

## Oyster Creek 1Q/2015 Plant Inspection Findings

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### Initiating Events

**Significance:**  Dec 31, 2014

Identified By: NRC

Item Type: NCV Non-Cited Violation

#### **Reactor Head Cooling Spray Piping Flange Misalignment**

The inspectors identified a Green Non-Cited Violation (NCV) of 10 CFR Part 50, Appendix B, Criterion XVI, “Corrective Action,” because Exelon did not promptly correct a condition adverse to quality associated with reactor head cooling (RHC) spray line 2-inch upper flange installed in a configuration that exceeded the allowable acceptance criteria. Specifically, Exelon staff identified a misaligned flange condition in Issue Report (IR) 845395 but did not correct the deficiency by evaluation, repair or replacement during the 1R22 refueling outage in 2008 or subsequently during the 1R23 and 1R24 refueling outages. Exelon staff completed corrective actions to replace the flange during the 1R25 refueling outage after the NRC inspector questioned the acceptability of this condition. Exelon staff entered this issue into their corrective action program as IR 2385501.

The finding is more than minor because it is associated with the Equipment Performance attribute of the Initiating Events cornerstone and affected the cornerstone objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, misalignment of the RHC spray line flange was greater than that provided in Oyster Creek pipe specifications and resulted in additional stresses in the flange weld. This condition was identified by Exelon staff as a possible contributor to the occurrence of a through wall crack and leak in the N7B upper flange socket weld joint that was identified and repaired in November 2012, but the misalignment was not corrected at that time.

The inspectors completed IMC 0609.04, “Phase 1- Initial Screening and Characterization of Findings,” and screened the finding as very low safety significance (Green). Using Exhibit 1 of IMC 0609, Appendix A, “The Significance Determination Process for Findings At-Power,” the inspectors answered “No” to Question 1 because the worst-case degradation would be a small leak from a fatigue crack caused by operating thermal and/or mechanical loads combined with cold spring stresses. The inspectors answered “No” to Question 2 of Exhibit 1 because the degradation would only result in a small leak in the socket weld of RHC spray line 2-inch upper flange connection and would not have affected other systems used to mitigate a Loss of Coolant Accident (LOCA). Based on the leakage observed from the through-wall crack in the 2-inch socket weld during the 1R24 outage Reactor Leak Test the reactor coolant leak rate would likely be less than technical specification limits and leakage would not be expected to increase greater than the make-up capacity of a control rod drive pump. Additionally, operations personnel could have manually depressurized the reactor pressure vessel if needed and all other mitigating systems equipment was available. The inspectors determined that this finding had a Problem Identification and Resolution cross-cutting aspect because Exelon did not evaluate and take timely corrective actions to address the long-standing repetitive flange alignment issue of the reactor head cooling spray piping flange connection to RPV head N7B nozzle (P.2). 1R08

Inspection Report# : [2014005](#) (*pdf*)

**Significance:**  Dec 12, 2014

Identified By: Self-Revealing

Item Type: FIN Finding

### **Failure to Evaluate a Temporary Configuration Change**

A self-revealing finding (FIN) of very low safety significance was identified for Exelon's failure to implement the temporary configuration change program when a temporary repair was performed on condenser bellows expansion joint Y-1-26. The temporary repair impacted the design function of Y-1-26 and led to failure of the downstream side of the bellows, causing a loss of condenser vacuum and manual reactor scram on July 11, 2014. Exelon replaced both the expansion joint Y-1-26 and the 2nd stage reheater steam supply relief valve V-1-132 on July 11, 2014, during forced outage 1F35. Exelon entered this issue into the corrective action program (IR 2422831).

This finding was more than minor because it was associated with the Design Control attribute of the Initiating Events cornerstone, and adversely affected the cornerstone objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. The inspectors determined that this finding was of very low safety significance (Green) using Exhibit 1 of NRC IMC 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated June 19, 2012, because the finding did not cause both a reactor trip and the loss of mitigation equipment relied upon to transition the plant from the onset of the trip to a stable shutdown condition (e.g. loss of condenser, loss of feed water). The inspectors determined that this finding had a cross-cutting aspect in the area of Problem Identification and Resolution, Operating Experience, because Exelon did not systematically and effectively evaluate relevant internal operating experience related to a similar condenser bellows expansion joint failure in 1986. [P.5] (Section 4OA3)

Inspection Report# : [2014010](#) (*pdf*)

## **Mitigating Systems**

**Significance:** G Mar 31, 2015

Identified By: NRC

Item Type: NCV Non-Cited Violation

### **Inadequate Post Maintenance Testing for Emergency Service Water Pump Breaker**

The inspectors identified an NCV of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings" for Exelon's failure to develop an adequate post maintenance test to determine operability of the 'A' emergency service water pump breaker. Specifically, the corrective maintenance work performed on April 16, 2013, did not correct the cause of the failure and Exelon did not perform an adequate post maintenance test to verify conditions had been corrected. As a result, the emergency service water system was returned to service even though it did not meet all the requirements for operability. The issue was not identified and resolved until a subsequent surveillance test on April 17, 2013, which identified a failed breaker. Exelon entered this issue into their corrective action program (IR 2471069). Planned corrective actions include revising work order activities to specify the correct post maintenance test.

This performance deficiency is more than minor because it is associated with the Equipment Performance attribute of the Mitigating Systems cornerstone, and adversely affected its objective to ensure the availability and reliability of the systems that respond to initiating events. Specifically, the inadequate post maintenance test for 'A' emergency service water pump breaker on April 16, 2013, led to the 'A' emergency service water pump failing to perform its function during the subsequent surveillance testing on April 17, 2013. The inspectors assessed this finding in accordance with the IMC 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." The inspectors concluded that this finding did not represent an actual loss of function of the emergency service water system for greater than its technical specification allowed outage time (15 days). Therefore, the inspectors determined that this finding is of very low safety significance (Green). The inspectors determined that this finding had a cross-cutting aspect in the area of Human Performance, Work Management, in that Exelon's work planning and executing of work

activities did not include documented instructions for performing an adequate post maintenance test. [H.5]

Inspection Report# : [2015001](#) (*pdf*)

**Significance:** **Y** Feb 11, 2015

Identified By: NRC

Item Type: VIO Violation

**Exelon did not establish adequate measures for the suitability of applications of materials and processes (maintenance) for the EMRV solenoid-operated actuators.**

Inspection Report# : [2015007](#) (*pdf*)

**Significance:** **G** Dec 31, 2014

Identified By: NRC

Item Type: NCV Non-Cited Violation

**Plant Shutdown Procedure Was Inadequate For Soft Shutdown**

The inspectors identified a Non-Cited Violation (NCV) of very low safety significance (Green) of TS 6.8.1, Procedures and Programs, because Exelon did not adequately establish and maintain the plant shutdown procedure. Specifically, the procedure was not adequate in that it did not contain precautions concerning rod insertion when reactor power is below the point of adding heat; operational limitations on plant cooldown when power is below the point of adding heat and contingency actions for re-criticality during shutdown. This issue has been entered into Exelon's Corrective Action Program (CAP) as IR 2412093 and a root cause analysis was conducted.

The finding was determined to be more than minor because the finding affected the procedure quality attribute of the Mitigating System cornerstone objective to ensure the reliability and capability of systems that respond to initiating events. Specifically, the plant shutdown procedure did not contain precautions to continuously insert control rods when reactor power is less than the point of adding heat, did not define operational considerations for limiting reactor cooldown and did not contain contingency actions for return to criticality during shutdown. The inspectors determined that this finding resulted in a mismanagement of reactivity by operators in that they demonstrated an inability to anticipate and control changes in reactivity during plant operations; and subsequently used Appendix M to determine the findings significance. The bounding analysis required by Appendix M was performed by a senior reactor analyst. This conservative analysis yielded a change in core damage frequency of 8.0E-7 and the finding was determined to be of very low safety significance (Green). This finding has a cross-cutting aspect in the area of Human Performance, Documentation, because Exelon did not ensure that the shutdown procedure contained adequate controls for soft shutdown. [H.7] (Section 4OA2)

Inspection Report# : [2014005](#) (*pdf*)

**Significance:** **G** Dec 31, 2014

Identified By: NRC

Item Type: NCV Non-Cited Violation

**Procedures Not Implemented During Plant Shutdown**

The inspectors identified an NCV of very low safety significance (Green) of TS 6.8.1, Procedures and Programs, because Oyster Creek Operators did not adequately implement procedures when performing a plant shutdown. Specifically, the operators failed to ensure that all personnel on shift had received Just In Time Training (JITT) for their role in the shutdown; operators failed to perform a reactivity Heightened Level Awareness (HLA) brief for the shutdown, and did not insert SRMs in accordance with procedure. These failures contributed to two unanticipated criticalities during the shutdown. This issue has been entered into Exelon's CAP as IR 2412093 and a root cause

analysis was conducted.

The finding was determined to be more than minor because the finding affected the procedure quality attribute of the Mitigating System cornerstone objective to ensure the reliability and capability of systems that respond to initiating events. Specifically, the failure to implement procedures during the plant shutdown contributed to two unanticipated returns to criticality which required operator action to mitigate. The inspectors determined that this finding resulted in a mismanagement of reactivity by operators in that they demonstrated an inability to anticipate and control changes in reactivity during plant operations, and subsequently used Appendix M to determine the findings significance. The bounding analysis required by Appendix M was performed by a senior reactor analyst. This conservative analysis yielded a change in core damage frequency of  $8.0E-7$  and the finding was determined to be of very low safety significance (Green). This finding has a cross-cutting aspect in the area of Human Performance, Procedure Adherence, because licensed operators did not implement processes, procedures and work instructions during the plant shutdown. [H.8] (Section 40A2)

Inspection Report# : [2014005](#) (*pdf*)

**Significance:** TBD Dec 31, 2014

Identified By: NRC

Item Type: AV Apparent Violation

**EDG #2 Fan Shaft Failure Inadequate Review of Change in Maintenance Process Results in Inoperable Emergency Diesel Generator**

The inspectors identified a preliminary White finding and an associated apparent violation of 10 CFR 50, Appendix B, Criterion III, "Design Control," because Exelon failed to review the suitability of the application of a different maintenance process at Oyster Creek that was essential to a safety-related function of the Emergency Diesel Generators (EDGs). Specifically, in May 2005, Exelon changed the method for tensioning the cooling fan belt on the EDG from measuring belt deflection to belt frequency and did not verify the adequacy of the acceptance criteria stated for the new method. As a result, Exelon did not identify that the specified belt frequency imposed a stress above the fatigue endurance limit of the shaft material, making the EDG cooling fan shaft susceptible to fatigue and subsequent failure on July 28, 2014. As a consequence, Exelon also violated Technical Specification (TS) 3.7.C, since the EDG#2 was determined to be inoperable for greater than the TS allowed outage time. Exelon's immediate corrective actions included entering the issue into their corrective action program, performing an immediate replacement of the EDG#2 fan shaft, examining the EDG#1 fan shaft for extent of condition, and performing a failure analysis to determine the cause of the broken shaft.

This finding is more than minor because it is associated with the equipment performance attribute of the Mitigating Systems cornerstone and affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). In accordance with IMC 0609.04, "Initial Characterization of Findings," and Exhibit 2 of IMC 0609, Appendix A, "The Significance Determination Process for Findings At-Power," issued June 19, 2012, the inspectors screened the finding for safety significance and determined that a detailed risk evaluation was required because the finding represented an actual loss of function of a single train for greater than its TS allowed outage time. The detailed risk evaluation concluded that the increase in core damage frequency was  $5.1E-6$ , or White (low to moderate safety significance). This finding does not have an associated cross-cutting aspect because the performance deficiency is not reflective of present performance.

Inspection Report# : [2014005](#) (*pdf*)

Inspection Report# : [2014009](#) (*pdf*)

**Significance:** TBD Dec 31, 2014

Identified By: NRC

Item Type: AV Apparent Violation

**Inadequate Application of Materials, Parts, Equipment, and Processes Associated with the Electromatic Relief**

## Valves

A preliminary yellow finding and associated apparent violation of 10 CFR 50, Appendix B, Criterion III, "Design Control," and Technical Specifications 3.4.B, "Automatic Depressurization System," was identified by Exelon for the failure to establish adequate measures for selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the electromechanical relief valves (EMRVs). The violation was also preliminarily determined to meet the IMC 0305, Section 11.05, criteria for treatment as an old design issue. Specifically, on June 20, 2014, during refurbishment of EMRVs that were removed from the plant during the 2012 refueling outage, Exelon personnel identified deficiencies with the 'B' and 'D' EMRVs. As part of the planned EMRV actuator testing and refurbishment activities, Exelon personnel conducted bench testing on June 26, 2014. Both valves did not stroke satisfactorily and resulted in two inoperable EMRVs for approximately 87 days which is greater than the Technical Specifications allowed outage time of 24 hours. Exelon's immediate corrective actions included placing this issue into the corrective action program as issue report 1679428 and redesigning the EMRV actuators to ensure the spring is on the outside of the guide bushing, therefore removing the possibility of the spring to enter the guide bushing area and subsequently jamming the actuator causing valve failure. All of the actuators were replaced with the redesigned actuators during the refueling outage in October 2014. In addition, Exelon issued a 10 CFR Part 21 report to inform the industry of the deficient EMRV actuator design.

This finding was more than minor because it adversely affected the design control quality 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 design deficiency of the EMRVs and the inadequate maintenance process led to the inability of the 'B' and 'D' EMRVs to perform their safety function. The inspectors screened this issue for safety significance in accordance with IMC 0609, Appendix A, Exhibit 2, and determined a detailed risk evaluation was required because the EMRVs were potentially failed or unreliable for greater than the Technical Specification allowed outage time. As described in Attachment 3 to this report, a detailed risk evaluation concluded that the increase in core damage frequency related to failure of the 'B' and 'D' EMRVs is in the mid E-5 range; therefore, this finding was preliminarily determined to have a substantial safety significance (Yellow). Due to the nature of the failures, no recovery credit was assigned. The dominant sequences included loss of main feedwater with failures of the isolation condensers, and failure to depressurize. This finding does not present an immediate safety concern because Exelon replaced all of the actuators with the redesigned actuators during the refueling outage in October 2014. The inspectors determined that this finding did not have a cross-cutting aspect because the most significant contributor to the performance deficiency was not reflective of current licensee performance. Specifically, the inspectors determined that the performance deficiency existed since original installation of the EMRVs and that an opportunity to identify this issue following original installation was in 2006 when Quad Cities changed the EMRV actuator design due to similar issues. However, the inspectors could not conclude that the issue would have likely been identified during that period since a Part 21 Report was not issued to inform the industry and NRC of the design change and industry operating experience focused on plants that completed or will complete an extended power uprate. [Section 40A2.1.c]

Inspection Report# : [2014009](#) (*pdf*)

**Significance:**  Jun 30, 2014

Identified By: NRC

Item Type: NCV Non-Cited Violation

### **Failure to Identify and Correct High Oil Level in D Emergency Service Water Pump Upper Motor Bearing**

The NRC inspectors identified a Green NCV of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," because Exelon did not promptly identify and correct a condition adverse to quality. Specifically, Exelon did not identify and correct a high oil level condition caused by water intrusion in the 'D' emergency service water pump upper motor bearing resulting in an inoperable 'D' emergency service water pump. Following identification of the high level by the inspections, Exelon entered this issue into their corrective action program as issue report 1645010. Exelon's corrective

action included sealing joints on top of the motor that are susceptible to water intrusion.

The inspectors determined that inadequate identification and resolution of the condition adverse to quality into the corrective action program is a performance deficiency that was within Exelon's ability to foresee and correct. This finding is more than minor because it is associated with the configuration control of the Mitigating Systems cornerstone and affected the cornerstone objective of ensuring the availability, reliability and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the performance deficiency affected the reliability of an emergency service water pump to perform its safety function. This issue was also similar to Example 3j of NRC IMC 0612, Appendix E, "Examples of Minor Issues," because the condition resulted in reasonable doubt of the operability of emergency service water system. The inspectors determined that this finding was a deficiency affecting the design or qualification of a mitigating structure, system, or component (SSC), where the SSC maintained its operability or functionality. Therefore, inspectors determined the finding to be of very low safety significance (Green).

The finding has a cross-cutting aspect in the area of Problem Identification and Resolution, Corrective Action Program, because Exelon did not identify the issue associated with the high oil level in the emergency service water pump upper motor bearing oil in a timely manner in February and April 2014 [P.1]. (Section 1R15)

Inspection Report# : [2014003](#) (*pdf*)

## Barrier Integrity

**Significance:**  Mar 31, 2015

Identified By: NRC

Item Type: NCV Non-Cited Violation

### **Post Maintenance Test Results Were Not Evaluated to Assure that Technical Specifications Requirements Were Satisfied.**

The inspectors identified an NCV of 10 CFR Part 50, Appendix B, Criterion XI, "Test Control," when Exelon did not document and adequately evaluate test results to assure that test requirements had been satisfied. Specifically, Exelon did not perform the proper post maintenance test procedure to assure that the requirements of Technical Specification 4.5.G.3 were satisfied following installation of a temporary modification to secondary containment. Exelon entered this issue into the corrective action program for resolution as issue report (IR) 2440643. Corrective actions include revising the process to perform the correct post maintenance test to ensure Technical Specification 4.5.G.3 is met.

This finding is more than minor because it is associated with the configuration control (Standby Gas Trains) attribute of the Barrier Integrity cornerstone and adversely affected the cornerstone objective of providing reasonable assurance that physical design barriers protect the public from radionuclide releases caused by accidents or events. The inspectors evaluated the finding using IMC 0609.04, "Initial Characterization of Findings," issued June 19, 2012, and IMC 0609, Appendix G, Attachment 1, "Shutdown Operations Significance Determination Process: Phase 1 Initial Screening and Characterization of Findings," issued May 9, 2014. Because the finding degraded the ability to close or isolate secondary containment, the inspectors were required to further assess the finding using IMC 0609, Appendix H, "Containment Integrity Significance Determination Process," issued May 6, 2004. The inspectors determined that this finding is of very low safety significance (Green) because the decay heat values were low, given that the unit had been shut down for approximately three days, and reactor water level was greater than that required for movement of irradiated fuel assemblies within the reactor pressure vessel. This finding has a cross-cutting aspect in the area of Human Performance, Procedure Adherence, because Exelon personnel did not perform the post maintenance test specified by the work order. [H.8]

Inspection Report# : [2015001](#) (pdf)

**Significance:** N/A Mar 31, 2015

Identified By: NRC

Item Type: NCV Non-Cited Violation

### **Incomplete 50.72 and 50.73 Reports Associated with Secondary Containment Integrity**

The inspectors identified a Severity Level IV NCV of 10 CFR 50.9(a) in that Exelon did not provide complete information in reports submitted per 10 CFR 50.72 and 10 CFR 50.73. Specifically, a licensee event report (LER) submitted on November 18, 2014, did not discuss a separate, partially opened secondary containment door that was discovered during the same time frame, which could have prevented the fulfillment of the safety function of secondary containment, and therefore was required to be discussed in the original LER. Exelon entered this issue into their corrective action program as IR 2440641. Planned corrective actions include revising the original LER to add a discussion of the partially opened secondary containment door.

The inspectors determined that not providing a complete report in accordance with 10 CFR 50.9(a) is a performance deficiency that was reasonably within Exelon's ability to foresee and correct and should have been prevented. Because the issue had the potential to affect the NRC's ability to perform its regulatory oversight function, the inspectors evaluated this performance deficiency in accordance with the traditional enforcement process. In accordance with Section 2.2.2.d of the NRC Enforcement Policy, the inspectors determined that the performance deficiency identified with the reporting aspect of the event is a Severity Level IV violation because it is of more than minor concern with relatively inappreciable potential safety significance and is related to findings that were determined to be more than minor issues. In accordance with IMC 0612, Appendix B, this issue was not assigned a cross-cutting aspect.

Inspection Report# : [2015001](#) (pdf)

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## **Emergency Preparedness**

**Significance:**  Sep 30, 2014

Identified By: NRC

Item Type: NCV Non-Cited Violation

### **Inadequate Evacuation Time Estimate Submittals**

The inspectors identified an NCV of Title 10 of the Code of Federal Regulations (10 CFR) 50.54(q)(2), 10 CFR 50.47(b)(10), and 10 CFR Part 50, Appendix E, Section IV.4, for failing to maintain the effectiveness of the Oyster Creek emergency plan as a result of failing to provide the station evacuation time estimate (ETE) to the responsible offsite response organizations (OROs) by the required date. Exelon entered this issue into its corrective action program as issue reports 1525923 and 1578649. Additionally, Exelon re-submitted a new revision of the Oyster Creek ETE to the NRC on April 4, 2014, and the NRC's review of that ETE is documented in Section 1EP4 of this report.

The performance deficiency is more than minor because it is associated with the Emergency Preparedness cornerstone attribute of procedure quality and adversely affected the cornerstone objective of ensuring that the licensee is capable of implementing adequate measures to protect the health and safety of the public in the event of a radiological emergency. The ETE is an input into the development of protective action strategies prior to an accident and to the protective action recommendation decision making process during an accident. Inadequate ETEs have the potential to reduce the effectiveness of public protective actions implemented by the OROs. The finding is determined to be of very low safety significance (Green) because it is a failure to comply with a non-risk significant portion of 10 CFR 50.47(b)(10). The cause of the finding is related to a cross-cutting aspect of Human Performance, Documentation,

because Exelon did not appropriately create and maintain complete, accurate, and up-to-date documentation [H.7].

Inspection Report# : [2014004](#) (*pdf*)

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## Occupational Radiation Safety

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## Public Radiation Safety

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## Security

Although the Security Cornerstone is included in the Reactor Oversight Process assessment program, the Commission has decided that specific information related to findings and performance indicators pertaining to the Security Cornerstone will not be publicly available to ensure that security information is not provided to a possible adversary. Other than the fact that a finding or performance indicator is Green or Greater-Than-Green, security related information will not be displayed on the public web page. Therefore, the [cover letters](#) to security inspection reports may be viewed.

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## Miscellaneous

**Significance:** N/A Nov 21, 2014

Identified By: NRC

Item Type: FIN Finding

**2014 Oyster Creek Biennial PI&R Inspection Summary**

Problem Identification and Resolution

The inspectors concluded that Exelon was generally effective in identifying, evaluating, and resolving problems. Exelon personnel identified problems, entered them into the corrective action program at a low threshold, and in general, prioritized issues commensurate with their safety significance. Exelon appropriately screened issues for operability and reportability, and performed causal analyses that appropriately considered extent of condition, generic issues, and previous occurrences. The inspectors also determined that Exelon implemented corrective actions to address the problems identified in the corrective action program in a timely manner.

The inspectors concluded that Exelon adequately identified, reviewed, and applied relevant industry operating experience to Oyster Creek operations. In addition, based on those items selected for review, the inspectors determined that Exelon's self-assessments and audits were thorough.

Based on the interviews the inspectors conducted over the course of the inspection, observations of plant activities, and reviews of individual corrective action program and employee concerns program issues, the inspectors did not identify any indications that site personnel were unwilling to raise safety issues, nor did they identify any conditions that could have had a negative impact on the site's safety conscious work environment.

No findings were identified.

Inspection Report# : [2014008](#) (*pdf*)

Last modified : June 16, 2015