



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

February 2, 2015

Mr. Bryan 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 – NRC INTEGRATED INSPECTION
REPORT 05000352/2014005 AND 05000353/2014005**

Dear Mr. Hanson,

On December 31, 2014, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Limerick Generating Station (LGS), Units 1 and 2. The enclosed inspection report documents the inspection results, which were discussed on January 16, 2014 with Mr. T. Dougherty, Site Vice President, and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

This report documents one self revealing non-cited violation which was determined to be of very low safety significance (Green). This finding was determined to involve a violation of NRC requirements. However, because of the very low safety significance, and because the issue is entered into your corrective action program, the NRC is treating this finding as a non-cited violation (NCV), consistent with Section 2.3.2 of the NRC Enforcement Policy. If you contest the NCV in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN.: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region I; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at LGS. In addition, if you disagree with the cross-cutting aspect assigned to the finding 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 Regional Administrator, Region I, and the NRC Resident Inspector at LGS.

In accordance with 10 *Code of Federal Regulations* (CFR) 2.390 of the NRCs "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available

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Sincerely,

/RA/

Fred L. Bower, III, Chief
Reactor Projects Branch 4
Division of Reactor Projects

Docket Nos.: 50-352, 50-353
License Nos.: NPF-39, NPF-85

Enclosure: Inspection Report 05000352/2014005 and 05000353/2014005
w/Attachment: Supplementary Information

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U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket Nos.: 50-352, 50-353

License Nos.: NPF-39, NPF-85

Report No.: 05000352/2014005 and 05000353/2014005

Licensee: Exelon Generation Company, LLC

Facility: Limerick Generating Station, Units 1 & 2

Location: Sanatoga, PA

Dates: October 1, 2014 through December 31, 2014

Inspectors: E. DiPaolo, Senior Resident Inspector
R. Montgomery, Resident Inspector
B. Lin, Project Engineer
A. Patel, Resident Inspector, Oyster Creek
T. Fish, Senior Operations Engineer
P. Presby, Senior Operations Engineer
T. Dunn, Operations Engineer
B. Fuller, Senior Operations Engineer
S. Barr, Senior Emergency Preparedness
C. Lally, Operations Engineer

Approved By: Fred L. Bower III, Chief
Reactor Projects Branch 4
Division of Reactor Projects

Enclosure

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SUMMARY

IR 05000352/2014005, 05000353/2014005; 10/01/14 – 12/31/14; Limerick Generating Station (LGS) Units 1 and 2; Problem Identification and Resolution.

The report covered a three-month period of inspection by resident inspectors and announced inspections performed by regional inspectors. One self-revealing finding of very low safety significance (Green) was identified. 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" (SDP), dated June 2, 2011. Cross-cutting aspects are determined using IMC 0310, "Aspects Within Cross-Cutting Areas," dated January 1, 2014. All violations of Nuclear Regulatory Commission (NRC) requirements are dispositioned in accordance with the NRC's Enforcement Policy, dated July 9, 2013. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 5.

Cornerstone: Initiating Events

- Green: A self-revealing, Green non-cited violation (NCV) of Technical Specification (TS) 6.8.1.b, "Administrative Controls," was identified for LGS' failure to properly implement station procedure MA-AA-716-100, "Maintenance Alterations Process," during troubleshooting and calibration associated with the Unit 1 condensate filter (CF) system. As a result, on September 9, 2014, one of two Instrument Maintenance (IM) technicians inadvertently mispositioned the air supply valve to the 1G CF flow transmitter causing an unplanned plant transient. The inspectors determined that the failure to properly implement station procedure MA-AA-716-100, "Maintenance Alterations Process," during troubleshooting of CF system instrumentation, was a performance deficiency. LGS promptly performed an investigation, verified the plant alignment and safely returned the Unit 1 reactor to 100 percent power. LGS entered the issue into their corrective action program (CAP) as issue report (IR) 2116233.

This self-revealing finding is more than minor because it affected the human performance attribute of 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. This resulted in elevated main steam line radiation levels which required operators to reduce reactor power in accordance with abnormal operating procedures. The inspectors evaluated the finding using inspection manual chapter (IMC) 0609, Appendix A, "The Significance Determination Process for Findings At-Power," to IMC 0609, "Significance Determination Process." This finding was determined to be of very low safety significance (Green) because it was associated with a transient initiator, but didn't cause a reactor trip and the loss of mitigation equipment relied upon to transition the plant from the onset of the trip to a stable shutdown condition. The finding has a cross-cutting aspect in the area of Human Performance, because LGS maintenance management did not ensure supervisory and management oversight of work activities [H.2]. (Section 40A2)

Other Findings

- None.

REPORT DETAILS

Summary of Plant Status

Unit 1 began the inspection period at 100 percent power. During the inspection period, power was lowered to 93 percent on December 13, to facilitate main turbine valve testing. Operators returned the unit to 100 percent power on December 14. Unit 1 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 November 8 and November 29, operators reduced power to 88 percent to facilitate control rod pattern adjustments. Operators restored power to 100 percent in each case the following day. On December 19, operators reduced power to approximately 90 percent to facilitate a control rod pattern adjustment. Operators returned power to 100 percent on December 20. Unit 2 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 – 2 samples)

.1 Readiness for Seasonal Extreme Weather Conditions

a. Inspection Scope

The inspectors performed a review of LGS' readiness for the onset of seasonal cold weather. The review focused on the site's emergency diesel generators (EDGs) and equipment located in the site's Spray Pond Pump House (i.e., emergency service water (ESW) and residual heat removal service water (RHRSW) pumps). The inspectors reviewed the Updated Final Safety Analysis Report (UFSAR), TSs, control room logs, and the CAP to determine what temperatures or other seasonal weather could challenge the systems and to ensure LGS personnel had adequately prepared for these challenges. The inspectors reviewed station procedures, including LGS' 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.

.2 Site Imminent Weather Conditions

a. Inspection Scope

On November 20, 2014, the inspectors reviewed LGS staff's preparations in advance of and during a Winter Storm Warning issued by the National Weather Service for

Montgomery County, Pennsylvania for November 26, 2014. The inspectors performed walkdowns of equipment that could be affected by high winds including the main transformer areas and the EDGs to verify that potential missile objects were secure. The inspectors verified that LGS personnel performed preparations in accordance with their severe weather procedures.

b. Findings

No findings were identified.

1R04 Equipment Alignment

.1 Partial System Walkdowns (71111.04 – 4 samples)

a. Inspection Scope

The inspectors performed partial walkdowns of the following systems:

- Unit 1 'B' residual heat removal (RHR) suppression pool cooling subsystem when the 'A' subsystem was unavailable due to planned maintenance on October 1, 2014
- Spray Pond Pump House alignment for the 'B' and 'D' RHRSW and ESW pumps on October 28, 2014
- Unit 1 'A' reactor enclosure recirculation system (RERS) when Unit 1 'B' RERS was unavailable for planned maintenance on October 28, 2014
- Unit 2 standby liquid control pumps alignment on October 29, 2014

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, TS, work orders, IRs, and the impact of ongoing work activities on redundant trains of equipment in order to identify conditions that could have impacted system performance of their 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 LGS staff had properly identified equipment issues and entered them into the CAP for resolution with the appropriate significance characterization.

b. Findings

No findings were identified.

.2 Full System Walkdown (71111.04S – 1 sample)

a. Inspection Scope

On December 12, 2014, the inspectors performed a complete system walkdown of accessible portions of the Unit 2 reactor core isolation cooling (RCIC) system to verify the existing equipment lineup was correct. The inspectors reviewed operating

procedures, surveillance tests, drawings, equipment line-up check-off lists, and the UFSAR to verify the system was aligned to perform its required safety functions. The inspectors also reviewed electrical power availability, component lubrication and equipment cooling, hangar and support functionality, and operability of support systems. The inspectors performed field walkdowns of accessible portions of the systems to verify system components and support equipment were aligned correctly and operable. The inspectors examined the material condition of the components and observed operating parameters of equipment to verify that there were no deficiencies. Additionally, the inspectors reviewed a sample of related IR's and work orders to ensure LGS personnel appropriately evaluated and resolved any deficiencies.

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 LGS 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 31, Unit 1 'B' and 'D' RHR Heat Exchange and Pump Room on October 1, 2014
- Fire Area 41, Unit 1, Reactor Enclosure Cooling Water Heat Exchanger Area Rooms on November 10, 2014
- Fire Area 122, Spray Pond Pump Structure Western Half on November 13, 2014
- Fire Area 123, Spray Pond Pump Structure Eastern Half on November 13, 2014
- Fire Area 56, Unit 2, RCIC Pump Room on December 8, 2014

b. Findings

No findings were identified.

1R07 Heat Sink Performance

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

a. Inspection Scope

The inspectors reviewed the heat transfer testing results for Unit 1 'A' core spray pump room cooler 1E-V211 to determine its readiness and availability to perform its safety functions. The inspectors reviewed the design basis for the component and verified LGS' commitments to NRC Generic Letter 89-13. This included a review of IR 1539675, Assignment 14, Heat Transfer Testing Scope and Frequency Reduction per Generic Letter 89-13 Commitments on December 18, 2014. The inspectors discussed the results of the most recent inspection with engineering staff. The inspectors verified that LGS 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.

.2 Triennial Heat Sink and Heat Exchanger Sample Selection (71111.07 - 6 samples)

a. Inspection Scope

Based on the Limerick Units 1 and 2 risk ranking of safety-related heat exchangers, past triennial heat sink inspections, recent operational experience, and resident inspector input, the inspectors selected six heat exchanger samples for inspection.

- | | | |
|---------------|--------------------------------|------------|
| • Unit 1 | 1A RHR Heat Exchanger | 1A-E205 |
| • Unit 1 | D12 Diesel Jacket Water Cooler | 1B-E507 |
| • Unit 1 | HPCI Turbine Lube Oil Cooler | 10-E213 |
| • Unit 2 | HPCI Turbine Lube Oil Cooler | 20-E213 |
| • Units 1 & 2 | B Control Enclosure-Chiller B | OB-K112 |
| • Units 1 & 2 | Ultimate Heat Sink | Spray Pond |

For the samples selected, the inspectors reviewed program and system health reports, self-assessments, and LGS' methods (inspection, cleaning, maintenance, and performance monitoring) used to ensure heat removal capabilities for the safety-related heat exchangers and compared them to LGS' commitments made in response to generic letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment." The inspectors reviewed the results from the most recent inspection and cleaning and verified that the heat exchangers were being maintained within the acceptance criteria.

1A Residual Heat Removal Heat Exchanger

The inspectors reviewed the programs and procedures for maintaining the safety functions of the Unit 1 RHR heat exchanger (1A-E205) which is directly cooled by service water (SW). The inspectors reviewed the results of the most recent cleaning, eddy current testing to verify tube integrity, and reviewed trending of tube plugging in the

1A heat exchanger (two tubes plugged with a limit of 54 tubes). The inspectors reviewed the results of these inspection activities and testing of tube integrity and reviewed engineering calculations verifying that tube plugging limits maintain the minimum required design flow requirements.

The inspectors reviewed the condition of the system components, including piping, pumps, and valves with Limerick staff personnel. The inspectors also reviewed the previous performance test (2010) of the 1A heat exchanger which verified that the heat exchanger met its acceptance criteria for design-basis heat removal (Calculation LM-0638). The inspectors further reviewed the current calculation (LM-0640, Revision 2) that established a revised minimum flow required during postulated design basis accident conditions. The calculation supported the structural evaluation of the 1A RHR heat exchanger for the minimum flow rate at the tube plugging limits.

Heat Sink Sample – Ultimate Heat Sink Units 1 and 2 - Spray Pond

The inspectors selected and completed an ultimate heat sink (UHS) sample to assess various surface anomalies on the surrounding peripheral support embankments which consists of various rock, sand, gravel and asphalt.

The spray pond serves as the UHS common to both Units 1 and 2. Also, for the above-ground UHS which is encapsulated by rock and earthen side slopes, the inspectors assessed and verified there were no visible seepage of water and the crest of the embankment showed no settlement. Rip-rap protection on side slopes was found to be firmly “in place” with no vegetation evident along the crest or slopes. The inspectors performed an unobstructed visual assessment of the reservoir and noted it was filled to apparent capacity. The inspectors took note that adjacent non-seismic non-safety related structures were maintained such that there was no blockage or obstruction of flow paths to the reservoir. Inspection of the crest of the dam revealed no evidence of settlement. Visible cracks and fissures were noted to have been appropriately prepared and filled with “caulking” material which excluded loose dirt, debris and rubble. The inspectors noted that surface cracking of asphalt on top of the embankment “capping” had been accomplished in a timely fashion to preclude further adverse attack (freezing, washout, erosion) of the embankment. IRs had been initiated to address deterioration and provide for effective repair.

The inspectors conducted a walkdown of the Unit 1 and Unit 2 common spray pond structures, associated work-buildings, earth moving equipment, and the resources that were available in close proximity to maintain and repair the spray pond facilities, as needed.

The inspectors reviewed the chemical additions made to the UHS for the purposes of preventing corrosion, scale formation, fouling and biological deposits in system piping and components. The inspectors reviewed and discussed the analyses and monitoring with personnel responsible for chemistry control. The inspectors confirmed the chemical treatment program at LGS for corrosion and biotic control was consistent with industry standards.

1B Jacket Water Cooler

The inspectors reviewed the results from the most recent cleaning and inspection of the 1B-E507 Jacket Water Heat Exchanger (single pass heat exchanger) including the visual inspection of the heat exchanger structural internals for evidence of macro-fouling, micro-fouling, corrosion, scale, silt deposits and clam or mussel infestation. Also, an

examination was performed to assess silt buildup, mud, debris, depth of pitting (none was found) and evidence of bypass flow (none was found) and trending of tube plugging, and engineering calculations of tube plugging limits. No tubes were found plugged and none were found to be fouled to any measureable extent. No tubes required plugging during this inspection period. A boroscope inspection was determined to be not necessary based on the visual evaluation of the tubes. The inspectors also verified that the heat exchanger met the visual inspection acceptance criteria for as-found and as-left conditions and had adequate cooling margin.

The inspectors used the visual inspection acceptance criteria shown as Item "3" on the "G501 EDG heat exchanger (HX) Inspection Checklist" to evaluate the internals of the heat exchanger. The inspection results were compared with the previous inspection (2011) results and the inspectors noted that the number of tubes allowed to be plugged was nine and the number of tubes plugged previously was zero. There are no tubes currently plugged in the 1B-E507 heat exchanger. Eddy current testing of the tubes in this heat exchanger is not due until February 2, 2015.

The flow balance test for the ESW Loop 'B' was performed on August 4, 2014 using test procedure RT-2-011-252-0, Revision 26, to verify the Loop 'B' was capable of supplying design flow to both of the Limerick Unit vital loads.

'B' Main Control Room (MCR) Chiller

The 'B' MCR chiller (OB-K112) is common to both Units 1 and 2. The inspectors reviewed the 'B' MCR Chiller Heat Transfer Test RT-2-011-392-0. This test is performed at a 48 month frequency. The purpose of this test is to verify adequate heat transfer capabilities of the 'B' MCR chiller condenser. This test also monitors chiller performance. The performance of this heat transfer test is required for license renewal and is consistent with the standards described in Generic Letter 89-13.

The inspectors reviewed the applicable drawings, test prerequisites, test procedure verification of heat transfer and conformance to the specified acceptance criteria. The inspectors also reviewed the MCR heat transfer performance calculation test and results for compliance with the specified chiller duty at design conditions. The inspectors review verified the test results were within the acceptance criteria.

All open tubes were eddy current tested (one tube was noted to have been plugged based on previous examinations). The inspectors noted that no indications identified met the repair criteria and no tubes were recommended to be plugged. No indications of cracking or erosion were noted and no other damage precursors were identified.

High Pressure Coolant Injection (HPCI) Turbine Lube Oil Cooler (Units 1 and 2) 10-E213 and 20-E213

The inspectors selected two (High Pressure Core Injection) turbine lube oil coolers (one per each unit) for review and evaluation of test performance and results of eddy current testing and visual examination of one hundred percent of the tubes in both exchangers. No indications were reported and no tubes were recommended to be plugged based upon the eddy current test results. There was no evidence of thru wall leakage or degradation due to corrosion of a pressure retaining boundary. No flow loss or impairment was identified and no leakage from pressure retaining bolted connections was noted. These test results were consistent with the previous examination of these components.

Review of Issue Reports

The inspectors selected and reviewed a sample of CAP inputs related to the heat sink and heat exchanger samples chosen for this inspection. The review verified that LGS staff is appropriately identifying, characterizing, and correcting problems related to these systems and components, and that the planned or completed corrective actions for the reported issues were appropriate.

b. Findings

No findings were identified.

1R11 Licensed Operator Regualification Program

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

a. Inspection Scope

The inspectors observed two licensed operator simulator scenarios that were part of the annual operating examination on October 28, 2014. The scenarios included several abnormal operating transients, an anticipated transient without scram, as well as a loss of coolant accident. The scenarios were complicated by failures of plant instrumentation, emergency core cooling systems, and inadvertent containment isolations. 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 classification made by the Shift Manager and the TS Actions entered by the licensed operators. 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 during the Unit 1 HPCI pump valve and flow test on December 17, 2014. The inspectors verified operator compliance and use of plant procedures, performance of procedure steps in proper sequence, and proper TS usage. Pre-job briefs, the use of human error prevention techniques, communications between crew members, and supervision of activities were also observed to verify that they were performed consistent with established plant practices.

b. Findings

No findings were identified.

.3 Licensed Operator Regualification Program (71111.11A – 1 sample)

a. Inspection Scope

On December 12, 2014, NRC region-based inspectors conducted an in-office review of results of licensee-administered annual operating tests for 2014. The inspection assessed whether pass rates were consistent with the guidance of NRC Manual Chapter 0609, Appendix I, and “Operator Regualification Human Performance SDP”. The inspectors verified that:

- Crew pass rates were greater than 80 percent. (Pass rate was 100 percent)
- Individual pass rates on the written examinations were greater than 80 percent. (N/A. Written exams were previously administered in the fall 2013.)
- Individual pass rates on the job performance measures of the operating examinations were greater than 80 percent. (Pass rate was 98 percent)
- Individual pass rates on the dynamic simulator test were greater than 80 percent. (Pass rate was 100 percent)
- Overall pass rate among individuals for all portions of the examinations was greater than or equal to 80 percent. (Overall pass rate was 98 percent)

b. Findings

No findings were identified.

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

a. Inspection Scope

The following inspection activities were performed using NUREG 1021, Revision 9, Supplement 1, Operator Licensing Examination Standards for Power Reactors, Inspection Procedure Attachment 71111.11, Licensed Operator Requalification Program.

A review was conducted of recent operating history documentation regarding fuel handling found in the licensee's CAP. The inspectors also reviewed specific events from the licensee's CAP to determine if possible training deficiencies existed.

The inspectors evaluated the 2014 Limerick Limited Senior Reactor Operator (LSRO) refueling operating tests and the 2014 Limerick LSRO biennial written examinations for quality and compliance with the Examination Standards. Inspectors observed the administration of refuel platform job performance measures to four operators at LGS on June 3, 2014.

The results of the biennial written examinations at Limerick and annual operating tests for 2014 were reviewed to determine whether pass/fail rates were consistent with the guidance of NUREG-1021, Revision 9, Supplement 1, Operator Licensing Examination Standards for Power Reactors and NRC Manual Chapter 0609, Appendix I, "Operator Requalification Human Performance SDP." All LSROs passed their examinations. Performance of all LSROs over 2 years was reviewed and indicated no adverse trends.

Two years of records for requalification training attendance and license reactivation for all four LSROs were reviewed for compliance with license conditions and NRC regulations. Medical records for all four LSROs were also reviewed. LSRO license maintenance was evaluated by the review of the 4th Quarter "Active License" status entries of 2013.

A sampling of feedback was reviewed and training materials were evaluated for response to this feedback. These materials were also reviewed for incorporation of plant modifications and industry events.

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, or component (SSC) performance and reliability. The inspectors reviewed system health reports, CAP documents, maintenance work orders, and maintenance rule basis documents to ensure that LGS was identifying and properly evaluating performance problems within the scope of the maintenance rule. For each sample selected, the inspectors verified that the SSC was properly scoped into the maintenance rule in accordance with 10 CFR 50.65 and verified that the (a)(2) performance criteria established by LGS staff was reasonable. As

applicable, for SSCs classified as (a)(1), the inspectors assessed the adequacy of goals and CAs to return these SSCs to (a)(2). Additionally, the inspectors ensured that LGS staff was identifying and addressing common cause failures that occurred within and across maintenance rule system boundaries.

- Restoration of Unit 2 EDGs in Maintenance Rule (a)(2) status following completion of (a)(1) action plan and completion of monitoring period (IR 1525669) on November 17, 2014
- Control enclosure chilled water-system 90 (a)(1) action plan (IR 1639507) on December 19, 2014
- EDG D12 inoperability due to control relay failure on December 23, 2014 (IR 2398456)

Findings

No findings were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13 – 5 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 LGS 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 LGS personnel performed risk assessments as required by 10 CFR 50.65(a)(4) and that the assessments were accurate and complete. When LGS 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 1 and 2 Yellow on-line risk during 101 safeguard bus being unavailable during maintenance from October 9–12, 2014
- Unexpected loss of EDG D21 while Unit 2 was in Yellow on-line risk due to 2A RHR limitorque inspection on October 21, 2014
- Unit 1 on-line risk following the failure of one electro-hydraulic pressure regulator on October 24, 2014
- Unit 1 Yellow on-line risk during reactor enclosure recirculation system charcoal sample on October 28, 2014.
- Units 1 and 2 Yellow on-line risk due to the 101 safeguard transformer being unavailable due to failure of the automatic voltage controller on November 17, 2014

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:

- IR 2400500, Unit 2 'A' RHR heat exchange sample containment isolation valve (HV-051-2F079A) slow to open during testing on October 23, 2014
- IR 2402370, 'B' RHRSW pump upper oil bearing level contamination issue on October 28, 2014
- IR 2405433, Unit 1 RCIC discharge flow indicator showing flow with RCIC secured on November 3, 2014
- IR 2414215, 101 safeguard transformer offsite power supply return to operable status following troubleshooting and repair of automatic voltage controller on November 19, 2014
- IR 2416015, Unit 1 reactor enclosure heating, ventilation and air conditioning (HVAC) heating coil condition impacting reactor enclosure temperatures on November 22, 2014
- IR 2421220 EDG D14 tubing clamp not screwed into engine block on December 5, 2014

The inspectors selected these issues based on the risk significance of the associated components and systems. The inspectors evaluated the technical adequacy of the operability determinations to assess whether technical specification 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 technical specifications and UFSAR to LGS' evaluations to determine whether the components or systems were operable. Where compensatory measures were required to maintain operability, the inspectors determined whether the measures in place would function as intended and were properly controlled by LGS. The inspectors determined, where appropriate, compliance with bounding limitations associated with the evaluations.

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.18 – 2 samples)a. Inspection Scope

The inspectors reviewed the temporary modifications listed below to determine whether the modifications affected the safety functions of systems that are important to safety. The inspectors reviewed 10 CFR 50.59 documentation and post-modification testing results, and conducted field walkdowns of the modifications to verify that the temporary modifications did not degrade the design bases, licensing bases, and performance capability of the affected systems.

- Engineering Change Request 14-00354 (Temporary), Bypass 101 Safeguard Transformer Motor Interlock Switch Function on November 7, 2014
- Engineering Change Request 12-00429, Reduce RHRSW Design Pressure to Improve Piping Design Margin on December 23, 2014

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19 – 6 samples)

a. Inspection Scope

The inspectors reviewed the post-maintenance tests for the maintenance activities listed below to verify that procedures and test activities ensured system operability and functional capability. The inspectors reviewed the test procedure to verify that the procedure adequately tested the safety functions that may have been affected by the maintenance activity, that the acceptance criteria in the procedure was consistent with the information in the applicable licensing basis and/or design basis documents, and that the procedure had been properly reviewed and approved. The inspectors also witnessed the test or reviewed test data to verify that the test results adequately demonstrated restoration of the affected safety functions.

- R1248575, Third offsite source installation due to the 101 transformer cable replacement project on October 12, 2014
- C0254437, Replace EDG D21 starting air solenoid on October 21, 2014
- M1973482, Replace EDG D12 control power under voltage relay on October 21, 2014
- M1975521, Troubleshoot and repair Unit 1 RCIC flow controller output signal on November 3, 2014
- C0254720, Troubleshoot and repair Unit 2 drywell floor drain instrumentation pressure control isolation valve on November 10, 2014
- C0254895, Troubleshoot and repair 101 safeguard transformer automatic voltage controller on November 18, 2014

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22 – 2 Routine, 4 In-Service Test [IST])

a. Inspection Scope

The inspectors observed performance of surveillance tests and/or reviewed test data of selected risk-significant SSCs to assess whether test results satisfied TS, the UFSAR, and LGS 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-6-012-231-0, 'A' Loop RHRSW Pump Valve & Flow Test on October 2, 2014 (IST)
- ST-6-052-232-2, 'B' Core Spray Pump Valve and Flow Test on October 27, 2014 (IST)
- ST-6-092-322-2, D22 EDG LOCA/LOAD Reject Testing and Fast Start Operability Test Run on October 30, 2014
- ST-6-049-200-1, RCIC Valve Test on December 3, 2014 (IST)
- ST-6-049-952-1, RCIC Vacuum Breaker Test on December 2, 2014
- ST-6-055-230-1, Unit 1 HPCI Pump Valve and Flow Test on December 17, 2014 (IST)

b. Findings

No findings were identified.

Cornerstone: Emergency Preparedness

1EP2 Alert and Notification System Evaluation (71114.02 - 1 sample)

a. Inspection Scope

An onsite review was conducted to assess the performance, maintenance, and testing of the LGS alert and notification system (ANS). During this inspection, the inspectors conducted a review of the ANS testing and maintenance programs. The inspectors reviewed the associated ANS procedures and the Federal Emergency Management Agency approved ANS Design Report to ensure LGS has complied with design report commitments for system maintenance and testing. The inspection was conducted with 10 CFR 50.47(b)(5) and the related requirements of 10 CFR Part 50, Appendix E, as reference criteria.

b. Findings

No findings were identified.

1EP3 Emergency Response Organization Staffing and Augmentation System (71114.03 - 1 sample)

a. Inspection Scope

The inspectors conducted a review of LGS' Emergency Response Organization (ERO) augmentation staffing requirements and the process for notifying and augmenting the ERO. The review was performed to verify the readiness of key LGS staff to respond to an emergency event and to verify LGS' ability to activate their emergency response facilities (ERF) in a timely manner. The inspectors reviewed the LGS Emergency Plan for ERF activation and ERO staffing requirements, the ERO duty roster, applicable station procedures, augmentation test reports, the most recent drive-in drill reports, and IRs related to this inspection area. The inspectors also reviewed a sample of ERO

responder training records to verify training and qualifications were up to date. The inspection was conducted with Title 10 CFR 50.47(b) (2) and related requirements of 10 CFR Part 50, Appendix E, as reference criteria.

b. Findings

No findings were identified.

1EP5 Maintenance of Emergency Preparedness (71114.05 - 1 sample)

a. Inspection Scope

The inspectors reviewed a number of activities to evaluate the efficacy of LGS' efforts to maintain the LGS emergency preparedness program. The inspectors reviewed: letters of agreement with offsite agencies; the 10 CFR 50.54(q) Emergency Plan change process and practice; LGS' maintenance of plant equipment important to EP; records of evacuation time estimate population evaluation; and provisions for, and implementation of, primary and backup ERF maintenance. The inspectors also verified LGS' compliance with new NRC EP regulations regarding: emergency action levels for hostile action events; protective actions for on-site personnel during events; emergency declaration timeliness; ERO augmentation and alternate facility capability; evacuation time estimate updates; on-shift ERO staffing analysis; and, ANS back-up means.

The inspectors further evaluated LGS' ability to maintain their EP program through identification and correction of EP weaknesses, by reviewing a sample of drill reports, actual event reports, self-assessments, 10 CFR 50.54(t) reviews, and EP-related IRs. The inspectors reviewed a sample of EP-related IRs initiated at LGS from January 2013 through October 2014. The inspection was conducted with Title 10 CFR 50.47(b) and the related requirements of 10 CFR Part 50, Appendix E, as reference criteria.

b. Findings

No findings were identified.

1EP6 Drill Evaluation (71114.06 – 1 sample)

.1 Emergency Preparedness Drill Observation

a. Inspection Scope

The inspectors evaluated the conduct of a routine LGS emergency drill on October 28, 2014, to identify any weaknesses and deficiencies in the classification, notification, and protective action recommendation development activities. The inspectors observed emergency response operations in the simulator, technical support center, and emergency operations facility to determine whether the event classification, notifications, and protective action recommendations were performed in accordance with procedures. The inspectors also attended the station drill critique to compare inspector observations with those identified by LGS staff in order to evaluate LGS' critique and to verify whether the LGS staff was properly identifying weaknesses and entering them into the CAP.

b. Findings

No findings were identified

4. OTHER ACTIVITIES

4OA1 Performance Indicator Verification

.1 Performance Indicator Verification (71151- 3 samples)

a. Inspection Scope

The inspectors reviewed data for the following three EP performance indicators: (1) Drill and Exercise Performance; (2) ERO Drill Participation; and, (3) ANS Reliability. The last NRC EP inspection at Limerick was conducted in the fourth quarter of 2013. Therefore,

the inspectors reviewed supporting documentation from EP drills and equipment tests from the fourth quarter of 2013 through the third quarter of 2014 to verify the accuracy of the reported performance indicators data. The acceptance criteria documented in Nuclear Energy Institute (NEI) 99-02, "Regulatory Assessment Performance Indicator Guidelines," Revision 7, was used as reference criteria.

b. Findings

No findings were identified.

.2 Mitigating Systems Performance Index (2 samples)

a. Inspection Scope

The inspectors reviewed LGS' submittal of the Mitigating Systems Performance Index for the following systems for the period of October 1, 2013 through September 30, 2014:

- 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 NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7. The inspectors also reviewed LGS' 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.

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

a. Inspection Scope

The inspectors reviewed LGS' submittal for the RCS specific activity and RCS leak rate performance indicators for both Unit 1 and Unit 2 for the period of October 1, 2013 through September 30, 2014. 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, "Regulatory Assessment Performance Indicator Guideline," 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. Inspection Findings

No findings were identified.

4OA2 Problem Identification and Resolution (71152 – 2 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 that LGS entered issues into the CAP 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 CAP and periodically attended condition report screening meetings.

.2 Semi-Annual Trend Review (71152 – 1 sample)

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 LGS outside of the CAP, such as trend reports, performance indicators, major equipment problem lists, system health reports, maintenance rule assessments, and maintenance or CAP backlogs. The inspectors also reviewed the CAP database for the first and second quarters of 2014 to assess IRs 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).

b. Findings and Observations

No findings were identified.

The review did not reveal any new trends that could indicate a more significant safety issue. The inspectors determined that LGS personnel were identifying issues at a low threshold and entering issues and into the CAP for resolution and, with a few exceptions, appropriately prioritizing investigation reviews. The inspectors also noted that the site's Nuclear Oversight organization continued to identify negative trends at an appropriate level and elevated issues when necessary. Based on the overall results of the semi-annual trend review, the inspectors determined that LGS was properly identifying adverse trends before they became more safety significant problems.

.3 Annual Sample: Unplanned Downpower to 90 Percent Power due to Main Steam Line High Radiation Levels (71152 – 1 sample)

a. Inspection Scope

The inspectors performed an in-depth review of LGS' cause analysis, extent of condition reviews, and short and long term corrective actions associated with an unplanned downpower to 90 percent power on Unit 1 due to main steam line high radiation levels on September 9, 2014. The inspectors assessed LGS' cause analysis, extent of condition reviews, and short and long term corrective actions to determine whether LGS was appropriately identifying, characterizing, and correcting problems associated with the event.

b. Findings and Observations

Introduction: A self-revealing, Green NCV of Technical Specification 6.8.1.b, "Administrative Controls," was identified for LGS' failure to properly implement station procedure MA-AA-716-100, "Maintenance Alterations Process," during troubleshooting and calibration associated with the CF system. As a result, on September 9, 2014, one of two Instrument Maintenance (IM) technicians inadvertently mispositioned the air supply valve to the 1G CF flow transmitter causing an unplanned plant transient.

Description: On September 9, 2014, LGS Unit 1 was operating at steady state conditions. At approximately 09:23, the Unit 1 Main Control Room (MCR) received the CF Demineralizer Trouble Alarm and operators noted abnormal indications for CF flows and differential pressure. At approximately 09:24, the Unit 1 MCR Main Steam High Radiation annunciator alarmed. Operations entered off normal procedure ON-102, "Air Ejector Discharge or Main Steam Line High Radiation," and emergency operating procedure T-103, "Secondary Containment Control," which directed a load reduction to maintain radiation levels below 1.5x normal power background. The higher radiation level was caused by an increase in hydrogen injection due to the CF transient. This required MCR operators to reduce power to approximately 90% power. LGS performed walkdowns of the CF system, system alignments, and interviewed personnel working in the area. LGS entered the issue into their CAP (IR 2116233) and initiated a root cause investigation.

LGS determined that the direct cause of the transient was due to an IM technician inadvertently mispositioning, during scheduled troubleshooting and calibration of the CF system, the air supply valve to the 1G CF flow transmitter. Subsequently, LGS determined that the root cause for this human performance error was due to LGS Maintenance Management not effectively establishing, and holding First Line

Supervisors accountable to a performance management model that consistently prioritizes the use of proper standards and behaviors over other motivators (for example: time, job completion, relationships).

On September 8, 2014, two IM technicians were preparing to perform troubleshooting and calibration of the CF system instrumentation. During preparations, the IM technicians were only required by their supervision to identify the system that was to be manipulated rather than the specific components that would be manipulated as required by MA-AA-716-100. This procedure requires that any equipment that is to be manipulated during the maintenance be logged, reviewed by supervision, and provided with an appropriate level of field verification prior to the manipulation taking place. Although Exelon's root cause determined that supervisors allowed the IM technicians the leniency to deviate from their original plan which led to the mispositioning of the air supply valve to the 1G CF flow transmitter, the inspectors noted that the original plan was inadequate because it was too general and lacked specificity. To uphold the standards of MA-AA-716-100, supervision should have required the IM technicians to specify what components they were going to operate and in what sequence.

Specifically, on Tuesday, September 9, 2014, after successful calibrations of other system instrumentation the IM technicians began working on troubleshooting a potential leak associated with the CF instrument air (I/A) system. In support of continued troubleshooting, the IM technicians opened a spare I/A supply valve; however, they did not apply the proper peer check as required by the MA-AA-716-100. As a result, at some point during the task, prior to the leak check of the tubing, the air supply valve to the 1G CF flow transmitter was inadvertently isolated by one of the two IM technicians. This mispositioning ultimately initiated the event.

Analysis: The inspectors determined that the failure to properly implement station procedure MA-AA-716-100, "Maintenance Alterations Process," during troubleshooting of CF system instrumentation, was a performance deficiency. This self-revealing finding was more than minor because it affected the human performance attribute of 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. This resulted in elevated main steam line radiation levels which required operators to reduce reactor power in accordance with abnormal operating procedures. The inspectors evaluated the finding using IMC 0609, Appendix A, "The Significance Determination Process for Findings At-Power," to IMC 0609, "Significance Determination Process." This finding was determined to be of very low safety significance (Green) because it was associated with a transient initiator, but didn't cause a reactor trip and the loss of mitigation equipment relied upon to transition the plant from the onset of the trip to a stable shutdown condition.

The finding has a cross-cutting aspect in the area of Human Performance, because LGS maintenance management did not ensure supervisory and management oversight of work activities. [H.2]

Enforcement: Technical Specification 6.8.1.b, "Administrative Controls," requires, in part, that written procedures shall be established, implemented, and maintained covering the activities in NUREG-0737 and Supplement 1 to NUREG-0737. NUREG-0737, "Clarification of TMI Action Plan Requirements," Section I.C.6, "Guidance on Procedures

for Verifying Correct Performance of Operating Activities,” specifies that licensees’ procedures be reviewed and revised, as necessary, to assure that an effective system of verifying the correct performance of operating activities is provided as a means of reducing human error and improving the quality of normal operations. MA-AA-716-100, “Maintenance Alterations Process,” Revision 12, implements this requirement. Step 4.2.2.2.A, requires that supervisors of work shall ensure proper verifications are being performed by technicians during maintenance alterations.

Contrary to the above, during troubleshooting of the CF system instrumentation, IM technicians conducted valve manipulations without their supervisor ensuring the proper level of verifications were being performed as required by MA-AA-716-100. In addition, LGS supervision was not appropriately enforcing the requirements of the MA-AA-716-100 and ensuring that the requirements of NUREG-0737 were being met. As a result, on September 9, 2014, one of two IM technicians inadvertently mispositioned the air supply valve to the 1G CF flow transmitter causing the MCR to receive a Main Steam High Radiation annunciator alarm. This required MCR operators to reduce power to approximately 90% power. LGS promptly performed an investigation, verified the plant alignment and safely returned the Unit 1 reactor to 100 percent power. LGS entered the issue into Exelon’s CAP as IR 2116233. Because this issue was of very low safety significance (Green) and LGS staff entered this issue into the CAP, this violation is being treated as an NCV consistent with Section 2.3.2 of the NRC Enforcement Policy. **(NCV 05000352/2014005-01, Unplanned Manual Power Reduction to 90% on Unit 1)**

4. Annual Sample: Trip of Service Air Compressor while Supplying I/A with Resultant Lowering of I/A Header Pressure and Power Reduction (71152 – 1 sample)

a. Inspection Scope

The inspectors performed an in-depth review of LGS’ cause analysis, troubleshooting, extent of condition reviews, and short and long term corrective actions associated with the lowering of I/A header pressure and 20% power reduction on July 7, 2013. This inspection focused on LGSs problem identification, evaluation, and resolution of issues arising from the lowering I/A header pressure and power reduction as a result of the trip of the service air compressor.

The inspectors assessed LGS’ cause analysis, troubleshooting, extent of condition reviews, and short and long term corrective actions to determine whether LGS was appropriately identifying, characterizing, and correcting problems associated with the lowering of I/A header pressure and whether the planned or completed corrective actions were appropriate. The inspectors compared the actions taken to the requirements of LGSs CAP and 10 CFR Part 50, Appendix B, Criterion XVI, “Corrective Action.”

b. Findings and Observations

No findings were identified.

The inspectors determined that LGS appropriately identified, characterized, and implemented corrective actions associated with the power reduction caused by the lowering of I/A header pressure. LGS took appropriate actions to identify the cause of the issue. The cause was determined to be the trip of the service air compressor, which

was in service at the time supplying the 1B I/A header, as the 1B I/A compressor was blocked for planned maintenance. The service air compressor trip was determined to be due to set point drift of a temperature switch associated with the compressor high temperature trip feature. The compressor trip was further exacerbated by a partially clogged pre-filter for the in-service 1A I/A dryer, and a failed differential pressure switch for the pre-filter. As a result of the trip of the service air compressor, all I/A for the unit was supplied through the 1A I/A dryer. Due to the partially clogged pre-filter, the increased air flow caused a much higher pressure drop across the filter, resulting in lowering I/A header pressure. Operators began reducing power in accordance with procedure upon confirmation of lowering pressures in the I/A headers, and stabilized power once I/A header pressure had been restored.

LGS promptly investigated the cause and performed an extent of condition for the other temperature switches, filters, and differential pressure indicators throughout the plant. This resulted in both the creation of new preventive maintenance items and adjustments to the previous preventive maintenance items. This was done to ensure proper functioning of I/A dryer filters and differential pressure indicators.

The inspectors determined LGS' overall response to the issue was commensurate with the safety significance, was timely, and the actions taken and planned were reasonable to resolve the issues identified by the trip of the service air compressor.

.5 Annual Sample: Procedure Use and Adherence Events (71152 - 1 sample)

a. Inspection Scope

LGS had procedure use and adherence events in calendar years 2012 and 2013. LGS performed individual evaluations for each event and also performed a self assessment under IR 152552.

The inspectors performed an in-depth review of the self assessment and the other evaluations, and assessed the following attributes; identification of the causes, extent of condition reviews and previous occurrences. The inspectors also assessed the timeliness of corrective actions and whether they will preclude repetition of the events. The inspectors performed reviews of the documents noted in the Attachment to this report to assess the effectiveness of the planned, scheduled, and completed corrective actions to resolve the identified deficiencies.

b. Findings and Observations

No findings were identified.

The inspectors determined that LGS appropriately identified, characterized, and implemented corrective actions associated with procedure use and adherence events identified during calendar years 2012 and 2013.

4OA3 Follow-Up of Events and Notices of Enforcement Discretion (71153 – 5 samples)

(Closed) Licensee Event Report (LER) 05000353/2013-003-00: Inoperable Reactor Enclosure Secondary Containment Integrity due to Open Airlock

(Closed) LER 05000352/2014-003-00: Inoperable Reactor Enclosure Secondary Containment Integrity due to Open Airlock

(Closed) LER 05000353/2014-003-00: Inoperable Reactor Enclosure Secondary Containment Integrity due to Open Airlock

(Closed) LER 05000353/2014-004-00: Inoperable Reactor Enclosure Secondary Containment Integrity due to Open Airlock

(Closed) LER 05000353/2014-006-00: Inoperable Reactor Enclosure Secondary Containment Integrity due to Open Airlock

The events were reported as a condition that could have prevented the fulfillment of a safety function of structures or systems needed to control the release of radioactive material in accordance with 10 CFR 50.72(b)(3)(v)(C) and the guidance contained in NUREG-1022, Revision 3, "Event Report Guidelines," 10 CFR 50.72 and 50.73. TS 3.6.5.1.1, "Reactor Enclosure Secondary Containment Integrity," Surveillance Requirement 4.6.5.1.1.b, requires at least one door in each access to the reactor enclosure be closed. The events were caused by human performance errors which resulted in inadvertently opening of both airlock doors simultaneously. One event (LER 05000353/2014-006-00) had an additional contributing factor associated with a degraded door self-closing mechanism. In all cases, the airlock doors were closed within 10 seconds, well within the Limiting Condition for Operation 3.6.5.1.1 action time limit of four hours. As a result, a violation of plant TS did not occur.

Although there was performance deficiencies associated with each of the events, the inspectors determined the issues to be minor. To prevent a breach of secondary containment, each reactor enclosure airlock is equipped with a door open indicating light which are used to locally verify the door status. If both doors are opened simultaneously, a local alarm is actuated. If both doors remain open for greater than 10 seconds, an alarm for each set of airlock doors is actuated in the main control room. Per alarm response procedure, an operator would be dispatched to the airlock door to check the status of the doors and to close them if they were open. LGS post loss of coolant accident dose calculations do not credit reactor enclosure secondary containment integrity for mitigation of on-site and off-site doses for the first 15.5 minutes of the event. Based on this information, the inspectors concluded that the performance deficiencies were minor because they: 1) could not reasonably be viewed as a precursor to a significant event; 2) would not have the potential to lead to a more significant to a more significant safety concern if left uncorrected; or 3) would not have adversely affected the reactor enclosure secondary containment's ability to protect the public from radionuclide releases. The LERs are closed.

4OA5 Other Activities

World Association of Nuclear Operators (WANO) Report Review

a. Inspection Scope

The inspectors reviewed the final report for the WANO plant assessment of LGS conducted in May 2014. The inspectors evaluated the report to ensure that NRC perspectives of LGS performance were consistent with any issues identified during the assessment. The inspectors also reviewed the report to determine whether WANO identified any significant safety issues that required further NRC follow-up.

b. Findings

No findings were identified.

4OA6 Meetings, Including Exit

On January 16, 2015, the inspectors presented the inspection results to Mr. Thomas Dougherty, Site Vice President, 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**Licensee Personnel

T. Dougherty, Site Vice President
 D. Lewis, Plant Manager
 M. Gillin, Director of Operations
 D. Doran, Director of Engineering
 F. Sturniolo, Director of Maintenance
 J. Hunter, Director of Work Management
 K. Kemper, Security Manager
 R. Dickinson, Manager, Regulatory Assurance
 J. Karkoska, Manager, Nuclear Oversight
 R. Ruffe, Training Director
 H. Weissinger, Shift Operations Superintendent
 G. Budock, Regulatory Assurance Engineer
 D. Molteni, Manager Operations Training
 M. DiRado, Manager, Engineering Programs
 D. Merchant, Radiation Protection Manager
 C. Gerdes, Manager, Chemistry, Environmental and Radioactive Waste
 D. O'Conner, Program Engineer
 J. Berg, System Manager
 G. Sprisslee, Chemistry Engineer
 K. Slough, Engineering – Mechanical Design Manager
 T. Avram, Design Engineer
 J. Narula, Design Engineer
 D. Weiksner, Limerick LSRO Program Lead

LIST OF ITEMS OPENED, CLOSED, DISCUSSED, AND UPDATEDOpened/Closed

05000352/2014-005-01	NCV	Unplanned Manual Power Reduction to 90% on Unit 1 (Section 4OA2.3)
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Closed

05000353/2013-003-00	LER	Inoperable Reactor Enclosure Secondary Containment Integrity Due to Open Air Lock (Section 4OA3)
05000352/2014-003-00	LER	Inoperable Reactor Enclosure Secondary Containment Integrity Due to Open Airlock (Section 4OA3)

05000353/2014-003-00	LER	Inoperable Reactor Enclosure Secondary Containment Integrity Due to Open Air Lock (Section 4OA3)
05000353/2014-004-00	LER	Inoperable Reactor Enclosure Secondary Containment Integrity Due to Open Air Lock (Section 4OA3)
05000353/2014-006-00	LER	Inoperable Reactor Enclosure Secondary Containment Integrity Due to Open Air Lock (Section 4OA3)

LIST OF DOCUMENTS REVIEWED

Section 1R01: Adverse Weather Protection

Issue Reports

2417128 2414720 2413985 2413864 2414392 2412049

Procedures

SE-14, Snow, Revision 19

OP-AA-108-111-1001, Severe Weather and Natural Disaster Guidelines, Revision 12

RT-6-100-005-2, Unit 2 Diesel Generator Heat Trace Operability Test, Revision 5

WC-AA-107, Seasonal Readiness, Revision 14

ST-6-107-590-1, Daily Surveillance Log/OPCONS 1, 2, 3 week ending November 23, 2014

Miscellaneous

L-S-07, Diesel Generator and Auxiliary Systems Design Basis Document, Revision 15

Winter Seasonal Readiness Work Order Backlog on December 1, 2014

L-S-26, Primary Containment Isolation System Design Basis Document, Revision 3

Design Analysis MISC-22, Leak Detection System Setpoint Bases, Revision 8

Section 1R04: Equipment Alignment

Issue Reports

2402370 2403148 (NRC ID)

Procedures

1S51.1.A, Equipment Alignment for Automatic Operation of the RHR System in the LPCI mode
– 'B' sub system, Revision 25

S51.9.A, Routine Inspection of RHR System, Revision 14

S51.1.A, Set Up of RHR System for Automatic Operation in LPCI Mode, Revision 52

2S48.1.A, Equipment Alignment to Place Standby Liquid Control System in Normal/Standby
Condition, Revision 8

Section 1R04S: Full System Walkdown

Procedures

549.1.A, Normal RCIC Line-up for Automatic Operation, Revision 25
2S49.1.A (COL), Valve Alignment to Assure Availability of the RCIC System, Revision 14

Drawings

8031-M-49, Reactor Core Isolation Cooling, Revision 48
8031-M-50, RCIC Pump/Turbine, Revision 12

Miscellaneous

Open corrective work orders for Unit 2 RCIC

Section 1R05: Fire Protection

Procedures

F-R-103, Unit 1, 'B' and 'D' RHR Heat Exchanger and Pump Room, Rooms 103 and 204,
Revision 8
F-R-207, Unit 1, RX Enclosure Cooling Water Heat Exchanger Area Rooms 207 and 210
(Elevation 201), Revision 8
F-R-179, Unit 2, RCIC Pump Room 179 (Elevation 177), Revision 8

Miscellaneous

F-S-001, Pre-Fire Plan for Spray Pond Pump Structure Western Half, (Fire Area 122),
Revision 13
FS-002, Pre-Fire Plan for Spray Pond Pump Structure Eastern Half, (Fire Area 123),
Revision 11

Section 1R07A: Heat Sink Performance

Procedures

RT-1-011-390-0, ESW Room Cooler Heat Transfer Performance Calculation Test, Revision 7
RT-2-011-394-1, 1EV211 Core Spray Room Cooler Air to Water Heat Transfer Test, Revision 8
ER-AA-340, Generic Letter 89-13 Program Implementing Procedure, Revision 7

Section 1R07T: Heat Sink Performance

Issue Reports

AR 01051492 1A RHR HX Broken Gasket and divider plate corrosion
CR 2014-07091 Chiller fitting leaks multiple common systems
AR 00943700 Action Request regards indication in shotcrete embankment at spray pond

Procedures

RT-1-012-390-0 RHR Heat Exchanger Heat Transfer Performance Computation Test
RT-2-012-390-1 1A-E205 RHR Heat Exchanger Heat Transfer Test
S-TDP-REL-0103, GL 89-13 Service Water Problems Affecting Safety-Related
Equipment Program Plan, Revision 00
1A-E205 RHR Heat Exchanger Heat Transfer Test
CC-AA-309-1001 R8 RHR Heat Exchanger Min RHR SW/Structural Eval for tube plugging
PI-AA-126-1001-F-01 R0 Focused Area Self-Assessment 89.13 Program
Eddy Current Technique Sheet LGS RHR U1 2010 Heat Exchanger 1A-E105
Eddy Current Technique Sheet LGS HPCI Adm-Brass

Drawings:

E41-1020-G-002 HPCI Lube Oil Cooler

Miscellaneous:

HX/Component Inspection Checklist Chiller B, OB-K112
GL 89-13 Service Water System Problems Affecting Safety –Related Equipment Focused Area Self-Assessment to review heat sink performance and GL 89-13 Program
MM-0638 Design Analysis flow/structural evaluation
Eddy Current Examination Report of 1A-E205 heat exchanger tubes examined.
RT-1-011-391-0 MCR Chiller Heat Transfer Performance Calculation Test
RT-2-011-392-0 “B” MCR Chiller Heat Transfer Test
RT-2-011-251-0 ESW Loop “A” Flow Balance Test
LM-0638 Design Analysis calculation to determine RHRSW flow, fouling factor and maximum allowable plugged tubes
VT-2, Visual Examination NDE Report, WO RO980380

Work Orders

R1208225	R1020290	R1136152	R1048857-01	R08667004	R0866790
R0966818	R1133494	R0968250	R0980380		

Section 1R11: Licensed Operator Requalification Program

Procedures

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HU-AA-1211, Pre-Job Briefings, Revision 9
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Section 1R11: LSRO Licensed Operator Requalification

Procedures

TQ-AA-152, LSRO Training Program, Revision 2
OP-AA-105-102, NRC Active License Maintenance, Revision 11
TQ-AA-223-F070, Document Based Instruction Guide for LSRO Requalification, Revision 04

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Job Performance Measure Number: NLSROJPM3064
Job Performance Measure Number: NLSROJPM3061
Job Performance Measure Number: NLSROJPM3074
Job Performance Measure Number: NLSROJPM4007
Job Performance Measure Number: NLSROJPM3060
Job Performance Measure Number: NLSROJPM4044
Job Performance Measure Number: NLSROJPM4065
Job Performance Measure Number: NLSROJPM4035

Job Performance Measure Number: NLSROJPM4087
Job Performance Measure Number: NLSROJPM4004

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01382419, LSRO Program Enhancements from 2012 71111.11B Inspection
01382435, LSRO Annual Operating & Biennial written exams

Miscellaneous

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Quarterly Curriculum Review Committee Minutes form 2013 and 2014 (TQ-AA-1002-F004)
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OP-AA-105-102, Attachment 2, Reactivation of License Logs, Revision 10
LSRO Requalification Training Cycle 1301 Schedule, Revision 002
LSRO Requalification Training Cycle 1401 Schedule, Revision 005
TQ-AA-AA-224-F030, Weekly Attendance Sheets for Weeks of 03/11/13 and 03/10/14,
Revision 03
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TQ-JA-150-20, LSRO 2013-2014 Sample Plan

Section 1R12: Maintenance Effectiveness

Issue Reports

1639507 2398456

Procedures

ER-AA-310, Implementation of the Maintenance Rule, Revision 9
ER-AA-310-1005, Maintenance Rule-Dispositioning Between (A)(1) and (A)(2), Revision 7
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Section 1R13: Maintenance Risk Assessments and Emergent Work Control

Issue Reports

2398452 2400344

Procedures

WC-AA-104, Integrated Risk Management, Revision 22
WC-AA-104-1006, On-Line Risk Management and Assessment, Revision 1
OP-AA-108-117, Protected Equipment Program, Revision 4
OP-AA-201-012-1001, Operations On-Line Fire Risk Management, Revision 1

Section 1R15: Operability Determinations and Functionality Assessments

Issue Reports

2400500	2402370	2405433	1374862	2413901	2414215
00864892	895483	2413985	2413864	2418399	2419789
2416015	2390041	2421220	2390429	2385156	1605977

Procedures

S76.1.B. Startup of Reactor Enclosure HVAC, Revision 61
ST.6-107-590-1, Daily Surveillance LOG/OPCON 1,2,3, Revision 166

Miscellaneous

OP-AA-101-113-1004, Event/Issues Report Format, Revision 28 for D21 EDG due to an unexpected drop in starting air receiver pressure during testing
LGS, M-171, Specification for Environmental Service Conditions Limerick Generating Station Units 1 and 2, Revision 17
CC-AA-309-1001, Attachment 1, Design Analysis cover sheet for Leak Detection System Setpoint Basis
IN 89-07, Failure of small diameter tubing in control air, fuel oil, and lube oil systems rendering EDGs inoperable

Work Orders

C0243340 R1305306-01 R1300666-01

Section 1R18: Plant Modifications

Issue Reports

2394276 2421870

Procedures

CC-AA-102, Design Input and Configuration Change Impact Screening, Revision 27
CC-AA-103, Configuration Change Control for Permanent Physical Plant Changes, Revision 25
CC-AA-112, Temporary Configuration Changes, Revision 21
S12.7.E, Bypass to Spray Networks Transfer, Revision 14

Miscellaneous

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L-S-02, Emergency Service Water Design Basis Document, Revision 15
L-S-04, Residual Heat Removal Service Water System Design Basis Document, Revision 12
Updated Final Safety Analysis, Chapter 9, Auxiliary Systems, Revision 17

Section 1R19: Post-Maintenance Testing

Issue Reports

2395489 2398456 2398664 2398760 2399243 2405433
2409072 2413346

Procedures

ST-6-107-594-1, "Weekly Surveillance Log," Revision 79
ST-6-107-594-2, "Weekly Surveillance Log," Revision 66
ST-6-092-315-2, "D21 Diesel Generator Fast Start Operability Test Run," Revision 52
ST-6-061-200-1, "Liquid Radwaste Valve Test," Revision 33

Miscellaneous

R1248575
R1291679
R1291678
R1295800
OP-AA-101-113-1004, "Event/Issues Report Form" Revision 28 for D12 due to an unexpected loss of 125 VDC alarm
M1973482
C0254437

C0254720

R1297228

Prompt Investigation report for Unit 2 Drywell Floor Drain Level Instrument PCIV Failed to open fully

Section 1R22: Surveillance Testing

Issue Reports

2389894 2389865

Procedures

ST-6-012-231-0, 'A' Loop RHRSW Pump Valve & Flow Test on October 2, 2014

ST-6-052-232-2, 'B' Loop Core Spray Pump Valve and Flow Test on October 27, 2014

ST-6-049-200-1, RCIC Valve Test, Revision 50 on December 3, 2014

ST-4-049-952-1, RCIC Vacuum Breaker Test, Revision 9 on December 2, 2014

ST-6-055-230-1, NPCI Pump Valve and Flow Test on December 17, 2014

S55.1.D, NPCI System Fall Flow Functional Test

S55.8.A, Routine Inspection of NPCI System

Miscellaneous

BWROG, Measurement Uncertainties in Appendix K LOCA analyses, July 1999

L-S-44, LGS Core Spray System, Revision 11

Work Order

R1297803-01

R1294153-01

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A1964704

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R1298943

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Miscellaneous

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EP-AA-1008, Exelon Emergency Action Levels for Limerick Generating Station, Revision 0

EP-AA-112-100, Control Room Operations, Revision 13

Section 4OA1: Performance Indicator Verification

Miscellaneous

Data binders for RHRSW/ESW unavailability data for 1 year

RCS Specific Activity from December 2013 – present

RCS LR Data binder

Section 40A2.2: Problem Identification and Resolution

Issue Reports

1424166	1424943	1426043	1426045	1533093	1569901
1625082	1534541				

Procedures

ON-119, Revision 27
S15.7.A, Revision 15
S15.9.A, Revision 27
RT-6-015-310-1, Revision 20

Action Requests

A1879466	A1880380	A1759832	A1879193	A1943424
01503749	01525552	01610612		

Miscellaneous

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Standing Orders SO-14-004, SO-13-024, SO-13-01

LIST OF ACRONYMS

ADAMS	Agencywide Documents Access and Management System
ANS	Alert and Notification System
CAP	Corrective Action Program
CF	Condensate Filter
CFR	<i>Code of Federal Regulations</i>
EDG	Emergency Diesel Generator
ERF	Emergency Response Facilities
ERO	Emergency Response Organization
ESW	Emergency Service Water
HPCI	high pressure coolant injection
HVAC	Heating, Ventilation, & Air Conditioning
HX	Heat Exchanger
IM	Instrument Maintenance
IMC	Inspection Manual Chapter
IR	Issue Report
LER	Licensee Event Report
LGS	Limerick Generating Station
LSRO	Limited Senior Reactor Operator
MCR	Main Control Room
NCV	Non-Cited Violation
NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission
RCIC	Reactor Core Isolation Coolant
RCS	Reactor Coolant System
RHR	Residual Heat Removal
RHRSW	Residual Heat Removal Service Water
SDP	Significance Determination Process
SSC	Structure, System, or Component
SW	Service Water
UFSAR	Updated Final Safety Analysis Report
UHS	Ultimate Heat Sink (Spray Pond)
WANO	World Association of Nuclear Operators