



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

November 3, 2015

Mr. George H. Gellrich, Site Vice President  
Calvert Cliffs Nuclear Power Plant, LLC  
Exelon Generation Company, LLC  
1650 Calvert Cliffs Parkway  
Lusby, MD 20657-4702

**SUBJECT: CALVERT CLIFFS NUCLEAR POWER PLANT – INTEGRATED INSPECTION  
REPORT 05000317/2015003 AND 05000318/2015003 AND INDEPENDENT  
SPENT FUEL STORAGE INSTALLATION REPORT 07200008/2015001**

Dear Mr. Gellrich:

On September 30, 2015, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Calvert Cliffs Nuclear Power Plant (CCNPP), Units 1 and 2. The enclosed inspection report documents the inspection results, which were discussed on October 14, 2015, with Mr. M. Flaherty, Acting Site Vice President, and other members of your staff.

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

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

If you contest the NCVs in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region I; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at CCNPP. In addition, if you disagree with the cross-cutting aspect assigned to any finding, or a finding not associated with a regulatory requirement in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region I, and the NRC Resident Inspector at CCNPP.

G. Gellrich

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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/*

Daniel L. Schroeder, 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 05000317/2015003 and 05000318/2015003  
w/Attachment: Supplementary Information

cc w/encl: Distribution via ListServ

G. Gellrich

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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. 05000317/2015003 and 05000318/2015003

Licensee: Exelon Generation Company, LLC (Exelon)

Facility: Calvert Cliffs Nuclear Power Plant, Units 1 and 2

Location: Lusby, MD

Dates: July 1, 2015 through September 30, 2015

Inspectors: R. Clagg, Senior Resident Inspector  
C. Highley, Resident Inspector (Acting)  
A. Siwy, Resident Inspector (Acting)  
T. Burns, Reactor Inspector  
P. Finney, Senior Resident Inspector  
S. Horvitz, Project Engineer  
J. Nicholson, Senior Health Physicist  
A. Rosebrook, Senior Project Engineer

Approved by: Daniel L. Schroeder, Chief  
Reactor Projects Branch 1  
Division of Reactor Projects

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## SUMMARY

Inspection Report 05000317/2015003, 05000318/2015003; 07/01/2015 – 09/30/2015; Calvert Cliffs Nuclear Power Plant (CCNPP), Units 1 and 2; Operability Determinations and Functionality Assessments.

This report covered a three-month period of inspection by resident inspectors and announced baseline inspections performed by regional inspectors. The inspectors identified a non-cited violation (NCV), which was of very low safety significance (Green). The significance of most findings is indicated by their color (i.e., greater than Green, or Green, White, Yellow, Red) and determined using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process," dated April 29, 2015. Cross-cutting aspects are determined using IMC 0310, "Aspects Within the Cross-Cutting Areas," dated December 4, 2014. All violations of U.S. Nuclear Regulatory Commission (NRC) requirements are dispositioned in accordance with the NRC's Enforcement Policy, dated February 4, 2015. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 5.

### Cornerstone: Mitigating Systems

- Green. The inspectors identified a Green NCV of Technical Specification (TS) 5.4.1.a for Exelon's failure to adequately establish and maintain procedures as required by Regulatory Guide (RG) 1.33, Appendix A, Section 3, "Procedures for Startup, Operation, and Shutdown of Safety-Related PWR Systems." The inspectors determined that Exelon's failure to adequately establish and maintain a procedure for the operation of the diesel fuel oil (DFO) supply system was a performance deficiency. Exelon entered this issue into their corrective action program (CAP) as issue report (IR) 02541107. Exelon's immediate corrective actions included halting of opening of 0-DFO-108, 21 Fuel Oil Storage Tank (FOST) to Auxiliary Boilers Isolation, and initiating an evaluation to determine the seismic adequacy of the piping downstream of 0-DFO-108.

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, the failure to adequately establish and maintain procedure Operating Instruction (OI)-21D, "Fuel Oil Storage and Supply," Revision 10, for the operation of the DFO supply system resulted in the alignment of the safety-related 21 FOST to non-safety-related/non-seismically qualified piping thus rendering the 21 FOST inoperable. In accordance with IMC 0609, Attachment 4, "Initial Characterization of Findings," issued on June 19, 2012, and IMC 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," Exhibit 2, "Mitigating Systems Screening Questions," and Exhibit 4, "External Events Screening Questions," issued on June 19, 2012, the inspectors determined that a detailed risk evaluation was necessary to disposition the significance of this finding because the loss of the 21 FOST would degrade two or more trains of a multi-train system or function. A regional Senior Reactor Analyst (SRA) performed a detailed risk evaluation and determined the finding to be of very low safety significance (Green). The inspectors determined that the finding has a cross-cutting aspect in the area of Problem Identification and Resolution, Operating Experience, because Exelon failed to adequately evaluate relevant external operating experience. Specifically, Exelon failed to evaluate for systems

where non-seismically qualified piping could be connected to safety-related tanks as was described in Information Notice (IN) 2012-01, "Seismic Considerations – Principally Issues Involving Tanks." [P.5]. (Section 1R15)

### **Other Findings**

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

## REPORT DETAILS

### Summary of Plant Status

Unit 1 began the inspection period at 100 percent power. On July 25, 2015, operators reduced power to 85 percent for the replacement of the 16B circulating water traveling screen. The operators returned the unit to full power on July 26. On September 11, 2015, operators reduced power to 85 percent for main turbine valve testing. The operators returned the unit to full power on September 12, 2015. 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 and remained at or near this level for the remainder of the inspection period.

### 1. REACTOR SAFETY

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

1R01 Adverse Weather Protection (71111.01 – 2 samples)

.1 Readiness for Impending Adverse Weather Conditions

a. Inspection Scope

The inspectors performed a review of Exelon's readiness for severe thunderstorms and high winds forecasted for August 24, 2015. The inspectors reviewed the implementation of adverse weather preparation procedures before the onset of this adverse weather condition. The inspectors verified that operator actions defined in Exelon's adverse weather procedure maintained the readiness of essential systems. The inspectors discussed readiness and staff availability for adverse weather response with operations and work control personnel. Documents reviewed for each section of this inspection report are listed in the Attachment.

b. Findings

No findings were identified.

.2 External Flooding

a. Inspection Scope

During the week of August 13, 2015, the inspectors performed an inspection of the external flood protection measures for CCNPP. The inspectors reviewed TS, procedures, design documents, the Updated Final Safety Analysis Report (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, and the Calvert Cliffs Individual Plant Examination Of External Events (IPEEE). The inspectors conducted a general site walkdown of external areas of the plant, including the auxiliary building and intake structure, to ensure that Exelon's flood protection



measures were in accordance with design specifications and toured accessible roofs to verify roof drainage was being properly maintained for protection of structures during a maximum precipitation event as described in the IPEEE. The inspectors also reviewed operating procedures for mitigating external flooding during severe weather to determine if Exelon planned or established adequate measures to protect against external flooding events.

b. Findings

No findings were identified.

1R04 Equipment Alignment

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

a. Inspection Scope

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

- 21 and 23 auxiliary feedwater (AFW) pumps during 22 AFW pump out of service for maintenance, August 18, 2015
- 11 main control room (MCR) heating, ventilation, and air conditioning (HVAC) during 12 MCR HVAC out of service for maintenance, August 24, 2015
- 21 emergency core cooling system (ECCS) train during 22 ECCS train out of service for maintenance, September 10, 2015

b. Findings

No findings were identified.

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

a. Inspection Scope

During the week of September 21, 2015, the inspectors performed a complete system walkdown of accessible portions of the Unit 2 high pressure safety injection system. The inspectors reviewed operating procedures, surveillance tests, drawings, equipment line-up check-off lists, and the UFSAR to verify the system was aligned to perform its

required safety functions. The inspectors also reviewed electrical power availability, component lubrication and equipment cooling, hangar and support functionality, and operability of support systems. The inspectors performed field walkdowns of accessible portions of the system to verify as-built system configuration matched plant documentation, and that system components and support equipment remained operable. The inspectors confirmed that systems and components were aligned correctly, free from interference from temporary services or isolation boundaries, environmentally qualified, and protected from external threats. The inspectors also examined the material condition of the components 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

Resident Inspector Quarterly Walkdowns (71111.05Q – 10 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, 11 ECCS Pump Room, Fire Area 4, August 4, 2015
- Unit 1, 12 ECCS Pump Room, Fire Area 3, August 4, 2015
- Unit 2, 21 ECCS Pump Room, Fire Area 1, August 4, 2015
- Unit 2, 22 ECCS Pump Room, Fire Area 2, August 4, 2015
- Unit 1, 27' Switchgear Room, Fire Area 19, August 10, 2015
- Unit 2, 27' Switchgear Room, Fire Area 18, August 10, 2015
- Unit 1, Purge Air Room, Fire Area 19A, August 10, 2015
- Unit 2, Purge Air Room, Fire Area 18A, August 10, 2015
- Unit 1, 45' Switchgear Room, Fire Area 34, August 10, 2015
- Unit 2, 45' Switchgear Room, Fire Area 25, August 10, 2015

b. Findings

No findings were identified.

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

a. Inspection Scope

The inspectors reviewed the 11 ECCS pump room cooler heat exchanger to determine its readiness and availability to perform its safety functions. The inspectors reviewed the design basis for the component and reviewed the results of previous inspections of the 11 ECCS pump room cooler heat exchanger. 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 Regualification Program and Licensed Operator Performance (71111.11Q – 2 samples)

.1 Quarterly Review of Licensed Operator Regualification Testing and Training

a. Inspection Scope

The inspectors observed licensed operator simulator training on September 1, 2015, which involved a loss of condensate pump, loss of main generator, anticipated transient without scram, and over steam demand event resulting in an Alert declaration. The inspectors evaluated operator performance during the simulated event and verified completion of risk significant operator actions, including the use of abnormal and emergency operating procedures. The inspectors assessed the clarity and effectiveness of communications, implementation of actions in response to alarms and degrading plant conditions, and the oversight and direction provided by the control room supervisor. The inspectors verified the accuracy and timeliness of the emergency classifications made by the shift manager and the TS action statements entered by the shift manager. Additionally, the inspectors assessed the ability of the crew and training staff to identify and document crew performance problems.

b. Findings

No findings were identified.

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

a. Inspection Scope

The inspectors observed licensed operators in the MCR on September 30, 2015, performing shift turnover, conducting AFW pump surveillance activities, and conducting restoration of the 21 saltwater (SW) header and component cooling heat exchanger (CCHX) following maintenance. The inspectors observed procedure use and

adherence, crew communications, and coordination of activities between work groups to verify that established expectations and standards were met.

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 Title 10 of the *Code of Federal Regulations* (10 CFR) 50.65 and verified that the (a)(2) performance criteria established by the Exelon staff was reasonable. As applicable, for SSCs classified as (a)(1), the inspectors assessed the adequacy of goals and corrective actions to return these SSCs to (a)(2). Additionally, the inspectors ensured that the Exelon staff was identifying and addressing common cause failures that occurred within and across maintenance rule system boundaries.

- Main steam line radiation monitor (1RE-5422A) (a)(1) determination and action plan (IR025000139)
- 1A2 diesel engine inoperable due to high lube oil differential pressure (IR02515614)
- 1A emergency diesel generator (EDG) maintenance rule goal exceeded (IR02548099)

b. Findings

No findings were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13 – 5 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 Units 1 and 2 Yellow risk activities associated with maintenance activities and forecasted severe thunderstorms and high winds, August 24, 2015
- Updated maintenance risk assessment for Units 1 and 2 Yellow risk activities associated with 12 MCR HVAC out of service for maintenance, August 25, 2015
- Maintenance risk assessment for Units 1 and 2, week of August 31, 2015
- Updated maintenance risk assessment for Unit 2 Yellow risk activities associated with 22 ECCS train out of service for maintenance, September 10, 2015
- Updated maintenance risk assessment for Unit 2 Yellow risk activities associated with 23 SW pump out of service for maintenance, September 24, 2015

b. Findings

No findings were identified.

1R15 Operability Determinations and Functionality Assessments (71111.15 – 9 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:

- 13 SW pump differential pressure is low during pump performance tests (IR02526848)
- Unit 1 wide range noble gas monitor show signs of failing power supply (IR02505020)
- 0C diesel generator (DG) piston installation deviates from vendor recommendation (IR02534687)
- 0C DG 15 125 volts direct current bus ground (IR02536405)
- 21 and 22 main steam line radiation monitors out of service (IR02359053)
- Suspected back leakage on 2-SI-247, 22A loop inlet check valve (IR02541205)
- 22 reactor coolant pump upper oil level (IR02523850)
- Determine seismic adequacy of DFO piping (IR02541107)
- Review of the Operator Workaround (OWA) Program

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 OWAs, 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.

b. Findings

Introduction: The inspectors identified a Green NCV of TS 5.4.1.a for Exelon's failure to adequately establish and maintain procedures as required by RG 1.33, Appendix A, Section 3, "Procedures for Startup, Operation, and Shutdown of Safety-Related PWR Systems."

Description: On June 23, 2015, during a daily review of the nuclear operations logs, the inspectors noted that Exelon was recirculating the 21 FOST in part by opening valve 0-DFO-108, 21 FOST to Auxiliary Boilers Isolation, and were limiting the time this valve could be open to 24 hours due to the non-seismic rating of piping downstream of 0-DFO-108. The inspectors questioned if this was appropriate given the safety-related classification of the tank.

Backup emergency alternate current (AC) power for CCNPP Units 1 and 2 is partially provided by three Fairbanks Morse (FBM) EDGs which are supplied by two above ground FOSTs. The remaining source of backup emergency AC power is supplied by the 1A EDG with a separate fuel source housed inside the 1A EDG safety-related structure. Based on a review of Exelon's UFSAR, TS, and other documentation, the inspectors determined that 11 FOST and 21 FOST are both sized to hold approximately 107,000 gallons of DFO. Additionally, the 21 FOST is the primary source of fuel oil for the FBM EDGs with the 11 FOST used as a backup if the fuel oil in 21 FOST becomes degraded. TS 3.8.3 requires 21 FOST to contain 85,000 gallons which will supply one FBM EDG per unit for 7 days with one unit under accident conditions and the other under normal shutdown conditions. The inspectors also noted that 0-DFO-108 connects to a standpipe internal to 21 FOST, the top of which lies at the 58,000 gallon level of the tank.

Exelon procedure OI-21D, "Fuel Oil Storage and Supply," Revision 10, directs 0-DFO-108 to be opened when the 21 FOST is being recirculated prior to sampling. Neither OI-21D nor the nuclear operations logs contain any compensatory measures other than a 24 hour administrative limit on how long 0-DFO-108 can remain open. The inspectors conducted a field walkdown of 21 FOST and 0-DFO-108 and noted that 0-DFO-108 is a manually operated valve located near the base of 21 FOST inside the concrete structure which houses 21 FOST. They also noted that the manual operator for 0-DFO-108 can only be accessed by passing in close proximity to portions of the non-seismically qualified piping downstream of the valve. The inspectors determined this physical arrangement would inhibit personnel access to the manual operator should a leak occur in this section of the piping.

The inspectors reviewed Engineering Service Package 199602285; and noted that in 1997, Exelon downgraded the piping downstream of 0-DFO-108 to non-safety-related because the seismic qualification could not be verified. Based on the location of the 21 FOST internal standpipe, to which 0-DFO-108 is connected, failure of the non-safety-related/non-seismically qualified piping downstream of 0-DFO-108, with 0-DFO-108 in the open position, would cause a loss of level in 21 FOST to below that which is required per TS 3.8.3.

The inspectors reviewed NRC IN 2012-01, "Seismic Considerations – Principally Issues Involving Tanks," and noted that it provided specific examples of safety-related tanks being connected to non-seismically qualified piping which were very similar in nature to the issue described above. The licensee reviewed IN 2012-01, as part of their CAP, and the inspectors noted that the licensee's review was limited to the specific systems identified in the IN 2012-01 and a consideration of non-safety-related tanks located near safety-related equipment. The evaluation did not include a review of other systems where non-seismically qualified piping could be connected to safety-related tanks.

The inspectors concluded that Exelon failed to adequately establish and maintain a procedure for the recirculation of 21 FOST and, as a result, Exelon rendered the 21 FOST inoperable during those times when 0-DFO-108 was open. Exelon entered this issue into their CAP as IR02541107.

Analysis: The inspectors determined that Exelon's failure to adequately establish and maintain a procedure for the operation of the DFO supply system was a performance deficiency. 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, the failure to adequately establish and maintain procedure OI-21D for the operation of the DFO supply system resulted in the alignment of the safety-related 21 FOST to non-safety-related/non-seismically qualified piping thus rendering the 21 FOST inoperable. In accordance with IMC 0609, Attachment 4, "Initial Characterization of Findings," issued on June 19, 2012, and IMC 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," Exhibit 2, "Mitigating Systems Screening Questions," and Exhibit 4, "External Events Screening Questions," issued on June 19, 2012, the inspectors determined that a detailed risk evaluation was necessary to disposition the significance of this finding because the loss of the 21 FOST would degrade two or more trains of a multi-train system or function.

A regional SRA performed a detailed risk evaluation. The SRA used the NRC's Standardized Plant Analysis Risk (SPAR) Model for Calvert Cliffs Unit 2, Revision 8.20, and the guidance of the Risk Assessment for Operational Events (RASP) Handbook for External Events, Revision 1.01, to estimate the risk significance of the inspection finding. The SRA used the seismic initiating event frequency and the seismically-induced loss of offsite power (LOOP) frequency for Calvert Cliffs from the RASP Handbook. The SRA also assumed the EDGs would have sufficient fuel oil to continue running for 4.6 days (the original FSAR design split the required volume between FOST 21 and 11 which is the basis for the standpipe height) since the 21 FOST tanks would only drain to the level of the standpipe and 56,000 gallons of usable fuel oil volume will remain available for EDG 1B, 2A, and 2B. The SRA combined these frequencies with a conditional core damage probability calculated using the SPAR model for a transient with EDG 1B, 2A, and 2B failing to continue to run after 4.6 days and separately for a switchyard LOOP event with each EDG failing to run after 4.6 days. Finally, the SRA factored in the exposure period of 24 hours of a one year period (8760 hours). The calculations for both a seismic transient event and a seismically-induced event were significantly below the 1E-6/yr threshold for a finding of very low safety significance. Due to short duration of exposure periods, the FOST standpipe design, and the relatively low frequency of a seismic event, the finding was determined to of very low safety significance (Green).

The inspectors determined that the finding has a cross-cutting aspect in the area of Problem Identification and Resolution, Operating Experience, because Exelon failed to adequately evaluate relevant external operating experience. Specifically, Exelon failed to evaluate for systems where non-seismically qualified piping could be connected to safety-related tanks as was described in IN 2012-01 [P.5].

**Enforcement:** TS 5.4.1.a states, in part, that written procedures shall be established and maintained covering the applicable procedures recommended in RG 1.33, Revision 2, Appendix A, of which Section 3 specifies procedures for the operation of safety-related pressurized water reactor (PWR) systems. Contrary to this, beginning in approximately December 1997, the licensee failed to establish and maintain OI-21D for the operation of the DFO supply system. Specifically, the procedure allowed the connection of non-seismically qualified piping to the safety-related 21 FOST which rendered the tank inoperable. Exelon's immediate corrective actions included halting of opening of 0-DFO-108 and initiating an evaluation to determine the seismic adequacy of the piping downstream of 0-DFO-108. Because this violation is of very low safety significance (Green) and has been entered into Exelon's CAP (IR02541107), this violation is being treated as an NCV, consistent with Section 2.3.2.a of the NRC Enforcement Policy. **(NCV 05000317,318/2015003-01: Failure to Establish and Maintain Procedures for the Operation of the Diesel Fuel Oil System)**

1R18 Plant Modifications (71111.18 – 1 sample)

Temporary Modifications

a. Inspection Scope

The inspectors reviewed the temporary modification engineering change package (ECP)-15-000314, "Temporary Fire Piping for Main Loop for Maintenance," Revision 0, to determine whether the modifications affected the safety functions of systems that are important to safety. The inspectors reviewed 10 CFR 50.59 documentation and post-modification testing results, and conducted field walkdowns to verify that the temporary modification did not degrade the design bases, licensing bases, and performance capability of the affected systems.

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 brief and post-job critique where possible, confirmed work site cleanliness was maintained, and witnessed the test or reviewed test data to verify quality control hold point were performed and checked, and that results adequately demonstrated restoration of the affected safety functions.

- WO C93141760, 1A EDG 1A2 flexible connection high temperature coolant leak, July 24, 2015
- WO C92808708, 12 ECCS air cooler SW inlet, August 5, 2015
- WO C92291468, Replace 22 AFW pump inboard and outboard bearing house drain valve, August 18, 2015
- WO C93162815, Increased vibration levels on 12 control room HVAC, August 25, 2015
- WO C92808620, 12 CCHX SW outlet solenoid valve, August 31, 2015
- WO C92816710, Calibrate 22 high pressure safety injection system pump protective relays and 186 device, September 10, 2015

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22 – 5 samples)

a. Inspection Scope

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

- STP-O-73A-1, "Saltwater Pump and Check Valve Quarterly Operability Test," Revision 23, July 9, 2015
- STP-O-8B-2, "Test of 2B DG and 24 4kV Bus LOCI Sequencer," Revision 29, July 15, 2015
- STP-O-5A23-2, "23 Auxiliary Feedwater Pump Quarterly Surveillance Test," Revision 0, August 11, 2015 (in-service test)
- STP-O-5A22-2, "22 Auxiliary Feedwater Pump Quarterly Surveillance Test," Revision 0, August 18, 2015 (in-service test)
- STP-M-514B-1, "Wide Range Nuclear Instrument Calibration Channel B," Revision 00710, August 28, 2015

b. Findings

No findings were identified.

## Cornerstone: Emergency Preparedness

### 1EP6 Drill Evaluation (71114.06 – 1 sample)

#### Training Observation

##### a. Inspection Scope

The inspectors observed a licensed emergency planning drill on September 1, 2015, which involved a loss of condensate pump, loss of main generator, anticipated transient without scram, and over steam demand event resulting in an Alert declaration. The inspectors evaluated the conduct of the drill to identify any weaknesses and deficiencies in the classification, notification, and protective action recommendation development activities. The inspectors observed emergency response operations in the simulator and technical support center to determine whether the event classification, notifications, and protective action recommendations were performed in accordance with procedures. The inspectors also attended the station drill critique to compare inspector observations with those identified by the Exelon staff in order to evaluate Exelon's critique and to verify whether the Exelon staff was properly identifying weaknesses and entering them into the CAP.

##### b. Findings

No findings were identified.

## 4. OTHER ACTIVITIES

### 4OA1 Performance Indicator Verification (71151 – 10 samples)

#### Mitigating Systems Performance Index

##### a. Inspection Scope

The inspectors reviewed Exelon's submittal of the Unit 1 and Unit 2 Mitigating Systems Performance Index for the systems listed below for the period July 1, 2014 through June 30, 2015:

- Emergency alternating current power system (MS06)
- High pressure injection system (MS07)
- Heat removal system (MS08)
- Residual heat removal system (MS09)
- Cooling water system (MS10)

To determine the accuracy of the performance indicator data reported during those periods, the inspectors used definitions and guidance contained in Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7. The inspectors also reviewed the Exelon's operator narrative logs, IRs, event reports, system health reports, and NRC integrated inspection reports to validate the accuracy of the submittals.

b. Findings

No findings were identified.

4OA2 Problem Identification and Resolution (71152 – 1 sample)

.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 Part 21.

b. Findings

No findings were identified.

.2 Annual Sample: Licensee Evaluation of Steam Generator Chloride and Sodium Excursion during Operator Manipulation of SG Blowdown System

a. Inspection Scope

The inspectors performed a review of Exelon's apparent cause evaluation (ACE) and corrective actions related to CR-2013-003699. This report described a condition with Unit 2, where chloride and sodium levels exceeded procedural Action Level 2 criteria on April 18, 2013, for approximately three hours related to secondary water chemistry controls intended to inhibit steam generator (SG) tube degradation. The condition occurred when operators manipulated valves to shift SG blowdown from the circulating water system to the condenser hot well. Upon indications of the chemistry excursion, procedures directed operators to down power to 50 percent within 24 hours if the Action Level 2 conditions were not cleared. No down power was necessary as secondary chemistry was restored to normal levels the same day.

The inspectors assessed whether Exelon's ACE was of sufficient detail to identify apparent causes and develop corrective actions that were implemented with an appropriate priority. The inspectors compared the actions to Exelon's CAP guidance. Additionally, the inspectors reviewed the applicable piping drawings.

b. Findings and Observations

No findings were identified.

The inspectors determined that Exelon personnel appropriately identified the causes of the chloride and sodium excursion that occurred on April 18, 2013. The problem occurred when operators shifted SG blowdown flow from the circulating water system to the condenser hot well via two valves. The operator opened one valve with a second valve likely not yet fully closed, resulting in approximately two to ten gallons (subsequently calculated) of circulating water (bay water) back-flow into the hot well. Exelon staff verified the equipment worked correctly, reviewed the implementing procedure OI-8A-2, "Blowdown System," Revision 41, and interviewed the operators involved. Exelon staff also reviewed operator training and the level of oversight provided for this activity. Exelon staff concluded the procedure contained a "human error trap" because of directions to "immediately" open valve 2-BD-4096-CV after shutting valve 2-BD-4015-CV, without ensuring that the 4015 valve was fully closed. As a result, bay water back flowed to the hot well. Exelon staff concluded that the procedure and operator training did not address the potential for this problem or adequately review the valve functions and expected indications. Also, the level of review for this procedure step involved a less rigorous "peer check" when Exelon programs called for "concurrent verification." The procedure was revised with more detailed guidance and concurrent verification was added to the applicable steps

Exelon staff determined there was also a design issue that was a contributing cause. Exelon discovered that Unit 1 was not susceptible to this condition as a check valve was provided in the line. The same check valve was not installed in Unit 2 and was never included in any plant drawings. Thus the same operator error on Unit 1 would have no adverse impact on plant chemistry. Considering this difference, Exelon staff concluded a contributing cause of the chemistry excursion condition on April 18, 2013, resulted from the absence of a check valve in the Unit 2 blowdown line to the circulating water system discharge. Subsequently, Exelon staff implemented modification ECP-14-000636, "Install Check Valve in the Unit 2 SG Blowdown System," Revision 0, to install a check valve as an additional barrier to this condition. This modification was completed in February 2015.

The inspectors concluded that Exelon's ACE and extent of condition reviews were sufficiently detailed to identify the likely causes and in accordance with Exelon's CAP guidance. The inspectors also determined that the corrective actions were reasonable to address both human factors and equipment, and these actions were implemented in an appropriate timeframe to address the problem.

4OA5 Other Activities

Operation of an Independent Spent Fuel Storage Installation at Operating Plants (60855 and 60855.1)

a. Inspection Scope

On September 17, 2015, at the end of vacuum drying of the first dry shielded canister (DSC), DSC-77, of the Independent Spent Fuel Storage Installation (ISFSI) dry cask campaign, a radioactive gas release was detected by the wide range noble gas monitor.

In response to the alarm, Exelon stopped work and evacuated the area. After an initial evaluation of the alarm was completed, Exelon continued with cask processing and backfilled the DSC with helium while performing a technical evaluation of the Kr-85 gas release. Subsequently, Exelon proceeded with cask closure and helium leak testing. Exelon determined they experienced a release of Kr-85 gas from the fuel assemblies in the DSC. Exelon concluded the fuel had a small defect site such as a pin-hole break or hairline crack and, therefore, considered the fuel was undamaged, met TS requirements, and was acceptable for long term storage. The DSC was transported to the ISFSI and placed into a horizontal storage module on September 28, 2015.

The inspectors, with assistance from a technical expert from the NRC's Office of Nuclear Materials Safety and Safeguards reviewed Technical Evaluation, ECP-15-000531, and other documents related to the gas release. The inspectors verified that no release to the environment occurred and there was no dose to the public since ventilation in this area is filtered and monitored for activity prior to being released. The inspectors verified that DSC-77 met the requirements of the specific license, TS, regulations, and site procedures. The inspectors reviewed Exelon's program associated with fuel characterization and selection for storage. The inspectors reviewed the fuel selection package for DSC-77 to verify that Exelon was loading fuel in accordance with the specific license, TS, and procedures. The inspectors also confirmed that Exelon's characterization of the condition of the spent fuel in DSC-77 met NRC Interim Staff Guidance-1, "Classifying the Condition of Spent Nuclear Fuel for Interim Storage and Transportation Based on Function."

b. Findings and Observations

No findings were identified.

The inspectors did note that the licensee did not take the opportunity to take a water sample from the cask to better evaluate the condition of the fuel and validate their evaluation. They also proceeded with cask loading operations prior to completing the written technical evaluation. While this did not result in a violation of NRC requirements, it did represent a weakness in the problem identification and resolution process and operability determination process when it comes to ISFSI cask loading operations in the spent fuel pool.

40A6 Meetings, Including Exit

Exit Meeting Summary

On October 14, 2015, the inspectors presented the inspection results to Mr. Mark Flaherty, Acting 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.

40A7 Licensee-Identified Violations

The following violations of very low safety significance (Green) were identified by Exelon and are violations of NRC requirements which meets the criteria of the NRC Enforcement Policy for being dispositioned as NCVs.

- 10 CFR 74.19 (c), “Recordkeeping,” states, in part that, each licensee who is authorized to possess special nuclear material (SNM), shall conduct a physical inventory of all SNM in its possession, under license, at intervals not to exceed 12 months. Contrary to this, on May 22, 2015, Exelon identified that the 2014 SNM inventory had not been completed by the end of August 2014, as was required since the 2013 SNM inventory was completed in August 2013. The 2014 SNM inventory was started on August 26, 2014, and was completed on October 6, 2014. Exelon subsequently self-identified that inventories of nine locations had exceeded 12 months although all SNM was accounted for by October 6, 2014. The inspectors determined that this finding was of very low safety significance (Green), because the finding did not represent an actual loss of SNM and the performance of an inventory in June 2015, as part of the corrective actions, was completed satisfactorily. The inspectors determined that Exelon correctly evaluated the finding and developed appropriate corrective action as documented in Exelon’s CAP as IR02504484.
- TS 5.4.1.a states, in part, that written procedures shall be established and maintained covering the applicable procedures recommended in RG 1.33, Revision 2, Appendix A, February 1978, of which Section 9 specifies procedures for performing maintenance. The vendor technical manual specifies the need to conduct routine lube oil sample analysis and Exelon procedure MA-AA-716-006, “Control of Lubricants Program,” Revision 11, directs the performance of sampling in accordance with specific site approved procedures. Contrary to the above, following the June 17, 2015, failure of the 1A EDG surveillance test, Exelon identified that appropriate procedural guidance did not exist for the processing of 1A EDG engine lube oil samples. On June 17, 2015, during surveillance testing of the 1A EDG, Exelon secured the engine due to high lube oil filter differential pressure. The engine lube oil filters were determined to be clogged due to engine coolant contamination of the engine lube oil system caused by leakage past O-rings on one engine cylinder piston. Investigation determined that monthly engine lube oil samples were not provided to the vendor for analysis from February – May 2015 due to the extended absence of the regular lubrication specialist and lack of procedural guidance for processing of lube oil samples once they were obtained. Subsequent analysis of these samples revealed that the engine lube oil had elevated potassium levels which is indicative of lube oil contamination by engine coolant. The inspectors evaluated the issue using IMC 0609 Appendix A, “The Significance Determination Process (SDP) for Findings At-Power,” which determined that the finding was of very low safety significance (Green) because the safety function was not lost and the 1A EDG was not considered inoperable for greater than its TS limiting condition for operation allowed outage time. The inspectors determined that Exelon correctly evaluated the finding and developed appropriate corrective action as documented in Exelon’s CAP as IR02517365.

**ATTACHMENT: SUPPLEMENTARY INFORMATION**

**SUPPLEMENTARY INFORMATION**

**KEY POINTS OF CONTACT**

Licensee Personnel

G. Gellrich, Site Vice President  
M. Flaherty, Plant General Manager  
D. Baker, Engineering Manager  
W. Buchanan, IV – Manager, Reactor Engineering  
D. Burdin, Systems Analyst 3  
J. Cabral, Engineer 3  
M. Fick, Principal Engineer, Regulatory Assurance  
P. Furio, Principal Engineer, Regulatory Assurance  
K. Greene, Engineer, Regulatory Assurance  
P. Gregory, Senior Program Manager, Dry Cask Services  
R. Haley, Fire Marshall, Operations Support  
S. Reichard, Regulatory Specialist, Regulatory Assurance  
B. Rickett, Supervisor, Maintenance  
L. Smith, Manager, Regulatory Assurance  
T. White, Manager, Site Reactor Services  
J. Wood, Jr., Manager, ISFSI Implementation and Support  
J. York, Manager, Site Radiation Protection

**LIST OF ITEMS OPENED, CLOSED AND DISCUSSED**

Opened and Closed

05000317,318/2015003-01	NCV	Failure to Establish and Maintain Procedures for the Operation of the Diesel Fuel Oil System (Section 1R15)
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**LIST OF DOCUMENTS REVIEWED**

**Section 1R01: Adverse Weather Protection**

Work Order:  
C92678745

**Section 1R04: Equipment Alignment**

Procedures:  
OI-3A, Safety Injection and Containment Spray, Revision 31

Condition Reports:

IR02404722	IR02553994	IR02560633
IR02459204	IR02555294	IR02560635
IR02459255	IR02555947	IR02560643
IR02460743	IR02556644	IR02560650
IR02494583	IR02560025	IR02564462
IR02546512	IR02560029	IR02564473
IR02550740	IR02560031	IR02564720
IR02552035	IR02560038	IR02564726
IR02553409	IR02560621	
IR02553433	IR02560628	

Drawings:

62731ELEV03  
62731SH0001

**Section 1R07: Heat Sink Performance**

Procedures:

I-134-1, 11 and 12 ECCS Pump Room Air Cooler Periodic Performance Evaluation, Revision 0

Condition Report:

IR2550202

Work Order:

C92546322

Miscellaneous:

Common Auxiliary Building & Radwaste Heat & Vent for 2Q15  
Unit 1 Salt Water Cooling System Health Report for 2Q15

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

Procedures:

OP-3, CCNPP Simulator Operating Examination, Revision 12  
OP-9, CCNPP Simulator Operating Examination, Revision 9

Miscellaneous:

Active Simulator Work Orders By Priority with Lead and ECD 8/13/2015  
Team Critique Sheet for OP-3  
Team Critique Sheet for OP-9

**Section 1R13: Maintenance Risk Assessments and Emergent Work Control**

Procedures:

OP-AA-111-101, Operating Narrative Logs and Records  
OU-AA-630-1000, Spent Fuel Loading Campaign Management, Revision 5



Miscellaneous:

Plan of the Day for the Week of September 21, 2015

Plant Logs

**Section 1R15: Operability Determinations and Functionality Assessments**

Procedures:

ERPIP 821

MN-1-110 Attachment 1, PC-1, Procedure Control Temporary Plant Configuration Change Form, Revision 01300

OI-50A, Plant Computer Adjustments, Revision 11

OP-AA-108-117, Protected Equipment Program, Revision 4

STP-O-73A-1, Saltwater Pump and Check Valve Quarterly Operability Test, Revision 23

TA-18, Temporary Bypass of Reactor Coolant Pump Status Alarms, Revision 00200

Technical Requirements Manual (TRM) 15.3.1 and 15.0.3

Condition Reports:

IR02525938

IR02526848

IR02534287

IR02539053

IR02539839

IR02523850

Drawings:

DWG # 62639SH0026C, Loop Diagram 22B Reactor Coolant Pump Upper and Lower Oil Reservoirs

Miscellaneous:

Functionality Assessment 15-11

**Section 1R18: Plant Modifications**

Procedures:

STP F-696-0, Fire Pump Flow Test, Revision 00902

Condition Reports:

IR02531159

Work Orders:

C92018910

C92831132

Drawings:

ECP-15-000314-TCN-01-CN-001, Plant Fire Protection System Fire Pump House and Main Header, Revision 0

ECP-15-000314-TCN-01-CN-002, Plant Fire Protection System Turbine and Service Bldgs. & Intake Structure, Revision 0

ECP-15-000314-TCN-01-CN-003, Plant Fire Protection System PIV and Fire Hydrant Locations, Revision 0

Miscellaneous:

ECP-15-000314, Temporary Routing of Fire Protection Piping from Fire Pump House to Maintain the Fire Protection System in Service While Isolating a Section of the Fire Main Loop for Maintenance, Revision 2

M-93-124, This Calculation Determines the Pressure at a Known Reference Point for Each Sprinkler System Using Fire Pump Discharge RV Setpoint, Revision 2

**Section 1R19: Post-Maintenance Testing**

Procedures:

Industrial Safety Program, Attachment 2, Job Hazard Analysis (JHA), Revision 08  
MA-AA-716-008, Attachment 3B-1, Work Package Planning, Briefing, and Transition Form, Revision 11  
MA-AA-716-100, Attachment 1, Maintenance alterations log, Revision 12  
OI-3A, Safety Injection and Containment Spray, Revision 31  
STP O-8A-1, Test of 1A DG and 11 4kV Bus LOCI Sequencer, Revision 28

Condition Reports:

IR02532177  
IR02532226  
IR02540935  
IR02540954

Work Orders:

C92808708  
C92816710  
C93141760

Drawings:

63-173-B  
63076SH0004  
93680  
630005SH0001

Miscellaneous:

Daily operator logs, narrative  
Technical Specification 3.5.2

**Section 1R22: Surveillance Testing**

Procedures:

STB-M-516B-1, Wide Range Nuclear Instrument Calibration Channel B  
STP-O-8B-2, Test of 2B DG and 24 4kV Bus LOCI Sequencer, Revision 29

Condition Reports:

IR02547570

Drawings:

Schematic Diagram RMSP, DWG # 12023-0035SH0001

Miscellaneous:

Graph of voltages vs Reactor Power on a log scale  
Technical Specifications and Bases 3.3.1  
Surveillance Frequency Control Program

**Section 1EP6: Drill Evaluation**

Procedures:

OP-3, CCNPP Simulator Operating Examination, Revision 12  
OP-9, CCNPP Simulator Operating Examination, Revision 9

Miscellaneous:

Active Simulator Work Orders By Priority with Lead and ECD 8/13/2015  
Team Critique Sheet for OP-3  
Team Critique Sheet for OP-9

**40A1: Performance Indicator Verification**

Procedures:

ER-AA-2008, Mitigating Systems Performance Index (MSPI) Monitoring and Margin Evaluation, Revision 4  
ER-AA-600-1047, Mitigating Systems Performance Index Basis Document, Revision 9  
LS-AA-2200, Mitigating System Performance Index Data Acquisition & Reporting, Revision 5

Miscellaneous:

Calvert Cliffs Unit 1 & 2 Performance Indicator Data  
MSPI Derivation Reports Units 1 & 2

**Section 40A2: Problem Identification and Resolution**

Procedures:

CNG-CA-1.01-1005, Apparent Cause Evaluation, Revision 00603  
OI-8A-2, Rev 41, Blowdown System  
SY-AA-101-112, Exelon Security Search Processes, Revision 32

Condition Reports: (\*denotes NRC-identified)

IR 2548805  
IR 2549660\*  
IR 2550044\*

Work Orders:

C92504593, Install New Valve in Accordance with ECP-14-000636

Corrective Action Documents:

CR-2013-003699, Apparent Cause Evaluation, June 20, 2013

**Section 40A5: Other Activities**

Procedures:

CC-AA-102, Revision 28, Design Input and Configuration Change Impact Screening  
NF-AA-621, Revision 003, Classification of Fuel Assemblies for Dry Storage  
NF-AA-622-1000, Revision 003, Fuel Characterization for Dry Storage

Condition Reports:

CR-IRE-022-410  
CR-2009-002271

CR-2010-012180  
CR-2013-003366

Issue Reports:  
IR 02556357

Calculations:  
CA06770 Thermal Analysis of NUHOMS 32P+ DSC For Vacuum Drying Condition

Miscellaneous:  
Analysis No. CA10060 Fuel Selection Packages CAL-0077 and CAL-0078 for DSCs CEG32P-L077 and CEG32P-L078-ISFSI  
Exelon Design Analysis CA10059 Revision 0, Calvert Cliffs Cask Loader 32P Cask Model – ISFSI  
Calvert ISFSI USAR  
Category 1 Root Cause Analysis, Spent Fuel Pool Monitor Alarm Due to Apparent Release of Fuel Pin Radio Gas Inventory  
NDE Action Plan for Determining Source of Helium Leakage on DSC-77  
Technical Evaluation ECP-15-000531  
Exelon Technical Evaluation ECP-15-000364-309-101-01, Revision 0000, Calvert Cliffs Unit 1 Cycles 1 to 21 and Unit 2 Cycles 1 to 19 Fuel Characteristics and Classification – ISFSI  
ANSI/ANS-5.4-1982, Method for Calculating the Fractional Release of Volatile Fission Products from Oxide Fuel

**LIST OF ACRONYMS**

10 CFR	Title 10 of the <i>Code of Federal Regulations</i>
AC	alternate current
ACE	apparent cause evaluation
AFW	auxiliary feedwater
CAP	corrective action program
CCHX	component cooling heat exchanger
CCNPP	Calvert Cliffs Nuclear Power Plant
DFO	diesel fuel oil
DG	diesel generator
DSC	dry shielded canister
ECCS	emergency core cooling system
ECP	engineering change package
EDG	emergency diesel generator
FBM	Fairbanks Morse
FOST	fuel oil storage tank
HVAC	heating, ventilation, and air conditioning
ISFSI	Independent Spent Fuel Storage Installation
IMC	Inspection Manual Chapter
IN	Information Notice
IPEEE	Individual Plant Examination of External Events
IR	Issue Report
LOOP	loss of offsite power
MCR	main control room
NCV	non-cited violation
NRC	Nuclear Regulatory Commission
OI	operating instruction
OWA	operator workaround
PWR	pressurized-water reactor
RASP	Risk Assessment for Operational Events
RG	Regulatory Guide
SG	steam generator
SNM	special nuclear material
SPAR	Standardized Plant Analysis Risk
SRA	senior reactor analyst
SSC	structure, system, and component
SW	saltwater
TS	technical specification
WO	work order
UFSAR	Updated Final Safety Analysis Report