



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

May 13, 2019

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, UNITS 1 AND 2 – INTEGRATED  
INSPECTION REPORT 05000352/2019001 AND 05000353/2019001

Dear Mr. Hanson:

On March 31, 2019, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Limerick Generating Station, Units 1 and 2. On April 12, 2019, the NRC inspectors discussed the results of this inspection with Mr. Frank Sturniolo, Plant Manager, and other members of your staff. The results of this inspection are documented in the enclosed report.

No NRC-identified or self-revealing findings were identified during this inspection.

The inspectors documented a licensee-identified violation which was determined to be of very low safety significance in this report. The NRC is treating this violation as a non-cited violation (NCV) consistent with Section 2.3.2.a of the Enforcement Policy.

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 at the NRC Public Document Room in accordance with 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

*/RA/*

Jonathan E. Greives, Chief  
Reactor Projects Branch 4  
Division of Reactor Projects

Docket Nos. 05000352 and 05000353  
License Nos. NPF-39 and NPF-85

Enclosure:  
Inspection Report 05000352/2019001 and  
05000353/2019001

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SUBJECT: LIMERICK GENERATING STATION, UNITS 1 AND 2 – INTEGRATED  
INSPECTION REPORT 05000352/2019001 AND 05000353/2019001 DATED  
MAY 13, 2019

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**U.S. NUCLEAR REGULATORY COMMISSION  
Inspection Report**

Docket Numbers: 05000352 and 05000353

License Numbers: NPF-39 and NPF-85

Report Numbers: 05000352/2019001 and 05000353/2019001

Enterprise Identifier: I-2019-001-0043

Licensee: Exelon Generation Company, LLC

Facility: Limerick Generating Station, Units 1 and 2

Location: Sanatoga, PA 19464

Inspection Dates: January 1, 2019 to March 31, 2019

Inspectors: S. Rutenkroger, Senior Resident Inspector  
M. Fannon, Resident Inspector  
S. Obadina, Resident Inspector  
H. Anagnostopoulos, Senior Health Physicist  
C. Bickett, Senior Reactor Inspector

Approved By: Jonathan E. Greives, Chief  
Reactor Projects Branch 4  
Division of Reactor Projects

Enclosure

## **SUMMARY**

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee's performance by conducting a quarterly inspection at Limerick Generating Station, Units 1 and 2 in accordance with the Reactor Oversight Process. The Reactor Oversight Process is the NRC's program for overseeing the safe operation of commercial nuclear power reactors. Refer to <https://www.nrc.gov/reactors/operating/oversight.html> for more information. Findings and violations being considered in the NRC's assessment are summarized in the table below. Licensee-identified non-cited violations are documented in report sections: 71152.

### **List of Findings and Violations**

No findings were identified.

### **Additional Tracking Items**

None.

## PLANT STATUS

Unit 1 operated at or near rated thermal power for the entire inspection period.

Unit 2 operated at or near rated thermal power for the entire inspection period.

## INSPECTION SCOPES

Inspections were conducted using the appropriate portions of the inspection procedures (IPs) in effect at the beginning of the inspection unless otherwise noted. Currently approved IPs with their attached revision histories are located on the public website at <http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/index.html>. Samples were declared complete when the IP requirements most appropriate to the inspection activity were met consistent with Inspection Manual Chapter (IMC) 2515, "Light-Water Reactor Inspection Program - Operations Phase." The inspectors performed plant status activities described in IMC 2515, Appendix D, "Plant Status," and conducted routine reviews using IP 71152, "Problem Identification and Resolution." The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel to assess licensee performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards.

## REACTOR SAFETY

### 71111.01 - Adverse Weather Protection

#### Impending Severe Weather Sample (IP Section 03.03) (1 Sample)

The inspectors evaluated readiness for impending adverse weather conditions for a cold weather alert on January 31 and February 1, 2019

### 71111.04 - Equipment Alignment

#### Partial Walkdown (IP Section 03.01) (4 Samples)

The inspectors evaluated system configurations during partial walkdowns of the following systems/trains:

- (1) Unit 1 reactor core isolation cooling on January 10, 2019
- (2) Unit 1 high pressure coolant injection on January 26, 2019
- (3) Unit 2 high pressure coolant injection on January 28, 2019
- (4) Unit 1 'B' core spray loop on February 14, 2019

### 71111.05Q - Fire Protection

#### Quarterly Inspection (IP Section 03.01) (5 Samples)

The inspectors evaluated fire protection program implementation in the following selected areas:

- (1) Fire area 81, Unit 1 'D12' emergency diesel generator and fuel oil-lube oil tank room, on January 4, 2019
- (2) Fire area 34, Unit 1 high pressure coolant injection pump room, on January 17, 2019
- (3) Fire area 70, Unit 2 standby liquid control and general area, on February 7, 2019
- (4) Fire area 47, Unit 1 standby liquid control and general area, on February 13, 2019
- (5) Fire area 56, Unit 2 reactor core isolation cooling pump room, on March 7, 2019

#### 71111.06 - Flood Protection Measures

##### Inspection Activities - Internal Flooding (IP Section 02.02a.) (1 Sample)

The inspectors evaluated internal flooding mitigation protections in the:

- (1) Unit common 4 kilovolt switchgear and battery room corridor on January 10, 2019

#### 71111.11Q - Licensed Operator Requalification Program and Licensed Operator Performance

##### Licensed Operator Performance in the Actual Plant/Main Control Room (IP Section 03.01) (1 Sample)

The inspectors observed operator follow-up from a grid electrical transient caused by the failure of a lightning arrestor on a 500 kV power line. The transient affected systems on both units, including electrical distribution, hydrogen water chemistry, reactor water clean-up, leading edge flow meter, and steam seal systems on January 24, 2019.

##### Licensed Operator Requalification Training/Examinations (IP Section 03.02) (1 Sample)

The inspectors observed and evaluated licensed operator requalification training on January 7, 2019.

#### 71111.12 - Maintenance Effectiveness

##### Routine Maintenance Effectiveness Inspection (IP Section 02.01) (3 Samples)

The inspectors evaluated the effectiveness of routine maintenance activities associated with the following equipment and/or safety significant functions:

- (1) Unit 1 standby liquid control system
- (2) Unit 2 standby liquid control system
- (3) Unit 1 reactor core isolation cooling system

#### 71111.13 - Maintenance Risk Assessments and Emergent Work Control

##### Risk Assessment and Management Sample (IP Section 03.01) (5 Samples)

The inspectors evaluated the risk assessments for the following planned and emergent work activities:

- (1) Unit 1 high pressure coolant injection maintenance outage on January 8, 2019
- (2) Unit 2 high pressure coolant injection testing on January 14, 2019

- (3) Unit 2 automatic depressurization system core spray permissive testing on February 14, 2019
- (4) Unit 2 high pressure coolant injection testing on February 22, 2019
- (5) Unit 1 reactor core isolation cooling maintenance outage on February 27, 2019

#### 71111.15 - Operability Determinations and Functionality Assessments

##### Sample Selection (IP Section 02.02) (6 Samples)

The inspectors evaluated the following operability determinations and functionality assessments:

- (1) IR 4207633, Unit 1 redundant reactivity control system logic division '1B' self-test function indicating fault condition on January 2, 2019
- (2) IR 4209593, Unit 1 suppression pool syphoning to floor drain during planned draining from the high pressure coolant injection test return line vent valves for filling and venting of the system piping on January 9, 2019
- (3) IR 4211654, Unit 2 'B' adjustable speed drive lower expansion tank level on January 17, 2019
- (4) IR 4212359, Unit 1 'A' standby liquid control system squib valve continuity light out on January 19, 2019
- (5) IR 4228166, Unit 2 'A' core spray safeguard pipe fill check valve did not open on March 10, 2019
- (6) IR 4231452, Unit 2 pin hole leak identified on emergency service water system piping on March 21, 2019

#### 71111.18 - Plant Modifications

##### Temporary Modifications and/or Permanent Modifications (IP Section 03.01 and/or 03.02) (1 Sample)

The inspectors evaluated the following temporary or permanent modifications:

- (1) Engineering change 620258 – standby liquid control technical specification change for minimum pump flow and boron-10 enrichment

#### 71111.19 - Post Maintenance Testing

##### Post Maintenance Test Sample (IP Section 03.01) (6 Samples)

The inspectors evaluated the following post maintenance tests:

- (1) Unit 1 high pressure coolant injection maintenance outage on January 9, 2019
- (2) Unit 1 'A' core spray maintenance outage on January 15, 2019
- (3) 'D11' emergency diesel generator maintenance outage on February 3, 2019
- (4) Unit 1 '1B1' battery cell replacements on February 5, 2019
- (5) Unit common diesel driven fire pump strainer maintenance on February 22, 2019
- (6) Unit 2 'D' residual heat removal cross tie valve maintenance and testing on March 20, 2019



## 71111.22 - Surveillance Testing

The inspectors evaluated the following surveillance tests:

### FLEX Testing (IP Section 03.02) (1 Sample)

- (1) S115.1.B, Unit common 'A' portable diesel generator on January 15, 2019

### In Service Testing (IST) (IP Section 03.01) (2 Samples)

- (1) ST-6-055-230-2, Unit 2 high pressure coolant injection pump, valve, and flow test on January 8, 2019
- (2) ST-6-049-230-1, Unit 1 reactor core isolation cooling pump, valve, and flow test on March 13, 2019

### Surveillance Testing (IP Section 03.01) (4 Samples)

- (1) ST-6-092-315-1, 'D11' emergency diesel generator fast start and 4 kilovolt emergency bus testing on February 3, 2019
- (2) RT-2-056-405-2, High pressure coolant injection turbine exhaust pressure high trip functional test on February 22, 2019
- (3) ST-2-049-100-1, Unit 1 reactor core isolation cooling logic system functional test on March 11, 2019
- (4) ST-4-055-304-2, High pressure coolant injection pump discharge, test loop shutoff, and test line flush to the suppression pool auto closure seal-in contact test on March 18, 2019

## **RADIATION SAFETY**

### 71124.05 - Radiation Monitoring Instrumentation

#### Calibration and Testing Program (IP Section 02.02) (1 Sample)

The inspectors evaluated Exelon's calibration and testing program. The inspectors specifically assessed the following instruments and equipment:

1. Laboratory instrumentation
2. Whole body counter
3. Post-accident monitoring instrumentation
4. Portal monitors, personnel contamination monitors, and small article monitors
5. Portable survey instruments, area radiation monitors, and air samplers/continuous air monitors
6. Instrument calibrator
7. Calibration and check sources
8. Electronic alarming dosimeters

Walk Downs and Observations (IP Section 02.01) (1 Sample)

The inspectors evaluated radiation monitoring instrumentation during plant walkdowns to include the following:

1. Portable survey instruments
2. Radiation area monitors and continuous air monitors
3. Personnel contamination monitors, portal monitors and small article monitors

**OTHER ACTIVITIES – BASELINE**

71151 - Performance Indicator Verification

The inspectors verified Exelon’s performance indicator submittals listed below for the period January 1, 2018, through December 31, 2018.

IE03: Unplanned Power Changes per 7000 Critical Hours Sample (IP Section 02.02) (2 Samples)

- (1) Unit 1 Unplanned Power Changes per 7000 Critical Hours
- (2) Unit 2 Unplanned Power Changes per 7000 Critical Hours

MS07: High Pressure Injection Systems (IP Section 02.06) (2 Samples)

- (1) Unit 1 high pressure injection systems
- (2) Unit 2 high pressure injection systems

MS08: Heat Removal Systems (IP Section 02.07) (2 Samples)

- (1) Unit 1 heat removal systems
- (2) Unit 2 heat removal systems

71152 - Problem Identification and Resolution

Annual Follow-up of Selected Issues (IP Section 02.03) (1 Sample)

The inspectors reviewed the licensee’s implementation of its corrective action program related to the following issues:

- (1) Inoperable Fire Rated Assembly (IR 04180366)

**INSPECTION RESULTS**

Licensee-Identified Non-Cited Violation	71152
This violation of very low safety significance was identified by the licensee and has been entered into the licensee corrective action program and is being treated as a Non-Cited Violation, consistent with Section 2.3.2 of the Enforcement Policy.	

Violation: License Condition 2.C(3) for Limerick Generating Station Unit 1 states that Exelon shall implement and maintain in effect all provisions of the approved Fire Protection Program, as described in the Updated Final Safety Analysis Report. Updated Final Safety Analysis Report Appendix 9A, Section 9A.5.3.15, states that the walls of the D12 4KV switchgear room (Fire Area 15), are capable of being rated as three-hour fire barriers. Contrary to the above, until October 19, 2018, Exelon did not ensure that the wall between the D12 and D14 4KV switchgear rooms maintained the three-hour fire rating. Specifically, Exelon identified a fire-rated assembly that was not installed in accordance with design drawings, resulting in the barrier being declared inoperable from October 5, 2018, through October 19, 2018. Further discussion of this issue is included in the “observations” section.

Significance: Green.

The inspectors evaluated this finding using IMC 0609, Appendix F, “Fire Protection Significance Determination Process.” The inspectors determined that the finding was of very low safety significance (Green) because the degraded assembly would continue to provide adequate fire endurance to prevent fire propagation through the assembly.

Corrective Action References: Issue Reports 4180366 and 4213709

Observation	71152
<p>In October 2018, during a fire protection audit, the Exelon Nuclear Oversight group identified a deficiency in the three-hour barrier that separates the D12 and D14 4KV emergency switchgear rooms. Exelon noted a gap under a fireproofed steel beam that penetrates the common wall between these two switchgear rooms. An initial inspection of the deficiency by engineering concluded that there was an indeterminate amount of fire resistant material present inside the gap; however, there did not appear to be any through-wall holes in the barrier. Operations initially declared the barrier operable, and recommended that engineering perform a detailed inspection to ensure the configuration met the three-hour rating. Subsequently, engineering determined that the fire barrier did not meet the requirements of the applicable fire barrier design drawing. As a result, on October 5, 2018, operations declared the fire barrier inoperable and stationed an hourly fire watch in accordance with Technical Requirements Manual Limiting Condition for Operation 3.7.7, “Fire Rated Assemblies.”</p>	
<p>Exelon performed an engineering evaluation (EC 625790) and determined that though the as-found configuration did not meet the design drawings, it was adequate to prevent fire spread between the two fire areas. This evaluation also provided the technical basis for an alternative fire barrier configuration that would be adequate for the hazards present. Following the detailed inspection of the barrier, the station reinstalled the fireproofing in accordance with the alternative fire barrier configuration, and declared the barrier operable on October 19, 2018. The inspectors concluded that the engineering evaluation as well as the as-left barrier configuration was adequate.</p>	
<p>Exelon also performed a work group evaluation and determined that procedure ST-4-022-920-1, “Fire-Rated Assembly Inspection,” did not contain adequate guidance to allow technicians to detect the potential through-wall gap. The station revised this procedure to include criteria to verify fireproofing is applied to beams a minimum of three feet out from the wall in accordance with design drawings. Exelon conducted an extent of condition review with the revised procedure, and did not identify any additional issues. Additionally, the station discussed this issue with the maintenance personnel that perform these inspections to ensure</p>	

they were aware of the issue as well as changes to the procedure. The inspectors concluded that Exelon's corrective actions for this issue were adequate. With the exception of the associated Exelon-identified violation, the inspectors did not identify any additional performance deficiencies.

## **EXIT MEETINGS AND DEBRIEFS**

The inspectors verified no proprietary information was retained or documented in this report.

- On April 12, 2019, the inspectors presented the quarterly integrated inspection results to Mr. Frank Sturniolo, Plant Manager, and other members of the licensee staff.
- On March 27, 2019, the inspectors presented the annual problem identification and resolution sample to Victor Gonzalez, Acting Regulatory Assurance Manager, and other members of the licensee staff.

## **DOCUMENTS REVIEWED**

### **71111.01**

#### Procedures

ER-LG-390, Control Room Envelope Habitability Program, Revision 0  
ER-LG-390-1001, Control Room Envelope Habitability Program Implementation, Revision 3  
OP-AA-108-111-1001, Severe Weather and Natural Disaster Guidelines, Revision 17  
OP-LG-102-102-1001, Augmented Operator Field Rounds, Revision 9  
RT-6-078-322-0, Fire Safe Shutdown Mobile D/G Operability Test, Revision 21  
SE-9, Preparation for Sever Weather, Revision 47

#### Condition Reports

4215770      4216060      4216109      4216334      4216339

#### Miscellaneous

Predictive Maintenance Services Fuel Test, 00-T527, 7/10/2018

### **71111.04**

#### Procedures

1S49.1.A(COL), Valve Alignment to Assure Availability of the RCIC System, Revision 17  
1S52.1.A(COL-2), Equipment Alignment for Core Spray Loop 'B' Operation, Revision 13  
1S55.1.A(COL), Equipment Alignment for Automatic Operation of HPCI System, Revision 30  
2S55.1.A(COL), Equipment Alignment for Automatic Operation of HPCI System, Revision 19

### **71111.05**

#### Procedures

OP-AA-201-008, Pre-Fire Plan Manual, Revision 4  
OP-LG-201-008, Limerick Generating Station Fire Protection (F) Pre-Fire Plan Strategies,  
Revision 5

### **71111.06**

#### Procedures

SE-4, Flood, Revision 7  
ST-6-022-760-0, Fire Water Valve Exercise Test, Revision 28

#### Miscellaneous

Engineering Change Request LG 09-00369, CDBI FASA 15 minute Ops Action in Flood PRA  
Not Achievable  
Report M-003, Summary of Requirements for Flooding Prevention Relative to LGS Units 1  
and 2, Revision 4

### **71111.11**

#### Procedures

OT-116, Loss of Condenser Vacuum, Revision 41

Condition Reports

4213672      4213681      4213683      4213684      4213687

**71111.12**

Miscellaneous

Engage System Health Reports  
Maintenance Rule Database Information

**71111.13**

Procedures

OP-LG-108-117-1000, Limerick Protected Equipment Program, Revision 5

Condition Report

4220236\*

**71111.15**

Procedures

ST-2-042-639-1, ATWS – Reactor Vessel Water Level – Low Low; Level 2; Division 1B,  
Functional Test (LS-X-M1-10131), Revision 27  
ST-2-042-643-1, ATWS – Reactor Vessel Pressure – High; Division 1B, Functional Test (PS-X-  
M1-10130), Revision 26

Condition Reports

4207633      4209593      4211654      4212359      4228166      4228849  
4231452

Work Orders

4860214

Miscellaneous

EC 627660, Supporting Computation for Operability Evaluation OPE-19-001, Revision 0  
OPE 19-001, Operability Evaluation for HBC-238-02 ESW Unit 2 “A” Piping Flaw (Pinhole  
Leak), Revision 0

**71111.18**

Miscellaneous

EC 620258  
UFSAR Change 2017-2018

**71111.19**

Procedures

M-095-005, Replacement of Station Battery Cells, Revision 10  
RT-6-051-207-2, 2D RHR-SDC Crosstie Valve Test, Revision 6  
RT-6-092-315-1, D11 Diesel Generator Abbreviated Run-In, Revision 19  
ST-6-022-252-0, Diesel Driven Fire Pump Flow Test, Revision 38

Condition Reports

4222305

Work Orders

4243730      4245988      4247148      4651573      4744730      4801616  
4840071      4841204

**71111.22**

Procedures

RT-2-056-405-2, HPCI – Turbine Exhaust Pressure – High; Calibration/Functional Test (PT-56-2N056F, PIS-56-2N656F), Revision 4  
S115.1.B, Operation of the FLEX Generator, Revision 3  
ST-2-049-100-1, RCIC Logic System Functional: Simulated Automatic Actuation Test, Revision 11  
ST-4-055-304-2, HPCI Pump Discharge, Test Loop Shutoff, and Test Line Flush to Supp. Pool Auto Closure Seal-In Contact Test for HV-055-2F006, HV-055-2F008, and HV-055-2F071, Revision 8  
ST-6-055-230-2, HPCI Pump, Valve, and Flow Test, Revision 80

Work Order

4749174

**71151**

Procedures

NEI 99-02, Regulatory Assessment Performance Indicator Guideline, Revision 7

Miscellaneous

Operation Narrative Logs  
Power History Graphs

**71152**

Procedures

CC-AA-211, Fire Protection Program, Revision 8  
CC-AA-211-1001, Fire Protection Engineering Evaluations, Revision 2  
LS-AA-128, Regulatory Review of Proposed Changes to the Fire Protection Program, Revision 3  
OP-AA-115, Operability Determinations, Revision 21  
OP-AA-115-1002, Supplemental Consideration for On-Shift Immediate Operability Determinations, Revision 3  
PI-AA-120, Issue Identification and Screening Process, Revision 8  
PI-AA-125, Corrective Action Program (CAP) Procedure, Revision 6

Condition Reports

4180366      4213709

Work Orders

4838392-02

Calculations

LF-0016-015, Fire Area 015 Safe Shutdown Analysis, Revision 0A

Miscellaneous

8031-A-0006, Sheet 2, Architectural Blockout Details and Miscellaneous Sealing Details,  
Revision 10

EC 625970, FA14-FA15 Steel Beam/Block Wall Interface Fire Protection Evaluation

Fire System Impairment 6564

Fire System Impairment 6619

NOSA-LIM-18-06, Fire Protection Audit Report (AR 4171364), October 1 – 12, 2018

Specification No. A-039A, Specification for Structural Steel Fireproofing (CAFCO Fendolite M-II,  
CAFCO Fendolite TG, or Approved Equal), Limerick Generating Station, Units 1 and 2,  
Revision 11

Technical Requirements Manual, Limerick Generating Station Unit 1, Revision 64