

Limerick 2

4Q/2011 Plant Inspection Findings

Initiating Events

Significance:  Sep 30, 2011

Identified By: Self-Revealing

Item Type: FIN Finding

Failure to Provide Adequate Restoration Instructions for Turbine Control Valve Online Maintenance

A Green, self-revealing finding was identified because Exelon did not provide adequate instructions for restoration of the Limerick Unit 2 number three turbine control valve (CV #3) following maintenance. During a fill and vent activity of the electro-hydraulic control (EHC) supply line for CV #3, a void in the system piping resulted in a low pressure condition at the next-in-series control valve, CV #1. The pressure drop actuated a relayed emergency trip system (RETS) pressure switch, generating a reactor protection system (RPS) 'B' side half scram signal. Combined with an 'A' side half scram signal that was previously inserted into RPS due to the CV #3 being maintained closed, an automatic reactor scram resulted.

The inspectors determined that Exelon's failure to provide adequate instructions for restoration of CV #3 from maintenance was a performance deficiency. The issue was more than minor because it was associated with the Procedure Quality attribute of the Initiating Events cornerstone, and it affected the cornerstone objective of limiting the likelihood of events that upset plant stability. Specifically, on May 29, 2011, Limerick Unit 2 experienced an automatic reactor scram during restoration of turbine CV #3 from maintenance. The restoration instructions in the work order (WO) did not provide sufficient guidance to address the presence of a large air void in the EHC system that had the potential to cause EHC pressure fluctuations and resulted in a reactor scram. The finding was determined to be of very low safety significance (Green) in accordance with IMC 0609 Attachment 4, "Phase 1- Initial Screen and Characterization of Findings," because the finding did not contribute to both the likelihood of a reactor trip and the likelihood that mitigation equipment or functions would not be available. This finding had a cross-cutting aspect in the area of Human Performance, Decision-Making, because Exelon did not use a systematic process to make a risk-significant decision when faced with uncertain or unexpected plant conditions. Specifically, Exelon did not recognize the potential risk of the CV #3 EHC fill and vent restoration activity, and they failed to conduct a thorough technical review of the restoration plan. [H.1.(a)] (Section 40A3.3)

Inspection Report# : [2011004](#) (*pdf*)

Significance:  Jun 30, 2011

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

Failure to Position Recirculation Isolation Valves in Accordance with Clearance

A Green, self-revealing NCV of Technical Specification (TS) 6.8.1, "Procedures and Programs," was identified for failure to position the Unit 2 recirculation loop isolation valves in accordance with the clearance instruction. As a result, the decay heat removal flow path, as provided by Unit 2 'A' residual heat removal (RHR), was in a degraded condition from April 6, 2011 until April 12, 2011, when the valve mispositioning was corrected. In addition, if the RHR system had been aligned to the Shutdown Cooling mode with the valves mispositioned in the open position, a large portion of the cooling flow would have bypassed the core, significantly impacting decay heat removal capability. Exelon entered the issue into the Corrective action Program (CAP) for resolution.

The inspectors determined that the failure to position the Unit 2 'A' loop recirculation pump suction and discharge valves to the closed positions in accordance with a clearance is a performance deficiency. This issue is more than minor because it was associated with the Configuration Control attribute of the Initiating Events cornerstone (i.e., shutdown equipment lineup), and it affected the cornerstone objective of limiting the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. This finding was determined to be of very low safety significance (Green) using IMC 0609, "Significance Determination Process",

Appendix G, “Shutdown Operations Significance Determination Process” because the finding did not require quantitative assessment (i.e., the finding did not degrade the ability to recover decay heat removal once lost). Exelon entered this issue into the CAP for resolution. Corrective actions included remediating the reactor operator who applied the main control room tag and revising the cross check program to require a concurrent verification check on clearance applications for valves being de-energized with main control room indicators.

The inspectors determined that this issue has a cross-cutting aspect in the area of Human Performance, Work Practices, because Exelon did not properly use human error prevention techniques (e.g., self and peer checking), commensurate with the risk of the assigned task. [H.4(a)] (Section 1R20)

Inspection Report# : [2011003](#) (*pdf*)

Significance:  Jun 30, 2011

Identified By: Self-Revealing

Item Type: FIN Finding

Failure to Identify Adverse Trend regarding Out of Calibration Instrumentation

A Green self-revealing finding was identified for Exelon’s failure to identify and correct an adverse trend regarding out of calibration temperature switches in the Unit 1 and Unit 2 stator cooling water (SCW) systems. Specifically, between 1990 and 2011 the SCW outlet temperature switches were checked by Exelon on a two year frequency and found to be out of calibration approximately 50 percent of the time. Since 2005, the switches were found out of calibration nearly 70 percent of the time, often by a significant amount. Each time the switches were found out of calibration, they were recalibrated within acceptable limits, but the adverse trend was not recognized. The inspectors determined that Exelon’s failure to identify and correct the adverse trend of out of calibration SCW outlet temperature switches was a performance deficiency which was reasonably within the licensee’s ability to foresee and prevent. Specifically, Exelon’s Performance Monitoring Program, described in ER-AA-2003, should have identified the trend during engineer’s annual review of cause and repair codes for completed work orders. Exelon entered the issue into the CAP for resolution.

The finding was more than minor because it was associated with the Initiating Events cornerstone and affected the cornerstone objective of limiting the likelihood of events that upset plant stability. Specifically, on February 25, 2011, the out of calibration SCW outlet temperature switches resulted in a SCW runback and manual scram of Limerick Unit 2 when they actuated 15 degrees lower than their intended set point. The finding was determined to be of very low safety significance (Green) in accordance with a Phase 1 of IMC 0609, “Significance Determination Process,” because the finding did not contribute to both the likelihood of a reactor trip and the likelihood that mitigation equipment or functions would not be available.

The inspectors determined that this finding had a cross-cutting aspect in the area of Problem Identification and Resolution, Corrective Action Program, because Exelon did not identify the trend of out-of-calibration temperature switches in a timely manner. Exelon relied on the implementation of a thorough Performance Monitoring Program to supplement their CAP in the specific area of instrument performance monitoring and trending, and this program failed to detect the adverse trend in instrument performance. [P.1(b)]

Inspection Report# : [2011003](#) (*pdf*)

Mitigating Systems

Significance:  Dec 31, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

Inadequate Corrective Actions for a Previous NRC Finding for Programmatic Deficiencies in the Preventive Maintenance Program

The inspectors identified a Green NCV of 10 CFR Part 50, Appendix B, Criterion XVI, “Corrective Action,” for

failure to implement adequate corrective actions for a previous NRC identified finding. The previous finding involved a failure to perform adequate preventive maintenance (PM) on an emergency diesel generator (EDG) due to site engineers not being fully aware of new PM requirements developed by Exelon corporate. The lack of proper PM led to a failure of the diesel in May 2010. In response to the previous finding, Limerick performed an apparent cause evaluation (ACE) and developed actions to address the causes and extent of condition. However, the inspectors identified that the actions were not properly implemented, and, as a result, the deficiency identified by the inspectors was not fully resolved. Exelon entered the issue in the Corrective Action Program (CAP) for resolution.

The inspectors determined that the failure to implement adequate corrective actions for a previous NRC-identified finding was a performance deficiency. The issue is more than minor because, if left uncorrected, it could become a more significant safety concern. Specifically, the issues identified by the inspectors impacted Limerick's ability to establish and implement appropriate PM for equipment relied on for safe operation of the plant. Until the issues are fully resolved, Limerick continues to be vulnerable to gaps in their PM program. This issue potentially affects all sites in the Exelon fleet. The finding was determined to be of very low safety significance (Green) using Attachment 4 to IMC 0609, "Significance Determination Process," because the incomplete corrective actions did not result in an actual loss of safety function.

This finding has a cross-cutting aspect I the area of Problem Identification and Resolution, Corrective Action Program, because Exelon failed to implement appropriate corrective actions for a previous NRC identified finding in timely manner. [P.1(d)] (Section 1R19)

Inspection Report# : [2011005](#) (pdf)

W Dec 08, 2011

Identified By: NRC

Item Type: VIO Violation

Failure of Feedwater MOV Resulting in RCIC Inoperability for Longer than Allowed by Technical Specifications (Final Significance Determination)

A self-revealing White finding and violation of Technical Specification (TS) 3.7.3, "Reactor Core Isolation Cooling System and TS 3.6.3, "Primary Containment Isolation Valves," was identified. The inspectors determined that the failure by Exelon to ensure sufficient technical guidance was contained in operating procedures to: 1) ensure that a Main Feedwater system (FW) motor-operated valve (MOV) could close against expected system differential pressures and 2) prevent operators from attempting to close FW MOVs out of sequence resulting in differential pressures for which they are not designed; is a performance deficiency. This resulted in the Reactor Core Isolation Cooling system (RCIC) and a Primary Containment Isolation Valve (PCIV) being inoperable from April 23 to May 23, 2011, due to FW MOVs HV-041-209B and HV-041-210 failing to fully shut. As a result, both safety related systems were inoperable for greater than their Technical Specification allowed outage times. Specifically, operations procedures did not contain adequate technical guidance to ensure that operations personnel operated HV-041-209 A&B and HV-041-210 in the proper sequence to remain within valve design limitations. This resulted in the HV-041-209B and HV-041-210 valves failing to fully close on April 22, 2011, although they indicated closed in the Main Control Room. Upon identification, Limerick operations staff fully closed the valves restoring RCIC and PCIV operability, entered the issue into the CAP as issue report 1219476 and conducted a cause evaluation. Subsequent corrective actions included an extent-of-condition review, revisions to the operating procedure, and revisions to maintenance and testing procedures.

The inspectors determined that this finding is more than minor because it is associated with the equipment performance attribute of the Mitigating Systems Cornerstone and affects the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, operating procedures, maintenance and testing were not adequately implemented to ensure that the design capability of HV-041-209B and HV-041-210 to close against expected system differential pressures was maintained. The finding was evaluated using NRC Inspection Manual Chapter 0609 Appendix A, "User Guidance for Significance Determination of Reactor Inspection Findings for At-Power Situations." Phase I, II, and III evaluations were conducted. The NRC total estimated ?CDF in this preliminary assessment is Low E-6/yr (WHITE) and the NRC total estimated Large Early Release Frequency (?LERF) in this preliminary assessment is 3.6E-9/yr (GREEN). The inspectors also determined that this issue has a cross-cutting aspect in the area of Human Performance, Resources, because Exelon did not ensure long term plant safety by maintaining design margins and minimizing

preventive maintenance deferrals [H.2. (a)]. Specifically, design limitations of the HV-041-209 A & B valves were not adequately captured in the procedural guidance, which contributed to the operators continuing on in the procedures for securing the FW long path recirculation line up when problems with the HV-041-210 valve were encountered. Additionally preventive maintenance activities which could potentially have prevented this issue were deferred without an appropriate evaluation. (Section 40A2.2)

Inspection Report# : [2011009](#) (pdf)

Significance:  Nov 04, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Verify Alternate AC Source Capability to Recover from Station Blackout

The team identified a non-cited violation of 10 CFR 50.63, “Loss of All Alternating Current (AC) Power,” because Exelon did not demonstrate that the alternate AC (AAC) source could provide acceptable capability to withstand a station blackout (SBO) within the analyzed coping timeline. Specifically, Exelon’s evaluation of the Limerick Generating Station’s excess emergency diesel generator (EDG) capacity did not analyze the effects of the loss of an operating emergency service water (ESW) pump following a single failure on the non-blacked out unit. The loss of the ESW pump would result in loss of cooling to one of the three credited EDGs and a subsequent high temperature trip of the EDG. The team determined the time delay to reset this trip had not been evaluated and that Exelon had not performed the timed test required by 10 CFR 50.63 to show that actions required to provide power to the blacked-out unit from the AAC could be performed within the analysis requirements. As a result, the team concluded that Exelon did not demonstrate that the AAC source would have the required availability and capability within the analyzed timeline. Exelon entered the issue into their corrective action program for evaluation and resolution.

This issue was more than minor because it is associated with the design control attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The team determined the finding was of very low safety significance because it was a design or qualification deficiency confirmed not to result in a loss of functionality. The finding had a cross-cutting aspect in the area in the area of Problem Identification and Resolution, Corrective Action Program Component, because Exelon did not thoroughly evaluate problems such that resolutions address causes and extent of conditions and did not conduct effectiveness reviews to ensure problems are resolved. Specifically, Exelon’s recent safety evaluation did not evaluate problems associated with a loss of an EDG due to a high temperature condition and the impact on the SBO AAC power source availability. (IMC 0310, Aspect P.1(c)) (1R17.1b)

Inspection Report# : [2011007](#) (pdf)

Barrier Integrity

Significance:  Mar 31, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Address Repeat TS Response Time Test Failures (Section 40A2.2)

The inspectors identified a Green NCV of 10 CFR Part 50, Appendix B, Criterion XVI, “Corrective Action Program,” because Exelon did not adequately evaluate and correct a condition adverse to quality regarding repeat failures of a Technical Specification (TS) surveillance test (ST). Specifically, on July 13, 2010, Exelon generated issue report (IR) 1091132 to document that ST-2-041-909-2, the Unit 2 Main Seam Line (MSL) Flow – High Response Time Test, had failed its past two performances. In both instances, in October 2008 and July 2010, multiple response time values exceeded the TS requirements, and Exelon had to replace several relays to bring the values back into compliance. After the 2008 failure Exelon performed an apparent cause evaluation (ACE) and generated one corrective action (CA) and several action items (ACITs) to address the causes. Following the 2010 failure, Exelon did not evaluate the repeat failure or generate any additional actions. The inspectors determined that the CA and ACITs from 2008 did not

thoroughly address the MSL Flow - High test failure, and the repeat test failure in 2010 was an opportunity for Exelon to re-evaluate the issue and pursue more appropriate and timely corrective actions. Exelon's failure to evaluate and correct a condition adverse to quality regarding repeat failures of a TS surveillance test was determined to be a performance deficiency (PD).

The PD was determined to be more than minor because it was associated with the System, Structure, and Component & Barrier Performance attribute of the Reactor Safety - Barrier Integrity cornerstone. The PD 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 finding was determined to be of very low safety significance (Green) in accordance with Inspection Manual Chapter 0609, Attachment 4, "Phase 1 – Initial Screening and Characterization of Findings," because it did not represent an actual open pathway in the physical integrity of reactor containment. The inspectors determined this finding had a cross-cutting aspect in the area of Problem Identification and Resolution, Corrective Action Program, because Exelon did not thoroughly evaluate the repeat MSL response time test failures to ensure the underlying causes were identified and resolved. [P.1(c)] (Section 40A2.2)

Inspection Report# : [2011002](#) (pdf)

Emergency Preparedness

Significance: SL-IV Aug 19, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

(Traditional Enforcement) Changes to EAL Basis Decreased the Effectiveness of the Plan without Prior NRC Approval

The inspector identified a finding of very low safety significance involving a Severity Level IV NCV of 10 CFR 50.54 (q) for failing to obtain prior approval for an emergency plan change which decreased the effectiveness of the plan. Specifically, the licensee modified the Emergency Action Level (EAL) Basis in EAL HU6, Revision 13, which indefinitely extended the start of the 15-minute emergency classification clock beyond a credible notification that a fire is occurring or indication of a valid fire detection system alarm. This change decreased the effectiveness of the emergency plan by reducing the capability to perform a risk significant planning function in a timely manner.

The violation affected the NRC's ability to perform its regulatory function because it involved implementing a change that decreased the effectiveness of the emergency plan without NRC approval. Therefore, this issue was evaluated using Traditional Enforcement. The NRC determined that a Severity Level IV violation was appropriate due to the reduction of the capability to perform a risk significant planning standard function in a timely manner. The licensee entered this issue into its corrective action program and revised the EAL basis to restore compliance.

The finding was more than minor using IMC 0612, because it is associated with the emergency preparedness cornerstone attribute of procedure quality for EAL and emergency plan changes, and it 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. Therefore, the performance deficiency was a finding. Using IMC 0609, Appendix B, the inspector determined that the finding had a very low safety significance because the finding is a failure to comply with 10 CFR 50.54(q) involving the risk significant planning standard 50.47(b)(4), which, in this case, met the example of a Green finding because it involved one Unusual Event classification (EAL HU6).

Inspection Report# : [2011503](#) (pdf)

Significance:  Aug 19, 2011

Identified By: NRC

Item Type: FIN Finding

Changes to EAL Basis Decreased the Effectiveness of the Plan without Prior NRC Approval

The inspector identified a finding of very low safety significance involving a Severity Level IV NCV of 10 CFR 50.54 (q) for failing to obtain prior approval for an emergency plan change which decreased the effectiveness of the plan. Specifically, the licensee modified the Emergency Action Level (EAL) Basis in EAL HU6, Revision 13, which indefinitely extended the start of the 15-minute emergency classification clock beyond a credible notification that a

fire is occurring or indication of a valid fire detection system alarm. This change decreased the effectiveness of the emergency plan by reducing the capability to perform a risk significant planning function in a timely manner. The violation affected the NRC's ability to perform its regulatory function because it involved implementing a change that decreased the effectiveness of the emergency plan without NRC approval. Therefore, this issue was evaluated using Traditional Enforcement. The NRC determined that a Severity Level IV violation was appropriate due to the reduction of the capability to perform a risk significant planning standard function in a timely manner. The licensee entered this issue into its corrective action program and revised the EAL basis to restore compliance. The finding was more than minor using IMC 0612, because it is associated with the emergency preparedness cornerstone attribute of procedure quality for EAL and emergency plan changes, and it 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. Therefore, the performance deficiency was a finding. Using IMC 0609, Appendix B, the inspector determined that the finding had a very low safety significance because the finding is a failure to comply with 10 CFR 50.54(q) involving the risk significant planning standard 50.47(b)(4), which, in this case, met the example of a Green finding because it involved one Unusual Event classification (EAL HU6).

Inspection Report# : [2011503](#) (*pdf*)

Occupational Radiation Safety

Public Radiation Safety

Physical Protection

Although the NRC is actively overseeing the Security cornerstone, the Commission has decided that certain findings pertaining to security cornerstone will not be publicly available to ensure that potentially useful information is not provided to a possible adversary. Therefore, the [cover letters](#) to security inspection reports may be viewed.

Miscellaneous

Last modified : March 02, 2012