

## Limerick 2 2Q/2013 Plant Inspection Findings

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### Initiating Events

**Significance:** G Jun 30, 2013

Identified By: Self-Revealing

Item Type: FIN Finding

#### **Failure to Follow Partial Procedure Change Process**

A self-revealing Green finding of Technical Specification 6.8.1, “Administrative Controls-Procedures,” was identified because Exelon personnel did not implement procedure use and adherence requirements when operators changed the scope of work for surveillance testing of main turbine stop and control valves. This resulted in a reactor protection system automatic scram on April 16, 2013. This issue was identified in the Exelon CAP as IRs 1503749 and 1525552

The failure of station operators to follow the partial procedure performance process during the performance of two TS required surveillances was a performance deficiency that was reasonably within Exelon’s ability to foresee and correct and could have been prevented. The performance deficiency was also contrary to Exelon’s procedure use and adherence requirements. This finding was more than minor because, if improper implementation of the partial procedure performance process is left uncorrected, the performance deficiency would have the potential to lead to a more significant safety concern such as a more severe plant transient or engineered safeguard system actuation or malfunction. Additionally, this issue is similar to example 4.b in IMC 0612, Appendix E, “Examples of Minor Issues,” in that the procedural error resulted in a reactor scram or other transient. The finding was determined to be self-revealing because it was revealed through the receipt of a scram signal during performance of a surveillance test which required no active and deliberate observation by the licensee. The finding was determined to be of very low safety significance (Green) in accordance with Appendix G of IMC 0609, "Shutdown Operations Significance Determination Process," because the finding did not require a quantitative assessment. A quantitative assessment was not required because the finding did not cause a loss of thermal margin, a loss of inventory, or degrade the ability to add inventory to the reactor coolant system.

This finding had a cross-cutting aspect in the area of Human Performance, Decision Making, because Exelon did not ensure that personnel made safety-significant or risk significant decisions using a systematic process to ensure that safety is maintained [H.1(a)]. Specifically, the partial procedure performance process was not properly implemented which resulted in plant conditions that were improper for the next evolution. This resulted in a reactor protection system automatic scram on April 16, 2013. (Section 4OA3.1)

Inspection Report# : [2013003](#) (*pdf*)

**Significance:** G Sep 30, 2012

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

#### **Failure to Establish and Perform Adequate Preventive Maintenance on 480VAC Load Center Power Transformers**

A self-revealing NCV of Limerick Technical Specification (TS) 6.8, “Procedures and Programs,” was identified for failure to establish and perform adequate preventive maintenance (PM) activities to routinely inspect the 480 volt-alternating current (VAC) load

center power transformers. As a result, Limerick experienced a transformer related fault that could have been prevented by PM which resulted in a manual reactor scram of Unit 1 on July 18, 2012. Corrective actions implemented by Limerick as a result of this transformer failure included advancing the thermography window installation schedule to align with each transformers feeder breaker trip test calibration. Limerick also performed thermography inspections on the other load center transformers and developed corrective actions (Issue Report (IR) 1355930 and 1390033) to reinstitute the clean and inspect PM on all load center transformers at an increased frequency of 8 years vice 20 years.

The finding was determined to be more than minor because it was associated with the Initiating Events cornerstone and 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. The finding was determined to be of very low safety significance because the finding caused a reactor trip but not the loss of mitigation equipment relied upon to transition the plant from the onset of the trip to a stable shutdown condition. This finding was determined to have a cross-cutting aspect because, although the performance deficiency occurred more than three years ago, the performance characteristic associated with ineffective PM implementation continues to exist within Limerick's PM program and is indicative of present performance. The cross-cutting aspect associated with this performance deficiency is in the Resources component of the Human Performance area because the licensee did not ensure that personnel, equipment, procedures and other resources were adequate to assure long term plant safety through maintenance and the minimization of long-standing equipment issues [H.2 (a)]. (Section 40A3.7)

Inspection Report# : [2012004](#) (pdf)

## Mitigating Systems

**Significance:** G Jun 30, 2013

Identified By: NRC

Item Type: NCV NonCited Violation

### **Failure to Identify and Correct a Condition Adverse to Quality Associated with Emergency Diesel Generator D24**

The inspectors identified a Green non-cited violation (NCV) of 10 Code of Federal Regulation (CFR) 50, Appendix B, Criterion XVI, "Corrective Action", because Exelon personnel did not identify and correct a condition adverse to quality associated with emergency diesel generator (EDG) D24 lubricating oil pipe fitting supports. This resulted in EDG D24 being in a degraded condition from November 2012 until the condition was corrected in May 2013. Exelon personnel entered this issue into the CAP as IRs 1507365, 1509125, 1511869, 1512745, 1526780, and 1528088.

The failure of Exelon personnel to identify and correct the degraded instrument line clamp and insert on EDG D24's lubricating oil supply pressure sensing line following the failure of a pipe fitting on November 13, 2012 is a performance deficiency that was reasonably within Exelon's ability to foresee and correct. The issue report (IR) written to document the issue (IR 1439284) was inappropriately classified as not a Critical Component Failure. This resulted in the issue receiving a lower level of investigation (work group evaluation versus an apparent cause or root cause evaluation). This NRC-identified finding was more than minor because it is associated with equipment performance and affected the Mitigating System cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating event to prevent undesirable consequences. The inspectors evaluated the finding using Appendix A, "The Significance Determination Process for Findings At-Power," to IMC 0609,

“Significance Determination Process.” Exelon personnel conducted vibration tested which determined that the pipe fitting crack initiation and propagation occurred during engine slow start speed acceleration. This was based vibration data which showed two vibration peaks at speeds during the acceleration. Also, the crack did not propagate during normal speed operation based on the fact that the leak size did not increased during monthly testing on April 27, 2013. The inspectors determined this finding did not represent an actual loss of function of a single train for greater than it Technical Specification Allowed Outage Time. Therefore, the inspectors determined the finding to be of very low safety significance (Green).

This finding had a cross-cutting aspect in the area of Problem Identification and Resolution, Corrective Action Program, because Exelon personnel did not thoroughly evaluate the cause of the November 12, 2012 lubricating oil system pipe fitting crack such that the resolutions address causes and extent of conditions [P.1(c)]. Specifically, although failure analysis determined that the cause of the pipe fitting failure was due to high cycle fatigue a thorough investigation into all potential causes (e.g., excessive vibrations, missing pipe support) was not performed. This resulted in EDG D24 being inoperable for greater than the TS allowed outage time from November 13, 2012 until the condition was corrected on May 12, 2013. (Section 1R15)

Inspection Report# : [2013003](#) (*pdf*)

**Significance:**  May 24, 2013

Identified By: NRC

Item Type: NCV NonCited Violation

**Inadequate Fire Brigade Transportation**

The NRC identified a Green, Non-Cited Violation (NCV) of License Condition 2.C.(3) of the Limerick Generating Station operating license, in that Exelon did not provide adequate procedural guidance for transporting the fire brigade and equipment to the spray pond pump house. Specifically, the existing fire procedure had incorrect guidance which would have needlessly delayed the fire brigade response. In response to this issue, Exelon initiated IR 1511763 and took prompt action to revise the affected procedures.

The finding was more than minor because it negatively affected the protection against external factors (fire) attribute of the mitigating systems cornerstone as related to the objective of ensuring the reliability and availability of the Essential Service Water pumps and Residual Heat Removal Service Water pumps. The finding was determined to be of very low safety significance (Green) in accordance with Section D of Exhibit 2 in Appendix A of IMC 0609, "The Significance Determination Process for Findings at Power," because the fire brigade's response time was mitigated by other defense-in-depth elements such as: area combustible loading limits were not exceeded, installed fire detection systems were functional, and alternate means of safe shutdown were not impacted. The finding did not have a cross-cutting aspect because it was not indicative of current performance. (Section 1R05.03)

Inspection Report# : [2013007](#) (*pdf*)

**Significance:**  May 24, 2013

Identified By: NRC

Item Type: FIN Finding

**Failure to Establish Preventive Maintenance for Safe Shutdown Transfer/Isolation Switches**

The NRC identified a Green finding for the failure to establish a preventive maintenance strategy for fire safe shutdown transfer/isolation switches in accordance

with the Exelon procedure ER-AA-200, Preventive Maintenance Program. As a result, Exelon failed to ensure that the local control circuits for several 4KV breakers would be isolated from the effects of fire damage. In response to this issue, Exelon generated IR 01515025, and initiated actions to evaluate the switches and implement appropriate maintenance programs.

This finding was more than minor because it was associated with the protection against external factors (fire) attribute 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, by failing to establish a preventive maintenance strategy for fire safe shutdown transfer/isolation switches, Exelon did not ensure that the local control circuits for several 4KV breakers would be isolated from the effects of fire damage. The team determined that the finding was of very low safety significance (Green), based on IMC 0609, Appendix F, "Fire Protection Significance Determination Process," task number 1.3.1 because Exelon had demonstrated a reasonable expectation of functionality for these switches by recently testing comparable switches. The finding did not have a crosscutting aspect because it was not indicative of current performance. (Section 1R05.06)

Inspection Report# : [2013007](#) (pdf)

**Significance:**  Dec 31, 2012

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

**Failure to Revise EDG Tank Cleaning Work Instructions**

A self-revealing Green NCV of Technical Specification 6.8.1, "Administrative Controls-Procedures," was identified because Exelon did not implement procedure use and adherence requirements when workers changed the scope of work on EDG fuel oil day tanks and did not revise the work instructions when they determined that work could not be performed as written. This resulted in EDG D13 accruing approximately 40 hours of unplanned unavailability between December 14 and 16, 2012.

This finding was more than minor because it was associated with the human performance attribute 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. The finding was determined to be self-revealing because it was revealed through the receipt of alarms during operation which required no active and deliberate observation by the licensee. The finding was determined to be of very low safety significance (Green) in accordance with IMC 0609, Appendix A, "The Significance Determination Process for Findings at Power," because the finding did not represent an actual loss of function a single train for greater than the TS allowed outage time.

This finding had a cross-cutting aspect in the area of Human Performance, Work Practices, because Exelon did not ensure that personnel followed procedures [H.4(b)]. Specifically, work order procedural steps to clean the fuel oil tank were not completed and a procedurally required change to written work instructions was not implemented when station personnel determined that the fuel oil tank cleaning would be based on the need to clean the tank as determined by tank inspection results. (Section 1R19)

Inspection Report# : [2012005](#) (pdf)

**Significance:**  Dec 31, 2012

Identified By: NRC

Item Type: FIN Finding

### **Failure to Administer an NRC Annual Operating Test Simulator Scenario Re-examination That Met Procedural Requirements**

The inspectors identified a Green finding of of Exelon procedure TQ-AA-150, "Operator Training Programs," and TQ-AA-155, "Conduct of Simulator Training and Evaluation," based on a determination that the minimum number of scenarios required for simulator re-examination was not administered following a crew failure of the dynamic simulator scenario portion of the annual operating exam during week two of the 2012 Licensed Operator Requalification Training (LORT) Annual Operating Test. The Exelon entered this finding into their corrective action process (IR 1437839), conducted a prompt investigation (PINV), assigned an action to complete the annual operating exam scenario set for the crew in question, and initiated an Apparent Cause Evaluation.

The inspectors determined that the finding was more than minor because it was associated with the Human Performance attribute of the Mitigation 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 (i.e., core damage). The risk importance of this issue was evaluated using IMC 0609, Appendix I, "Licensed Operator Requalification Significance Determination Process (SDP)." Based on this screening criteria, the finding (inadequate retest) was characterized by the SDP as having very low safety significance (Green) because crew remediation was conducted and a partial re-evaluation performed. The finding has a cross-cutting aspect in the area of Human Performance, Work Practices, H.4(b), in that personnel work practices did not support human performance since personnel did not follow their procedural requirements to determine and ensure that simulator scenario re-exam administered following a failed Annual Operating Test was commensurate with the original exam failure.

FIN 05000352, 353/2012005-01, Failure to Administer an NRC Annual Operating Test Simulator Scenario Re-examination That Met Procedural Requirements

Inspection Report# : [2012005](#) (pdf)

**Significance:**  Dec 18, 2012

Identified By: NRC

Item Type: NCV NonCited Violation

### **Inadequate Evaluation of Voltage to Safety-Related Equipment with Offsite Power Available**

The team identified a non-cited violation of Title 10 of the Code of Federal Regulations (10 CFR) Part 50, Appendix B, Criterion III, "Design Control," which states, in part, "design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program." The team determined that Exelon did not verify that adequate voltages would be available to safety-related equipment powered from the 4kV, 480vac, and 120Yac distribution systems during a design basis loss-of-coolant accident with offsite power available. Specifically, the team found that Exelon assumed a non-conservative offsite power voltage at the start of the event, used a non-conservative assumption for motor starting times, and did not have calculations that determined the minimum voltage level for the 480 Vac and 120Yac distribution level during post event electrical transients. Following questions from the team Exelon entered the issue into their corrective action program, revised existing calculations, performed new calculations, and completed evaluations to ensure that the minimum voltage level that would be reached during an event would be adequate at all three voltage levels. The team reviewed these calculations and evaluations and concluded the results of the work performed during the inspection were reasonable.

The team determined that the failure to verify adequate voltages at all voltage levels to

safety-related equipment during a design basis loss-of-coolant accident was a performance deficiency. This issue was more than minor because it was similar to IMC 0612, Appendix E, "Examples of Minor Issues," Example 3.j, in that the design analysis deficiency resulted in a condition where the team had reasonable doubt of operability of the safety-related busses. In addition, it was 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 (Green) because it was a design or qualification deficiency confirmed not to result in loss of operability or functionality. This finding had a crosscutting aspect in the area of Human Performance, Resources, because Exelon did not provide complete, accurate and up-to-date design documentation to plant personnel and because these calculations had been recently revised. (IMC 0310, H.2(c)) (Section 1R21.2.1.1 5.1 )

Inspection Report# : [2012007](#) (pdf)

**Significance:**  Dec 18, 2012

Identified By: NRC

Item Type: NCV NonCited Violation

#### **480V Motor Control Circuit Breaker Overcurrent Protection**

The team identified a finding of very low safety significance (Green) involving a non-cited violation of Limerick Generating Station License Condition 2.C.(3), "Fire Protection," which states Exelon Generation Company shall implement and maintain in effect all provisions of the approved Fire Protection Program as described in the UFSAR. Specifically, the team found that Exelon's multiple high impedance fault (MHIF) analysis, developed to verify that post-fire safe shutdown equipment would remain available, used non-conservative overcurrent trip setpoints for 480 volt overcurrent protection devices. Specifically, the team found that molded case circuit breaker overcurrent protection did not protect against all possible faults currents that could be present on downstream equipment. "As a result, fault current greater than that assumed in the MHIF analysis could propagate past the circuit breaker and trip upstream equipment. Exelon entered the issue into their corrective action program and performed an analysis that showed credited equipment would be available. The team concluded the results of the work performed were reasonable.

The team determined that Exelon's selection of breaker trip values for use in the MHIF analysis was non-conservative and was a performance deficiency. Specifically, the post-fire safe shutdown MHIF analysis did not use worst case or maximum fault current to verify that fire induced fault currents that propagated past branch feeder circuit breakers would not cause the motor control center source breaker to overload and trip. This issue was more than minor because it was similar to IMC 0612, Appendix E, "Examples of Minor Issues," Example 3.j, in that the design analysis deficiency resulted in a condition where the team had reasonable doubt of operability of the MCC during a fire. In addition, this issue was associated with the Fire Protection 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 (Green) because the finding affected the post-fire safe shutdown category and it had a low degradation rating. This finding did not have a cross-cutting aspect because the design requirements of the breakers had not changed from initial startup and therefore it does not

reflect current licensee performance. (Section 1R21.2.1.15.2)

Inspection Report# : [2012007](#) (*pdf*)

**Significance:**  Sep 30, 2012

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

### **Inadequate Post Maintenance Testing Following Circuit Breaker Replacement**

A self-revealing NCV of TS 6.8, “Procedures and Programs,” was identified because Exelon did not maintain adequate maintenance procedures associated with work performed on the Unit 2 ‘B’ residual heat removal (RHR) pump motor circuit breaker. Specifically, Exelon did not perform appropriate post maintenance testing following the replacement of the Unit 2 ‘B’ RHR pump breaker on November 30, 2011. Despite the circuit breaker replacement affecting necessary pump support equipment operation due to circuit breaker dimensional differences, the procedure did not require a check to assure the support equipment was not adversely affected following the installation. As a result, the Unit 2 ‘B’ RHR pump was inoperable for the low pressure coolant injection function when the pump was operating in the suppression pool cooling mode because the pump’s minimum flow valve would not have opened automatically following the receipt of a loss of coolant accident signal. This condition existed from November 30, 2011 until the condition was corrected on June 27, 2012. This issue was entered into the Exelon CAP as IR 1381792. This self-revealing finding was determined to be more than minor because it is associated with the procedure quality 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. The finding was determined to be of very low safety significance (Green) because it did not represent a loss of system function and did not represent an actual loss of function for two separate safety systems out-of-service for greater than its TS Allowed Outage Time. The finding had a cross-cutting aspect in the area of Human Performance, Resources, because Exelon did not provide work packages with sufficient detailed instructions to assure nuclear safety [H.2(c)]. (Section 4OA2.2)

Inspection Report# : [2012004](#) (*pdf*)

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## **Barrier Integrity**

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## **Emergency Preparedness**

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## **Occupational Radiation Safety**

**Significance:**  Jun 30, 2013

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

### **Failure to Adhere to Radiation Protection Procedures for Evacuation of the Unit 2 Upper Drywell in Preparation for Irradiated Component Moves**

The inspectors identified a self-revealing finding of very low safety significance associated with failure to comply with Technical Specification (TS) 6.8 procedures. Specifically, the inspectors identified that the licensee failed to implement radiation protection procedure requirements associated with clearance of personnel from the upper levels of the Unit 2 Reactor Drywell in preparation for removal and movement of irradiated core component from the Unit 2 reactor vessel. The licensee entered this issue into their corrective action plan (CAP) (IR 1495585).

The failure to adhere to Technical Specification required radiation protection procedures for personnel exposure control for irradiated core component movement is a performance deficiency. The performance deficiency was determined to be more than minor because it was related to the Programs and Process attribute of the Occupational Radiation Safety Cornerstone, and adversely affected the cornerstone objective to ensure adequate protection of worker health and safety from exposure to radiation from radioactive material during routine reactor operation. Further, if left uncorrected, the performance deficiency had the potential to lead to a more significant safety concern if personnel were locked in the area and irradiated hardware dropped above their work location. The finding was not subject to traditional enforcement because it was not associated with a violation that impacted the regulatory process and did not contribute to actual safety consequences. The finding was assessed using IMC 0609, Appendix C, 2 Enclosure "Occupational Radiation Safety SDP," , dated August 19, 2008, and was determined to be of very low safety significance (Green) because it was not related to As-Low-As-Is-Reasonably-Achievable (ALARA), did not result in an overexposure or a substantial potential for overexposure, and did not compromise the licensee's ability to assess dose. This finding was associated with the Work Control aspect of the Human Performance cross-cutting component. Specifically, the licensee did not effectively coordinate this work activity by incorporating actions to address the impact of the work on different job activities, and the need for work groups to maintain interfaces and communicate, coordinate, and cooperate with each other during activities in which interdepartmental coordination is necessary to assure plant and human performance (H.3 (b)). (Section 2RS1)

Inspection Report# : [2013003](#) (*pdf*)

**Significance:** N/A Oct 18, 2012

Identified By: NRC

Item Type: NCV NonCited Violation

#### **Failure to Follow Radiation Protection Procedures for Personnel Monitoring**

NRC Letter, dated October 18, 2012 (ML12292A140), documented an NRC Office of Investigation review to determine whether a contract foreman deliberately failed to follow procedures on the use of electron dosimetry while at Limerick (NRC Investigation Report Number 1-2012-030). The NRC concluded that the contract foreman deliberately failed to follow an NRC-required procedure (RP-AA-1008) regarding the use of dosimetry and that the issue was being treated as an NCV. In order to facilitate entering this issue into the NRC's Plant Issues Matrix and assessment process this issue is identified as NCV 05000352, 353/2012005-03, Failure to Follow Radiation Protection Procedures for Personnel Monitoring.

Inspection Report# : [2012005](#) (*pdf*)

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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 09, 2012

Identified By: NRC

Item Type: FIN Finding

### **Biennial PI&R inspection summary**

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 prioritized issues commensurate with their safety significance. In most cases, 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 typically implemented corrective actions to address the problems identified in the corrective action program in a timely manner. Notwithstanding, the inspectors identified one finding in the area of prioritization and evaluation of issues.

The inspectors concluded that, in general, Exelon adequately identified, reviewed, and applied relevant industry operating experience to LGS 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.

Inspection Report# : [2012010](#) (*pdf*)

Last modified : September 03, 2013