data, Revision 14
LS-AA-2003, Use of INPO Consolidated Data Entry Database for NRC, INPO, and WANO Data Entry, Revision 10

Section 4OA2: Problem Identification and Resolution

Procedures:
Licensed Operator Requalification Training Program Manual, Revision 0902
OI-3A-1, Unit One Safety Injection and Containment Spray, Revision 29
OI-3A-2, Unit Two Safety Injection and Containment Spray, Revision 31
OP-AA-105-102, NRC Active License Maintenance, Revision 11
OP-AA-108-115, Operability Determinations, Revision 16
PI-AA-125, Corrective Action Program (CAP) Procedure, Revision 2
PUMP-02, Containment Spray Pump Overhaul, Revision 8
TQ-AA-150, Operator Training Programs, Revision 12
STP-O-12A-0, 11 Control Room Post-LOCI Ventilation System Monthly Test, Revision 0

Condition Reports:

2013-007736	2013-008782	
2013-008374	AR 02412861	

Work Orders:

C91917674	C91917706	C92451468
C91917675	C91919395	C93243477
C91917676		

Drawings:
12047-0001, Containment Spray Pump and Motor Outline Drawing SMJ Vertical Suction Large Size Motor Driven, Revision 7
12047-0007, Containment Spray Pump Cross Section Drawing SMJ Type Pump, Revision 7
12047-0008, Mechanical Seal Type DZ Single Inside – Non Cartridge Size 2.375, Revision 0
60723SH0004, Ventilation Systems Control Room/Cable Spreading Room HVAC, Revision 53

Corrective Action Documents:

CA-2013-001776	CR-2012-07958	IR02585231*
CA-2013-001777	CR-2012-11302	IR02585806*
CA-2013-001778	IR01700138	IR02585813*
CR-2012-06012	IR01700141	
CR-2012-06226	IR02585228*	

CR-2013-003963, STA Proficiency Lapsed, Apparent Cause Evaluation
* IR written as a result of this inspection

Calculations:
CA08570, Bearing Life Analysis of Byron Jackson 6x8x11H SMJ Containment Spray Pumps, Revision 1
CA10062, Containment Spray Pumps Seal Cooler Support Design, Revision 0
ECP-14-000580-CN-005, M-94-062 – ECCS Pump Room Air Cooler Performance with Reduced Air and Water Flows, dated 9/23/15

Completed Surveillance Tests, Functional Tests, and Post-Modification Tests:
ETP 15-026, 12 Containment Spray Pump Seal Cooler Flow Test, performed 11/6/15
ETP 15-027, 21 Containment Spray Pump Seal Cooler Flow Test, performed 10/30/15
STP O-73K-1, Containment Spray Pump Operability Test, performed 11/6/15
STP O-73K-2, Containment Spray Pump Operability Test, performed 10/30/15
STP O-73M-1, Containment Spray Flow Test (11 Containment Spray Pump), performed 3/12/14
STP O-73M-1, Containment Spray Flow Test (12 Containment Spray Pump), performed 2/23/14
STP O-73M-2, Containment Spray Flow Test (21 & 22 Containment Spray Pumps), performed 2/22/15
STP O-7A-2, Quarterly “A” Train Engineered Safety Features Logic Test, performed 8/3/15
STP O-7C-1, Quarterly “A” Train Engineered Safety Features Logic Test, performed 7/27/15
STP O-7D-1, Quarterly “B” Train Engineered Safety Features Logic Test, performed 8/10/15
STP O-7D-2, Quarterly “B” Train Engineered Safety Features Logic Test, performed 10/17/15

Engineering Evaluations:
CR-2012-006012, Containment Spray Pump Mechanical Seal Cooling Coil Design Flaw Reasonable Expectation of Continued Operability (RECO), dated 6/6/12
CR-2012-007958, Failure to Verify or Check the Adequacy of Design of the Containment Spray Pump Bearing and Mechanical Seal Cooling Systems Apparent Cause Evaluation Report, Revision 0
CR-2012-011302, 21 Containment Spray Pump Thrust Bearing Failure Apparent Cause Evaluation Report, Revision 0
ECP-13-000498-015-6-01, Equivalent Change Technical Evaluation, Revision 1
ECP-14-000580, Containment Spray Pumps Seal Coolers Replacement, Revision 0
ECP-14-000580-5059-01, Containment Spray Pumps Seal Coolers Replacement 50.59 Screening, dated 7/29/15
ECP-14-000580-MU-07, Containment Spray Pumps Seal Cooler Heat Exchangers Q-List Classification, dated 7/28/15

SA-2013-000180 (CA-2012-003521), Containment Spray System Vulnerability Self-Assessment Report, dated 6/21/13
Sr. Lubrication Analyst Memorandum, Containment Spray Pump Bearings, dated 6/21/12
SR-1475, Bearing Life Analysis of Byron Jackson 6x8x11H SMJ Containment Spray Pumps Serial No. 691-N-0022/5 for Calvert Cliffs Nuclear Power Plant, Revision 6

System Health Reports, System Walkdowns & Trending:
Unit 1 Containment Spray System Health Report, Q2-2015
Unit 2 Containment Spray System Health Report, Q2-2015

Vendor Technical Manuals & Specifications:
12047-004, Containment Spray Pumps & Motors, Revision 19
12047-004-1002, Type "D" Mechanical Seals Installation, Operation and Maintenance Instructions, dated 9/19/85
12047-005, Containment Spray Pumps ANQ3 Seal Cooler Heat Exchangers Installation, Operation & Maintenance Manual, Revision 0
691-N-0022/5 (6x8x11H SMJ), Certificate of Conformance, dated 5/4/15
DOC18798, Containment Spray Pump Air Fin Heat Exchanger for Calvert Cliffs Nuclear Power Plant, Revision A
SP-5904, Containment Spray Pumps Seal Cooler Heat Exchangers, Revision 2

Miscellaneous:
CA-2012-003502, Questioning Attitude for System Walkdowns and CAP Evaluations Presentation, dated 1/24/13
Calvert Cliffs Nuclear Power Plant – NRC Component Design Bases Inspection Report 05000317/2012007 and 05000318/2012007, dated 8/24/12
Containment Spray Pump Seal Cooler Modification TRB Presentation, dated 9/19/12
Flowserve Letter to Calvert Cliffs Nuclear Station, Containment Spray Pump Mechanical Seals (06KPX877307), dated 6/20/12
Margin Management Issue #016043, Containment Spray Pump Seal Coolers, dated 3/9/15
NRC Inspection Manual Chapter 0326, Operability Determinations & Functionality Assessments for Conditions Adverse to Quality or Safety, dated 1/31/14
P-CAL-035596, PM Change Request, 11 and 12 Post-LOCI Discharge Damper PMs, 5/12/15
PCR No. 12-06675, Containment Spray Pump Overhaul Procedure Change Request, dated 11/26/12
PMCR ID: P-CAL-037059, CS Pump Seal Cooler HX PMs, dated 11/6/15
Replace Containment Spray Pump Seal Coolers Presentation, dated 11/9/15

Section 4OA3: Followup Events and Notices of Enforcement Discretion

Procedures:
OP-CA-102-106, Operator Response Time Program at Calvert Cliffs, Revision 1
EOP-8, Functional Recovery Procedure, Revision 37
AOP-2A, Excessive Reactor Coolant Leakage, Revision 26
AOP 7A, Loss of Saltwater Cooling, Revision 15

Condition Reports:
02550343 02549970 02439913

Miscellaneous:

ECP-15-000289, Evaluation of CCW System Performance during Certain LOCA Failure Scenarios, Revision 0

SE00543, Evaluation of CCW System Performance during Certain LOCA Failure Scenarios, Revision 0

LIST OF ACRONYMS

10 CFR	Title 10 of the *Code of Federal Regulations*
ACE	apparent cause evaluation
AFAS	auxiliary feedwater actuating system
AFW	auxiliary feedwater
CAP	corrective action program
CDBI	component design bases inspection
CCNPP	Calvert Cliffs Nuclear Power Plant
CCW	component cooling water
CR	condition report
CS	containment spray
EDG	emergency diesel generator
ESF	engineered safety feature
ESFAS	engineered safety features actuation system
HELB	high energy line break
IMC	Inspection Manual Chapter
IR	issue report
JPM	job performance measure
LCO	limiting condition for operation
LER	Licensee Event Report
LOCI	loss of coolant incident
MCR	main control room
NCV	non-cited violation
NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission, U.S.
NVLAP	National Voluntary Laboratory Accreditation Program
PI	performance indicator
RG	regulatory guide
SG	steam generator
SGFP	steam generator feedwater pump
SRA	senior reactor analyst
SRW	service water
SSC	structure, system, and component
STA	shift technical advisor
SW	saltwater
SWAC	saltwater air compressor
TS	technical specification
UFSAR	Updated Final Safety Analysis Report
WO	work order