

Limerick 1

2Q/2013 Plant Inspection Findings

Initiating Events

Significance: G Nov 09, 2012

Identified By: NRC

Item Type: FIN Finding

Failure to Take Timely Corrective Actions to Address the 144D Load Center ODM contingency actions

Green. The inspectors identified a finding of very low safety significance (Green) for Exelon's failure to complete an evaluation of the off-normal bus alignment prior to the summer period. Consequently, on July 18, 2012, LGS experienced a fault of the 124A load center (LC) transformer which led to an unplanned manual scram. Exelon's root cause evaluation for this event identified that a contributing cause was the electrical configuration being in an off-normal bus alignment (114A LC cross-tied to the 124A LC) for an extended period due to the failure of the 144D transformer, which placed more load on the degraded 124A connection and contributed to its failure. Exelon has entered the issue into the corrective action program (AR 1437657).

This finding was more than minor because it is similar to examples 4.f and 4.g of IMC 0612, Appendix E, "Examples of Minor Issues," in that operators inserted a manual scram per procedural requirements following the loss of the reactor recirculation pumps (RRP) associated with the 124A LC transformer failure. Additionally, the finding was 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. This finding was of very low safety significance (Green) because the finding did cause a reactor trip but did not cause a loss of mitigation equipment relied upon to transition the plant from the onset of the trip to a stable shutdown condition. This finding had a cross-cutting aspect in the Problem Identification and Resolution cross-cutting area, Corrective Action Program component, because Exelon did not take appropriate corrective actions to address safety issues and adverse trends in a timely manner, commensurate with their safety significance and complexity [P.1(d)]. Specifically, Exelon's failure to restore the normal 124A LC alignment or evaluate the effects of continuing the off-normal alignment during the summer period in a timely manner placed additional loading on the transformer contributing to the failure. (Section 4OA2.1.c)

Inspection Report# : [2012010](#) (*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 4OA3.7)

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

Mitigating Systems

Significance: G 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: G 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: G Mar 31, 2013

Identified By: NRC

Item Type: FIN Finding

Failure to Adequately Assess Battery Charger Operability in a Timely Manner

The inspectors identified a Finding (FIN) of very low safety significance (Green) for the failure to adequately assess the operability of multiple safeguard battery chargers in a timely manner after an issue report (IR) was generated for battery charger testing concerns. Specifically, although the IR documented as-found current limit settings for safeguard battery chargers that were below Technical Specification (TS) minimum values, the operability basis documented that no operability concern existed because the battery chargers had passed their most recent TS surveillance tests and no explanation for the unexpected test results was given. Following questions from the inspectors regarding the operability bases of the battery chargers, Exelon staff performed an in-depth operability determination which factored in battery charger maintenance history, preventive maintenance practices, past operating experience, and vendor input. Exelon personnel entered this issue into their corrective action plan (CAP) as IR1486275 and plan to perform an evaluation to address the shortcomings in the initial operability determination.

The performance deficiency 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). This finding was also similar to examples 3.j and 3.k of IMC 0612, Appendix E. Specifically, in the absence of any further engineering evaluation, there was reasonable doubt of operability of multiple safeguard battery chargers at power operations. This finding was evaluated in accordance with NRC IMC 0609, Attachment 4, "Phase 1 – Initial Screening and Characterization of Findings," and determined to be of very low safety significance (Green) because the finding does not affect the operability of the system, does not represent a loss of system and/or function, and does

not represent an actual loss of function of at least a single train for greater than its technical specification allowed outage time.

The inspectors determined the finding has a crosscutting aspect in Human Performance, Decision-Making, because Exelon personnel did not make a safety-significant decision using a systematic process, especially when faced with uncertain or unexpected plant conditions, to ensure that safety was maintained. Specifically, Exelon personnel did not adequately assess the operability of multiple safeguard battery chargers in a timely manner after an IR was generated for battery charger testing concerns that called into question the operability of safeguard battery chargers [H.1(a)]. Enforcement action does not apply because the performance deficiency did not involve a violation of a regulatory requirement.

Inspection Report# : [2013002](#) (*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: G Sep 30, 2012

Identified By: NRC

Item Type: VIO Violation

Failure to Immediately Reduce Reactor Power per the Alarm Response Card Procedure

The inspectors identified a cited violation of very low safety significance (Green) of TS 6.8, "Procedures and Programs," because Limerick operators did not adequately follow an alarm response procedure when responding to a MCR alarm on July 11, 2012.

Specifically, the operators failed to immediately reduce power per the alarm response card (ARC) procedure, ARC-MCR-107-A2, 'Turbine Control Valve / Stop Valve Scram Bypassed,' after the MCR received the alarm condition. The operators decided to delay the immediate reduction in reactor power to validate the control room alarm indication. Overall, it took operators one hour and forty-nine minutes to commence reducing reactor power per procedure. This finding is being cited because not all of the criteria specified in Section 2.3.2.a of the NRC Enforcement Policy for a non-cited violation were satisfied in that Exelon failed to restore compliance within a reasonable amount of time after the violation was identified. Specifically, the violation was communicated to Exelon Management by the inspectors on August 22, 2012. However, this violation was not entered into the Exelon CAP, as IR 1429761, until October 22, 2012 and no interim corrective actions were identified until Standing Order 12-08 was issued on October 22, 2012 to provide operator guidance, 103 days after the initial event.

The finding was determined to be more than minor because it affected the human performance 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, it resulted in operators not reducing reactor power immediately as required for reactor protection. The inspectors determined this finding did affect a single RPS trip signal but did not affect the function of other redundant trips or diverse methods of reactor shutdown, did not involve control manipulations that unintentionally added positive reactivity, and did not result in a mismanagement of reactivity by operators. 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 Human

Performance, Work Practices, because operators did not follow procedures [H.4(b)].
(Section 1R15.2)

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

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

Significance:  Sep 30, 2012

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to enter Technical Specifications in a Timely Manner

The inspectors identified a NCV of very low safety significance (Green) of TS 3.3.1.1, "Reactor Protection System (RPS) Instrumentation," because Limerick operators did not enter the required TS action in a timely manner in response to an RPS instrumentation line failure. Specifically, following the main control room (MCR) receipt of the Unit 1 'Turbine Control Valve / Stop Valve Scram Bypassed' alarm and equipment operator verification that the 'C' and 'D' channels of RPS circuitry were potentially bypassed indicating a possible loss of RPS function, action by the MCR operators to enter the applicable TS action statement was delayed by over an hour while RPS electrical prints were reviewed to verify inputs to the RPS circuitry. This issue was entered into Exelon's CAP as IR 1387851 and an apparent cause evaluation was conducted.

The finding was determined to be more than minor because it is associated with the human 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. Specifically, operators did not reduce thermal power within 15 minutes as required for reactor protection. The inspectors determined this finding did affect a single RPS trip signal but did not affect the function of other redundant trips or diverse methods of reactor shutdown, did not involve control manipulations that unintentionally added positive reactivity, and did not result in a mismanagement of reactivity by operators. Therefore, the inspectors determined the finding to be of very low safety significance (Green). This finding had a cross-cutting aspect in the 5

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area of Human Performance, Decision-Making, because operators did not use conservative assumptions in decision making and promptly apply readily available information contained in the ARC, TS Bases, and equipment operator reports to determine TS applicability for the alarm condition [H.1(b)]. (Section 1R15.1)

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

Barrier Integrity

Emergency Preparedness

Occupational Radiation Safety

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*)

Public Radiation Safety

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.

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