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

April 28, 2017

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 05000317/2017001 AND 05000318/2017001

Dear Mr. Hanson:

On March 31, 2017, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Calvert Cliffs Nuclear Power Plant (CCNPP), Units 1 and 2. On April 25, 2017, the NRC inspectors discussed the results of this inspection with Mr. Mark Flaherty, Site Vice President, and other members of your staff. The results of this inspection are documented in the enclosed report.

The NRC inspectors did not identify any finding or violation of more than minor significance.

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

Sincerely,

/RA/

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

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

Enclosure:
Inspection Report 05000317/2017001 and
05000318/2017001
w/Attachment: Supplementary Information

cc w/encl: Distribution via ListServ

SUBJECT: CALVERT CLIFFS NUCLEAR POWER PLANT – INTEGRATED INSPECTION REPORT 05000317/2017001 AND 05000318/2017001 DATED APRIL 28, 2017

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NAME	RClagg	ARosebrook	ADimitriadis		
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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.	05000317/2017001 and 05000318/2017001
Licensee:	Exelon Generation Company, LLC (Exelon)
Facility:	Calvert Cliffs Nuclear Power Plant, Units 1 and 2
Location:	Lusby, MD
Dates:	January 1, 2017 through March 31, 2017
Inspectors:	R. Clagg, Senior Resident Inspector C. Roettgen, Resident Inspector H. Anagnostopoulos, Health Physicist M. Modes, Senior Reactor Inspector A. Rosebrook, Senior Project Engineer A. Siwy, Project Engineer
Approved by:	Anthony Dimitriadis, Chief Reactor Projects Branch 1 Division of Reactor Projects

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SUMMARY

Inspection Report 05000317/2017001, 05000318/2017001; 1/01/2017 – 3/31/2017; Calvert Cliffs Nuclear Power Plant (CCNPP), Units 1 and 2; Routine Integrated Inspection Report.

This report covers a three-month period of inspection by resident inspectors and announced baseline inspections performed by regional inspectors. No findings were identified during this inspection. The U.S. Nuclear Regulatory Commission's (NRC's) program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 6.

REPORT DETAILS

Summary of Plant Status

Unit 1 began the inspection period at 100 percent power. On March 18, operators reduced power to 80 percent for turbine valve testing. The unit was restored to 100 percent power the same day. 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 February 8, 2017, operators reduced power to 94 percent for an auxiliary feedwater (AFW) large flow test. On February 9, power was further reduced to 93 percent for main steam safety valve and returned to full power the same day. On February 13, the operators shut down the unit for a planned refueling outage (RFO). Unit startup began on March 5 and on March 7 the unit reached 100 percent power. On March 12, operators reduced power to 95 percent for "Variable Average Coolant Temperature Testing." The unit was restored to 100 percent power on March 13. The unit remained at or near 100 percent power for the remainder of the inspection period.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection (71111.01 – 2 samples)

Readiness for Impending Adverse Weather Conditions

a. Inspection Scope

The inspectors reviewed Exelon's preparations for the impending adverse weather conditions listed below. The inspectors reviewed the implementation of adverse weather preparation procedures before the onset of and during this adverse weather condition. The inspectors walked down the 11 and 14 4kV transformers and the 21 and 24 4kV transformers to ensure system availability. 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 (IR) are listed in the Attachment.

- Impending high winds, March 1, 2017
- Forecasted high winds, sleet and snow, March 13, 2017

b. Findings

No findings were identified.

1R04 Equipment Alignment

Partial System Walkdowns (71111.04Q – 4 samples)

a. Inspection Scope

The inspectors performed partial walkdowns of the systems listed below. The inspectors selected these systems based on their risk-significance relative to the reactor safety cornerstones at the time they were inspected. The inspectors reviewed applicable procedures, system diagrams, the Updated Final Safety Analysis Report (UFSAR), technical specifications (TSs), work orders (WOs), action requests (ARs), 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 corrective action program (CAP) for resolution with the appropriate significance characterization.

- 11 penetration room exhaust ventilation system and the associated ventilation envelope, February 8, 2017
- 22 component cooling water during 21 saltwater (SW) header out of service for maintenance, February 16, 2017
- 12 SW header during 11 A/B SW heat exchanger out of service for maintenance, March 7, 2017
- 1A emergency diesel generator (EDG) during 2B EDG out of service due to service water heat exchanger cleaning, March 15, 2017

b. Findings

No findings were identified.

1R05 Fire Protection

Resident Inspector Quarterly Walkdowns (71111.05Q – 8 samples)

a. Inspection Scope

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

- Unit 2, Component Cooling Pump Room, Fire Area 12, January 20, 2017
- Unit 2, Exhaust Ventilation Equipment Room, Fire Area 13, January 20, 2017
- Unit 2, Containment, Fire Area CNMT, February 21, 2017
- Unit 1, Turbine Building, Fire Area TB, March 1, 2017

- Unit 2, Turbine Building, Fire Area TB, March 1, 2017
- Unit 1, Cable Spreading Room, Fire Area 17, March 9, 2017
- Unit 1, 27' Switch Gear Room, Fire Area 19, March 9, 2017
- Unit 2, 27' Switch Gear Room, Fire Area 18, March 9, 2017

b. Findings

No findings were identified.

1R06 Flood Protection Measures (71111.06 – 1 sample)

Internal Flooding Review

a. Inspection Scope

The inspectors reviewed the UFSAR, the site flooding analysis, and plant procedures to identify internal flooding susceptibilities for the site. The inspectors review focused on the heating, ventilation, and air conditioning (HVAC) Equipment Room for the control room and cable spreading room. It verified the adequacy of equipment seals located below the flood line, floor and water penetration seals, watertight door seals, common drain lines and sumps, sump pumps, level alarms, control circuits, and temporary or removable flood barriers. It assessed the adequacy of operator actions that Exelon had identified as necessary to cope with flooding in this area and also reviewed the CAP to determine if Exelon was identifying and correcting problems associated with both flood mitigation features and site procedures for responding to flooding.

b. Findings

No findings were identified.

1R08 In-Service Inspection Activities (71111.08P – 1 sample)

a. Inspection Scope

From February 22-24 and 28, and March 6-8, 2017, the inspectors conducted an inspection and review of in-service inspection program activities in order to assess the effectiveness of Exelon's program for monitoring degradation of the reactor coolant system (RCS) boundary and risk-significant piping system boundaries.

Non-destructive Examination and Welding Activities (Inspection Manual Chapter (IMC) 02.01)

The inspectors reviewed the results of the nondestructive evaluation of risk-significant dissimilar metal weld 2-CV-2005-30, safe end-to-piping nozzle, in the 21A charging nozzle, by directly observing the encoded ultrasonic data. The inspectors reviewed the final report CC17-IVE-048 for this weld. The inspectors discussed the reported flaw, located in the Inconel weld at the inside diameter (1.23" length with a depth of 0.2") with the qualified Level III. In addition, the inspectors reviewed the ultrasonic examination results of similar dissimilar welds inspected using the same ultrasonic technique:

12-SC-2004-1	Report CC17-IVE-038	Safe End to Nozzle
12-SI-2009-15	Report CC17-IVE-039	Safe End to Nozzle
12-SI-2010-13	Report CC17-IVE-040	Safe End to Nozzle
12-SI-2011-13	Report CC17-IVE-041	Safe End to Nozzle

12-SI-2013-13	Report CC17-IVE-042	Safe End to Nozzle
3-PS-2001-1	Report CC17-IVE-044	Piping Nozzle to Safe End
3-PS-2002-1	Report CC17-IVE-045	Piping Nozzle to Safe End

The inspectors compared the weld inspection, for the listed welds, against the implementing standard: NRC approved Code Case N-770-1, "Alternative Examination Requirements and Acceptance Standards for Class 1 PWR Piping and Vessel Nozzle Butt Welds Fabricated With UNS N06082 or UNS W86182 Weld Filler Material With or Without Application of Listed Mitigation Activities." The inspectors verified the cast stainless steel safe-end material was examined in a manner that satisfied related license renewal commitments. The inspectors reviewed the ultrasonic examination procedure LMT-10-PAUT-007, Revision 2, "Fully Encoded Phased Array Ultrasonic Examination of Dissimilar Metal Piping Welds," and verified it was qualified to American Society of Mechanical Engineers(ASME), Boiler and Pressure Vessel Code, Section XI, "Rules for Inservice Inspection for Nuclear Power Plant Components," Appendix VIII (Performance Demonstration Initiative Program Certificate PDQS 867).

For each evaluation, the inspectors verified nondestructive examination activities were performed in accordance with the 2004 Edition of ASME "Rules for Inservice Inspection for Nuclear Power Plant Components" requirements. The inspectors verified the nondestructive test met the requirements contained in ASME, Section XI, Mandatory Appendix VIII, and the examination personnel were qualified in accordance with ASME, Section XI, Mandatory Appendix VII. The inspectors verified indications and defects, if present, were dispositioned in accordance with the ASME Code and verified that relevant indications were compared to previous examinations to determine if any changes had occurred.

Acceptance of Relevant Indications for Continued Service

The inspectors verified the utility acceptance of the flaw described above in CC17-IVE-048 was properly characterized in accordance with ASME Code, Section XI, Article IWA-3300, and the relevant indication was recorded in accordance with ASME Code, Section XI, Article IWA-3200. The inspectors verified the relevant indication was evaluated in accordance with ASME Code, Case N-770-1, -3132.3, "Acceptance by Evaluation," and the selected analytical methods were conformance with ASME, Section XI, IWB-3600. The inspectors reviewed the analysis supporting the flaws return-to-service for one cycle of operation to determine if the basis inputs were conservatively chosen or estimated. The inspectors reviewed Structural Integrity Associates Calculation, File Number 1700300.302, and Westinghouse Letter LTR-MRCDA-17-16, Revision 0.

Vessel Upper Head Penetration Inspection Activities (IMC 02.02).

On December 5, 2015, Exelon was granted "Relief Request for Extension of Volumetric Examination Interval for Reactor Vessel Heads with Alloy 690 Nozzles" (ADAMS ML15327A367). The NRC granted relief from the examination frequency stipulated in accepted Code, Case N-729-1. The inspectors noted that Exelon is authorized to defer reactor head examinations until the Spring 2022 RFO for Unit 1 and the Spring 2023 RFO for Unit 2 which will occur in the fifth ten-year In-service inspection interval.

Boric Acid Corrosion Control Inspection Activities (IMC 02.03)

The inspectors examined if Exelon staff properly applied applicable corrosion rates to affected components and properly assessed the effects of corrosion induced wastage on structural or pressure boundary integrity. In addition to reviewing the controlling procedures for the Boric Acid Corrosion Control Program, the inspectors reviewed the program health report from the 4th quarter 2016 in which Exelon staff noted Unit 2 ran with an active packing leak in motor-operated valve (MOV) SI-656.

The inspectors reviewed AR03949124, "Possible Active BACC on 2HVCVC-193," a report generated as the consequence of a forced outage during December 2016.

For the current outage, the inspectors reviewed the actions taken in response to leakage identified at the 2PT153 Fitting, and resolution of leakage associated with SwageLok™ fittings.

The inspectors confirmed that these corrective actions were consistent with requirements of the ASME Code and Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix B, "Criterion XVI."

Steam Generator Tube Inspection Activities (IMC 02.04)

Exelon staff did not perform eddy current examinations of the steam generators during the February 2017 RFO. The inspectors evaluated Technical Evaluation ECP-17-000090, Calvert Cliffs Unit 2, CC2R22, "Skip Cycle Degradation and Operational Assessment," Revision 0, February 2017 against the Electric Power Research Institute guidelines contained in Report 1019038, "Steam Generator Integrity Assessment Guidelines," Revision 3, November 2009 to determine if the basis for the skip cycle met the guideline thresholds.

Identification and Resolution of Problems (IMC 02.05)

The inspectors verified Exelon staff were identifying in-service inspection, boric acid leakage, and steam generator problems at an appropriate threshold and entering them in the CAP. The inspectors selected a sample of problems associated with in-service inspection and steam generator inspection documented by Exelon and verified the appropriateness of the corrective actions. The inspectors used the guidance in NRC Inspection Procedure 71152, "Identification and Resolution of Problems," to evaluate the corrective actions. The inspectors also determined if Exelon staff were assessing the applicability of operating experience to their plant.

b. Findings

No findings were identified.

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

.1 Quarterly Review of Licensed Operator Requalification Testing and Training

a. Inspection Scope

The inspectors observed a licensed operator just-in-time training for shutdown and cooldown of Unit 2 for the RFO on February 9, 2017. The inspectors evaluated operator performance during the simulated event and verified completion of risk significant operator actions, including the use of alarm response and normal operating procedures. The inspectors assessed the clarity and effectiveness of communications, implementation of actions in response to alarms and plant conditions, and the oversight and direction provided by the control room supervisor. 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

On February 12, 2017, the inspectors observed and reviewed licensed operators in the main control room during the Unit 2 reactor shutdown and cooldown for the RFO. The inspectors observed infrequently performed test or evolution briefings, pre-shift briefings, and reactivity control briefings to verify that the briefings met the criteria specified in Exelon procedures, OP-AA-103-102, “Watch Standing Practices,” Revision 16, and HU-AA-1211, “Pre-Job Briefings,” Revision 11. Additionally, the inspectors observed evolution performance to verify that procedure use, crew communications, and coordination of activities between work groups similarly met established expectations and standards.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12Q – 1 sample)

a. Inspection Scope (1 Quality Control sample)

The inspectors reviewed the 1-PS-10216, commercial grade dedication process to assess that parts installed in safety-significant systems that were purchased as commercial grade parts were properly dedicated prior to installation in a quality grade application.

b. Findings

No findings were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13 – 4 samples)

a. Inspection Scope

The inspectors reviewed station evaluation and management of plant risk for the maintenance and emergent work activities listed below to determine if 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 determined that Exelon 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 that 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.

- Unit 2, Maintenance risk assessment for "lowered reactor inventory" during reactor vessel head removal, February 16, 2017
- Unit 2, Maintenance risk assessment for "24 – 4kV bus work," February 22, 2017
- Unit 1 and Unit 2, Updated maintenance risk assessment due to impending high winds, March 1, 2017
- Unit 2, Updated maintenance risk assessment due to 22 service water unplanned inoperability, March 15, 2017

b. Findings

No findings were identified.

1R15 Operability Determinations and Functionality Assessments (71111.15 – 5 samples)

a. Inspection Scope

The inspectors reviewed operability determinations for the degraded or non-conforming conditions listed below based on the risk significance of the associated components and systems. 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 evaluated whether the measures in place would function as intended and were properly controlled by Exelon staff.

- 10 CFR Part 21 Event Notification 52458, Potential defect with ITT Conoflow GT25CD1826 transducers– Calvert affected (AR03958750)
- 2RV321 failed as found testing (AR03976885)
- Through wall deterioration found on spool piece LJ1-2010-2 (AR03979273)
- MOV diagnostic test indicated worm gear wear on 2MOV6590P (AR03980807)

- Condensate booster pump close and annunciation circuits were tied together (AR03980942)

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.19 – 1 sample)

Permanent Modifications

a. Inspection Scope

The inspectors evaluated the modifications listed below and verified that the design bases, licensing basis, 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 examined revisions to the UFSAR, Alarm Response Manual, system operating procedures, and system design basis documents to ensure the modifications were incorporated into these documents.

- ECP-15-000572, Open phase modification, install microprocessor based over current relay (WO C93393739, C93393660, C93393659)

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19 – 8 samples)

a. Inspection Scope

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

- WO C92353303, replace air supply pressure control valve, 2PCV613, February 21, 2017
- WO C92937254, replace motor on 2MOV651OP, February 22, 2017
- WO C220093639, MOV-25A, 2MOV4052OP, swap actuator with spare, February 22, 2017
- WO C93078727, analysis of diagnostic testing on MOV637OP, February 23, 2017
- WO C93082299, visual check for leaks on 2CKVSI-340, February 28, 2017
- WO C92611729, functional test of 22A reactor coolant pump alarms, NFPA-805 mod, March 1, 2017
- WO C91145673, replace 2MOV627 actuator, March 2, 2017

- WO C93485817, Unit 2 condensate booster pump suction and lube oil pressure switch trip logic. March 8, 2017

b. Findings

No findings were identified.

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

a. Inspection Scope

The inspectors reviewed the station's work schedule and outage risk plan for the Unit 2 maintenance and RFO 2R22, which was conducted from February 13 through March 5, 2017. The inspectors reviewed Exelon's development and implementation of outage plans and schedules to verify that risk, industry experience, previous site-specific problems, and defense-in-depth were considered. During the outage, the inspectors observed portions of the shutdown and cooldown processes and monitored controls associated with the following outage activities:

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

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22 – 8 samples)

a. Inspection Scope

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

- STPO-8B2YR-2, "Biennial Test of 2B DG," January 18, 2017
- STPO-71-1, "Monthly Test of 'B' Train Containment Cooling Units, Iodine Removal Units, and Penetration Room Exhaust Filter," February 8, 2017
- STPO-013-2, "Shutdown ESFAS Logic Test," February 14, 2017
- STPO-7A-2, "Partial Stroke Test of 2CKVSI-4146, RWT Outlet Check Valve," February 21, 2017
- STPO-108C-2, "Local Leak Rate Test, Penetration 41 (Shutdown Cooling)," February 22, 2017
- STPO-066I1-2, "Saltwater Emergency Outboard Valve Op Test," February 23, 2017
- STPO-108D44-2, "Penetration 44, 2FP-145B (FP Containment Isolation Valve)," February 23, 2017
- STPO-73H-2, "AFW Pump Large Flow Test," March 5, 2017 (in-service testing)

b. Findings

No findings were identified.

Cornerstone: Emergency Preparedness

1EP6 Drill Evaluation (71114.06 – 1 sample)

Emergency Preparedness Drill Observation

a. Inspection Scope

The inspectors evaluated the conduct of a routine Exelon emergency drill on March 29, 2017, 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 in the 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 staff in order to evaluate Exelon's critique and to determine if the Exelon staff was properly identifying weaknesses and entering them into the corrective action program.

b. Findings

No findings were identified.

2. RADIATION SAFETY

Cornerstone: Public Radiation Safety and Occupational Radiation Safety

2RS1 Radiological Hazard Assessment and Exposure Controls (71124.01) (7 samples)

a. Inspection Scope

The inspectors reviewed Exelon's performance in assessing and controlling radiological hazards in the workplace. The inspectors used the requirements contained in 10 CFR Part 20, "Standards for Protection Against Radiation," TSs, Regulatory Guide 8.38, "Control of Access to High and Very High Radiation Areas (VHRAs) of Nuclear Plants," and the procedures required by TSs as criteria for determining compliance.

Inspection Planning

The inspectors reviewed the performance indicators for the occupational exposure cornerstone, radiation protection (RP) program audits, and reports of operational occurrences in occupational radiation safety since the last inspection.

Radiological Hazard Assessment (1 sample)

The inspectors conducted independent radiation measurements during walk-downs of the facility and reviewed the radiological survey program, air sampling and analysis, continuous air monitor use, recent plant radiation surveys for radiological work activities, and any changes to plant operations since the last inspection to verify survey adequacy of any new radiological hazards for onsite workers or members of the public.

Instructions to Workers (1 sample)

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

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

Contamination and Radioactive Material Control (1 sample)

The inspectors observed the monitoring of potentially contaminated material leaving the radiological controlled area and inspected the methods and radiation monitoring instrumentation used for control, survey, and release of that material. The inspectors selected several sealed sources from inventory records and assessed whether the sources were accounted for and were tested for loose surface contamination. The inspectors evaluated whether any recent transactions involving nationally tracked sources were reported in accordance with requirements.

Radiological Hazards Control and Work Coverage (1 sample)

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

Risk-Significant HRA and VHRA Controls (1 sample)

The inspectors reviewed the procedures and controls for HRAs, VHRAs, and radiological transient areas in the plant.

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

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

Problem Identification and Resolution (1 sample)

The inspectors evaluated whether problems associated with radiation monitoring and exposure control (including operating experience) were identified at an appropriate threshold and properly addressed in the CAP.

b. Findings

No findings were identified.

2RS5 Radiation Monitoring Instrumentation (71124.05) (3 samples)

a. Inspection Scope

The inspectors reviewed performance in assuring the accuracy and operability of radiation monitoring instruments used to protect occupational workers during plant operations and from postulated accidents. The inspectors used the requirements in 10 CFR Part 20, Regulatory Guides, ANSI 323A-1997, “Radiation Protection Instrumentation, Test and Calibration, Portable Survey Instruments”, ANSI N323D-2002, “American National Standard for Installed Radiation Protection Instrumentation”, ANSI N42.14-1991, “Calibration and Use of Germanium Spectrometers for the Measurement of Gamma-Ray Emission Rates of Radionuclides,” and procedures required by TSs as criteria for determining compliance.

Inspection Planning

The inspectors reviewed the Calvert Cliffs UFSAR, RP audits, records of in-service survey instrumentation, and procedures for instrument source checks and calibrations.

Walk-downs and Observations (1 sample)

The inspectors conducted walk-downs of plant area radiation monitors and continuous air monitors. The inspectors assessed the material condition of these instruments and that the monitor configurations aligned with the UFSAR. The inspectors checked the calibration and source check status of various portable radiation survey instruments and contamination detection monitors for personnel and equipment.

Calibration and Testing Program (1 sample)

The inspectors reviewed the current detector and electronic channel calibration, functional testing results alarm set-points and the use of scaling factors for the following radiation detection instrumentation: laboratory analytical instruments, whole body counter, containment high-range monitors, portal monitors, personnel contamination monitors, small article monitors, portable survey instruments, area radiation monitors, electronic dosimetry, air samplers, and continuous air monitors. The inspectors reviewed the calibration standards used for portable instrument calibrations and response checks to verify that instruments were calibrated by a facility that used National Institute of Science and Technology traceable sources.

Problem Identification and Resolution (1 sample)

The inspectors verified that problems associated with radiation monitoring instrumentation (including failed calibrations) were identified at an appropriate threshold and properly addressed in the CAP.

b. Findings

No findings were identified.

2RS6 Radioactive Gaseous and Liquid Effluent Treatment (71124.06) (6 samples)

a. Inspection Scope

The inspectors reviewed the treatment, monitoring, and control of radioactive gaseous and liquid effluents. The inspectors used the requirements outlined in 10 CFR Part 20, 10 CFR Part 50, Appendix I, TS, Offsite Dose Calculation Manual (ODCM), applicable industry standards, and procedures required by TSs as criteria for determining compliance.

Inspection Planning

The inspectors conducted in-office reviews of the Calvert Cliffs 2014 and 2015 annual radioactive effluent and environmental reports, radioactive effluent program documents, UFSAR, ODCM, and applicable event reports.

Walkdowns and Observations (1 sample)

The inspectors walked down the gaseous and liquid radioactive effluent monitoring and filtered ventilation systems to assess the material condition and verify proper alignment according to plant design. The inspectors also observed potential unmonitored release points and reviewed radiation monitoring system surveillance records and the routine processing and discharge of gaseous and liquid radioactive wastes.

Calibration and Testing Program (1 sample)

The inspectors reviewed gaseous and liquid effluent monitor instrument calibration, functional test results, and alarm set-points based on National Institute of Standards and Technology calibration traceability and ODCM specifications.

Sampling and Analyses (1 sample)

The inspectors reviewed radioactive effluent sampling activities, representative sampling requirements, compensatory measures taken during effluent discharges with inoperable effluent radiation monitoring instrumentation, the use of compensatory radioactive effluent sampling, and the results of the inter-laboratory and intra-laboratory comparison program including scaling of hard-to-detect isotopes.

Instrumentation and Equipment (1 sample)

The inspectors reviewed the methodology used to determine the radioactive effluent stack and vent flow rates to verify that the flow rates were consistent with TS/ODCM and UFSAR values. The inspectors reviewed radioactive effluent discharge system surveillance test results based on TS acceptance criteria. The inspectors verified that the high-range effluent monitors used in emergency operating procedures were calibrated and operable and have post-accident effluent sampling capability.

Dose Calculations (1 sample)

The inspectors reviewed changes in reported dose values from the previous annual radioactive effluent release reports, several liquid and gaseous radioactive waste discharge permits, the scaling method for hard-to-detect radionuclides, ODCM changes, land use census changes, public dose calculations (monthly, quarterly, annual), and records of abnormal gaseous or liquid radioactive releases.

Problem Identification and Resolution (1 sample)

The inspectors evaluated whether problems associated with the radioactive effluent monitoring and control program were identified at an appropriate threshold and properly addressed in Exelon's CAP.

b. Findings

No findings were identified.

4OA1 Performance Indicator Verification (71151)

RCS Specific Activity and RCS Leak Rate (4 samples)

a. Inspection Scope

The inspectors reviewed Exelon's submittal for the RCS specific activity (BI01) and RCS leak rate (BI02) performance indicators for both Unit 1 and Unit 2 for the period of January 2016 through December 2016. 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 RCS sample analysis and control room logs of daily measurements for RCS

leakage and compared that information to the data reported by the performance indicator. Additionally, the inspectors observed surveillance activities that determined the RCS identified leakage rate, and chemistry personnel taking and analyzing an RCS sample.

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 determine if 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 AR 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: Review of Electro-Hydraulic Controls (EHC) System Check Valve Failure and Unit 2 Turbine and Reactor Trip Event on December 3, 2016

a. Inspection Scope

The inspectors performed an in-depth review of Exelon's CAP classification, evaluation, corrective actions to address the failure of an EHC system check valve which resulted in a turbine trip and reactor trip of Unit 2 on December 3, 2016.

The inspectors assessed Exelon's problem identification threshold, cause analyses, extent of condition reviews, compensatory actions, and the prioritization and timeliness of Exelon's corrective actions to determine whether Exelon was appropriately identifying, characterizing, and correcting problems associated with this issue and whether the planned or completed corrective actions were appropriate. The inspectors compared the actions taken to the requirements of Exelon's CAP and 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions." In addition, the inspectors performed field walkdowns and interviewed engineering personnel to assess the effectiveness of the implemented corrective actions.

b. Findings and Observations

No findings were identified.

On December 3, 2016, at 10:24 pm, the Calvert Cliffs Unit 2 turbine tripped due to main generator directional power relay trip, resulting in an automatic reactor trip. The monthly Unit 2 main turbine EHC standby pump auto start operations performance evaluation (PE-2-93-14-O-M) was in progress at the time of the trip. An EHC oil leak on the 21 main turbine governor valve's (GV)-21 emergency trip fluid check valve caused a loss of pressure in the EHC emergency trip fluid header resulting in all of the GVs and intercept valves rapidly closing.

Exelon conducted a prompt post trip review of all plant systems to verify proper plant response to the event, and wrote AR 03949100. Exelon replaced the failed check valve and two other identical check valves, and sent all three valves to a laboratory for failure analysis, and conducted a root cause analysis (RCA).

The direct cause of the plant trip was the failure of the GV-21 emergency trip fluid check valve. The aluminum silicon bronze check valve body thread fracture most likely occurred due to intergranular stress corrosion cracking (IGSCC) initiating at the first full thread root from the shank. The intergranular surface consisted of approximately two-thirds the entire fracture surface with the remaining portions containing dimples, typical of a ductile shear overload condition. The fracture surface was darkened/oxidized, suggesting it had been present for a relatively long time. In order to have IGSCC a susceptible material must be present (aluminum bronze is susceptible to IGSCC), be under tensile stress (the threads of the check valve are under tensile stress), and be exposed to a corrosive environment.

The RCA identified that the check valve had not been removed from the system since it was last overhauled by the vendor in the early 1990's. Both the vendor documents and the station work orders contain a note warning that use of ammonia based solvents is prohibited. Given the limited documentation, there was no way to determine when the failed check valve was contaminated by ammonia. Additionally, there was no evidence that either of the other two replaced valves had ever been contaminated thus ruling out EHC system contamination as a possible source. The inspectors determined that no performance deficiency could be identified because it could not be established when the ammonia contamination occurred.

No violation of NRC requirements was identified since the failure involved a non-safety related system (EHC). The licensee has since replaced all affected check valves and potentially susceptible components during the recent Unit 2 RFO.

4OA3 Follow-Up Events and Notices of Enforcement Discretion (71153 – 1 sample)

(Closed) Licensee Event Report (LER) 05000318/2016-001-00: Automatic Reactor Trip Due to Main Turbine Electro-Hydraulic Control Fluid Leak

On December 3, 2016, Operations was conducting a performance evaluation of the auto start feature of Unit 2 main turbine EHC pumps. At 2223, the standby EHC pump started, per the procedure, and a normal rise in pressure was noted. At 2224, Unit 2 main turbine tripped automatically which was followed by an automatic reactor protection system trip. The main turbine tripped on a main generator directional power relay trip following the closure of all Unit 2 main turbine GVs and intercept valves. This was due to an EHC leak on 21 main turbine GV actuator emergency trip fluid check valve which caused a rapid decrease in EHC header pressure. The trip was an uncomplicated reactor trip as all safety features performed as expected. The failed emergency trip fluid check valve was sent offsite to a lab for forensic investigation. This analysis determined

the check valve failed due to IGSCC. The most likely cause of the IGSCC on this check valve was exposure to ammonia during some previous maintenance activity. Corrective actions included replacement of all similar Unit 2 EHC valves during the 2017 RFO and establishment of a preventive maintenance strategy to periodically replace similar EHC valves. The inspectors did not identify a performance deficiency during their review of the LER. This LER is closed.

4OA5 Other Activities

Temporary Instruction (TI) 2515/192, Inspection of Exelon's Interim Compensatory Measures Associated with the Open Phase Condition Design Vulnerabilities in Electric Power Systems

a. Inspection Scope

The objective of this performance based TI is to verify implementation of interim compensatory measures associated with an open phase condition (OPC) design vulnerability in electric power system for operating reactors. The inspectors conducted an inspection to determine if Exelon had implemented the following interim compensatory measures. These compensatory measures are to remain in place until permanent automatic detection and protection schemes are installed and declared operable for OPC design vulnerability. The inspectors verified the following:

- Exelon had identified and discussed with plant staff the lessons-learned from the OPC events at the US operating plants including Byron Station OPC event and its consequences. This includes conducting operator training for promptly diagnosing, recognizing consequences, and responding to an OPC event.
- Exelon had updated plant operating procedures to help operators promptly diagnose and respond to OPC events on off-site power sources credited for safe shutdown of the plant.
- Exelon had established and continues to implement periodic walkdown activities to inspect switchyard equipment such as insulators, disconnect switches, and transmission line and transformer connections associated with the offsite power circuits to detect a visible OPC.
- Exelon had ensured that routine maintenance and testing activities on switchyard components have been implemented and maintained. As part of the maintenance and testing activities, Exelon assessed and managed plant risk in accordance with 10 CFR 50.65(a)(4) requirements.

b. Findings

No findings were identified. The inspectors verified that the criteria were met.

4OA6 Meetings, Including Exit

Exit Meeting Summary

On April 25, 2017, the inspectors presented the inspection results to Mr. Mark Flaherty, 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, Site Vice President
S. Agyem-Bediako, Senior Site Industrial Safety Advisor
A. Barrett, Exelon Industrial Safety CFAM
N. Bates, Senior Radiation Protection Specialist
C. Blue, Manager, Radiological Engineering
J. Bowie, Radiation Protection Technician
B. Erdman, Manager, Radiation Protection Technical Support
R. Fearrington, Radiation Protection Technician
M. Fick, Principal Engineer, Regulatory Assurance
W. Frawley, Chemistry Technician
K. Greene, Principal Engineer, Regulatory Assurance
C. Hawkins, Exelon Level 3
G. Helmrich, Chemistry Technician
R. Holland, Radiation Protection Technician
T. Hoover, Supervisor, Radiation Protection
R. Ihnacik, Radioactive Waste Chemist
A. Krauser, Senior Site Specialist, NDE
E. Kreahling, Senior Engineer
S. Loftis, Senior Chemist
S. Martinez, Radiation Protection Technician
J. McIntyre, Engineer 3
J. Norris, Supervisor, Radiation Protection
C. Olsen, Engineer 1
J. Prowinski, Environmental Chemist
C. Ricketts, Radiation Protection Technician
B. Rydel, Senior Engineer
S. Sanders, Manager, Site Radiation Protection
H. Simpson, Radiation Protection Technical Specialist
L. Smith, Manager, Site Regulatory Assurance
R. Thomas, Supervisor, Chemistry Operations
Z. Uemeke, Branch Manager, Electrical System
T. White, Manager, Site Reactor Services
J. Wynn, Senior Engineer

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Closed

05000318/2016-001-00	LER	Automatic Reactor Trip Due to Main Turbine Electro-Hydraulic Control Fluid Leak (Section 4OA3)

LIST OF DOCUMENTS REVIEWED

Section 1R04: Equipment Alignment

Procedures
OI-21A, 1A Diesel Generator, Revision 02206

Drawings
64316, Simplified System Drawing- Containment and Penetration Room Ventilation, Revision 12
62150SH0001, Appendix R Separation Requirements Aux. Bldg & Cntmt. Sturct. Floor Plan at El 5' – 0"
62152SH0001, Appendix R Separation Requirements Aux. Bldg & Cntmt. Sturct. Floor Plan at El 45' – 0"

Section 1R05: Fire Protection

Procedures
FFSM-AB5, Firefighting Strategies Manual, Revision 200

Section 1R06: Flood Protection Measures

Drawings
60723SH0004, Ventilation Systems Control Room and Cable Spreading Room HVAC, Revision 53
60728SH0002, Plant Heating System Auxiliary Building & Containment Structure, Revision 40
62153SH0001, Appendix 'R' Separation Requirements, Auxiliary Building & Containment Structure Elevation 69'0", Revision 10

Miscellaneous
M-90-194, Time Response for Isolation of an Auxiliary Building Flooding Event, Revision 0
M-90-207, Maximum Flood Height Resulting From a Pipe Break in the Control Room HVAC Equipment Room, Revision 0

Section 1R08: In-Service Inspection Activities

Action Requests
AR03073331
AR03969029
AR03969110
AR03976451

Miscellaneous
WO C93608483

Section 1R11: Licensed Operator Requalification Program

Procedures
OP-5, Plant Shutdown from Hot Standby to Cold Shutdown, Revision 02801

Section 1R12: Maintenance Effectiveness

Procedures
CC-AA-309-1012, 10 CFR Part 21 Technical Evaluations, Revision 3

Miscellaneous
Attachment 2, Critical Characteristics Determination for QC833, Spec No. 1541F, Revision 01
Attachment 4, Dedication Requirements Form for QC833, Spec No. 1541F, Revision 02
Receipt Inspection Report, Purchase Order 437091 dated July 18th, 2012
Apparent Cause Investigation, AR 02698078

Section 1R13: Maintenance Risk Assessments and Emergent Work Control

Procedures
ER-AA-600-1042, On-line Risk Management, Revision 010

Section 1R15: Operability Determinations and Functionality Assessments

Action Requests
AR03979273
AR03976885
AR03980807

Drawings
62708SH0002, Circulating Water Cooling System, Revision 115

Miscellaneous
ECP-17-000141, Technical Evaluation for Saltwater Piping Degradation, Revision 0
M-601, Piping Class Summary Sheets, Revision 50
IST Program Basis Document (Unit 2), 4th 10 Year Interval

Section 1R19: Post Maintenance Testing

Procedures
MA-AA-716-012, Post Maintenance Testing, Revision 22
MA-AA-716-060, Compression Fittings Inspection, Installation, Remake, and Repair, Revision 3
STPO-108C-2, Local Leak Rate Test, Penetration 41 (Shutdown Cooling), Revision 0500

Action Requests
AR03984922

Section 1R20: Refueling and Other Outage Activities

Procedures
OP-5, Plant Shutdown From Hot Standby to Cold Shutdown, Revision 02801
MA-AA-716-008-1008, Reactor Services Refuel Floor FME Plan, Revision 012
ER-AA-600-1043, Shutdown Risk Management, Revision 006

Section 1R22: Surveillance Testing

Procedures
STPO-71-1, Monthly Test of 'B' Train Containment Cooling Units, Iodine Removal Units, and Penetration Room Exhaust Filter, Revision 01706
STPO-013-2, Shutdown ESFAS Logic Test, Revision 0400
STPO-108C-2, Local Leak Rate Test, Penetration 41 (Shutdown Cooling), Revision 0500
STPO-73H-2, AFW Large Flow Test, Revision 10
STOP-8B2YR-2, Biennial Test of the 2B DG, Revision 0

Drawings
60736SH0001, Fuel Oil Storage System, Revision 54

Miscellaneous
Electrical Metering Calibration Data Sheet for the 2B EDG GEN WATTS, Revision 2
Tech Spec Action Value Basis Document, Module 2 Diesel Generator Power, Review 0
Preventative Maintenance Change Request, P-CAL-025308

Section 2RS1: Radiological Hazard Assessment and Exposure Controls

Procedures
RP-AA-1004, "Radiation Protection Stop Work Authority and Corporate RPM Event Notification," Revision 9
RP-AA-210, "Dosimetry Issue, Usage and Control," Revision 27
RP-AA-230, "Operation of the Canberra FASTSCAN Whole Body Counter (WBC) Using ABACOS Plus," Revision 3
RP-AA-300, "Radiological Survey Program," Revision 14
RP-AA-300-1005, "Removing Items from the Spent Fuel Pool, Reactor Cavity, and Equipment Pit," Revision 1
RP-AA-300-1006, "Radiological Controls for System Operations with Radiological Impact in Normally Accessible Areas," Revision 0
RP-AA-301, "Radiological Air Sampling Program," Revision 10
RP-AA-350, "Personnel Contamination Monitoring, Decontamination and Reporting," Revision 18
RP-AA-460, "Controls for High and Locked High Radiation Areas," Revision 29
RP-AA-460-001, "Controls for Very High Radiation Areas," Revision 6
RP-AA-460-002, "Additional High Radiation Exposure Control," Revision 3
RP-AA-503, "Unconditional Release Survey Method," Revision 14
RP-AA-700-1301, "Calibration, Source Check, Operation and Set-up of the Eberline Beta Air Monitor, Model AMS-4," Revision 3
RP-AA-870-1001, "Set-Up and Operation of Portable Air Filtration Equipment," Revision 7
RP-AA-870-1002, "Use of Vacuum Cleaners in Radiologically Controlled Areas," Revision 8

Action Requests

AR03960808	AR03966689	AR03973742	AR03980658
AR03962615	AR03972725	AR03974135	
AR03964764	AR03973248	AR03980627	

Documents
Air sample, GA, Containment 69' North, dated 2/14/2017 at 0305
Air sample, GA, RWP CC-2-17-00513, dated 3/2/2017 at 1050
Air sample, GA, RWP CC-2017-00614, dated 2/27/2017 at 1925
Air sample, GA, RWP CC-2017-00614, dated 2/27/2017 at 1925

Air sample, GA, RWP CC-2-17-00614, dated 2/27/2017 at 2020
Air sample, GA, RWP CC-2-17-00614, dated 2/27/2017 at 0738
Air sample, GA, RWP CC-2-17-00614, dated 2/27/2017 at 1115
Air sample, GA, RWP CC-2-17-00618, dated 2/14/2017 at 1250
Air sample, GA, RWP CC-2-17-00614, dated 2/28/2017 at 1830
Air sample, Lapel 21817, RWP CC-2017-00614, dated 2/27/2017 at 0800
Air sample, Lapel 28565, RWP CC-2017-00614, dated 2/27/2017 at 1120
Air sample, Lapel 34238, RWP CC-2017-00614, dated 2/27/2017 at 1825
Air sample, Lapel 39008, RWP CC-2017-00614, dated 2/27/2017 at 0800
Air sample, Lapel 42314, RWP CC-2017-00614, dated 2/28/2017 at 1710
Air sample, Lapel 47526, RWP CC-2017-00618, dated 2/14/2017 at 1200
Air sample, Lapel 47645, RWP CC-2017-00614, dated 2/27/2017 at 1830
Air sample, Lapel 47936, RWP CC-2017-00614, dated 2/27/2017 at 1005
Air sample, Lapel 9451, RWP CC-2017-00618, dated 2/14/2017 at 1200
Air sample, RWP CC-2-17-00614, dated 2/27/2017 at 1254
ALARA Plan 17RFO-0004
ALARA Plan 17RFO-0010
ALARA Plan 17RFO-0011
ALARA Plan 17RFO-0013
ALARA Plan 17RFO-0015
ALARA Plan 17RFO-0019
Confirmation Form, 2017 Annual Inventory Reconciliation, License ID 5789, National Source Tracking System, dated 1/9/2017
Inventory, High and Very High Radiation Key Control, dated 2/8/2017
Letter, reconciliation, National Source Tracking System, dated 1/9/2017 (and related documents)
Log, EPD alarms since the start of the refueling outage
Log, Personnel Contamination Events, for CC2R22, dated 2/26/2017
Log, Whole Body Counts, dated 1/27/2017 to present
Presentation, Station ALARA Committee meeting, for 3/1/2017
Radiation Work Permit CC-2-17-00502, Revision 00
Radiation Work Permit CC-2-17-00503, Revision 00
Radiation Work Permit CC-2-17-00505, Revision 00
Radiation Work Permit CC-2-17-00613, Revision 00
Radiation Work Permit CC-2-17-00614, Revision 01
Radiation Work Permit CC-2-17-00617, Revision 00
RP-AA-203-1001, “Personnel Exposure Investigation.” EID C30205, dated 3/1/2017
Source inventory list, dated 2/16/2017
Source Leak Test Record, RP-AA-800 Attachment 2, dated 1/30/2017
Survey, Radiological, Map 3-1D, dated 3/19/2015
Survey, Radiological, Map 3-1D, dated 3/30/2016
Survey, Radiological, Map 3-2, dated 4/20/2015
Survey, Radiological, Map 3-2, dated 4/26/2016
Survey, Radiological, Map 4-4B-1, dated 5/27/2015
Survey, Radiological, Map 4-4B-1, dated 7/9/2016
Survey, Radiological, Map C2-9, dated 2/13/2017
Survey, Radiological, Map C2-9, dated 2/14/2017 at 1400
Survey, Radiological, Map C2-9, dated 2/27/2017 0500
Survey, Radiological, Map C2-9, dated 2/27/2017 at 1230
Survey, Radiological, Map C2-9, dated 2/27/2017 2100
Survey, Radiological, Map C2-1, dated 2/28/2017
Survey, Radiological, Map C2-1, dated 3/1/2017
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Survey, Radiological, Map C2-8, dated 3/1/2017 at 1000
Surveys, Radiological, Unit-2 Containment, Post Shutdown, dated 2/13/2017
TA-AA-223-F050, "Radiation Protection Technician Initial Training Program," Revision 8
TEDE ALARA Evaluation, RWP CC-2-17-00502
TEDE ALARA Evaluation, RWP CC-2-17-00503
TEDE ALARA Evaluation, RWP CC-2-17-00505
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Miscellaneous

ANSI 323A-1997, "Radiation Protection Instrumentation, Test and Calibration, Portable Survey Instruments",
ANSI N323D-2002, "American National Standard for Installed Radiation Protection Instrumentation",
ANSI N42.14-1991, "Calibration and Use of Germanium Spectrometers for the Measurement of Gamma-Ray Emission Rates of Radionuclides,"

Section 2RS5: Radiation Monitoring Instrumentation

Procedures

CP-0972, Determination of Tritium Activity, Revision 01000
CY-AA-130-201, Radiochemistry Quality Control, Revision 4
CY-AA-170-1100, Quality Assurance for Radiological Monitoring Programs, Revision 3
RP-AA-225, Quality Control Operations for the Canberra FASTSCAN Whole Body Counter, Revision 3
RP-AA-229, FASTSCAN ABACOS Plus Whole Body Counter (WBC) Calibration, Revision 3
RP-AA-400-1009, Remote Monitoring system, Revision 2
RP-AA-700, Controls for Radiation Protection Instrumentation, Revision 4
RP-AA-700-1101, Calibration of the RO-2, RO-2A, RO-20 AND RSO-50E Ion Chambers, Revision 1
RP-AA-700-1203, Calibration of the MGP Instruments Telepole, Revision 0
RP-AA-700-1207, Calibration of the RO-7, Revision 1
RP-AA-700-1209, Calibration of Shepherd Box Irradiators, Revision 0
RP-AA-700-1213, Operation and Calibration of PCM-2 Whole Body Frisking Monitor, Revision 1
RP-AA-700-1220, Calibration and Operation of the Model 142-10 Dosimeter Irradiator, Revision 1
RP-AA-700-1305, Operation and Calibration of the AMP-100/200, Revision 1
RP-CA-700-1000, Calibration of CCNPP-Specific Radiation Protection Instruments, Revision 000
RP-CA-700-1004, Operation and Response Check of CCNPP-Specific Counter Scaler Systems, Revision 000

Action Requests

AR02436958	AR02466614	AR02619492	AR03961248
AR02444003	AR02466620	AR02629001	
AR02450035	AR02466623	AR02669547	
AR02454094	AR02611826	AR02670147	

Miscellaneous

Area Monitor Technical Manual, RD-14 Detector Assembly with Check-Source, 03724301-1TM, Revision A
ARGOS-5 Calibration Data Sheet, RP-AA-700-1240, S/N 192-158, dated 8/29/2016
Calibration data sheet, RP-CA-700-1000, GEM-5 S/N 244, dated 11/4/2016
Calibration data sheet, RP-CA-700-1000, Ludlum 12/NRD S/N 112624, dated 11/1/2016

Calibration data sheet, RP-CA-700-1101, RO-20 S/N 0614, dated 4/27/2016
Calibration data sheet, RP-CA-700-1101, RO-20 S/N 0614, dated 4/27/2016
Calibration data sheet, RP-CA-700-1301, AMS-4 S/N 1438, dated 1/10/2017
Calibration report, Canberra FASTSCAN WBC System #97-6317, dated 1/7/2015
Calibration report, Canberra FASTSCAN WBC System #97-6317, dated 1/13/2016
Calibration report, High Range Radiation Monitor Calibrator RT-11, General Atomic Company, dated 6/14/1982
Calibration report, Thermo-Scientific RadEye PX with NRD, S/Ns 10490 and 371, U.S. Department of Commerce, dated 9/12/2016
Calibration, gamma spectroscopy system detector #1, GEOM 20, dated 8/23/2011
Certificate of Calibration, Eckert & Ziegler, S/N 84825-61, dated 6/23/2011
Certificate of Conformance, Electrometer/Ion Chamber 20X6-1800, S/N 32774
Counter Scaler Operability Check Data sheet, RP-CA-700-1004, for MS-2 S/N 869.
Data sheet, ITEC-668, for DRM-2 S/N 12707-027, dated 2/4/2014
Evaluation of Gamma Portal Monitors as Passive Internal Monitors, BGE: 43-0401: 14001, 2/14/2014
Instrument out of tolerance reports, 1/27/2015 to 8/18/2016
Inventory list, portable radiological survey instruments
Operation and Maintenance Manual, Sorrento High-Range Gamma Radiation Monitoring System, E-115-876, Supplement 1
Radiation work permit, CC-0-17-00206, Revision 00
Radiological survey 2016-0913, dated 12/26/2016
Report BGE-IR-94011, Containment High Range Area Radiation Monitors Impact of Extended Surveillance, Revision 0
Report, Energy Response Test and Dose Rate Calibration of Model RD-23 High-Range Radiation Monitor Detector, E-255-978, General Atomic Company, dated May 1981
RP-AA-700-1209, Calibration and Reference Data (Attachment 9), for calibrator S/N 8189
SAM Calibration Data Sheet, RP-AA-700-1501, S/N 236, dated 1/10/2017
Self-Assessment, AR02588496-2, dated 12/2/2016
Self-Assessment, AR02643361, dated 9/9/2016
Technical Manual, Area Monitor Probes AMP 50-100-200 Operation and Maintenance Manual, 15-00031, Revision 5
Technical Manual, RT-11 Calibrator Description and Operating Instructions, E-255-1040, October 1981.
Technical Manual, TelePole Wide Range Operating and Maintenance Manual, 15-00008, Revision 6
Work Order C91506782
Work Order C91511131
Work Order C91950968
Work Order C91959197
Work Order C92355127
Work Order C92355130
Work Order C92759281
Work Order C92759990

Section 2RS6: Radioactive Gaseous and Liquid Effluent Treatment

Procedures
CP-402, The Reactor Coolant Waste Hydrogen and Oxygen Sampling System, Revision 5
CP-509, Land Use Census, Revision 00400
CP-0224, Monitoring Radioactivity in systems Normally Uncontaminated, Revision 01800
CY-AA-170-210, Potentially Contaminated System Controls Program, Revision 1
EP-EC-121-1002, Calvert Cliffs Equipment Matrix, Revision 1

RP-AA-228, 10 CFR 50.75(g) and 10 CFR 72.30(f) Documentation Requirements, Revision 2
STP O-70-2, Monthly Test of "A" Train Containment Cooling Units, Iodine Removal Units, & Penetration Room Exhaust Filter, Revision 01605

Action Requests

AR02437002	AR02588721	AR02641289	AR03950970
AR02487756	AR02596284	AR02699917	AR03953054
AR02524603	AR02615799	AR02700750	AR03971805
AR02536961	AR02635064	AR02725766	

Miscellaneous

10 CFR 50.59 Review, Tritium Found In Plant Air Condensate for STP Tritium Search, IR02725766 / ECP-16-000700
Analysis, 10 CFR 61, DAW Smears, collected 3/6/2016
Annual Radioactive Effluent Release Report (2014), dated 7/14/2015
Annual Radioactive Effluent Release Report (2015), dated 7/29/2016
Annual Radiological Environmental Operating Report (2014), dated 5/8/2015
Annual Radiological Environmental Operating Report (2015), dated 5/5/2016
Assessment Report, Peer, NEI Groundwater Protection Initiative, dated 1/6/2017
Audit, NUPIC of Eckert & Ziegler Analytics, #24128, dated 4/15/2016
Certificates, radioactive source, #368-41-1, 2, and 3.
CR-2013-006381
CR93390374
L-20170101-858-C, discharge permit
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Land Use Census Around Calvert Cliffs Nuclear Power Plant, August 2015
Land Use Census Around Calvert Cliffs Nuclear Power Plant, August 2016
List, 10 CFR 50.59 Approvals, 2015-2016
Log, 10 CFR 50.75(g) Events
NOSA-CAL-16-04 (AR2670954), Chemistry, Radwaste, Effluent and Environmental Monitoring Audit Report, dated 8/16/2016
Offsite Dose Calculation Manual, Revision 00900 (including 10 CFR 50.54(q) screening forms)
PD200100001, Sinkhole Opened on North Side of Turbine Building, by M.J. Lewis
Permit, 11 Waste Gas Decay Tank Gaseous Release, G-20170207-1677-B, with associated sample results.
Results of Radiochemistry Cross-Check Program, Constellation – Calvert Cliffs, 2Q2015
Results of Radiochemistry Cross-Check Program, Exelon – Calvert Cliffs, 4Q2015, 2Q2016, 3Q2016, 4Q2016
Results of Radiochemistry Cross-Check Program, GEL Lab for Exelon, 2Q2015
Self-Assessment, AR02525806, dated 12/22/2015
Self-Assessment, AR02732352, dated 1/31/2017
Surveillance test M-549-1, dated 3/10/2014
Surveillance test M-549-1 dated 2/28/2016
System Radiological Evaluation, Tritium Found In Plant Air Condensate for STP Tritium Search, IR02725766, dated 11/3/2016
Technical Requirements Manual, Revision 02200
Updated Final Safety Analysis Report, Revision 48
Work Order C91722871
Work Order C91961321
Work Order C92158595
Work Order C92160117
Work Order C92252041
Work Order C92502702

Work Order C92759850
Work Order C92777633
Work Order C92833437
Work Order C93102369
Work Order C93121116
Work Order C93125862
Work Order C93212593
Work Order C93246395
Work Order C93594000

Section 4OA1: Performance Indicator Verification

Miscellaneous
Calvert Cliffs Nuclear Power Plant, Plan of the Day, Various dates

Section 4OA2: Problem Identification and Resolution

Action Requests
IR 03949100

Miscellaneous
Project Report CCN-99837
Project Report CCN-99441

Section 4OA3: Followup of Events and Notices of Enforcement Discretion

Action Request
IR 03949100

Miscellaneous
LER 05000318/2016-001-00, Automatic Reactor Trip Due to Main Turbine Electro-Hvdraulic Control Fluid Leak

Section 4OA5: Other Activities

Procedures
1C18, Revision 36, 13KV & 4KV Essential FDR BRK & 11 EDG
1C19, Revision 39, 13KV & 4KV Essential FDR BRK and 12 EDG
MA-AA-716-230-1003, Revision 4, Thermography Program Guide
WC-AA-8000, Revision 9, Interface Procedure between BGE/COMED/PECO and Exelon Generation (Nuclear/Power) for Construction and Maintenance Activities

Action Requests
AR 03969516*
(The asterisk to designate that it was initiated because of the NRC)

Miscellaneous
BGE work order 13844331, BGE inspection of Calvert Cliff's switchyard, dated December 27, 2017
BGE work order 13865210, BGE inspection of Calvert Cliff's switchyard, dated January 10, 2017
Lesson Plan #POI-SWYDINSP, Switchyard Inspection for the Plant Operator Continuing Training Program at the Calvert Cliffs Nuclear Power Plant

N-CC-OPS-LOR-344-1-16, Licensed Operator Requal 2016 Outage Modifications
N-CC-OPS-LOR-344-1-17, Licensed Operator Requal 2017 Outage Modifications
WO C93232535
WO C93354061
WO C93360075

LIST OF ACRONYMS

10 CFR	Title 10 of the *Code of Federal Regulations*
ADAMS	Agencywide Documents Access and Management System
AFW	auxiliary feedwater
AR	action request
ASME	American Society of Mechanical Engineers
CAP	corrective action program
CCNPP	Calvert Cliffs Nuclear Power Plant
EDG	emergency diesel generator
EHC	electro-hydraulic control
Exelon	Exelon Generation Company, LLC
GV	governor valve
HRA	high radiation area
HVAC	heating, ventilation, and air conditioning
IGSCC	intergranular stress corrosion cracking
IMC	Inspection Manual Chapter
IR	inspection report
LER	licensee event report
MOV	motor-operated valve
NRC	Nuclear Regulatory Commission
ODCM	Offsite Dose Calculation Manual
OPC	open phase condition
OWA	operator work around
RCA	root cause analysis
RCS	reactor coolant system
RFO	refueling outage
RP	radiation protection
SSC	structure, system, and component
SW	saltwater
TI	temporary instruction
TS	technical specification
UFSAR	Updated Final Safety Analysis Report
VHRA	very high radiation area
WO	work order