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

August 3, 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 05000317/2016002 AND 05000318/2016002

Dear Mr. Hanson:

On June 30, 2016, 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 July 28, 2016, with Mr. George Gellrich, Site Vice President, 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.

The inspectors documented two findings of very low safety significance (Green) in this report. One of these findings involved a violation of NRC requirements. Additionally, NRC inspectors documented one Severity Level IV violation with no associated finding. The NRC is treating these violations as non-cited violations (NCV) 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 by Andrew Rosebrook Acting for/

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 05000317/2016002 and 05000318/2016002
w/Attachment: Supplementary Information

cc w/encl: Distribution via ListServ

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U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket Nos.	50-317 and 50-318
License Nos.	DPR-53 and DPR-69
Report Nos.	05000317/2016002 and 05000318/2016002
Licensee:	Exelon Generation Company, LLC (Exelon)
Facility:	Calvert Cliffs Nuclear Power Plant, Units 1 and 2
Location:	Lusby, MD
Dates:	April 1, 2016 through June 30, 2016
Inspectors:	R. Clagg, Senior Resident Inspector C. Roettgen, Resident Inspector M. Modes, Senior Reactor Inspector J. Petch, Resident Inspector A. Rosebrook, Senior Project Engineer
Approved by:	Anthony Dimitriadis, Chief Reactor Projects Branch 1 Division of Reactor Projects

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SUMMARY

Inspection Report 05000317/2016002, 05000318/2016002; 04/01/2016 – 06/30/2016; Calvert Cliffs Nuclear Power Plant (CCNPP), Units 1 and 2; Fire Protection, Performance Indicator Verification, and Problem Identification and Resolution.

This report covered a three-month period of inspection by resident inspectors and announced baseline inspections performed by regional inspectors. The inspectors documented two findings of very low safety significance (Green) in this report. One of these findings involved a violation of NRC requirements. Additionally, NRC inspectors documented one Severity Level (SL) IV violation with no associated finding. 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: Initiating Events

- Green. The inspectors documented a self-revealing, Green finding for Exelon's failure to implement procedures for engineering changes. Specifically, Exelon failed to address the full scope and critical parameters associated with a modification to a steam generator feed pump (SGFP). As a result, the 22 SGFP turbine pedestal studs were improperly torqued, resulting in the SGFP shifting, becoming misaligned, and eventually resulting in the failure of the turbine to pump coupling. This resulted in the unexpected tripping of the 22 SGFP on December 1, 2015, and operators inserting a manual reactor trip as required by procedure. The inspectors determined that Exelon's failure to properly implement procedures CNG-CM-1.01-1003, "Design Inputs and Change Impact Screen," Revision 00601, Attachment 12; CNG-CM-1.01-2000, "Scoping and Identification of Critical Components," Revision 00201; and CNG-FES-007, "Preparation of Design Inputs and Change Impact Screen," Revision 00010 was a performance deficiency that was a performance deficiency that was within Exelon's ability to foresee and prevent. Exelon's corrective actions included, replacing the failed coupling, verifying the torque on the 21 SGFP using a HYTORC™, and developing an adverse condition monitoring plan for Unit 1's SGFPs. Exelon conducted a root cause evaluation (RCE) and developed corrective actions to preclude repetition (CAPR) including implementation of Exelon procedure HU-AA-1212, "Technical Task Risk/Rigor Assessment, Pre-Job Brief, Independent Third Party Review, and Post-Job Review," Revision 007 and conducting critical parameters and rigor training for engineering personnel including the expectations for three pass reviews and verification of assumptions.

  The inspectors reviewed IMC 0612, Appendix B, "Issue Screening," and IMC 0612, Appendix E, "Examples of Minor Issues" and determined the issue is more than minor because it was associated with the Design Control Attribute of the Initiating Events Cornerstone and adversely impacted the associated cornerstone objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, the performance deficiency resulted in a reactor trip from full power on December 1, 2015. The inspectors evaluated the finding using 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 1, "Initiating Events Screening Questions," issued on June 19, 2012 and determined the finding to be of very low safety significance (Green) because the finding did not cause a reactor trip and the loss of mitigation equipment relied upon to transition the plant from the onset of the trip to a stable shutdown condition. The inspectors determined that the finding had a cross-cutting aspect in the area of Human Performance, Documentation, because Exelon failed to develop and maintain complete and accurate engineering change packages (ECP), work orders (WO), and maintenance procedures.[H.7] (Section 4OA2)

Cornerstone: Mitigating Systems

- Green. The inspectors identified a Green, NCV of CCNPP Renewed Facility Operating License for Units One and Two, paragraph 2.E for Exelon's failure to maintain in effect all provisions of the approved fire protection program as described in the Updated Final Safety Analysis Report (UFSAR). Specifically, Exelon installed scaffolding in safety related areas not in accordance with approved procedures and, therefore, impaired fire sprinkler systems that were required by the approved fire protection program without establishing approved contingency measures. The inspectors determined that Exelon's impairment of fire sprinkler systems by installing scaffolding with dimensions exceeding those approved in Exelon procedure MA-AA-716-025 was a performance deficiency that was within Exelon's ability to foresee and prevent. The performance deficiency led to the violation of CCNPP Renewed Facility Operating License, paragraph 2.E, because Exelon failed to maintain in effect all provisions of the approved fire protection program. Exelon's immediate corrective actions included stationing continuous fire watches and removal of the scaffolding deck boards which were impairing the fire sprinkler systems. Exelon entered these issues in to their corrective action program (CAP) as issue reports (IR): 02642463, 02642549, 02642844, 02644495, 02647104, 02647454, and 02647455.

  The inspectors reviewed IMC 0612, Appendix B, "Issue Screening," and determined the issue is more than minor because it adversely affected the protection against external factors 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 installed scaffolding that exceeded the allowed dimensions in MA-AA-716-025 and impaired the function of fire sprinkler systems in areas containing safety related equipment. The inspectors evaluated the finding using IMC 0609, Attachment 4, "Initial Characterization of Findings," issued on June 19, 2012, and IMC 0609, Appendix F, "The Fire Protection SDP Worksheet" issued on September 20, 2013 and determined the finding to be of very low safety significance (Green) because, in all cases of impairment, the fire sprinkler systems were still capable of protecting their intended targets or were still capable to suppress fires such that no additional equipment important to safety would have been affected. The inspectors determined that the finding had a cross-cutting aspect in the area of Human Performance, Procedure Adherence, because Exelon failed to properly implement procedure MA-AA-716-025, "Scaffold Installation, Modification, and Removal Request Process," Revision 11, which limits scaffolding dimensions and locations when installing scaffolding in safety related areas. [H.8] (Section 1R05)

Other Findings

- Severity Level IV. The inspectors identified a Severity Level IV, NCV of 10 CFR 50.73(a)(2) for Exelon's failure to report within 60 days of discovery, a condition that could have prevented the fulfillment of the safety function of the service water (SRW) system needed to

mitigate the consequences of an accident. Additionally, Exelon failed to report within 60 days of discovery, a single condition that caused two trains of the SRW system, a system designed to mitigate the consequences of an accident, to become inoperable. Exelon entered the issue into their CAP as IR 02688409 and on July 20, 2016, submitted LER 05000317/2016-004-00, High Energy Line Break Barrier Breached Due to Human Performance Error Causing Both Service Water Trains to be Inoperable.

The inspectors determined that Exelon's failure to report a single condition that caused the inoperability of two trains of SRW and may have prevented SRW from fulfilling its design functions to mitigate the consequences of an accident within 60 days of discovering the condition was a violation of 10 CFR 50.73(a)(2), and could have impacted the regulatory process. The inspectors reviewed IMC 0612, Appendix B, "Issue Screening," and the NRC Enforcement Policy, revised February 4, 2015, and determined the violation is of SL-IV because it is most similar to example 6.9.d.9 of the NRC Enforcement Policy, "A licensee fails to make a report required by 10 CFR 50.72 or 10 CFR 50.73," which is a SL-IV violation. The inspectors determined that the violation did not have a cross-cutting aspect because it involved the traditional enforcement process only. (Section 4OA1)

REPORT DETAILS

Summary of Plant Status

Unit 1 began the inspection period at 100 percent power. On May 4, 2016, operators reduced power to 81 percent to support repairs of the Mark IV turbine control valve #4 servo valve cabling. On May 5, operators restored the unit to 100 percent power. On May 31, the unit tripped due to a failed 11 steam generator high level engineered safety features actuation system (ESFAS) logic module. On June 2, operators restored the unit to 100 percent power. 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 May 21, 2016, operators reduced power to 80 percent for main turbine valve testing and restored the unit to 100 percent power the same day. On June 25, operators reduced power to 94 percent for variable reactor coolant system (RCS) average coolant temperature testing and restored the unit to 100 percent power the same day. 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 – 3 samples)

.1 Readiness for Seasonal Extreme Weather Conditions

a. Inspection Scope

The inspectors performed a review of Exelon's readiness for the onset of seasonal high temperatures. The review focused on the intake structure, 1B emergency diesel generator (EDG), and the 0C diesel generator. The inspectors reviewed the UFSAR, technical specifications (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 hot weather conditions. Documents reviewed for each section of this inspection report are listed in the Attachment.

b. Findings

No findings were identified.

.2 Summer Readiness of Offsite and Alternate Alternating Current (AAC) Power Systems

a. Inspection Scope

The inspectors performed a review of plant features and procedures for the operation and continued availability of the offsite alternating current (AC) power system and the onsite AAC power system to evaluate readiness of the systems prior to seasonal high grid loading. The inspectors reviewed Exelon's procedures affecting these areas and the communications protocols between the transmission system operator and Exelon. This review focused on changes to the established program and material condition of the offsite AC and onsite AAC power equipment. The inspectors assessed whether Exelon established and implemented appropriate procedures and protocols to monitor and maintain availability and reliability of both the offsite AC and the onsite AAC power system. The inspectors evaluated the material condition of the associated equipment by interviewing the responsible system manager, reviewing IRs and open WOs, and walking down portions of the offsite AC and onsite AAC power systems including the 500 kilovolt switchyard.

b. Findings

No findings were identified.

.3 External Flooding

a. Inspection Scope

During the week of June 20, 2016, the inspectors performed an inspection of the intake structure and 1A EDG. The inspectors reviewed TS, procedures, design documents, and the UFSAR, Chapter 2.8.3, which depict the design flood levels and protection areas containing safety-related equipment to identify areas that may be affected by external flooding. The inspectors conducted a general site walkdown of external areas of the plant, including the 1A EDG and intake structure, to ensure that Exelon's erected flood protection measures were in accordance with design specifications. The inspectors also reviewed operating procedures for mitigating external flooding during severe weather to confirm that, overall, Exelon had established adequate measures to protect against external flooding events and, more specifically, that credited operator actions were adequate.

b. Findings

No findings were identified.

1R04 Equipment Alignment

.1 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, 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.

- Emergency switchgear heating, ventilation, and air conditioning during 11 emergency switchgear out of service for maintenance, April 4, 2016
- 22 emergency core cooling system (ECCS) train during 21 ECCS train of out of service for maintenance, April 5, 2016
- 21 ECCS train during 22 ECCS train out of service for maintenance, April 12, 2016
- 11 and 13 auxiliary feedwater (AFW) pumps during 12 AFW pump out of service for maintenance, April 18, 2016

b. Findings

No findings were identified.

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

On June 28, 2016, the inspectors performed a complete system walkdown of accessible portions of the 11 component cooling water (CCW) train, to verify the existing equipment lineup was correct. The inspectors reviewed operating procedures, surveillance tests, drawings, equipment lineup check-off lists, and the UFSAR to verify the system was aligned to perform its required safety functions. The inspectors also reviewed electrical power availability, component lubrication and equipment cooling, hangar and support functionality, and operability of support systems. The inspectors performed field walkdowns of accessible portions of the systems to verify as-built system configuration matched plant documentation, and that system components and support equipment remained operable. The inspectors confirmed that systems and components were aligned correctly, free from interference from temporary services or isolation boundaries, environmentally qualified, and protected from external threats. The inspectors also examined the material condition of the components for degradation and observed operating parameters of equipment to verify that there were no deficiencies. Additionally, the inspectors reviewed a sample of related IRs and WOs to ensure Exelon appropriately evaluated and resolved any deficiencies.

b. Findings

No findings were identified.

1R05 Fire Protection

.1 Resident Inspector Quarterly Walkdowns (71111.05Q – 6 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 1, AFW Pump Room, Fire Area 42, April 12, 2016
- Unit 2, AFW Pump Room, Fire Area 43, April 12, 2016
- 1A EDG Building, Fire Area EDG 1A, May 18, 2016
- 0C (Station Blackout) Diesel Generator Building, Fire Area 0C, June 8, 2016
- 11 ECCS Pump Room, Fire Area 4, June 30, 2016
- 12 ECCS Pump Room, Fire Area 3, June 30, 2016

b. Findings

Introduction. The inspectors identified a Green NCV of CCNPP Renewed Facility Operating License for Units One and Two, paragraph 2.E for Exelon's failure to maintain in effect all provisions of the approved fire protection program as described in the UFSAR. Specifically, Exelon installed scaffolding in safety related areas not in accordance with approved procedures and, therefore, impaired fire sprinkler systems that were required by the approved fire protection program without establishing approved contingency measures.

Description. On March 17, 2016, during a walkdown of the SRW system, the inspectors identified a potential impairment of the fire sprinkler system in the Unit 2 SRW Pump Room, a safety-related area, due to scaffolding installed beneath the fire water sprinkler heads and informed Exelon. The inspectors reviewed Exelon procedure MA-AA-716-025, "Scaffold Installation, Modification, and Removal Request Process," Revision 11, and noted that Attachment 8, section 3.1.5, stated that scaffolding installed with less than four feet of vertical separation from a sprinkler head, or scaffolding greater than four feet in width regardless of the vertical separation from a sprinkler head is considered an impairment to the fire sprinkler system. Additionally, the procedure stated that adjacent scaffolding must be separated by a distance that is more than the greatest dimension of either scaffolding or it will impair the fire sprinkler system. Investigation by Exelon confirmed that the Unit 2 SRW Pump Room fire sprinkler system was impaired due to scaffolding being greater than four feet wide and a continuous fire watch was required to restore compliance with the Technical Requirements Manual (TRM), section 15.7.6, "Spray and Sprinkler System." Exelon's immediate corrective actions included stationing a continuous fire watch with backup fire suppression equipment, and removal of the scaffolding deck boards which were impairing the fire sprinkler system. Exelon also conducted extent of condition inspections and noted scaffolding impairing the fire

sprinkler systems in the following areas: Units 1 and 2, 5' East Penetration Rooms, Unit 1, Component Cooling Pump Room, Units 1 and 2, 5' Fan Rooms, the 21 ECCS Pump Room, and the Unit 2, 27' East Penetration Room. In each case, Exelon stationed a continuous fire watch until the impairment was removed. The inspectors verified that impairments found by Exelon during extent of condition inspections had been removed. The inspectors noted that the earliest impairment existed from when scaffolding was installed on November 23, 2015, and remained until all impairments had been removed on March 29, 2016.

The inspectors reviewed CCNPP Renewed Facility Operating License for Units One and Two, paragraph 2.E, which requires that Exelon implement and maintain in effect all provisions of the approved fire protection program as described in the UFSAR. The inspectors reviewed UFSAR Table 9-20, "Summary of Fire Protection Systems" and noted that all of the fire sprinkler systems that were found to be impaired were required. The inspectors also noted UFSAR, section 9.9, states that the modes of applicability for which fire protection systems must remain operable, and required compensatory measures when these systems are inoperable are contained in the CCNPP TRM. The inspectors reviewed the TRM and noted that all of the impaired fire sprinkler systems are included in TRM Tables 15.7.6-1 or 15.7.6-2. The TRM also states that the sprinkler systems identified in Tables 15.7.6-1 and 15.7.6-2 are required to be operable whenever equipment in the protected areas are required to be operable. The inspectors also noted that TRM contingency measure 15.7.6.A requires a continuous fire watch with backup fire suppression equipment be established within one hour of a required sprinkler becoming inoperable, and that the required sprinkler be restored to operable status within 14 days. The inspectors concluded that Exelon impaired required fire sprinkler systems, failed to establish a continuous fire watch within one hour impairing any of the fire sprinkler systems, failed to restore the fire sprinkler systems to operable status within 14 days, and, as a result, failed to maintain in effect all provisions of the approved fire protection program. Exelon entered these issues in to their CAP as IRs: 02642463, 02642549, 02642844, 02644495, 02647104, 02647454, and 02647455.

Analysis. The inspectors determined that Exelon's impairment of fire sprinkler systems by installing scaffolding with dimensions exceeding those approved in Exelon procedure MA-AA-716-025 was a performance deficiency that was within Exelon's ability to foresee and prevent. The performance deficiency led to the violation of CCNPP Renewed Facility Operating License, paragraph 2.E, because Exelon failed to maintain in effect all provisions of the approved fire protection program. The inspectors reviewed IMC 0612, Appendix B, "Issue Screening," and determined the issue is more than minor because it adversely affected the protection against external factors 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 installed scaffolding that exceeded the allowed dimensions in MA-AA-716-025 and impaired the function of fire sprinkler systems in areas containing safety related equipment. The inspectors evaluated the finding using IMC 0609, Attachment 4, "Initial Characterization of Findings," issued on June 19, 2012, and IMC 0609, Appendix F, "The Fire Protection SDP Worksheet" issued on September 20, 2013 and determined the finding to be of very low safety significance (Green) because, in all cases of impairment, the fire sprinkler systems were still capable of protecting their intended targets or were still capable to suppress fires such that no additional equipment important to safety would have been affected.

The inspectors determined that the finding has a cross-cutting aspect in the area of Human Performance, Procedure Adherence, because Exelon failed to properly implement procedure MA-AA-716-025, "Scaffold Installation, Modification, and Removal Request Process," Revision 11, which limits scaffolding dimensions and locations when installing scaffolding in safety related areas. [H.8]

Enforcement. Paragraph 2.E of CCNPP Renewed Facility Operating License for Units One and Two, requires Exelon to maintain in effect all provisions of the approved fire protection program as described in the UFSAR. The UFSAR section 9.9 lists fire sprinkler systems required for protection. The TRM section 15.7.6 lists the modes and conditions when fire sprinkler systems are required to be operable and contingency measures in the event that fire sprinkler systems are not operable. Contrary to this, from November 23, 2015, until March 29, 2016, Exelon failed to maintain in effect all provisions of the approved fire protection program as described in the UFSAR. Specifically, Exelon installed scaffolding in such a manner as to impair several fire sprinkler systems required by the UFSAR to be operable while the equipment it protects is required to be operable and failed to implement required contingency measures. Exelon's immediate corrective actions included stationing continuous fire watches and removal of the scaffolding deck boards which were impairing the fire sprinkler systems. Because this violation is of very low safety significance (Green) and has been entered into Exelon's CAP (IR 02642463, 02642549, 02642844, 02644495, 02647104, 02647454, and 02647455), this violation is being treated as an NCV, consistent with Section 2.3.2.a of the NRC Enforcement Policy. **(NCV 05000317,318/2016001-01: Scaffolding Impairs Fire Sprinkler Systems in Safety Related Fire Areas)**

.2 Fire Protection – Drill Observation (71111.05A – 1 sample)

a. Inspection Scope

The inspectors observed an unannounced fire brigade drill scenario conducted on April 20, 2016, that involved a fire in the Unit 2 Voltage Regulator. The inspectors evaluated the readiness of the plant fire brigade to fight fires. The inspectors verified that Exelon personnel identified deficiencies, openly discussed them in a self-critical manner during the drill debrief, and took appropriate corrective actions as required. The inspectors also evaluated the fire brigade's actions to determine whether these actions were in accordance with Exelon's fire-fighting strategies. The inspectors evaluated specific attributes as follows:

- Proper wearing of turnout gear and self-contained breathing apparatus
- Proper use and layout of fire hoses
- Employment of appropriate fire-fighting techniques
- Sufficient fire-fighting equipment brought to the scene
- Effectiveness of command and control
- Search for victims and propagation of the fire into other plant areas
- Smoke removal operations
- Utilization of pre-planned strategies
- Adherence to the pre-planned drill scenario
- Drill objectives met

b. Findings

No findings were identified.

1R06 Flood Protection Measures (71111.06 – 2 samples)

.1 Internal Flooding Review

a. Inspection Scope

The inspectors evaluated the 11 and 12 ECCS Pump Rooms for internal flooding on June 29, 2016. The inspectors reviewed the UFSAR, the site flooding analysis, and plant procedures to assess susceptibilities involving internal flooding. The inspectors also reviewed the CAP to determine if Exelon identified and corrected flooding problems and whether operator actions for coping with flooding were adequate. The inspectors focused on the adequacy of equipment seals located below the flood line, floor and wall penetration seals, watertight door seals, common drain lines and sumps, sump pumps, level alarms, control circuits, and temporary or removable flood barriers.

b. Findings

No findings were identified.

.2 Annual Review of Cables Located in Underground Bunkers/Manholes

a. Inspection Scope

The inspectors conducted an inspection of underground bunkers/manholes subject to flooding that contain cables whose failure could affect risk-significant equipment on May 3, 2016. The inspectors performed walkdowns of risk-significant areas, including manholes 1MH-17, 2MH-16, and 2MH-19 containing EDG cables, to verify that the cables were not submerged in water, that cables and/or splices appeared intact, and to observe the condition of cable support structures. When applicable, the inspectors verified proper sump pump operation and verified level alarm circuits were set in accordance with station procedures and calculations to ensure that the cables will not be submerged. The inspectors also ensured that drainage was provided and functioning properly in areas where dewatering devices were not installed.

b. Findings

No findings were identified.

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

a. Inspection Scope

The inspectors reviewed the 21 ECCS pump room air cooler to determine its readiness and availability to perform its safety functions. The inspectors reviewed the design basis for the component and verified Exelon's commitments to NRC Generic Letter 89-13, "Service Water Requirements Affecting Safety-Related Equipment." The inspectors observed actual performance tests for the heat exchanger and/or reviewed the results of

previous inspections. The inspectors discussed the results of the most recent inspection with engineering staff and reviewed pictures of the as-found and as-left conditions. The inspectors verified that 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 – 3 samples)

.1 Quarterly Review of Licensed Operator Requalification Testing and Training

a. Inspection Scope

The inspectors observed licensed operator requalification testing on May 5, 2016, which involved a seismic event and loss of all AC power resulting in a General Emergency 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

a. Inspection Scope

The inspectors observed licensed operators in the main control room performing the activities listed below. The inspectors observed pre-shift briefings, reactivity control briefings, procedure use and adherence, crew communications, and coordination of activities between work groups to verify that established expectations and standards were met.

- Unit 1, response to automatic reactor trip, May 31, 2016
- Unit 1, reactor startup following forced outage, June 1, 2016

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12Q – 3 samples)

a. Inspection Scope

The inspectors reviewed the samples listed below to assess the effectiveness of maintenance activities on structure, system, and component (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 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.

- Unit 2 containment pressure indicator reads high, failing channel on post-accident monitoring system testing (IR02649526)
- 1-AFW-4525, Motor Driven AFW SG 11 Flow Control Valve, unavailable for positioner maintenance (WO C92999690)
- Seismic monitor alarm during Unit 1 reactor trip (IR0267690)

b. Findings

No findings were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13 – 7 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 11 emergency switchgear heating, ventilation, and air conditioning out of service for maintenance, April 4, 2016
- Updated maintenance risk assessment for 21 ECCS train out of service for maintenance, April 5, 2016

- Updated maintenance risk assessment for high winds affecting offsite power, April 7, 2016
- Updated maintenance risk assessment for 22 ECCS train out of service for maintenance, April 12, 2016
- Maintenance risk assessment for 0C diesel generator out of service for maintenance, week of May 9, 2016
- Updated maintenance risk assessment for 11 ECCS train out of service for maintenance, May 24, 2016
- Maintenance risk assessment for 1A diesel generator out of service for maintenance, week of May 30, 2016

b. Findings

No findings were identified.

1R15 Operability Determinations and Functionality Assessments (71111.15 – 7 samples)

a. Inspection Scope

The inspectors reviewed operability determinations for the following degraded or non-conforming conditions based on the risk significance of the associated components and systems listed below. The inspectors evaluated the technical adequacy of the operability determinations to assess whether TS operability was properly justified and the subject component or system remained available such that no unrecognized increase in risk occurred. The inspectors compared the operability and design criteria in the appropriate sections of the TS and UFSAR to Exelon staff's evaluations to determine whether the components or systems were operable. The inspectors confirmed, where appropriate, compliance with bounding limitations associated with the evaluations. Where compensatory measures were required to maintain operability, such as in the case of operator work arounds (OWA), the inspectors determined whether the measures in place would function as intended and were properly controlled by Exelon staff. The inspectors verified that Exelon staff identified OWAs at an appropriate threshold and addressed them in a manner that effectively managed OWA-related adverse effects on operators and SSCs.

- 11 main steam isolation valve Haskell pump stalled multiple times (IR02645811)
- 21 high-pressure safety injection pump failed polarization index test (IR02651117)
- Unit 1 and Unit 2 AFW pump room ventilation (CR-2008-000676)
- Safety related digital components not rated for post-accident environment (IR02676376)
- Seismic monitor alarm during Unit 1 reactor trip (IR02676090)
- Spurious trip of 11 steam generator high level module in ESFAS (IR02676079)
- 1A diesel generator work aborted due to Unit 1 trip (IR02676114)

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.18 – 1 sample)

Permanent Modifications

a. Inspection Scope

The inspectors evaluated the modification ECP-14-000184, "AFW Pump Room Steam Traps and Drains Upgrade," Revision 4, and verified that the design bases, licensing bases, and performance capability of the affected systems were not degraded by the modifications. In addition, the inspectors reviewed modification documents associated with the upgrade and design change. The inspectors also reviewed revisions to the UFSAR and system design basis documents to ensure the modifications were incorporated into these documents.

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19 – 6 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 C93055284, Modify 12 AFW pump turbine drain lines, April 19, 2016
- WO C92958204, 2-MOV-617, 21B high-pressure safety injection loop isolation valve test and inspection, May 4, 2016
- WO C90921205, 0C2 diesel fuel oil (DFO) rack positioner replacement, May 13, 2016
- WO C93293102, Inspect 2B EDG camshaft, May 18, 2016
- WO C93035651, 1RV5209, 11A SRW heat exchanger relief valve replacement, May 23, 2016
- WO C92314796, Inspect and replace anodes on 11 ECCS room air cooler, May 26, 2016

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22 – 4 samples)

a. Inspection Scope

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. The inspectors reviewed the surveillance tests listed below.

- STP-O-8A-2, "Test of 2A DG and 4kV Bus 21 UV," Revision 30, April 4, 2016
- PE-0-024-O-M, "Slow Speed Start 0C Diesel Generator," Revision 3, June 9, 2016
- STP-O-73A-2, "Saltwater Pump and Check Valve Quarterly Operability Test," Revision 18, June 13, 2016 (in-service testing)
- STP-O-8B-1, "Test of 1B DG and 14 4kV Bus UV," Revision 31, June 14, 2016

b. Findings

No findings were identified.

Cornerstone: Emergency Preparedness

1EP6 Drill Evaluation (71114.06 – 1 sample)

Emergency Preparedness Drill Observation

a. Inspection Scope

On May 23, 2016, the inspectors observed Exelon's performance of an emergency planning drill that involved a loss of the refueling water tank, loss of coolant accident, and loss of containment due to a stuck open containment isolation valve which required a General Emergency to be declared. The inspectors observed emergency response operations in the simulator, technical support center, and emergency operations facility to determine whether the event classification, notifications, and protective action recommendations were performed in accordance with procedures. The inspectors also attended the station drill critique to compare inspector observations with those identified by Exelon's staff and to evaluate whether the Exelon staff had properly identified weaknesses and entered them into the CAP. Drill issues were captured by Exelon in the CAP as IR02672757, and were reviewed by the inspectors.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator Verification (71151)

Safety System Functional Failures (2 samples)

a. Inspection Scope

The inspectors reviewed Exelon's submittals for the Safety Systems Functional Failures performance indicator (PI) for both Units 1 and 2 for the period of April 1, 2015, through March 31, 2016. To determine the accuracy of the PI data reported during those periods, inspectors used definitions and guidance contained in Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, and NUREG-1022, "Event Reporting Guidelines 10 CFR 50.72 and 10 CFR 50.73," Revision 3. The inspectors reviewed Exelon's operator narrative logs, operability assessments, maintenance rule records, maintenance WOs, IRs, event reports, and NRC integrated inspection reports to validate the accuracy of the submittals.

b. Findings

Introduction. The inspectors identified a Severity Level IV, NCV of 10 CFR 50.73(a)(2) for Exelon's failure to submit a Licensee Event Report (LER) within 60 days of discovery, a condition that could have prevented the fulfillment of the safety function of the SRW system needed to mitigate the consequences of an accident. Additionally, Exelon failed to report within 60 days of discovery, a single condition that caused two trains of the SRW system, a system designed to mitigate the consequences of an accident, to become inoperable.

Description. On January 20, 2016 an exit meeting was conducted which presented to Exelon the findings contained in CCNPP – Integrated Inspection Report 05000317/2015004 and 05000318/2015004 and constitutes the date of discovery for this issue. This report documented NCV05000317/2015004-01: Failure to Implement Procedures for the Control of Hazard Barriers During Maintenance. This NCV documented that, on October 20, 2015, Exelon had placed Calvert Cliffs Unit 1 in a condition where the SRW system may not have been capable of performing its design functions during a high energy line break (HELB) in the turbine building. Specifically, Exelon blocked open the HELB barrier that protects the SRW pump room from a HELB in the turbine building. Because all three SRW pumps are located in the room for which the barrier was impaired, both trains of SRW were rendered inoperable during the maintenance. The degraded condition no longer existed at the time of discovery and Exelon entered the issue into their CAP as IR 02586773.

During periodic review of PI data, the inspectors noted that a loss of safety function of the SRW system was not included in data submitted by Exelon to the NRC as required by Exelon procedure LS-AA-2001, "Collecting and Reporting of NRC Performance Indicator Data," Revision 14. The inspectors determined the loss of safety function was also not reported to the NRC in the form of a LER as required by 10 CFR 50.73(a)(2), sections (v)(D) and (vii)(D). During subsequent interviews the inspectors identified that Exelon had not evaluated the loss of SRW safety function for reporting per 10 CFR 50.73 or for inclusion in PI data submitted to the NRC. Exelon entered the issue into their CAP as IR 02688409 and on July 20, 2016, submitted LER 05000317/2016-004-00,

High Energy Line Break Barrier Breached Due to Human Performance Error Causing Both Service Water Trains to be Inoperable.

Analysis. The inspectors determined Exelon's failure to properly implement procedure LS-AA-2001 was a performance deficiency. Specifically, Exelon failed to include the loss of safety function of the SRW system discussed in NCV05000317/2015004-01 in PI data submitted to the NRC. The inspectors reviewed IMC 0612, Appendix B, "Issue Screening," and determined this performance deficiency was minor because it relates to a performance indicator but would not have caused the performance indicator to exceed a threshold.

The inspectors determined that Exelon's failure to report, within 60 days of discovery, a single condition that caused the inoperability of two trains of SRW and could have prevented SRW from fulfilling its design functions to mitigate the consequences of an accident was a violation of 10 CFR 50.73(a)(2), and could have impacted the regulatory process. The inspectors reviewed IMC 0612, Appendix B, "Issue Screening," and the NRC Enforcement Policy, revised February 4, 2015, and determined the violation is of SL-IV because it is most similar to example 6.9.d.9 of the NRC Enforcement Policy, "A licensee fails to make a report required by 10 CFR 50.72 or 10 CFR 50.73," which is a SL-IV violation.

The inspectors determined that the violation did not have a cross-cutting aspect because it involved the traditional enforcement process only.

Enforcement. 10 CFR 50.73(a)(2)(v)(D) requires any event or condition that occurred within three years preceding discovery, that could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident, be reported by the license holder by submission of a LER within 60 days of discovery. Additionally, 10 CFR 50.73(a)(2)(vii)(D) requires any event where a single cause or condition that occurred within three years preceding discovery, caused two independent trains to become inoperable in a single system designed to mitigate the consequences of an accident, be reported by the license holder by submission of a LER within 60 days of discovery. Contrary to the above, on March 20, 2016, Exelon failed to submit an LER within 60 days of discovery of an event which occurred within the three years preceding discovery, where a single condition caused both trains of the SRW system, a system designed to mitigate the consequences of an accident, to become inoperable and could have prevented the fulfillment of the safety function of the SRW system. Because this violation is of very low safety significance and has been entered into Exelon's CAP (IR 02688409), this violation is being treated as an NCV, consistent with Section 2.3.2.a of the NRC Enforcement Policy. **(NCV 05000317/2016002-02: Failure to Report Conditions as Required by 10 CFR 50.73)**

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

.1 Routine Review of Problem Identification and Resolution Activities

a. Inspection Scope

As required by Inspection Procedure 71152, "Problem Identification and Resolution," the inspectors routinely reviewed issues during baseline inspection activities and plant status reviews to verify that Exelon entered issues into the CAP at an appropriate

threshold, gave adequate attention to timely corrective actions, and identified and addressed adverse trends. In order to assist with the identification of repetitive equipment failures and specific human performance issues for follow-up, the inspectors performed a daily screening of items entered into the CAP and periodically attended 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 first and second quarter of 2016 to assess IRs written in various subject areas (equipment problems, human performance issues, etc.), as well as individual issues identified during the NRC's daily IR review (Section 4OA2.1). The inspectors reviewed Exelon's quarterly trend report for the first quarter of 2016, conducted under PI-AA-125-1005, "Coding and Analysis Manual," Revision 0, 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 concerning Exelon's use of risk in deciding when an operability determination is warranted for SSCs required to be operable by TS. Exelon procedure OP-AA-108-115, "Operability Determinations," Revision 17, states, "the definition of operability is that the SSC must be capable of performing its specified safety function or functions, which inherently assumes that the event occurs and that the safety function or functions can be performed. Therefore, the use of PRA or probabilities of occurrence of accidents or external events is not consistent with the assumption that the event occurs, and is not acceptable for making operability decisions." The inspectors identified multiple examples where, contrary to the above definition of operability, Exelon allowed conditions to exist that rendered safety related equipment inoperable without entering the associated TS limiting condition for operation or Exelon failed to fully execute their operability determination process when it would have been appropriate to do so.

- NCV 05000317,318/2015003-01: Failure to Establish and Maintain Procedures for the Operation of the DFO System. Exelon procedure OI-21D, "Fuel Oil Storage and Supply," Revision 10, directed establishing a recirculation flow path for a safety

related fuel oil storage tank through non-seismically rated piping. A note in the procedure indicated that due to the non-seismically rated piping involved, the configuration must be limited to a duration of no more than 24 hours. Imposing a time restriction on the duration the safety related tank is connected to non-seismically rated piping limits the risk associated with the configuration; however, it is not a valid factor in determining the operability of the safety related tank. Exelon is tracking a procedure change in their CAP as IR 02601497.

- NCV 05000317/2015004-01: Failure to Implement Procedures for the Control of Hazard Barriers During Maintenance. Exelon procedure EN-1-135, "Control of Barriers," Revision 202, stated in section 3.7, under the definition of routine entry/egress that, "A 5 minute time limit has been established as a reasonable amount of time to accomplish equipment movement through a HELB barrier." EN-1-135 also states in section 5.3 that, "The door may be held open per section 3.7, but not blocked open," and in section 5.5 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." Exelon staff interpreted this procedure to imply that no equipment was required to be declared inoperable, and no TS limiting condition for operation entries would need to be made for equipment normally protected by a HELB barrier as long as the barrier was not impaired for greater than 5 minutes. This interpretation contradicts some of the above quoted sections of EN-1-135, and the above definition of operability. Exelon has completed corrective actions including training of all work planning personnel and operations personnel which was tracked under IR 02625943.

- In June 2016, Exelon completed a technical evaluation to show that the CCW system safety function of providing cooling to containment during a design basis loss of coolant accident (LOCA) would be maintained even with a valve in the system with a safety function to fully shut, not in its required position. A recent analysis of the valve had shown low margin for shutting the valve during design basis accident conditions. The technical evaluation assumed an ultimate heat sink temperature of 80F which is less than the UFSAR limit of 90F. This is a non-conservative assumption and was used to justify continued operation in the degraded condition only until a modification raising the air pressure available to shut the CCW valve was completed. This was consistent with ultimate heat sink temperatures at the time in the low 70Fs. The inspectors determined that the maximum ultimate heat sink temperature the previous summer was 84.6F. Exelon failed to analyze for a loss of the CCW system safety function at this elevated ultimate heat sink temperature until being questioned by the inspectors. Exelon's revised analysis of the CCW system safety function, including ultimate heat sink temperatures up to 85F, demonstrated that the safety function was maintained. Exelon's original decision to evaluate the CCW system safety function only to an ultimate heat sink temperature of 80F was based on the valve's categorization as a low safety significance air operated valves (AOV). The use of safety significance in determining if evaluation for operability and reportability is required is inconsistent with the definition of operability above. This observation is discussed for trending purposes only. The inspectors are conducting follow on inspection activities regarding Exelon's application of design control measures to this valve.

The inspectors continue to monitor Exelon's operability determination results to assess if Exelon's previous corrective actions have been effective.

.3 Annual Sample: Review of Repetitive Failures of the 22 Steam Generator Feed Pump Turbine to Pump Coupling

a. Inspection Scope

The inspectors performed an in-depth review of Exelon staff's evaluation and corrective actions associated with the failures of the 22 SGFP on May 21, 2013, and December 1, 2015, both of which resulted in a manual reactor trip of Unit 2. The inspectors reviewed RCEs, completed following each failure, engineering service requests (ESR) and ECPs associated with changing the SGFP pump casing from cap screws to threaded hold down bolts; applicable WOs, and maintenance procedures used for torqueing the cap screws and hold down bolts; and post trip review packages. The inspectors interviewed plant personnel associated with the conduct of both RCEs and performed an in-depth review of the corrective action history. The inspectors evaluated the status of corrective actions from the 2013 RCE and assessed the timeliness of corrective actions developed during the 2015 RCE.

b. Observations and Assessment

A self-revealing finding of very low safety significance (Green) was identified and is documented in Section 4OA2.3.c below.

Additionally, the inspectors determined that the root causes for the 2013 failure and the 2015 failure were different enough such that the CAPRs would not have prevented the cause of the 2015 failure. The root cause in 2013 was a pre-existing flaw in a coupling weld. The root cause in 2015 was a failure by engineering personnel to fully identify and scope critical parameter changes for a modification to the turbine pedestal fasteners. Although in both 2013 and 2015, misalignment of the coupling was a contributing cause, the reasons for the misalignments were significantly different. In 2013, a hot alignment was performed resulting in minor alignment errors. In 2015, the misalignment was due to the machine shifting during operation due to the turbine pedestal hold down bolts not being adequately torqued.

The inspectors questioned the timeliness of the corrective actions related to the December 2015 failure considering that SGFP work was performed during the Unit 1 refueling outage in March 2016. The inspectors noted that additional training and revisions to the maintenance procedures were not labeled as CAPRs, and those corrective actions were not scheduled to be complete until June 2016. The inspectors verified that the WO instructions for the Unit 1 SGFP were revised appropriately, torque values were verified with a HYTORC™, and crews received just in time training prior to the Unit 1 refueling outage. The remaining maintenance personnel and general maintenance procedures were to be updated by June 2016, which the inspectors concluded was reasonable and timely. While the inspectors believed these corrective actions should have been classified as CAPRs, the corrective actions were completed in a timely manner for the personnel performing this work during the Unit 1 outage. As a result, no violations of NRC requirements were identified with respect to timeliness of corrective actions.

The inspectors observed that monitoring parameters were identified in the 2013 RCE, which helped predict the failure. These same parameters were used in 2015 in the

adverse condition monitoring plan for Unit 1 SGFPs developed as part of the extent of condition review for the 2015 RCE. However, enhancements to monitor steam generator turbine thrust bearing temperature for a sudden drop, were not implemented for Unit 2 prior to December 2015. While this parameter would not have precluded a coupling failure, it would have allowed the operators to avoid an unnecessary plant transient (i.e. SGFP trip and manual reactor trip), and to downpower and remove the SGFP from service before the coupling completely failed. Because this was an enhancement and not a CAPR, this does not constitute a violation of NRC requirements.

c. Findings

Introduction. The inspectors documented a self-revealing, Green finding for Exelon's failure to implement procedures for engineering changes. Specifically, Exelon failed to address the full scope and critical parameters associated with a modification to a SGFP. As a result, the SGFP 22 turbine pedestal studs were improperly torqued, which allowed the SGFP to shift and become misaligned, and eventually result in the failure of the turbine to pump coupling. This resulted in the unexpected tripping of the 22 SGFP on December 1, 2015, and operators inserting a manual reactor trip as required by procedure.

Discussion. On December 1, 2015, Unit 2 turbine driven SGFP 22 tripped. Operators attempted to reset SGFP 22, in accordance with the abnormal operating procedure, and were unsuccessful. Steam generator water levels continued to lower and operators manually initiated a reactor trip. All systems operated as designed and the unit trip was uncomplicated.

Upon inspection, SGFP 22 coupling was found failed. During disassembly, maintenance staff also discovered that one of the four pump casing hold-down nuts (southeast corner) had backed off from its bolting surface by 1-5/8 inches. The as-found condition of the SGFP 22 studs identified that three studs were torqued to 70% of the designed specification and the southeast stud was found several turns backed off providing no hold down force. These factors allowed the SGFP 22 to shift during normal operations, become misaligned with the turbine exceeding the maximum designed angular misalignment of its coupling, and subsequently caused the coupling to fail.

Exelon's post trip review and RCE determined that the southeast stud had been pulled out of perpendicular alignment to its base during the 2015 refueling outage due to the stud tensioner not having a flat surface to sit flush upon. Maintenance procedures had not been revised to address the new critical parameter of stud perpendicularity which the new torqueing methodology and equipment was vulnerable to. The investigation further discovered that the vendor supplied torque settings used with the new tensioning equipment in March 2014 for Unit 1 and March 2015 for Unit 2 refueling outage were incorrect and resulted in insufficient clamping force being applied to all the studs. An extent of condition review determined that although the SGFP 21 also had insufficient tensioning applied during the refueling outage, it was found to still be within acceptable alignment.

Exelon's RCE determined that the root cause of the failure was a failure to properly implement an engineering change. In June 2013, ESR-13-000795 was initiated to evaluate acceptability of using studs vs. hold down bolts to allow the use of stud tensioners on the SGFPs. A second ESR, ESR-13-000807, was developed to add

SGFP pedestal bolt material to the SGFP drawings. These ESRs were closed to ECP 13-000612. The ECP allowed the use of studs, specified the materials to be used, and allowed the use of stud tensioners. However, the ECP provided no technical basis within the engineering equivalency for the use of stud tensioners.

Two critical design parameters, stud perpendicularity and adequate stud tension accounting for relaxation factor, were not adequately addressed in the ECP. As a result, an incorrect setting, which did not account for stud relaxation, was supplied for the stud tensioners by the vendor. This setting was not independently validated by engineering and resulted in only ~70% of the required torque being applied. Also, maintenance procedures and WOs were not updated to ensure the stud tensioner was perpendicular to the studs. If the tensioner is not perpendicular to the stud, force will be applied unevenly on the hold down bolt, and may deflect the stud. Subsequently, when the tensioner is released, the stud returns to its normal state and torque on the hold down bolt is further relaxed. Maintenance procedures also did not require workers to perform a torque verification despite the potential for torque relaxation.

Exelon determined that Exelon procedures CNG-CM-1.01-1003, Attachment 12, "Design Inputs and Change Impact Screen," Revision 00601, CNG-CM-1.01-2000, "Scoping and Identification of Critical Components," and CNG-FES-007, "Preparation of Design Inputs and Change Impact Screen," Revision 0017, were not properly utilized for ECP 13-000612. Specifically, CNG-FES-007 was not used when preparing the CNG-CM-1.01-1003, Attachment 12, screening. CNG-FES-007, specifically asks if there are any bolting and threading applications. If answered yes, the user is directed to consider Electric Power Research Institute's (EPRI) Bolted Joint Maintenance and Application Guide, Section 4.4, which specifically addresses both relaxation factors and stud perpendicularity. Additionally, there is no record that pre-job technical briefs and scope change briefs required by CNG-CM-1.01-2000 had been performed. This barrier is also designed to identify the critical parameters involved in the ECP. Exelon also concluded that when completing CNG-CM-1.01-1003, Attachment 12, maintenance/civil engineering was not selected as an impacted organization, despite the fact that maintenance would be using new equipment and techniques to torque the studs as a result of the modification. This was another missed opportunity to review and implement the EPRI guidance per CNG-FES-007.

The RCE also concluded that installation instructions identifying and communicating critical parameters to the planners and therefore the craft via CNG-MN-4.01-1000, "Integrated Work Planning," Revision 006 were not provided. This was due to CNG-CM-1.03-1003, Attachment 12 and CNG-FES-007 not being properly implemented. As a result, the planners failed to include the EPRI guidance in the preparation of the WO. However, there was a missed opportunity during pre-job field walkdowns and planning meetings to question the adequacy of the work instructions given the new equipment being used. Additionally, it was identified that maintenance personnel questioned if the stud tensioning setting values had been validated and brought that concern to engineering. No reply was received from engineering, and the maintenance personnel assumed the vendors supplied information was correct due to the level of experience the vendor had in this area.

Corrective actions included replacing the failed coupling, verifying the torque on the 21 SGFP using a HYTORC™, and development of an adverse condition monitoring plan for Unit 1's SGFPs. Exelon conducted a RCE and developed CAPRs including

implementation of Exelon procedure HU-AA-1212, "Technical Task Risk/Rigor Assessment, Pre-Job Brief, Independent Third Party Review, and Post-Job Review," Revision 007 and conducting critical parameters and rigor training for engineering personnel including the expectations for three pass reviews and verification of assumptions. Maintenance procedures and WOs were revised to reflect EPRI guidance, training was developed for maintenance personnel on the stud tensioners and the EPRI guidance, and modifications were developed to ensure stud perpendicularity. Additionally, Unit 1 SGFPs studs were properly torqued during the March 2016 outage using the revised WOs.

Analysis. The inspectors determined that Exelon's failure to properly implement procedures CNG-CM-1.01-1003, "Design Inputs and Change Impact Screen," Revision 00601, Attachment 12; CNG-CM-1.01-2000, "Scoping and Identification of Critical Components," Revision 00201; and CNG-FES-007, "Preparation of Design Inputs and Change Impact Screen," Revision 00010, was a performance deficiency that was within Exelon's ability to foresee and prevent. The inspectors reviewed IMC 0612, Appendix B, "Issue Screening," and IMC 0612, Appendix E, "Examples of Minor Issues," and determined the issue is more than minor because it was associated with the Design Control Attribute of the Initiating Events Cornerstone and adversely impacted the associated cornerstone objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, on December 1, 2015, the performance deficiency resulted in a reactor trip from full power. The inspectors evaluated the finding using IMC 0609, Attachment 4, "Initial Characterization of Findings," issued on June 19, 2012 and IMC 0609, Appendix A, "The SDP for Findings At-Power," Exhibit 1, "Initiating Events Screening Questions," issued on June 19, 2012 and determined the finding to be of very low safety significance (Green) because the finding did not cause a reactor trip and the loss of mitigation equipment relied upon to transition the plant from the onset of the trip to a stable shutdown condition.

The inspectors determined that the finding had a cross cutting aspect of Human Performance, Documentation because Exelon failed to maintain complete and accurate ECPs, WOs, and maintenance procedures. Specifically, engineering, maintenance, and work planning personnel had several opportunities to revise procedures and WOs with the required EPRI guidance. Additionally, maintenance personnel questioned if the vendor provided settings had been validated. In both cases, the inadequate ECP documentation precluded these barriers from identifying the underlying performance deficiency and were missed opportunities. [H.7]

Enforcement. This finding does not involve enforcement action because no violation of a regulatory requirement was identified. The main feedwater system is not safety related; therefore, 10 CFR 50, Appendix B, is not applicable. The licensee procedures which were not implemented are not listed in NRC Regulatory Guide 1.33, Appendix A, "Typical Procedures for Pressurized Water Reactors and Boiling Water Reactors;" therefore TS 5.4.1, "Procedures," is also not applicable. Because this finding does not involve a violation, is of very low safety significance, and Exelon entered the issue into their CAP (IR 02594406), it is identified as a Finding. **(FIN 05000318/2016002-03, Failure to Implement Engineering Change Procedures Results in Plant Trip)**

4OA3 Follow-Up Events and Notices of Enforcement Discretion (71153 – 2 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 Inspection Manual Chapter 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.

- Unit 1, automatic reactor trip due to failure of 11 steam generator high level ESFAS logic module, May 31, 2016

b. Findings

No findings were identified.

.2 (Closed) LER 05000318/2015-001-00 and LER 05000318/2015-001-01: Manual Reactor Trip Due to Steam Generator Feed Pump 22 Trip

On December 1, 2015, Unit 2 turbine driven SGFP 22 tripped. Operations attempt to reset SGFP 22, in accordance with the abnormal operating procedure, was unsuccessful. Facing lowering steam generator water level, Operations manually initiated a reactor trip. The unit experienced an uncomplicated trip as all systems operated as designed.

Following the reactor trip, the unit transitioned into an unscheduled outage. Upon inspection, SGFP 22 coupling was found failed. During disassembly, Maintenance discovered that one of the four pump casing hold-down nuts (southeast corner) had backed off from its bolting surface by 1-5/8 inches. Further investigation revealed that the vendor supplied stud tensioning values used in tensioning the hold down studs on both Unit 2 SGFPs during the March 2015 refueling outage were incorrect and resulted in insufficient clamping force being applied to all the studs. As a result, SGFP 22 pump became misaligned with the turbine to such an extent to exceed the maximum designed angular misalignment of its coupling and subsequently caused the coupling to fail.

Although SGFP 21 also had insufficient tensioning applied during the refueling outage, it was found to still be within acceptable alignment. The root cause of the failure was that engineering personnel failed to rigorously implement engineering standards and applicable site processes in evaluating the change that allowed the use of studs to hold down the SGFP pump casing to its pedestal. The investigation further determined that the southeast stud had been pulled out of perpendicular alignment to its base during the 2015 refueling outage due to the stud tensioner not having a flat surface to sit flush

upon. This, combined with the incorrect stud tensioning value used, prevented sufficient clamping force to be applied and led to SGFP 22 failure.

The enforcement aspects of this issue are as discussed in Section 4OA2 of this report. The inspectors did not identify any additional issues during the review of this LER. This LER is closed.

4OA5 Other Activities

Post-Approval Site Inspection for License Renewal (71003) (1 sample)

a. Inspection Scope

The reviewed commitments, license conditions, and enhanced aging management programs, were selected based on several attributes including the results of previous license renewal audits and inspections of aging management programs; the complexity in implementing a commitment; and the extent to which the baseline inspection programs will inspect attributes of the commitment, license condition or aging management program. Consideration was given to the amount of time since the renewed license was granted and beginning of the period of extended operation.

For each commitment the inspectors reviewed supporting documents, including completed surveillances, conducted interviews, performed visual inspection of structures and components and observed selected activities described below to verify Exelon completed the necessary actions to comply with the license conditions or commitments. The inspectors selectively verified Exelon implemented the aging management programs, included in the NRC staff's license renewal safety evaluation report, in accordance with 10 CFR 54, "Requirements for the Renewal of Operating Licenses for Nuclear Power Plants." The inspectors verified a selected sample of Exelon corrective actions that were the result of license renewal activities.

On a sampling basis, the inspectors verified that Exelon staff completed the necessary actions to comply with the license conditions that are a part of the renewed operating license, and had implemented the aging management programs included in the NRC license renewal safety evaluation report. The following commitments, license conditions, and enhanced programs were reviewed.

b. Findings and Observations

No findings were identified.

Alloy 600 Program

Commitment 15

> "Alloy 600 Program will be modified to include RCS nozzle thermal sleeves and non-pressure boundary components. Welds and base metals are implicitly included in this program. The Alloy 600 program will be modified to include all Alloy-600 components, not just those forming the pressure boundary."

The inspectors noted the Alloy 600 Program was modified to include the RCS nozzle thermal sleeves crediting the CCNPP Technical Procedure CP-204 for maintaining the water chemistry so that stress corrosion cracking and intergranular stress corrosion cracking, is mitigated.

In order to determine how the program was implemented the inspectors reviewed the results of the ultrasonic examinations for 4-PS-1003-06, 4-PS-1006-1, 4-SR-1005-01, 12-PSL-1, 12-PSL-13, 12-SC-1004-1, 12-SI-1009-16, and 12-SIC-1010-14. The inspectors compared the inspection parameters against the requirements in American Society of Mechanical Engineers, Section XI, and the applicable Code Cases, and Relief Requests. The inspectors also reviewed Report No. 16000207.401.R0, March 1, 2016, "Past Operability Evaluation of Weld #4-SR-1006-1 Axial Flaw Indication on the Safety Relief System at Calvert Cliffs Nuclear Power Plant, Unit 1."

Buried Piping Program

Commitment 26

> "A new program for buried pipe will include AFW piping and will provide assurance that the piping will remain capable of maintaining the system pressure boundary under all current licensing basis (CLB) conditions. Representative sample of buried piping will be selected for inspection to ensure that the pipe wrapping/coatings are adequately protecting the pipe from the external environment."

Commitment 28

> "A new program for buried pipe inspection will include DFO and will provide assurance that the effects of aging are being effectively managed for the period of extended operation under CLB design loading conditions. This program will consider variations in environmental conditions (including cathodic protection) to select representative samples of the buried piping for inspection to ensure that the pipe coating/wrapping and cathodic protection system are adequately protecting the pipe from external ARDMs."

The inspectors reviewed AMBD-0035, "Buried Piping Program," Revision 0200. The inspectors noted the purpose of the DFO buried pipe is to provide reliable supply of fuel oil to the EDGs, the auxiliary boilers, the station black out diesel generator, and the diesel driven fire pump. In addition, the purpose of the AFW buried pipe is to provide a reliable supply of water to the auxiliary feed pumps. The inspectors ascertained the aging affects were mitigated by minimizing the exposure of external steel surfaces to the aggressive environment by protecting the surface with wrapping/coatings and the application of cathodic protection. The inspectors reviewed preventative maintenance (PM) records (00362002, 00630003, 063008) and WOs (C019961913, CO200802489, C92107835) comparing them against procedure ER-AA-5400, "Underground (Buried) Piping and Raw Water Corrosion Program Guide," Revision 8 and ER-AA-5400-1003, "Buried Pipe and Raw Water Corrosion Program Performance Indicators," Revision 10 to determine if the aging affects in AMBD-0035 were being managed and the intended functions of the applicable systems were being maintained. The inspectors reviewed

WO C91748124, for the quarterly inspection of the cathodic protection system, performed January 7, 2013, which was the result of preventive maintenance task 0063003 to determine if the essential elements of the PM were being implemented.

Salt Water (SW) System

Commitment 40

> "The PM Program activities for the Salt Water System piping, valve, pumps, and ECCS Pump Room air coolers were modified to include specific ARDMs where they were not included and/or additional specified components/subcomponents where they were not being inspected."

The SW system was divided into 6 logical groups by type and age-related degradation mechanism. For example, Group 1 included device types without internal lining subject to crevice corrosion, general corrosion, microbiological induced corrosion and pitting, and Group 2 included device types with internal lining with the associated plausible aging mechanisms. Each group was then evaluated to determine what changes, if any, were required to manage the effects of aging. In the original NRC safety evaluation report, for the SW system, this was recorded as a list of 29 specific plant tasks, 5 specific checklists, and one procedure that needed to be modified to manage aging effects.

This approach to license renewal was not used in subsequent licensee renewal applications. In order to bring the results of this application in line with subsequent renewals the NRC worked with Exelon to revise the commitments. The commitment was reduced to a summary statement in order to describe the essential elements of the program subject to regulatory change management controls and provide for appropriate latitude for Exelon to modify their processes as necessary.

The inspectors reviewed the modifications made for the SW system PM and operational procedures to determine if changes were made to address the plausible or active aging effects. The inspectors reviewed records of PM activities 10122063[B] for the inspection of rubber lined carbon steel, noting the PM was clearly identified as a license renewal commitment activity intended to inspect for general and crevice corrosion. The inspectors reviewed the following PMs in the same manner: 20122101[B], 10122187[B], and 10322037. The inspectors reviewed procedures supporting the PMs to determine if the aging affects were identified.

Compliance with 10 CFR 54.37 (b)

The inspectors reviewed CNG-CM-6.01-1001, "10 CFR 54.37(B) Compliance and 10 CFR 54 Supporting Documentation Maintenance," Revision 00100, covering the period February 2015 to April 2016, to determine what newly identified SSCs were identified that would have been subject to an aging management review, or evaluation of time-limited aging analysis, in accordance with 10 CFR 54.21. The implementation was compared against the guidance contained in the Regulatory Issue Summary 2007-16, "Implementation of the Requirements of 10 CFR 54.37(b) for Holders of Renewed Licenses," Revision 1.

The inspectors determined that newly installed SSCs are not included in the 10 CFR 54.37(b) program. Newly installed SSCs are, however, entered into a separate database that tracks the newly installed SSCs for subsequent license renewal. Exelon annually compares all the components currently entered into their comprehensive facility configuration management database with the previously generated license renewal database. This comparison captures any components that have been installed or modified since the last comparison was made. For the current comparison, a delta of 140 components was identified. All the components screened out of license renewal as either short-lived or active components. The inspectors reviewed the 140 components and determined they were short-lived or active components, such as switches, fuses, circuit boards, controllers, or relays.

Spent Fuel Pool Cooling System Pumps

Commitment 43

> "The PM Program activities for inspection of the Spent Fuel Pool Cooling System pumps were modified to explicitly present inspection requirements."

The spent fuel pool cooling system consists of two half-capacity pumps and two half-capacity heat exchangers in parallel, a bypass filter (which removes insoluble particulates), a bypass demineralizer (which removes soluble ions), and various piping, valves, and instrumentation. The spent fuel pool is located in the auxiliary building. The spent fuel pool is divided into identical halves, each serving one reactor unit. Both new fuel and spent fuel may be stored in the fuel pool. The spent fuel pool cooling system has the following major components: piping and valves, pumps and motors, heat exchangers, a filter/strainer, a demineralizer, and instruments. The components are constructed of carbon steel, low allow steel, alloy stainless steel, elastomer lining, and some of the components are zinc-plated or painted on the external surfaces. The internal environment for all major components, with the exception of the shell-side of the heat exchangers, is borated water, with approximately 2500 ppm boron. The shell-side of the heat exchangers is exposed to treated demineralized water containing additives for corrosion control. This commitment applies to Group 4 of the spent fuel pool cooling system: cavitation, erosion, and erosion-corrosion of pump casings.

The inspectors reviewed PM 0672007[B], "Inspect 11 Spent Fuel Pool Cooling Pump," noting the PM identified the task as specifically credited by license renewal procedure AMBD-0021. The checklist referred to Technical Procedure PUMP-26, "Spent Fuel Pool Cooling Pump Overhaul," Revision 00500, page 10. At page 10, step 6.1.15, of the referenced procedure, the user is directed to "Inspect pump casing and gasket seating surfaces for signs of the following: wear, cavitation, corrosion, and erosion-corrosion." The inspectors noted this activity had been implemented in 2013.

4OA6 Meetings, Including Exit

Exit Meeting Summary

On July 28, 2016, the inspectors presented the inspection results to Mr. George Gellrich, Site Vice President, and other members of the Exelon staff. The inspectors verified that no proprietary information was retained by the inspectors or documented in this report.

ATTACHMENT: SUPPLEMENTARY INFORMATION

SUPPLEMENTARY INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel
G. Gellrich, Site Vice President
M. Flaherty, Plant General Manager
K. Bodine, Manager, Engineering Programs
T. Chan, Senior Engineer, Engineering Programs
M. Fallen, Contract Employee, Engineering Programs
M. Fick, Principal Engineer, Regulatory Assurance
K. Greene, Principal Engineer, Regulatory Assurance
L. Richards, Manager, Maintenance Planning
T. Riti, Director, Site Operations
D. Schrumpf, Manager, Component Maintenance Optimization
C. Dobry, Senior Engineer, Design Engineering

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened/Closed

05000317, 318/2016002-01	NCV	Scaffolding Impairs Fire Sprinkler Systems in Safety Related Fire Areas (Section 1R05)
05000317/2016002-02	NCV	Failure to Report Conditions as Required by 10 CFR 50.73 (Section 4OA1)
05000318/2016002-03	FIN	Failure to Implement Engineering Change Procedures Results in Plant Trip (Section 4OA2)

Closed

05000318/2015-001-00/01	LER	Manual Reactor Trip Due to Steam Generator Feed Pump 22 Trip (Section 4OA3.2)

LIST OF DOCUMENTS REVIEWED

Section 1R01: Adverse Weather Protection

Procedures
OP-AA-101-101, Management of Nuclear Generation, Revision 10
OP-AA-108-107-1001, Station Response to grid Capacity Conditions, Revision 4
WC-AA-107, Seasonal Readiness, Revision 15

Section 1R04: Equipment Alignment

Procedures
OI-16-1, Component Cooling System, Revision 35

Drawings
OM-51 (60-710-E), Component Cooling System, Unit 1

Section 1R05: Fire Protection

Miscellaneous
Fire Fighting Strategies Manual, Revision 1

Section 1R06: Flood Protection Measures

Procedures
ES-001, Flooding, Revision 4
Section 9.5.5 of UFSAR

Section 1R07: Heat Sink Performance

Miscellaneous
Work Order C92433655

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

Procedures
OP-2-1, Plant Startup from Hot Standby to Minimum Load, Revision 04900
OP-3-1, Normal Power Operation, Revision 06701

Section 1R12: Maintenance Effectiveness

Procedures
IMP 98005, Bailey AV-1 Positioner Maintenance Checklist
WC-AA-101, On-Line Work Control Process, Revision 26

Miscellaneous
Work Order C92999690

Section 1R13: Maintenance Risk Assessments and Emergent Work Control

Procedures
WC-AA-101, On-Line Work Control Process, Revision 26
WC-AA-101-1006, On-Line Risk Management and Assessment, Revision 2
OP-AA-201-012-1001, Operations On-Line Fire Risk Management, Revision 001
OP-CA-201-012-1001, On-Line Fire Risk Management, Revision 00201

Section 1R15: Operability Determinations and Functionality Assessments

Procedures
ER-AA-410, AOV Program Implementing Procedure, Revision 2
ER-AA-410, AOV Categorization, Revision 3
ER-AA-410, AOV Design Basis Review and Setpoint Control, Revision 2
OP-AA-108-115, Operability Determinations, Revision 17

Drawings
61029SH0002 Revision 11, Block Diagram Plant Protection
61406A, Resistance Testing Section 12, Sheet 2, Revision 0

Calculations
CA07065, AOV Required Torque Calculation for SDC Heat Exchanger Outlet Valves 1(2)CV3828 and 1(2)CV3830 Revision 0
KVAP Version 3.1 Analysis of 1CV3824 with Air Supply Pressure of 40 psig
KVAP Version 3.1 Analysis of 1CV3824 with Air Supply Pressure of 52 psig
KVAP Version 3.1 Analysis of 1CV3826 with Air Supply Pressure of 52 psig

Action Requests
01791117
01807793
02651117
02676079
02680281
02682392
02682738
02664197

Miscellaneous
Engineered Safety Features Actuation System Description No. 48, Revision 5
IEEE STD 43-2000, IEEE Recommended Practice for Testing Insulation Resistance of Rotating Machinery, Revision 2006
Unit 1 20160531 Trip Sequence of Events Messages Report
Work Order C90793151
Work Order C92957236
ECP-16-000448, Technical Evaluation to Address the Impact of AOV Not Closing Completely to Isolate a CCW Heat Exchanger During a LOCA, Revision 0001
Design Specification M-303, Non-nuclear Service Butterfly Control Valves, Revision 23

Section 4OA2: Problem Identification and Resolution

Procedures:
PI-AA-125-1001, Root Cause Investigation Report Template, Revision 1
CNG-CM-1.01-1003 Attachment 12, Design Inputs and Change Impact Screen
CNG-CM-1.01-2000, Scoping and Identification of Critical Components
CNG-FES-007, Preparation of Design Inputs and Change Impact Screen, HU-AA-1212, Technical Task Risk/Rigor Assessment, Pre-Job Brief, Independent Third Party Review, and Post-Job Review, Revision 007

Action Requests:
02594406
01700153
02605276
2013-004520
2013-004679
02649412

Miscellaneous:
AP-913 – Continuing Equipment Reliability
ECP-13-000612
ECP-14-000307
ESR-13-000795
ESR--13-000807
Drawing number 12071-0001, 14x 14 x 17 DVSR, Revision 11
PORC Briefing Sheet Date December 5, 2015, "22 Steam Generator Feed Pump Coupling Failure Evaluation."
LER 05000318/2015-001-00, Manual Reactor Trip Due to Steam Generator Feed Pump 22 Trip.
LER 05000318/2013-004-00, Manual Reactor Trip Due to 22 Steam Generator Feed Pump Trip
Exelon Powerpoint Briefing Date December 1, 2015 Calvert Cliffs Unit 2 Trip Due to Failure of 22 SGFP Coupling, Revision 0
EPRI Bolted Joint Maintenance and Application Guide
System IQ reports January 1, 2016 – June 25, 2016
WO C93348007

Section 4OA3: Follow-Up of Events and Notices of Enforcement Discretion:

Action Requests:
02594406

Miscellaneous:
LER 05000318/2015-001-00, Manual Reactor Trip Due to Steam Generator Feed Pump 22 Trip
LER 05000318/2013-004-00, Manual Reactor Trip Due to 22 Steam Generator Feed Pump Trip

Section 4OA5: Other Activities

Procedures:

CCNPP, Technical Procedure Valve-60, Masoneilan 37002 Minitork II Inspection and Repair, Revision 00500

CCNPP, Technical Procedure SW-03, Salt Water Pipe Cleaning and Inspection, Revision 00300

CCNPP, Technical Procedure Valve-36, Masoneilan Minitork Butterfly Valve Overhaul, Revision 01100

CCNPP, Technical Procedure Valve-57, Salt Water Pump Discharge Check Valve Inspection and Repair, Revision 00500

LIST OF ACRONYMS

10 CFR	Title 10 of the *Code of Federal Regulations*
AAC	alternate alternating current
AC	alternating current
ADAMS	Agencywide Documents Access and Management System
AFW	auxiliary feedwater
AOV	air operated valves
CAP	corrective action program
CAPR	correction actions to preclude repetition
CCNPP	Calvert Cliffs Nuclear Power Plant
CCW	component cooling water
CLB	current licensing basis
DFO	diesel fuel oil
ECCS	emergency core cooling system
ECP	engineering change package
EDG	emergency diesel generator
EPRI	Electric Power Research Institute
ESFAS	engineered safety features actuation system
ESR	engineering service request
HELB	high energy line break
IMC	Inspection Manual Chapter
IR	issue report
LER	licensee event report
LOCA	loss of coolant accident
NCV	non-cited violation
NRC	Nuclear Regulatory Commission
OWA	operator work around
PI	performance indicator
PM	preventative maintenance
RCE	root cause evaluation
RCS	reactor coolant system
SDP	significance determination process
SGFP	steam generator feed pump
SL	severity level
SRW	service water
SSC	structure, system, and component
SW	salt water
TRM	Technical Requirements Manual
TS	technical specification
UFSAR	Updated Final Safety Analysis Report
WO	work order