UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
2100 RENAISSANCE BOULEVARD, SUITE 100
KING OF PRUSSIA, PA 19406-2713

February 1, 2018

EA-17-185
EA-17-191

Mr. Bryan C. Hanson
Senior Vice President, Exelon Generation Company, LLC
President and Chief Nuclear Officer, Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: LIMERICK GENERATING STATION – INTEGRATED INSPECTION REPORT 05000352/2017004 AND 05000353/2017004 AND EXERCISES OF ENFORCEMENT DISCRETION

Dear Mr. Hanson:

On December 31, 2017, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Limerick Generating Station (LGS), Units 1 and 2. On January 12, 2018, the NRC inspectors discussed the results of this inspection with Frank Sturniolo, Plant Manager, and other members of your staff. The results of this inspection are documented in the enclosed report.

NRC inspectors documented one finding of very low safety significance (Green) in this report. This finding involved a violation of NRC requirements. The NRC is treating this violation as a non-cited violation (NCV) consistent with Section 2.3.2.a of the Enforcement Policy.

The inspectors also reviewed Licensee Event Reports 50-352,353/2017-001-00, which described the details regarding an issue with relays in the main control room heating, ventilation, and cooling system, and 50-353/2017-004-00, which described the details regarding a reactor coolant system pressure boundary leak from a Unit 2 reactor pressure vessel instrument nozzle. Although both of these issues constituted violations of technical specifications, the NRC concluded that they were not within Exelon's ability to foresee and correct, Exelon's actions did not contribute to the degraded conditions, and the actions taken were reasonable to address the issues. As a result, the NRC did not identify any performance deficiencies. A risk evaluation was performed, and the issues were determined to be of very low safety significance (Green). Based on the results of the NRC's inspection and assessment, I have been authorized, after consultation with the Director, Office of Enforcement, and the Regional Administrator to exercise enforcement discretion, in accordance with NRC's Enforcement Policy Section 2.2.4, "Using Traditional Enforcement to Disposition Violations Identified at Power Reactors," and Section 3.10, "Reactor Violations with No Performance Deficiencies."

If you contest the violation or significance of the NCV, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U. S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region I; the Director, Office of Enforcement; and the NRC Resident Inspector at Limerick Generating Station. In addition, if you disagree with a cross-cutting aspect assignment in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the U. S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC, 20555-0001; with copies to the Regional Administrator, Region I, and the NRC Resident Inspector at the Limerick Generating Station.

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

Sincerely,

/RA/

Erin E. Carfang, Acting Branch Chief
Reactor Projects Branch 4
Division of Reactor Projects

Docket Nos. 50-352 and 50-353
License Nos. NPF-39 and NPF-85

Enclosure:
Inspection Report 05000352/2017004
and 05000353/2017004 w/Attachment:
Supplementary Information

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SUBJECT: LIMERICK GENERATING STATION – INTEGRATED INSPECTION REPORT AND EXERCISE OF ENFORCEMENT DISCRETION 05000352/2017004 AND 05000353/2017004 DATED FEBRUARY 1, 2018

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REGION I

Docket Nos.:	50-352 and 50-353
License Nos.:	NPF-39 and NPF-85
Report No.:	05000352/2017004 and 05000353/2017004
Licensee:	Exelon Generation Company, LLC
Facility:	Limerick Generating Station, Units 1 & 2
Location:	Sanatoga, PA 19464
Dates:	October 1, 2017 through December 31, 2017
Inspectors:	S. Rutenkroger, PhD, Senior Resident Inspector M. Fannon, Resident Inspector H. Anagnostopoulos, Senior Health Physicist C. Bickett, Senior Reactor Inspector K. Mangan, Senior Reactor Inspector J. D'Antonio, Senior Operations Engineer
Approved By:	Erin E. Carfang, Acting Branch Chief Reactor Projects Branch 4 Division of Reactor Projects

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SUMMARY

IR 05000352/2017004 and 05000353/2017004; 10/1/17 – 12/31/17; Limerick Generating Station Units 1 and 2; Follow-Up of Events and Notices of Enforcement Discretion.

This report covered a three-month period of inspection by resident inspectors and announced baseline inspections performed by regional inspectors. The inspectors identified one non-cited violation of very low safety significance (Green and/or Severity Level IV). The significance of most findings is indicated by their color (i.e., greater than Green, or Green, White, Yellow, Red) and determined using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process", dated April 29, 2015. Cross-cutting aspects are determined using IMC 0310, "Aspects Within Cross-Cutting Areas," dated December 4, 2014. All violations of Nuclear Regulatory Commission (NRC) requirements are dispositioned in accordance with the NRC's Enforcement Policy, dated November 1, 2016. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 6.

Cornerstone: Mitigating Systems

- Green. The inspectors identified a self-revealing Green non-cited violation (NCV) of 10 *Code of Federal Regulations* (CFR) 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," for Exelon's failure to adequately establish post-maintenance testing instructions for a relay replacement for the Unit 2 high pressure coolant injection (HPCI) system. Specifically, implementing the instructions caused a loss of all suction sources and unplanned inoperability of the Unit 2 HPCI system. Exelon initiated a condition report (issue report (IR) 4036417) and conducted a technical human performance (THU) workshop with the maintenance planning department to increase awareness of THU tools and added THU behavior discussion topics to weekly maintenance planning department all hands meetings.

  This finding is more than minor because it adversely affected the configuration control attribute of the mitigating systems cornerstone to ensure the availability of systems that respond to initiating events to prevent undesirable consequences (i.e. core damage). Specifically, HPCI was made inoperable when it was planned to remain operable. Using IMC 0609, Appendix A, Exhibit 2, the inspectors determined that this finding required a detailed risk assessment because it represented a loss of the single train system's function. The Regional Senior Reactor Analyst performed a detailed risk evaluation using the Limerick Generating Station (LGS) Unit 2 Standardized Plant Analysis Risk Model. The issue was modeled with a HPCI failure to start due to the suction valves being closed. The change in core damage frequency per year was determined to be in the low E-9 range due to the very short duration that both suction sources were isolated. Therefore the issue was determined to be of very low safety significance (Green). The inspectors determined that this finding has a cross-cutting aspect in the area of Human Performance, Work Management, because the work process did not ensure individuals were aware of plant status and the changes in the plan of work were not effectively implemented. [H.5] (Section 4OA3)

REPORT DETAILS

Summary of Plant Status

Unit 1 began the inspection period at 100 percent power. On December 9, 2017, operators reduced power to approximately 78 percent for a rod pattern adjustment. Operators returned the unit to 100 percent on December 10, 2017. The unit remained at or near 100 percent power for the remainder of the inspection period.

Unit 2 began the inspection period at 100 percent power. On October 8, 2017, operators commenced a shutdown for a planned maintenance outage (2M54). The station reached operational condition 5 (refueling) on October 10, 2017. Following the completion of maintenance activities, operators commenced a reactor startup on October 18, 2017. Operators returned the unit to 100 percent power on October 20, 2017. The unit remained at or near 100 percent power for the remainder of the inspection period.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection (71111.01 – 1 sample)

Readiness for Seasonal Extreme Weather Conditions

a. Inspection Scope

The inspectors reviewed Exelon's readiness for the onset of seasonal cold temperatures. The review focused on the emergency diesel generators (EDGs). The inspectors reviewed the Updated Final Safety Analysis Report (UFSAR), technical specifications (TSs), control room logs, and the corrective action program to determine what temperatures or other seasonal weather could challenge these systems, and to ensure Exelon personnel had adequately prepared for these challenges. The inspectors reviewed station procedures, including Exelon's seasonal weather preparation procedure and applicable operating procedures. The inspectors performed walkdowns of the selected systems to ensure station personnel identified issues that could challenge the operability of the systems during cold weather conditions. Documents reviewed for each section of this inspection report are listed in the Attachment.

b. Findings

No findings were identified.

1R04 Equipment Alignment

Partial System Walkdowns (71111.04 – 3 samples)

a. Inspection Scope

The inspectors performed partial walkdowns of the following systems:

- Unit 2 'A' residual heat removal (RHR) while in shutdown cooling on October 11, 2017
- Unit 2 'B' RHR during planned 'A' RHR maintenance and testing on November 1, 2017
- Unit 2 HPCI during reactor core isolation cooling testing on November 17, 2017

The inspectors selected these systems based on their risk-significance relative to the reactor safety cornerstones at the time they were inspected. The inspectors reviewed applicable operating procedures, system diagrams, the UFSAR, TSs, work orders, condition reports, and the impact of ongoing work activities on redundant trains of equipment in order to identify conditions that could have impacted the system's performance of its intended safety functions. The inspectors also performed field walkdowns of accessible portions of the systems to verify system components and support equipment were aligned correctly and were operable. The inspectors examined the material condition of the components and observed operating parameters of equipment to verify that there were no deficiencies. The inspectors also reviewed whether Exelon staff had properly identified equipment issues and entered them into the corrective action program for resolution with the appropriate significance characterization.

b. Findings

No findings were identified.

1R05 Fire Protection

Resident Inspector Quarterly Walkdowns (71111.05Q – 5 samples)

a. Inspection Scope

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

- Fire area 86, Unit 2 'D24' EDG and fuel oil day tank room, elevation 217', on October 2, 2017
- Fire areas 10 and 11, Unit 2 class 1E battery rooms, elevation 239', on October 20, 2017
- Fire area 28, Unit common standby gas treatment area rooms, elevation 350', on November 9, 2017
- Fire area 32, Unit 1 'A' and 'C' RHR heat exchanger and pump room, elevations 177' and 201' on November 20, 2017
- Fire area 124, Unit 1 EDG access corridor and condensate pump room, elevation 217', on December 1, 2017

b. Findings

No findings were identified.

1R06 Flood Protection Measures (71111.06 – 1 sample)

Internal Flooding Review

a. Inspection Scope

The inspectors reviewed the UFSAR, the site flooding analysis, and plant procedures to identify internal flooding susceptibilities for the site. The inspectors' review focused on the Unit 1 'A' and 'C' RHR pump room area. It verified the adequacy of equipment seals located below the flood line, floor and water penetration seals, watertight door seals, common drain lines and sumps, sump pumps, level alarms, control circuits, and temporary or removable flood barriers. It assessed the adequacy of operator actions that Exelon had identified as necessary to cope with flooding in this area and also reviewed the corrective action program to determine if Exelon was identifying and correcting problems associated with both flood mitigation features and site procedures for responding to flooding.

b. Findings

No findings were identified.

1R07 Heat Sink Performance (711111.07A – 1 sample)

a. Inspection Scope

The inspectors reviewed the Unit 2 'B' reactor enclosure cooling water heat exchanger's readiness and availability to perform its safety functions. The inspectors reviewed the design basis for the component and verified Exelon's commitments to NRC Generic Letter 89-13, "Service Water System Requirements Affecting Safety-Related Equipment." The inspectors observed inspections of the heat exchanger internals, observed in-progress cleaning, and reviewed the results of previous testing and inspections of the heat exchanger. The inspectors discussed the results of the most recent inspection with maintenance and engineering staff. The inspectors verified that Exelon initiated appropriate corrective actions for identified deficiencies. The inspectors also verified that the number of tubes plugged within the heat exchanger did not exceed the maximum amount allowed.

b. Findings

No findings were identified.

1R11 Licensed Operator Requalification Program and Licensed Operator Performance (71111.11 – 3 samples)

.1 Quarterly Review of Licensed Operator Requalification Testing and Training (71111.11Q – 1 sample)

a. Inspection Scope

The inspectors observed licensed operator simulator training scenarios on October 31, 2017. The scenarios included a failed reactor pressure vessel level transmitter, loss of cooling to the 'A' adjustable speed drive, a reactor coolant system leak in the reactor water clean-up heat exchanger room, and a reactor coolant system leak in the outboard main steam isolation valve room. The scenarios were complicated by a trip of the 'A' turbine enclosure cooling water pump, the failure to automatically start

of the 'B' turbine enclosure cooling water pump, and a stuck open injection valve for the 'C' reactor feedwater pump. The inspectors evaluated operator performance during the simulated event and verified completion of risk significant operator actions, including the use of abnormal and emergency operating procedures. The inspectors assessed the clarity and effectiveness of communications, implementation of actions in response to alarms and degrading plant conditions, and the oversight and direction provided by the control room supervisor. The inspectors verified the accuracy and timeliness of the emergency classifications made by the shift manager and the TS action statements entered by the shift technical advisor. Additionally, the inspectors assessed the ability of the crew and training staff to identify and document crew performance problems.

b. Findings

No findings were identified.

.2 Quarterly Review of Licensed Operator Performance in the Main Control Room (71111.11Q – 1 sample)

a. Inspection Scope

The inspectors observed and reviewed licensed operator performance in the main control room during the performance of the Unit 2 startup on October 18, 2017. The inspectors observed infrequently performed test or evolution briefings and reactivity control briefings to verify that the briefings met the criteria specified in Exelon's operations and administrative procedures. Additionally, the inspectors observed crew performance to verify that procedure use, crew communications, and coordination of activities between work groups similarly met established expectations and standards.

b. Findings

No findings were identified.

.3 Licensed Operator Requalification (71111.11B – 1 sample)

a. Inspection Scope

The following inspection activities were performed using NUREG-1021, "Operator Licensing Examination Standards for Power Reactors," Revision 11, and Inspection Procedure Attachment 71111.11, "Licensed Operator Requalification Program."

Examination Results

The inspection assessed whether written and operating examination pass/fail rates were consistent with the guidance of NRC Manual Chapter 0609, Appendix I, and "Operator Requalification Human Performance Significance Determination Process." The review verified that the failure rate (individual or crew) did not exceed 20 percent.

- The overall individual operator failure rate was 1.7 percent.
- The overall crew failure rate was 0.0 percent.

Written Examination Quality

The inspectors reviewed two written examinations administered during the 2017 examination cycle for qualitative and quantitative attributes as specified in Appendix B of Attachment 71111.11, "Licensed Operator Requalification."

Operating Test Quality

Ten job performance measures (JPMs) and five scenarios were reviewed for qualitative and quantitative attributes as specified in Appendix C of 71111.11, “Licensed Operator Requalification Program.”

Licensee Administration of Operating Tests

Observations were made of the dynamic simulator exams and JPMs administered during the week of October 23, 2017. These observations included facility evaluations of crew and individual performance during the dynamic simulator exams and individual performance of five JPMs.

Examination Security

The inspectors assessed whether facility staff properly safeguarded exam material. Scenarios, JPMs, and written examinations were checked for excessive overlap of test items.

Remedial Training and Re-Examinations

The remediation plans for two individual licensed operator exam failures were reviewed to assess the effectiveness of the remedial training. Remediation and reexamination for these individuals was processed in accordance with site procedures.

Conformance with Operator License Conditions

Medical records for thirteen licenses were reviewed to assess conformance with license conditions.

Proficiency watch standing records were reviewed for two years.

The reactivation plan for seven licensed operators was reviewed to assess the effectiveness of the reactivation process. These reactivations were successfully processed in accordance with site procedures.

Records for the participation of licensed operators in the requalification program for two years were reviewed. Records for the performance of licensed operators on annual requalification operating test and biennial requalification written exams were reviewed.

Simulator Performance

Simulator performance and fidelity was reviewed for conformance to the reference plant control room. A sample of simulator deficiency reports was also reviewed to ensure facility staff addressed identified modeling problems. Simulator test documentation was also reviewed.

Problem Identification and Resolution

A review was conducted of recent operating history documentation found in inspection reports. The inspectors also reviewed specific events from Exelon’s corrective action program which indicated possible training deficiencies to verify that they had been appropriately addressed. These reviews did not detect any operational events that were indicative of possible training deficiencies.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12Q – 3 samples)

a. Inspection Scope

The inspectors reviewed the samples listed below to assess the effectiveness of maintenance activities on structure, system, and component performance and reliability. The inspectors reviewed system health reports, corrective action program documents, maintenance work orders, and maintenance rule basis documents to ensure that Exelon was identifying and properly evaluating performance problems within the scope of the maintenance rule. For each sample selected, the inspectors verified that the structure, system, or component was properly scoped into the maintenance rule in accordance with 10 CFR 50.65 and verified that the (a)(2) performance criteria established by Exelon staff was reasonable. As applicable, for structures, systems, and components classified as (a)(1), the inspectors assessed the adequacy of goals and corrective actions to return these structures, systems, and components to (a)(2). Additionally, the inspectors ensured that Exelon staff was identifying and addressing common cause failures that occurred within and across maintenance rule system boundaries.

- Unit 1 EDGs 'D11,' 'D13,' 'D12,' and 'D14' as of November 1, 2017
- Unit 2 EDGs 'D21,' 'D23,' 'D22,' and 'D24' as of November 1, 2017
- Unit 2 HPCI pump discharge check valve maintenance on December 10, 2017 (quality control)

b. Findings

No findings were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13 – 6 samples)

a. Inspection Scope

The inspectors reviewed station evaluation and management of plant risk for the maintenance and emergent work activities listed below to verify that Exelon performed the appropriate risk assessments prior to removing equipment for work. The inspectors selected these activities based on potential risk significance relative to the reactor safety cornerstones. As applicable for each activity, the inspectors verified that Exelon personnel performed risk assessments as required by 10 CFR 50.65(a)(4) and that the assessments were accurate and complete. When Exelon performed emergent work, the inspectors verified that operations personnel promptly assessed and managed plant risk. The inspectors reviewed the scope of maintenance work and discussed the results of the assessment with the station's probabilistic risk analyst to verify plant conditions were consistent with the risk assessment. The inspectors also reviewed the TS requirements and inspected portions of redundant safety systems, when applicable, to verify risk analysis assumptions were valid and applicable requirements were met.

- Unit 2 'B' RHR borescope inspection activities on October 12, 2017
- Unit 2 containment control during startup on October 18, 2017
- Unit 2 'A' RHR contactor testing on November 1, 2017
- Unit 2 reactor core isolation cooling testing on November 17, 2017
- Unit 1 HPCI testing on December 4, 2017
- Unit 2 HPCI check valve maintenance on December 9, 2017

b. Findings

No findings were identified.

1R15 Operability Determinations and Functionality Assessments (71111.15 – 6 samples)

a. Inspection Scope

The inspectors reviewed operability determinations for the following degraded or non-conforming conditions based on the risk significance of the associated components and systems:

- Unit 2 surveillance sample specimen holder found broken on October 11, 2017
- Unit 2 jet pump number 9 foreign material evaluation on October 12, 2017
- Unit 1 'B' reactor enclosure recirculation system fan trip on October 14, 2017
- Unit 2 'D23' EDG jacket water return header connection from the #11 cylinder leaking nine drops per minute on October 20, 2017
- Unit 1 'B' RHR heat exchanger shell side inlet valve feeder breaker tripped on November 3, 2017
- Unit 1 'D13' EDG calculated high lube oil consumption on November 15, 2017

The inspectors evaluated the technical adequacy of the operability determinations to assess whether TS operability was properly justified and the subject component or system remained available such that no unrecognized increase in risk occurred. The inspectors compared the operability and design criteria in the appropriate sections of the TSs and UFSAR to Exelon's evaluations to determine whether the components or systems were operable. The inspectors confirmed, where appropriate, compliance with bounding limitations associated with the evaluations. Where compensatory measures were required to maintain operability, such as in the case of operator workarounds, the inspectors determined whether the measures in place would function as intended and were properly controlled by Exelon.

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.18 – 1 sample)

Permanent Modifications

a. Inspection Scope

The inspectors evaluated a modification to the technical requirements manual (TRM) implemented by LGS-2017S046, "Drywell Air Temperature Instrumentation TRM Table 3.3.7.5-1 Action 83 Allowed Outage Time and Shutdown Requirement Revision." The inspectors verified that the design bases, licensing bases, and performance capability of the affected systems were not degraded by the modification. In addition, the inspectors reviewed documents associated with the change, including the TRM, TSs, 10 CFR 50.59 screening evaluation, and the design basis documents. The inspectors also reviewed the applicable emergency operating procedures to ensure the procedures could be reasonably performed.

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19 – 5 samples)

a. Inspection Scope

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

- Unit 2 reactor enclosure heating, ventilation, and cooling (HVAC) system restoration following implementation of defeat of supply dampers swap to winter mode on September 29, 2017
- Unit 2 'A' RHR suppression pool suction thermal overload replacement and testing on November 1, 2017
- Unit 2 'D21' EDG electrical power system instrument maintenance on December 1, 2017
- Unit 2 'D21' EDG twenty-four month system overhaul on December 2, 2017
- Unit 2 HPCI discharge check valve maintenance on December 11, 2017

b. Findings

No findings were identified.

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

a. Inspection Scope

The inspectors reviewed the station's work schedule and outage risk plan for the Unit 2 maintenance outage (2M54), conducted October 8 through October 20, 2017. The inspectors reviewed Exelon's development and implementation of outage plans and schedules to verify that risk, industry experience, previous site-specific problems, and defense-in-depth were considered. During the outage, the inspectors observed portions of the shutdown, cooldown, startup, and heatup processes and monitored controls associated with the following outage activities:

- Configuration management, including maintenance of defense-in-depth, commensurate with the outage plan for the key safety functions and compliance with the applicable TSs when taking equipment out of service
- Implementation of clearance activities and confirmation that tags were properly hung and that equipment was appropriately configured to safely support the associated work or testing
- Installation and configuration of reactor coolant pressure, level, and temperature instruments to provide accurate indication and instrument error accounting
- Status and configuration of electrical systems and switchyard activities to ensure that TSs were met
- Monitoring of decay heat removal operations
- Impact of outage work on the ability of the operators to operate the spent fuel pool cooling system

- Reactor water inventory controls, including flow paths, configurations, alternative means for inventory additions, and controls to prevent inventory loss
- Activities that could affect reactivity
- Maintenance of secondary containment as required by TSs
- Fatigue management
- Tracking of startup prerequisites, walkdown of the drywell (primary containment) to verify that debris had not been left which could block the emergency core cooling system suction strainers, and startup and ascension to full power operation
- Identification and resolution of problems related to outage activities

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22 – 5 samples)

a. Inspection Scope

The inspectors observed performance of surveillance tests and/or reviewed test data of selected risk-significant structures, systems, and components to assess whether test results satisfied TSs, the UFSAR, and Exelon procedure requirements. The inspectors verified that test acceptance criteria were clear, tests demonstrated operational readiness and were consistent with design documentation, test instrumentation had current calibrations and the range and accuracy for the application, tests were performed as written, and applicable test prerequisites were satisfied. Upon test completion, the inspectors considered whether the test results supported that equipment was capable of performing the required safety functions. The inspectors reviewed the following surveillance tests:

- ST-6-092-314-1, Unit 1 'D14' EDG slow start and 4 kilovolt electrical bus undervoltage functional test on October 23, 2017
- ST-4-051-312-2, Unit 2 'A' RHR automatic closure seal-in contactor test on November 2, 2017
- ST-6-092-112-1, Unit 1 'D12' EDG 24 hour endurance test on November 6 and 7, 2017
- ST-6-092-113-1, Unit 1 'D13' EDG 24 hour endurance test on November 13 and 14, 2017
- ST-6-055-230-1, Unit 1 HPCI pump, valve, and flow test on December 21, 2017

b. Findings

No findings were identified.

2. RADIATION SAFETY

Cornerstone: Occupational and Public Radiation Safety

2RS1 Radiological Hazard Assessment and Exposure Controls (71124.01 - 3 samples)

a. Inspection Scope

The inspectors reviewed Exelon's performance in assessing and controlling radiological hazards in the workplace. The inspectors used the requirements contained in 10 CFR 20, TSs, Regulatory Guide 8.38, and the procedures required by TSs as criteria for determining compliance.

Inspection Planning

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

Contamination and Radioactive Material Control (1 sample)

The inspectors observed the monitoring of potentially contaminated material leaving the radiological controlled area and inspected the methods and radiation monitoring instrumentation used for control, survey, and release of that material.

The inspectors selected several sealed sources from inventory records and assessed whether the sources were accounted for and were tested for loose surface contamination. The inspectors evaluated whether any recent transactions involving nationally tracked sources were reported in accordance with requirements.

Risk-Significant High Radiation Areas (HRAs) and Very High Radiation Controls (VHRA) (1 sample)

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

Problem Identification and Resolution (1 sample)

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

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator Verification (71151)

.1 Mitigating Systems Performance Index (2 samples)

a. Inspection Scope

The inspectors reviewed LGS's submittal of the Mitigating Systems Performance Index for the following systems for the period of October 1, 2016 through September 30, 2017:

- Unit 1 Cooling Water (MS10)
- Unit 2 Cooling Water (MS10)

To determine the accuracy of the performance indicator data reported during those periods, the inspectors used definitions and guidance contained in Nuclear Energy Institute (NEI) Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7. The inspectors also reviewed LGS's operator narrative logs, condition reports, mitigating systems performance index derivation reports, event reports, and NRC integrated inspection reports to validate the accuracy of the submittals.

b. Findings

No findings were identified.

.2 Reactor Coolant System Specific Activity and Reactor Coolant System Leak Rate (4 samples)

a. Inspection Scope

The inspectors reviewed LGS' submittal for the reactor coolant system (RCS) specific activity and RCS leak rate performance indicators for both Unit 1 and Unit 2 for the period of October 1, 2016 through September 30, 2017. To determine the accuracy of the performance indicator data reported during those periods, the inspectors used definitions and guidance contained in NEI Document 99-02, Revision 7. The inspectors also reviewed RCS sample analysis and control room logs of daily measurements of RCS leakage, and compared that information to the data reported by the performance indicator.

b. Findings

No findings were identified.

.3 Occupational Exposure Control Effectiveness (1 sample)

a. Inspection Scope

The inspectors reviewed licensee submittals for the occupational radiological occurrences PI for the period of October 1, 2016 through September 30, 2017. The inspectors used PI definitions and guidance contained in NEI Document 99-02, Revision 7, to determine the accuracy of the PI data reported. The inspectors reviewed electronic personal dosimetry accumulated dose alarms, dose reports, and dose assignments for any intakes that occurred during the time period reviewed to determine if there were potentially unrecognized PI occurrences. The inspectors conducted walkdowns of various locked HRA and VHRA entrances to determine the adequacy of the controls in place for these areas.

b. Findings

No findings were identified.

.4 Radiological Effluent Technical Specifications/Offsite Dose Calculation Manual Radiological Effluent Occurrences (1 sample)

a. Inspection Scope

The inspectors reviewed licensee submittals for the radiological effluent TSs/offsite dose calculation manual radiological effluent occurrences PI for the period of October 1, 2016 through September 30, 2017. The inspectors used PI definitions and guidance contained in the NEI Document 99-02, Revision 7, to determine if the PI data was reported properly. The inspectors reviewed the public dose assessments for the PI for public radiation safety to determine if related data was accurately calculated and reported.

The inspectors reviewed the corrective action program database to identify any potential occurrences such as unmonitored, uncontrolled, or improperly calculated effluent releases that may have impacted offsite dose.

The inspectors reviewed gaseous and liquid effluent summary data and the results of associated offsite dose calculations to determine if indicator results were accurately reported.

b. Findings

No findings were identified.

4OA2 Problem Identification and Resolution (71152 – 3 samples)

.1 Routine Review of Problem Identification and Resolution Activities

a. Inspection Scope

As required by Inspection Procedure 71152, "Problem Identification and Resolution," the inspectors routinely reviewed issues during baseline inspection activities and plant status reviews to verify Exelon entered issues into the corrective action program at an appropriate threshold, gave adequate attention to timely corrective actions, and identified and addressed adverse trends. In order to assist with the identification of repetitive equipment failures and specific human performance issues for follow-up, the inspectors performed a daily screening of items entered into the corrective action program and periodically attended condition report screening meetings. The inspectors also confirmed, on a sampling basis, that, as applicable, for identified defects and non-conformances, Exelon performed an evaluation in accordance with 10 CFR Part 21.

b. Findings

No findings were identified.

.2 Semi-Annual Trend Review

a. Inspection Scope

The inspectors performed a semi-annual review of site issues, as required by Inspection Procedure 71152, "Problem Identification and Resolution," to identify trends that might indicate the existence of more significant safety issues. In this review, the inspectors included repetitive or closely-related issues that may have been documented by Exelon outside of the corrective action program, such as trend reports, performance indicators, major equipment problem lists, system health reports, maintenance rule assessments, and maintenance or corrective action program backlogs. The inspectors also reviewed Exelon's corrective action program database for the third and fourth quarters of 2017 to assess condition reports written in various subject areas (equipment problems, human performance issues, etc.), as well as individual issues identified during the NRCs daily condition report review (Section 4OA2.1). The inspectors reviewed Exelon's trending information to verify that Exelon personnel were appropriately evaluating and trending adverse conditions in accordance with applicable procedures.

b. Findings and Observations

No findings were identified.

The inspectors identified a new adverse trend in the area of equipment reliability. The inspectors noted a higher number of issues with important systems relative to previous periods at LGS. For example, LGS experienced an electro-hydraulic control system leak, a condensate pump trip, a recirculation pump motor oil reservoir leak, a trip of a

recirculation pump due to an electrical fault, a battery ground caused by water intrusion from a steam leak, a core spray pump failure to start, a diesel generator shutdown due to a lube oil leak from a fitting failure, failures of the rod position indication system, and unplanned inoperability of the high pressure coolant injection system due to a check valve failing open. For some of these issues further inspection will be performed during licensee event report (LER) reviews or other baseline inspection samples. Otherwise, during this inspection, the inspectors did not identify a performance deficiency and/or determined that the listed issues represented issues of minor safety significance. The inspectors shared this trend assessment with Exelon. As a result, Exelon initiated a condition report and reviewed ongoing improvement plans and other corrective measures to ensure newly implemented actions will be effective in improving equipment reliability and reversing this adverse trend.

The inspectors also reviewed and assessed the adverse trend in human performance identified by Exelon that was discussed in the 2016 second quarter integrated inspection report (ML16214A219), the 2016 fourth quarter integrated inspection report (ML17041A175), and the 2017 second quarter inspection report (ML17214A658). The inspectors noted additional examples in the most recent semiannual period in which Exelon personnel did not implement appropriate human error prevention tools. For example, a residual heat removal pump discharge piping header fill inlet valve was inadvertently left closed, high pressure coolant injection was made inoperable inadvertently, a condensate demineralizer deep bed was removed from service from the incorrect unit, the technical support center emergency ventilation system was actuated inadvertently, a residual heat removal service water pump was nearly started without an established flow path, and a residual heat removal heat exchanger was flushed on the incorrect unit. Exelon performed causal evaluations for the individual events and developed additional department-level and site-wide human performance improvement efforts. Exelon implemented configuration control refocus days and other measures intended to proactively improve personnel engagement with increased field presence of supervisors and personal involvement of site leaders in regular activities in the field.

The inspectors noted Exelon's expanded efforts to improve site performance. The inspectors determined that although human performance worsened early in the semi-annual period, that performance notably improved in the latter half of the period. The inspectors will review Exelon's actions to improve human performance in the next semi-annual trend review to ensure the sustainability of Exelon's continuing performance improvement initiatives. The inadvertent inoperability of high pressure coolant injection is documented as a finding in section 4OA3. The inspectors determined that the remaining issues were of minor safety significance and that Exelon's continuing actions to resolve the adverse trend were appropriate. Based on the overall results of the semi-annual trend review, the inspectors determined that Exelon was appropriately identifying and entering issues into the corrective action program, adequately evaluating the issues, and properly identifying adverse trends before they became more safety significant problems.

.3 Annual Sample: Scram Solenoid Pilot Valve Degradation and Replacement

a. Inspection Scope

The inspectors performed an in-depth review of Exelon's evaluation and corrective actions associated with "buzzing" scram solenoid pilot valves on both units at LGS, as documented in condition report IR 2571432. The inspectors assessed Exelon's implemented and planned corrective actions to evaluate whether Exelon's staff appropriately identified, characterized, prioritized, and corrected problems associated with this issue. The inspectors compared the actions taken to the requirements in Exelon's corrective action program and 10 CFR 50, Appendix B.

The inspectors also reviewed associated documents, conducted interviews with engineering personnel, and completed field walkdowns to gain an understanding of the implemented and planned corrective actions associated with this issue.

b. Findings and Observations

No findings were identified.

A scram solenoid pilot valve contains two main normally energized coils, one for each solenoid. They are energize to open and spring to close. The internals include a fixed armature with a copper shading ring, a movable plunger with seats at both ends, and a plunger spring. The shading ring is installed in the surface of the fixed armature so that the plunger seats against it. The magnetic flux from the main solenoid coil passes through this shading ring and induces a current in the shading ring which will be approximately 90 degrees out of phase relative to the main flux. As a result, the shading ring will exert a holding force on the plunger when the main flux is crossing through its minimum value. The force produced by the shading ring can be affected by the material of the ring, size of the ring, how much of the main flux interacts with the ring, and the distance of the ring from the plunger. If the force produced by the shading ring on the plunger is insufficient, “chatter” or “buzzing” may occur. This buzzing can result in degradation of the coil materials and/or wear and deformation of the plunger, fixed armature, or both.

In response to the issues at LGS, Exelon staff developed a control rod drive system health action plan, which included performance of a trend analysis of the scram solenoid pilot valve buzzing at LGS, review of the procurement specifications for the valves, and benchmarking to evaluate how the industry is addressing this issue. Exelon completed the trend analysis in condition report IR 2571432. The station concluded that the data did not indicate that the issues with these valves were time-dependent. Specifically, Exelon concluded that the affected valves were initially installed between 2005 and 2015, and the age of the valves when the buzzing started was anywhere from six months to over 11 years. Additionally, given that the scram solenoid pilot valves are fabricated on an as-needed basis, the broad range of time since initial installation, and the number of scram solenoid pilot valves that have not experienced this issue even though they were installed at the same relative time period, Exelon ruled out a batch defect as a cause of the issue.

As a result of similar issues on the scram solenoid pilot valves across the industry, the vendor established corrective actions to improve their manufacturing and testing processes, which included ensuring that the depth of the shading coil is inspected and controlled.

Exelon implemented Revision Q to the scram solenoid pilot valve procurement specification (SCN 114-47377) which will ensure that scram solenoid pilot valves installed in the future are subject to the corrective actions implemented by the vendor.

The inspectors also noted that Exelon increased the frequency of performance monitoring for these valves from monthly to every two weeks. Additionally, operators conduct rounds in these areas every 12 hours. In the event that a buzzing scram solenoid pilot valve is identified, the station would enter the issue into the corrective action program, and schedule replacement of the valve based on severity. The inspectors noted that Exelon typically replaced the valves within six months or less, which appeared to be appropriate, given that the station has not experienced any failures of control rods to scram due to this issue to date.

.4 Annual Sample: EDG Piping Leakage

a. Inspection Scope

The inspectors performed an in-depth review of Exelon's evaluation and corrective actions following the failure of ¼" diameter pipe nipples at two locations on the 'D24' EDG lube oil system. The inspectors reviewed condition reports that documented the identification, evaluation, and corrective actions taken to identify the causes of the failures and correct the underlying deficiencies. Specifically, the inspectors reviewed Exelon's evaluation that determined the causes of the pipe failure; interim corrective actions to restore the EDG to an operable status; and long term corrective actions to minimize the effects of vibration induced fatigue on the piping. In addition to review of these documents, the inspectors interviewed engineers to determine whether the scope of the corrective actions addressed the identified deficiencies.

The inspectors assessed Exelon's evaluation, extent of condition review, completed and proposed corrective actions, and the prioritization and timeliness of actions to evaluate whether the actions taken by Exelon staff were appropriate. The inspectors evaluated whether the interim corrective actions which included replacing the piping and installing tubing supports, additional clamps, and separators addressed the degraded conditions. The inspectors also reviewed Exelon's evaluation that determined the cause of the failures in order to evaluate if the causes were understood, if long-term corrective actions were adequate and if an extent of condition review on the other EDGs adequately corrected the identified cause. Specifically, the inspectors evaluated whether proposed corrective actions which included increased inspections of tubing, replacement of similarly located pipe nipples, installation of additional tube supports and separators, and replacement of degraded grommets on the tubing clamps on the EDGs addressed the causes of the failures. Additionally, the inspectors assessed if vibration levels were reduced on the piping following completion of the corrective actions. Finally, the inspectors walked down all the EDGs to determine if the corrective actions proposed had been appropriately implemented.

b. Findings and Observations

No findings were identified.

The inspectors concluded the extent-of-condition review was thorough and the causes of the failures were appropriately identified. The inspectors determined the cause of the failure was most likely high cycle fatigue on the piping and that the long term corrective actions reduced vibration on the system, replaced susceptible components, and provided for additional long term inspections of the components to monitor for vibration induced degradation. The inspectors also concluded that the corrective actions were reasonable and addressed interim operability concerns. Finally, the inspectors determined that the extent of condition review addressed the potential for similar failures on the other EDGs.

4OA3 Follow-Up of Events and Notices of Enforcement Discretion (71153 – 3 samples)

.1 (Closed) LER 05000353/2017-004-00: Degraded Condition due to Reactor Pressure Vessel (RPV) Instrument Nozzle Leakage

a. Inspection Scope

On May 8, 2017, while LGS Unit 2 was in cold shutdown for a refueling outage, leakage was identified from a 2 inch RPV instrument nozzle during a RPV pressure test. The leakage originated from the area where the nozzle penetrates the vessel wall.

Prior to lowering pressure, an extent of condition examination was performed and no leakage was identified from any other instrument nozzles. Exelon determined the most probable cause was intergranular stress corrosion cracking from a defect in the overlay cladding which created the environment where the cracking could occur and propagate. A half nozzle repair was completed which consisted of replacing the outer portion of the existing nozzle with a new nozzle that was welded to the outside of the RPV. A post leakage test was performed immediately following the repair to validate the integrity of the repair and RPV pressure boundary. The LER and associated evaluations and follow-up actions were reviewed for accuracy, the appropriateness of corrective actions, violations of requirements, and potential generic issues. This LER is closed.

b. Findings

No findings were identified.

Description. On May 8, 2017, while LGS Unit 2 was in cold shutdown for a refueling outage, during a RPV pressure test, a through-wall leak was identified from a 2 inch RPV instrument nozzle. A visual examination detected active leakage at the nozzle's interface with the RPV. The leak was approximated at one pint per minute. The condition was reported in event notification 52738 as required by 10 CFR 50.72(b)(3)(ii)(A) because it represented a degradation of a principal safety barrier.

Exelon evaluated the flaw and determined the RCS pressure boundary leakage was most likely caused by intergranular stress corrosion cracking originating from a defect in the Alloy 82 overlay cladding. This created an environment and pathway for the crack to develop and propagate. Exelon's corrective actions included a half nozzle repair, a post leakage test, and an extent of condition review.

The inspectors reviewed the LER, Exelon's root cause evaluation of the event, and performed visual inspection of the leak conditions and determined that RCS pressure boundary leakage reasonably began on an unknown date that was more than 36 hours before the shutdown for the refueling outage on April 16, 2017.

However, the inspectors determined that the existence of RCS pressure boundary leakage was not within Exelon's ability to foresee and correct and therefore was not a performance deficiency. For information, the inspectors screened the significance of the condition using IMC 0609, Appendix A, "The Significance Determination Process For Findings At-Power," and determined that the condition represented very low safety significance (Green) because it would not result in exceeding the RCS leak rate for a small loss of coolant accident and would not have likely affected other systems used to mitigate a loss of coolant accident.

Enforcement. TS 3.4.3.2 requires, in part, that RCS operational leakage shall be limited to no pressure boundary leakage. If pressure boundary leakage exists, the TS 3.4.3.2 limiting condition for operation action statement requires Unit 2 to be in at least hot shutdown within 12 hours and in cold shutdown within the next 24 hours. Contrary to the above, for a period that began on an unknown date that was very likely more than 36 hours before the shutdown for the refueling outage on April 16, 2017, and ending on April 16, 2017, RCS pressure boundary leakage existed, and Exelon did not place Unit 2 in at least hot shutdown within 12 hours and in cold shutdown within the next 24 hours.

This issue is considered within the traditional enforcement process because there was no performance deficiency associated with the violation of NRC requirements. IMC 0612, "Power Reactor Inspection Reports", Section 03.22 states, in part, that traditional enforcement is used to disposition violations receiving enforcement discretion or violations without a performance deficiency.

The NRC Enforcement Policy, Section 2.2.1 states, in part, that, whenever possible, the NRC uses risk information in assessing the safety significance of violations. Accordingly, after considering that the condition represented very low safety significance, the inspectors concluded that the violation would be best characterized as Severity Level IV under the traditional enforcement process. However, the NRC is exercising enforcement discretion (EA-17-185) in accordance with Section 3.10 of the NRC Enforcement Policy which states that the NRC may exercise discretion for violations of NRC requirements by reactor licensees for which there are no associated performance deficiencies. In reaching this decision, the NRC determined that the issue was not within Exelon's ability to foresee and correct; Exelon's actions did not contribute to the degraded condition; and the actions taken were reasonable to identify and address the condition. Furthermore, because Exelon's actions did not contribute to this violation, it will not be considered in the assessment process or the NRC's Action Matrix.

.2 (Closed) LER 05000352, 353/2017-001-00: Condition Prohibited by TSs due to Parts Quality Issue

a. Inspection Scope

Over the period of October 19, 2016 to December 5, 2016, the main control room (MCR) HVAC system experienced four failures. Three of these failures were determined to be an intermittent dropout, or chattering, of the loss of offsite power start relays for the 'B' MCR HVAC supply and return fans. After Exelon had replaced relays and relays failed again, the relays were sent for testing which identified a manufacturing issue that caused the relay failures. The relay chattering was caused by an incorrectly installed capacitor on the internal timing circuit. An extent of condition review was performed that identified two additional relays from the same manufacturing lot as the failed relays that were installed in the plant. Exelon replaced both of these relays.

As a result of these relay failures, the 'B' MCR HVAC system was determined to be inoperable for a period of 47 days, which is greater than the allowable TS Limiting Condition of Operation 3.7.2. action statement of 7 days for an inoperable control room emergency fresh air supply train. The LER and associated evaluations and follow-up actions were reviewed for accuracy, the appropriateness of corrective actions, violations of requirements, and potential generic issues. This LER is closed.

b. Findings

No findings were identified.

Description. Over the period of October 19, 2016 to December 5, 2016, the MCR HVAC system experienced four failures. An investigation was performed for each of the failures, and Exelon determined that three of the failures were caused by an intermittent dropout, or chattering, of the loss of offsite power start relay for the 'B' MCR supply and return fans. Testing determined the relays were not reliable and failure of the relays could not be predicted. The 'B' MCR HVAC train was determined to be inoperable since the initial relay replacement on October 19, 2016. The final relay failure and replacement occurred on December 5, 2016. Exelon determined the system was inoperable for a total of 47 days while these relays were in service, which is greater than the allowable TS Limiting Condition of Operation 3.7.2. action statement of 7 days for an inoperable control room emergency fresh air supply train. Exelon's corrective actions included replacement of the failed relays with those from a different manufacturing lot, an extent of condition review, and a failure analysis to determine the cause of the failure. The extent of condition review found two additional relays from the same manufacturing lot as the failed relays that were installed in the plant. Exelon replaced both of these relays.

The inspectors reviewed the LER, Exelon's root cause evaluation of the event, and the subsequent 10 CFR Part 21 vendor submittal for the issue and determined that the 'B' MCR HVAC train was inoperable for a total of 47 days while these relays were in service. However, the inspectors determined that the issue was not within Exelon's ability to foresee and correct and therefore was not a performance deficiency. For information, the inspectors screened the significance of the condition using IMC 0609, Appendix A, "The Significance Determination Process For Findings At-Power," and determined that the condition represented very low safety significance (Green) because it did not represent a degradation of the radiological barrier function provided for the control room and did not represent a degradation of the barrier function of the control room against smoke or a toxic atmosphere.

Enforcement. TS 3.7.2 requires, in part, that two independent control room emergency fresh air supply systems shall be operable. With one control room emergency fresh air supply subsystem inoperable, restore the inoperable subsystem to operable status within 7 days or be in at least hot shutdown within the next 12 hours and in cold shutdown within the following 24 hours. Contrary to the above, over the period of October 19, 2016, to December 5, 2016, the 'B' MCR HVAC system was inoperable for a period of 47 days, and Exelon did not place Unit 1 and Unit 2 in at least hot shutdown within 12 hours and in cold shutdown within the next 24 hours.

This issue is considered within the traditional enforcement process because there was no performance deficiency associated with the violation of NRC requirements. IMC 0612, "Power Reactor Inspection Reports," Section 03.22 states, in part, that traditional enforcement is used to disposition violations receiving enforcement discretion or violations without a performance deficiency. The NRC Enforcement Policy, Section 2.2.1 states, in part, that, whenever possible, the NRC uses risk information in assessing the safety significance of violations. Accordingly, after considering that the condition represented very low safety significance, the inspectors concluded that the violation would be best characterized as Severity Level IV under the traditional enforcement process. However, the NRC is exercising enforcement discretion (EA-17-191) in accordance with Section 3.10 of the NRC Enforcement Policy which states that the NRC may exercise discretion for violations of NRC requirements by reactor licensees for which there are no associated performance deficiencies. In reaching this decision, the NRC determined that the issue was not within Exelon's ability to foresee and correct; Exelon's actions did not contribute to the degraded condition; and the actions taken were reasonable to identify and address the condition. Furthermore, because Exelon's actions did not contribute to this violation, it will not be considered in the assessment process or the NRC's Action Matrix.

.3 (Closed) Licensee Event Report (LER) 05000353/2017-006-00: HPCI Inoperability During Post Maintenance Testing

a. Inspection Scope

On July 27, 2017, Exelon staff recognized that the LGS Unit 2 HPCI system was inoperable during post maintenance testing following a relay replacement activity when an undesirable valve alignment was established that resulted in a loss of suction path for the HPCI pump. The relay replacement was originally planned to be performed with HPCI inoperable. However, the work was rescheduled to perform the relay replacement with HPCI operable. In July 2017, prior to performing the work, LGS maintenance and operations personnel performed a review of the work package. The review identified that the work package required revision to maintain the system operable during the relay replacement. The review did not identify that the post maintenance testing also required a revision.

Since the HPCI inoperability was not planned, Exelon submitted this LER pursuant to the requirements of 10 CFR 50.73(a)(2)(v)(D), any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident. The inspectors identified a self-revealing finding during the review of this LER. This LER is closed.

b. Findings

Introduction. The inspectors identified a self-revealing Green NCV of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," for Exelon's failure to adequately establish post-maintenance testing instructions for a relay replacement for the Unit 2 HPCI system. Specifically, implementing the instructions caused a loss of all suction sources and unplanned inoperability of the Unit 2 HPCI system.

Description. The HPCI system is an emergency core cooling system for LGS, Units 1 and 2. It is designed to provide coolant to the reactor vessel, prevent the actuation of the automatic depressurization system, and maintain reactor water level above the top of the reactor core in the event of a small pipe break, i.e. following a small break loss of coolant accident. The HPCI system consists primarily of a booster and main high pressure pump driven by a steam turbine that pumps water either from the condensate storage tank or the suppression pool into the reactor vessel via one core spray line and one feedwater line.

On July 27, 2017, following a planned relay replacement in the Unit 2 HPCI system, operations personnel performed post maintenance testing and closed the suppression pool suction valve with the condensate storage tank suction valve already closed resulting in Unit 2 HPCI being inoperable due to having no suction source of water. The relay replacement was originally planned to be performed during a system outage window with HPCI already inoperable. However, the work was rescheduled to perform the relay replacement with HPCI operable. Prior to performing the work, LGS maintenance and operations personnel performed a review of the work package. The review identified that the work package required revision to maintain the system operable during the relay replacement. The review did not identify that the post maintenance test also required a revision. Operations personnel recognized the inoperability when the condensate storage tank suction valve did not automatically open. Operations personnel reopened the HPCI suction source from the suppression pool which restored HPCI to an operable status approximately 20 minutes after being initially isolated. Exelon subsequently revised the instructions and completed the post-maintenance testing correctly.

Exelon performed a root cause evaluation and determined that maintenance planning personnel developed incorrect written instructions for performing post maintenance testing of the relay by including additional extraneous steps that were not necessary, and the instructions were not revised to maintain HPCI operable when the maintenance plan was revised. The inspectors reviewed Exelon's root cause evaluation, discussed the issue with plant staff, and verified the corrective actions were commensurate with the safety significance. Exelon initiated condition report IR 4036417. Exelon conducted a THU workshop with the maintenance planning department to increase awareness of THU tools and added THU behavior discussion topics to weekly maintenance planning department all hands meetings.

Analysis. The inspectors determined that inadvertently causing a loss of suction sources for the Unit 2 HPCI system causing unplanned inoperability was reasonably within Exelon's ability to foresee and correct and should have been prevented and therefore was a performance deficiency.

This finding is more than minor because it adversely affected the configuration control attribute of the mitigating systems cornerstone to ensure the availability of systems that respond to initiating events to prevent undesirable consequences (i.e. core damage). Specifically, HPCI was made inoperable when it was planned to remain operable.

Using IMC 0609, Appendix A, Exhibit 2, the inspectors determined that this finding required a detailed risk assessment because it represented a loss of the single train system's function. The Regional Senior Reactor Analyst performed a detailed risk evaluation using the LGS Unit 2 Standardized Plant Analysis Risk Model. The issue was modeled with a HPCI failure to start due to the suction valves being closed. The change in core damage frequency per year was determined to be in the low E-9 range due to the very short duration that both suction sources were isolated. Therefore the issue was determined to be of very low safety significance (Green).

The inspectors determined that this finding has a cross-cutting aspect in the area of Human Performance, Work Management, because the work process did not ensure individuals were aware of plant status and the changes in the plan of work were not effectively implemented. [H.5]

Enforcement. 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," states, in part, that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances. Contrary to the above, on July 27, 2017, Exelon did not prescribe documented instructions of a type appropriate to the circumstances for activities affecting quality. Specifically, post-maintenance testing instructions inadvertently caused a loss of all suction sources and unplanned inoperability of the HPCI system. Exelon restored a source of suction after approximately 20 minutes and subsequently revised and correctly performed the post-maintenance testing. Because this violation was of very low safety significance (Green) and was entered into Exelon's corrective action program (IR 4036417), the violation is being treated as an NCV, consistent with Section 2.3.2.a of the NRC Enforcement Policy. (NCV 05000353/2017004-01, Unplanned HPCI Inoperability Due to Isolating All Suction Sources During Post-Maintenance Testing)

4OA6 Meetings, Including Exit

On January 12, 2018, the inspectors presented the inspection results to Frank Sturniolo, Plant Manager, and other members of the LGS staff. The inspectors verified that no proprietary information was retained by the inspectors or documented in this report.

ATTACHMENT: SUPPLEMENTARY INFORMATION

SUPPLEMENTARY INFORMATION
KEY POINTS OF CONTACT

Exelon's Personnel
R. Libra, Site Vice President
F. Sturniolo, Plant Manager
M. Bonifanti, Director of Operations
K. Kemper, Director of Site Training
J. Murphy, Director of Engineering
D. Palena, Director of Site Work Management
D. Turek, Director of Maintenance
R. Dickinson, Manager, Regulatory Assurance
A. Hightower, Emergency Preparedness Manager
J. McGee, Security Manager
M. Arnosky, On-Line Work Management Manager
P. Marvel, Maintenance I&C Manager
G. Budock, Regulatory Assurance Engineer
S. Schumacher, Control Rod Drive System Manager
C. Fritz, Senior Reactor Operator
R. Fayewicz, Senior Reactor Operator
J. Sullivan, Senior Reactor Operator
J. Harkins, Shift Manager
W. Clark, System Engineer
C. Giambrone, Shift Operations Superintendent
D. Semeter, Training Manager
J. Mercurio, Licensed Operator Requal Training Lead Instructor
C. Briggs, Chemistry Programs Manager
A. Davis, RP Technical Support Manager
D. Merchant, Radiation Protection Manager
T. Fritz, System Engineer

LIST OF ITEMS OPENED, CLOSED, DISCUSSED, AND UPDATED

Opened/Closed

05000353/2017004-01	NCV	Unplanned HPCI Inoperability Due to Isolating All Suction Sources During Post-Maintenance Testing

Closed

05000352,353/2017-001-00	LER	Condition Prohibited by TSs due to Parts Quality Issue
05000353/2017-004-00	LER	Degraded Condition due to RPV Instrument Nozzle Leakage
05000353/2017-006-00	LER	HPCI Inoperability during Post Maintenance Testing

LIST OF DOCUMENTS REVIEWED

Section 1R01: Adverse Weather Protection

Procedures
GP-7, Cold Weather Preparation and Operation, Revision 53
SE-14, Snow, Revision 21
WC-AA-107, Seasonal Readiness, Revision 18

Condition Reports
3984851

Miscellaneous
Certification of 2017-2018 Winter Readiness

Section 1R04: Equipment Alignment

Procedures
2S55.1.A (COL), Equipment Alignment for Automatic Operation of HPCI System, Revision 19
ER-AA-302-1006, Motor-Operated Valve Maintenance and Testing Guidelines, Revision 15
ER-LG-302-1000, Limerick Specific MOV Program Document, Revision 0
MA-AA-716-005, MOV Troubleshooting and Root Cause Matrix for SMB-000/00 Size Operators and Their Valves, Revision 1
M-C-700-241, Limitorque Motor Operator Installation, Revision 7
M-C-700-242, Limitorque Motor Operator Size SMB-000 Rebuild and Lubrication, Revision 6
M-C-700-243, Limitorque Motor Operator Size SMB-00 Rebuild and Lubrication, Revision 11
M-C-700-253, Limitorque Motor Operator Size SMB-000 Torque Switch Replacement, Revision 3
ON-121, Loss of Shutdown Cooling, Revision 32
S51.6.A, Swapping RHR Pumps in RHR-SDC Mode, Revision 18
S51.8.B, Shutdown Cooling/Reactor Coolant Circulation Operation Start-Up and Shutdown, Revision 81
S55.1.A, Normal HPCI Line-Up for Automatic Operation, Revision 37

Condition Reports
4069681
4069684

Miscellaneous
L-S-09, Residual Heat Removal System, Revision 21

Section 1R05: Fire Protection

Procedures
F-A-426, Pre-Fire Plan Common, Unit 2 Class 1E Battery 426 and 454, Revision 9
F-A-427, Pre-Fire Plan Common, Unit 2 Class 1E Battery Room 427, Revision 10
F-A-624, Pre-Fire Plan Common, Standby Gas Treatment Area Rooms 624 and 625, Revision 7
F-D-313, Unit 1 Diesel Generator Access Corridor and Condensate Pump Room, Rooms 313 and 314 (El 217), Revision 10
F-D-315D, Pre-Fire Plan, D24 Diesel Generator and Fuel Oil-Lube Oil Tank Rooms 315D and 316D, Revision 9
F-R-102, Pre-Fire Plan Common, Unit 1 A and C RHR Heat Exchanger and Pump Rooms 102 and 203, Revision 7

Work Orders
4691941

Miscellaneous
FSI 3253

Section 1R06: Flood Protection Measures

Procedures
ARC-MCR-113 G5, 1A-1C RHR Pump Room Flood, Revision 2
SE-4, Flood, Revision 7
SE-4-1, Reactor Enclosure Flooding, Revision 11
T-103, Secondary Containment Control, Revision 24

Miscellaneous
Report M-003, Summary of Requirements for Flooding Prevention Relative to LGS Unit 1 and Unit 2, Revision 4

Section 1R07: Heat Sink Performance

Work Orders
4697604

Miscellaneous
02445126-02, Tech Eval to Evaluate Ability of the Unit 1 and Unit 2 RECW Heat Exchanger to Perform Its Design Basis Function with 340 Tubes Plugged, Revision 0
ECR 432857, RECW Heat Exchanger 2B-E201 Tube Plugging Evaluation, Revision 0

Section 1R11: Licensed Operator Requalification Program

Procedures
GP-2 Appendix 1, Reactor Start-up and Heat-up, Revision 55
GP-2, Normal Plant Startup, Revision 169
OP-AA-103-102, Watch-Standing Practices, Revision 16
OP-AA-104-101, Communications, Revision 3
OP-AA-105-102, NRC Active License Maintenance, Revision 13
RT-6-000-994-0, Verification of Operator Qualifications, Revision 20
TQ-AA-150, Operator Training programs, Revision 14
TQ-AA-150-J202, LORT Annual Exam Development Job Aid, Revision 02
TQ-AA-201, Exam Security and Administration, Revision 17

Condition Report
4067749
4067752

Simulator Testing
06/01/2016 Unit 2 Manual Reactor Scram on Dual Recirc Pump Trip
06/12/16 Unit 2 Main Turbine Control Valve CV-3 Closure Event
1.12, Simulator to Reference Plant (LGS Unit 1) Critical Parameter Comparison, Power Level 28 percent
1.12, Simulator to Reference Plant (LGS Unit 1) Critical Parameter Comparison, Power Level 60 percent
1.12, Simulator to Reference Plant (LGS Unit 1) Critical Parameter Comparison, Power Level 100 percent

7.01, Manual Scram, Rev. 22 test dated 9/4/16
7.03, Closure of All Main Steam Isolation Valves at Rated Power, Revision 22 test dated 9/6/16
7.04, Trip of Both Reactor Recirculation Pumps, Rev. 17 test dated 9/6/16
7.08, Maximum Size Reactor Coolant System Rupture Combined with Loss of All Offsite Power, Revision 23 test dated 9/9/16

Miscellaneous
Simulator Evaluation Guide 3006E, Revision 4

Section 1R12: Maintenance Effectiveness

Procedures
MA-AA-736-600, Torqueing and Tightening of Bolted Connections, Revision 6

Condition Reports

2607645	2607723	2607728	2607732	2608059	2608095
2641998	2641998	2659281	2659747	2659749	2663089
2668344	2674817	2679860	2679862	2686844	2691514
2706535	2710187	2710592	2714268	2723451	2723592
2723847	2724052	2728224	2728912	3964204	3964205
3976432	3983575	3986675	3998165	4003917	4004092
4004364	4011143	4012513	4022485	4028740	4049989
4056984	4062096	4065287	4082181	4082589	

Work Orders
04722137

Drawings
8031-M-1-E41-F005-C-1.4, 14-600# Swing Check Bolted Bonnet Butt Weld Ends Cast Carbon Steel, Revision C

Section 1R13: Maintenance Risk Assessments and Emergent Work Control

Procedures
ER-AA-600-1042, On-Line Risk Management, Revision 10
ER-AA-600-1042, On-Line Risk Management, Revision 10
ER-AA-600-1043, Shutdown Risk Management, Revision 6
OP-LG-108-117-1000, Limerick Protected Equipment Program, Revision 6
OP-LG-108-117-1000, Limerick Protected Equipment Program, Revision 6
OU-AA-101-1011, Outage Risk Management, Revision 0
WC-AA-101-1006, On-line Risk Management and Assessment, Revision 2
WC-AA-101-1006, On-Line Risk Management and Assessment, Revision 2

Miscellaneous
Operations Protected Equipment Log 10/11/2017 and 10/12/2017
Operations Protected Equipment Log 10/18/2017
Operations Protected Equipment Log 11/1/2017
Operations Protected Equipment Log 11/17/2017
Operations Protected Equipment Log 12/9/2017

Section 1R15: Operability Determinations and Functionality Assessments

Procedures
1FSSG-3045E, Fire Area 045E Fire Guide, Revision 20
CC-AA-211, Fire Protection Program, Revision 8
E-D124-R-G, Loss of MCC D124-R-G, Revision 9
ST-6-060-460-1, Primary Containment Isolation Capability Check, Revision 46
ST-6-092-113-1, D13 Diesel Generator 24 Hour Endurance Test, Revision 43
T-102, Primary Containment Control PC/G, SP/T, SP/L, PC/P, DW/T, Revision 26
T-225, Startup and Shutdown of Suppression Pool and Drywell Spray Operation, Revision 24
T-244 Alternate Injection from the Fire System, Revision 20

Condition Reports

1101010	4061623	4062018	4062241	4062246	4062602
4062967	4063190	4063193	4065287	4070486	4074366
4075181	4075209				

Work Orders
4189392
4286449
4669731
4698543

Miscellaneous
ER-LG-330-1006, Risk Informed In-service Inspection Evaluation, Revision 3
L-S-07, Limerick Generating Station Units 1 and 2 Diesel Generator and Auxiliary Systems, Revision 15
L-S-09, Residual Heat Removal System, Revision 21
Operations Narrative Logs
Unit 2 Potential Lost Parts Evaluation

Section 1R18: Plant Modifications

Condition Reports
4038954

Miscellaneous
L-S-25A, Primary Containment Pressure Suppression System Design Basis Document, Revision 6
LG-2017S046, 50.59 Screening for Drywell Air Temperature Instrumentation TRM Change

Section 1R19: Post-Maintenance Testing

Procedures
RT-6-092-315-2, D21 Diesel Generator Abbreviated Run-In, Revision 15
RT-6-092-321-2, D21 Diesel Generator Overspeed Trip Test, Revision 26
S55.1.D, HPCI System Full Flow Functional Test, Revision 46
S76.2.C, Defeat of Reactor Enclosure HVAC Supply Dampers Swap to Winter Mode, Revision 2
ST-2-020-400-2, Electrical Power Systems 2AG501 Diesel Generator Critical and Non-Critical Instruments Calibration / Functional Test, Revision 32
ST-4-051-311-2, 2A RHR Auto Closure Seal-In Contact Test for HV-051-2F004A, Revision 5
ST-4-051-312-2, 2A RHR Auto Closure Seal-In Contact Test for HV-051-225A and HV-051-2F027A, Revision 5

ST-6-051-231-2, A RHR Pump, Valve, and Flow Test, Revision 76
ST-6-055-230-2, HPCI Pump, Valve, and Flow Test, Revision 79
ST-6-092-315-2, D21 Diesel Generator Fast Start Operability Test Run, Revision 56

Condition Reports
4057062
4082181
4080158

Work Orders

4173668	4177376	4299128	4300417	4300418	4300419
4300704	4307539	4307539	4667190	4682818	4722137

Miscellaneous
LG 99-02239, U/2 HPCI Full Flow Test Orifice Installed Backwards, Revision 0

Drawings
8031-M-55, P&ID High Pressure Coolant Injection (Unit 2), Revision 57

Section 1R20: Refueling and Other Outage Activities

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GP-2 Appendix 1, Reactor Start-up and Heat-up, Revision 54
GP-2, Normal Plant Startup, Revision 168
GP-3 Appendix 1, Establishing Cold Shutdown, Revision 60
GP-3, Normal Plant Shutdown, Revision 162
GP-10, Reactor Pressure Vessel Leakage Test, Revision 73
M-041-400, Reactor Pressure Vessel Reassembly, Revision 39
ON-121, Loss of Shutdown Cooling, Revision 32
OP-AA-108-117, Protected Equipment Program, Revision 4
OP-AA-108-117-1001, Spent Fuel Storage Pools Heat-Up Rate with Loss of Normal Cooling, Revision 00
OU-AA-103, Shutdown Safety Management Program, Revision 16
S51.8.B, Shutdown Cooling/Reactor Coolant Circulation Operation Startup and Shutdown, Revision 81

Condition Reports

4061570	4061572	4061574	4061577	4061623	4061959
4062018	4062125	4062511	4063190	4063206	

Miscellaneous
Operations Narrative Logs

Section 1R22: Surveillance Testing

Procedures
ST-2-092-324-1, 4KV Emergency D14 Bus Undervoltage Channel/Functional Test, Revision 30
ST-4-051-311-2, 2A RHR Auto Closure Seal-In Contact Test for HV-051-2F004A, Revision 5
ST-4-051-312-2, 2A RHR Auto Closure Seal-In Contact Test for HV-051-225A and HV-051-2F027A, Revision 5
ST-6-055-230-1, HPCI Pump, Valve, and Flow Test, Revision 85
ST-6-092-112-1, D12 Diesel Generator 24 Hour Endurance Test, Revision 39
ST-6-092-113-1, D13 Diesel Generator 24 Hour Endurance Test, Revision 43
ST-6-092-314-1, D14 Diesel Generator Slow Start Operability Test Run, Revision 103

Condition Reports

1101010	2717565	4020972	4074366	4075209

Work Orders

4189392	4286449	4292476	4668128	4691841

Miscellaneous

L-S-07, Limerick Generating Station Units 1 and 2 Diesel Generator and Auxiliary Systems, Revision 15

Section 2RS1: Access Control to Radiologically Significant Areas

Procedures

RP-AA-280, Occupational Exposure Reporting, Revision 10
RP-AA-1008, Unescorted Access to and Conduct in Radiologically Controlled Areas, Revision 6
RP-AA-1010, Justification of the Small Article Monitor (SAM) Alarm Setpoint, Revision 1
RP-AA-19, High Radiation Area Program Description, Revision 2
RP-AA-201, Access to the RCA for Escorted Visitors, Revision 6
RP-AA-210, Dosimetry Issue, Usage, and Control, Revision 27
RP-AA-350, Personnel Contamination Monitoring Decontamination and Reporting, Revision 18
RP-AA-350-1001, Response to Guardhouse Portal Monitor Alarms, Revision 2
RP-AA-376, Radiological Postings, Labeling, and Markings, Revision 9
RP-AA-460, Controls for High and Locked High Radiation Areas, Revision 29
RP-AA-460-001, Controls for Very High Radiation Areas, Revision 6
RP-AA-460-002, Additional High Radiation Exposure Control", Revision 3
RP-AA-460-003, Access to HRAs LHRAs and Contaminated Areas in Response to a Potential or Actual Emergency, Revision 9
RP-AA-503, Unconditional Release Survey Method, Revision 14
RP-AA-503-F-01, Unconditional Release Using the Small Articles Monitor, Revision 4
RP-AA-700-1239, Operation and Calibration of the Model SAM-12 Small Articles Monitor, Revision 4
RP-AA-700-1240, Operation and Calibration of the Canberra Argos-5 Personnel Contamination Monitor, Revision 6
ST-0-107-493-0, Periodic Byproduct Material Leakage Test and Inventory, W/0 04596700

Condition Reports

4054298	4058791	4060287	4065084	4066729	4070025
4071535	4074236				

Miscellaneous

Confirmation Form, 2017 Annual Inventory Reconciliation, National Source Tracking System, dated 1/6/2017 Inventory, sealed radioactive sources, printed 12/4/2017

Section 4OA1: Performance Indicator Verification

Procedures

LS-AA-2140, Monthly Data Elements for NRC Occupational Exposure Control Effectiveness,Revision 5
LS-AA-2150, Monthly Data Elements for RETS/ODCM Radiological Effluent Occurrences, Revision 5
LS-AA-2200, Mitigating System Performance Index Data Acquisition and Reporting, Revision 5
NEI 99-02, Regulatory Assessment Performance Indicator Guideline, Revision 7
RP-AA-403, Attachment 3, Planned Dose Rate Alarm Form, various
ST-5-061-810-0, Batch Liquid Waste Releases Monthly Composite Analysis, W/0 R1256926-01

Miscellaneous
List, Dose and Dose Rate Alarms, 1/1/2017 to present
List, RCA Exit Transactions > 100 mrem, 1/1/2017 to present
Logs, Whole Body Count, 1/1/2017 to present Operations Narrative Logs
RCS Leak Rate Data from October 2016 – October 2017
RCS Specific Activity Data from October 2016 – October 2017
Report, Open EMS, Liquid Status Summary Report, dated 12/4/2017
RHRSW and ESW MSPI Data from October 2016 – October 2017

Section 4OA2: Problem Identification and Resolution

Procedures
PI-AA-1001, Performance Improvement Integrated Matrix, Revision 3
PI-AA-101-1001, Performance Monitoring and Analysis Manual, Revision 0
PI-AA-120, Issue Identification and Screening Process, Revision 8
PI-AA-125, Corrective Action Program (CAP) Procedure, Revision 6

Condition Reports

1106803	1133256	1244946	1439284	1446596	1465797
1491195	1507365	1509125	1512745	1524096	1524143
1524270	1524287	1524304	1524310	1524313	1524318
2510148	2571432	2715183	3952174	3963665	3986936
3995233	4020785	4020940	4020967	4020972	4021268
4021784	4022237	4022361	4022485	4022875	4024190
4024259	4025049	4025058	4029717	4029860	4029892
4030266	4030338	4030779	4031071	4034122	4034439
4034621	4034842	4035365	4036225	4036417	4036471
4036534	4037533	4037811	4038954	4039383	4041292
4041650	4041907	4042994	4043706	4043733	4043822
4044408	4044613	4045049	4045090	4046098	4046391
4046838	4047501	4047614	4048261	4048498	4048577
4049572	4049989	4049989	4050248	4050262	4051256
4051348	4051928	4051929	4051930	4051931	4051932
4051933	4051934	4051935	4051936	4051937	4051938
4054731	4056984	4057062	4057278	4059470	4059600
4060791	4060810	4061623	4061959	4062002	4062018
4062071	4062096	4062125	4062241	4062246	4062412
4062511	4062514	4062602	4062967	4063066	4063190
4063193	4063206	4063219	4063231	4063380	4063565
4063724	4064400	4064604	4065084	4065287	4065896
4066033	4067693	4068016	4069001	4069703	4069706
4069708	4069712	4069979	4070486	4070641	4073004
4075943	4076445	4076647	4077789	4078235	4078725
4078731	4078992	4079731	4079861	4079877	4079882
4079885	4079888	4080158	4081134	4081625	4081859
4081882	4081907	4081962	4082004	4082181	4082219
4082335	4082538	4082568	4082589	4082644	4082714
4082863	4082970	4083352	4083416	4083606	4083842
4083893	4084116	4084494	4084499	4084504	4084506
4084508	4084509	4084532	4084541	4084568	4084784

Work Orders
2072802
2073304
4588471

Miscellaneous
01507365-08, Lube Oil Leak from Crack in Pipe Nipple to Valve 092-2402D on E24 Diesel Generator, Revision 0
8031-M-20, Fuel and Diesel Oil Storage Transfer, Revision 53
ER-AA-2030 Template EDG Trimesterly Walkdown, performed 4/30/17 and 8/31/17
IC-11-00087, Preventative Maintenance of Non-Critical Instrumentation on Emergency Diesel Generator 1CG501, Revision 22
LIM-01908, Failure Analysis of Lube Oil Pipe Nipple and Tubing, dated 3/21/17
Limerick Control Rod Drive System Health Action Plan
List of Open Corrective Maintenance Work Orders for the Control Rod Drive System (as of 10/04/2017)
PDSH-GA-101A, Instrument Calibration Sheet, Revision 1
PMRQ 00208630, Perform Hand-Over-Hand Tubing Inspection, dated 8/27/13
SME-D9, Rockwell-Edward Forged Steel Valves Sales Manual, dated 6/7/80
Valve Packing Datasheet: HV-050-1F046, Revision 0
Vibration data on D11 at valve 092-1402A and 093-1403A, dated 4/3/17

Section 4OA3: Follow-up of Events and Notices of Enforcement Discretion

Procedures
IC-C-11-04067, Testing and/or Replacement of Agastat Series GP, TR, and 7000 Series Relays, Revision 12

Condition Reports
2640598 2740480 3943194 3946803 3949624 3992141
4007992 4036417

Miscellaneous
Exelon Power Labs Report LIM-49416
Exelon Power Labs Report LIM-96957
LGS Purchase Order 80949

LIST OF ACRONYMS

CFR	*Code of Federal Regulations*
EDG	emergency diesel generator
HPCI	high pressure coolant injection
HRA	high radiation area
HVAC	heating, ventilation, and cooling
IMC	Inspection Manual Chapter
IR	Issue Report
JPM	job performance measure
LER	licensee event report
LGS	Limerick Generating Station
MCR	main control room
NCV	non-cited violation
NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission
PI	performance indicators
RCIC	reactor core isolation cooling
RCS	reactor coolant system
RHR	residual heat removal
RPV	reactor pressure vessel
THU	technical human performance
TRM	technical requirements manual
TS	technical specification
UFSAR	Updated Final Safety Analysis Report
VHRA	very high radiation area