



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

November 4, 2021

Mr. David P. Rhoades
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 05000352/2021003 AND 05000353/2021003

Dear Mr. Rhoades:

On September 30, 2021, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Limerick Generating Station, Units 1 and 2. On October 22, 2021, the NRC inspectors discussed the results of this inspection with Mr. Frank Sturniolo, Site Vice President and other members of your staff. The results of this inspection are documented in the enclosed report.

No findings or violations of more than minor significance were identified during this inspection.

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 Title 10 of the *Code of Federal Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

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

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

Enclosure:
As stated

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SUBJECT: LIMERICK GENERATING STATION, UNITS 1 AND 2 – INTEGRATED
 INSPECTION REPORT 05000352/2021003 AND 05000353/2021003 DATED
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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: 05000352/2021003 and 05000353/2021003

Enterprise Identifier: I-2021-003-0022

Licensee: Exelon Generation Company, LLC

Facility: Limerick Generating Station, Units 1 and 2

Location: Sanatoga, PA 19464

Inspection Dates: July 1, 2021 through September 30, 2021

Inspectors: A. Ziedonis, Senior Resident Inspector
S. Haney, Resident Inspector
L. Grimes, Resident Inspector
E. Garcia, Reactor Engineer

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

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee's performance by conducting an integrated 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.

List of Findings and Violations

No findings or violations of more than minor significance were identified.

Additional Tracking Items

None.

PLANT STATUS

Unit 1 began the inspection period at rated thermal power. On September 2, 2021, the unit was down powered to approximately 86 percent, due to grid stability concerns following heavy rains and off-site sub-station flooding in the region. The unit was returned to rated thermal power later the same day. On September 17, 2021, the unit was down powered to approximately 79 percent, to perform turbine valve testing and a control rod sequence exchange. The unit was returned to full power on September 18, 2021, and remained at or near rated thermal power for the remainder of the inspection period.

Unit 2 began the inspection period at rated thermal power. On September 11, 2021, the unit was down powered to approximately 75 percent, to perform turbine valve testing and a control rod sequence exchange. The unit was returned to rated thermal power later the same day, and remained at or near rated thermal power for the remainder of the 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 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. Starting on March 20, 2020, in response to the National Emergency declared by the President of the United States on the public health risks of the coronavirus (COVID-19), resident and regional inspectors were directed to begin telework and to remotely access licensee information using available technology. During this time, the resident inspectors performed periodic site visits each week, increasing the amount of time on site as local COVID-19 conditions permitted. As part of their onsite activities, resident inspectors conducted plant status activities as described in IMC 2515, Appendix D, "Plant Status," conducted routine reviews using IP 71152, "Problem Identification and Resolution," observed risk significant activities; and completed on site portions of IPs. In addition, resident and regional baseline inspections were evaluated to determine if all or a portion of the objectives and requirements stated in the IP could be performed remotely. If the inspections could be performed remotely, they were conducted per the applicable IP. In some cases, portions of an IP were completed remotely and on site. The inspections documented below met the objectives and requirements for completion of the IP.

REACTOR SAFETY

71111.01 - Adverse Weather Protection

Impending Severe Weather Sample (IP Section 03.02) (1 Sample)

- (1) The inspectors evaluated readiness for impending adverse weather conditions associated with multiple hot weather alerts during the week of August 23, 2021

External Flooding Sample (IP Section 03.03) (1 Sample)

- (1) The inspectors evaluated that flood protection barriers, mitigation plans, procedures, and equipment are consistent with the licensee's design requirements and risk analysis assumptions for coping with external flooding on July 12, 2021

71111.04 - Equipment Alignment

Partial Walkdown Sample (IP Section 03.01) (3 Samples)

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

- (1) Unit 1 D14 emergency diesel generator during instrumented run on August 16, 2021
- (2) Unit 2 reactor core isolation cooling system following planned testing on August 18, 2021
- (3) Unit common 'A' standby gas treatment system train during 'B' standby gas treatment system controller replacement on September 21, 2021

71111.05 - Fire Protection

Fire Area Walkdown and Inspection Sample (IP Section 03.01) (5 Samples)

The inspectors evaluated the implementation of the fire protection program by conducting a walkdown and performing a review to verify program compliance, equipment functionality, material condition, and operational readiness of the following fire areas:

- (1) Fire area 33, Unit 1 reactor core isolation cooling pump and turbine room on July 7, 2021
- (2) Fire area 113, Unit common railroad access bay and generator equipment area rooms on July 7, 2021
- (3) Fire area 45, Unit 1 control rod drive equipment and neutron monitoring areas on August 19, 2021
- (4) Fire area 25, Unit common auxiliary equipment room on September 1, 2021
- (5) Fire area 32, Unit 1 'A' and 'C' residual heat removal rooms on September 1, 2021

Fire Brigade Drill Performance Sample (IP Section 03.02) (1 Sample)

- (1) The inspectors evaluated the on-site fire brigade training and performance during an unannounced fire drill on September 2, 2021

71111.06 - Flood Protection Measures

Inspection Activities - Internal Flooding (IP Section 03.01) (1 Sample)

The inspectors evaluated internal flooding mitigation protections in the:

- (1) Unit 1 reactor building safeguards system access area on September 8, 2021

Cable Degradation (IP Section 03.02) (1 Sample)

The inspectors evaluated cable submergence protection in:

- (1) Review of 103W and 104W manholes inspection in March 2021 and review of cable condition monitoring program

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)

- (1) The inspectors observed and evaluated licensed operator performance in the Control Room during a Unit 1 planned power reduction for turbine valve testing and a control rod sequence exchange on September 18, 2020

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

- (1) The inspectors observed and evaluated licensed operator requalification training on September 7, 2021

71111.12 - Maintenance Effectiveness

Maintenance Effectiveness (IP Section 03.01) (1 Sample)

The inspectors evaluated the effectiveness of maintenance to ensure the following structures, systems, and components remain capable of performing their intended function:

- (1) Unit common emergency service water boundary check valve 011-0063 on August 9, 2021

71111.13 - Maintenance Risk Assessments and Emergent Work Control

Risk Assessment and Management Sample (IP Section 03.01) (4 Samples)

The inspectors evaluated the accuracy and completeness of risk assessments for the following planned and emergent work activities to ensure configuration changes and appropriate work controls were addressed:

- (1) Unit common emergent troubleshooting and repair in response to emergency service water check valve leakage on July 20, 2021
- (2) Unit 1 emergent work associated with D14 emergency diesel generator on July 27, 2021
- (3) Unit 2 risk-informed completion time limiting condition for operation emergent extension following 'A' traversing in-core probe stuck electronic drive on August 11, 2021
- (4) Unit common fuel floor crane following emergent repairs on September 3, 2021

71111.15 - Operability Determinations and Functionality Assessments

Operability Determination or Functionality Assessment (IP Section 03.01) (6 Samples)

The inspectors evaluated the licensee's justifications and actions associated with the following operability determinations and functionality assessments:

- (1) Unit common emergency service water check valve boundary leakage on July 14, 2021
- (2) Unit 1 D14 emergency diesel generator following safeguard battery alarms on July 29, 2021
- (3) Unit 2 automatic depressurization system following division 1 out of service alarm on August 23, 2021
- (4) Unit 2 thermal limits following identification of potential foreign material that could result in fuel channel flow diversion on September 1, 2021
- (5) Unit 1 controls rods during periodic channel distortion testing on September 18, 2021
- (6) Unit 1 high pressure coolant injection system flow controller functionality following emergency shutdown switch replacement on September 26, 2021

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) Unit 2 low pressure coolant injection testable injection check valves (HV-051-2F041A and D) vibration monitoring instrumentation

71111.19 - Post-Maintenance Testing

Post-Maintenance Test Sample (IP Section 03.01) (5 Samples)

The inspectors evaluated the following post-maintenance test activities to verify system operability and functionality:

- (1) Unit 2 'C' residual heat removal pump discharge pressure permissive signal to the division 1 automatic depressurization system following trip unit replacement on August 26, 2021
- (2) Unit 1 'A' residual heat removal shutdown cooling suction motor operated valve following motor starter replacement on August 27, 2021
- (3) Unit 2 reactor core isolation cooling steam supply valve stroke following back-seat configuration on September 9, 2021
- (4) Unit common 'B' main control room chiller cleaning and condenser tube inspection on September 21, 2021
- (5) Unit 1 high pressure coolant injection system following repairs on September 26, 2021

71111.22 - Surveillance Testing

The inspectors evaluated the following surveillance tests:

Surveillance Tests (other) (IP Section 03.01) (4 Samples)

- (1) ST-6-011-231-0, Unit 1 'A' loop emergency service water pump, valve and flow test on July 12, 2021
- (2) ST-6-048-230-1/2, Unit 1 and 2 standby liquid control pump surveillance alternate treatment frequency change on July 16, 2021
- (3) ST-6-092-314-1, Unit 1 D14 emergency diesel generator slow start operability test run on July 30, 2021
- (4) ST-6-049-230-2, Unit 2 reactor core isolation cooling system pump, valve and flow in-service test on August 17, 2021

71114.06 - Drill Evaluation

Select Emergency Preparedness Drills and/or Training for Observation (IP Section 03.01) (1 Sample)

- (1) The inspectors evaluated the conduct of an emergency preparedness drill on October 7, 2021

Drill/Training Evolution Observation (IP Section 03.02) (1 Sample)

- (1) The inspectors evaluated a simulator training evolution on August 3, 2021

OTHER ACTIVITIES – BASELINE

71151 - Performance Indicator Verification

The inspectors verified licensee performance indicators submittals listed below:

IE01: Unplanned Scrams per 7000 Critical Hours Sample (IP Section 02.01) (2 Samples)

- (1) Unit 1 for the period of July 1, 2020, through June 30, 2021
- (2) Unit 2 for the period of July 1, 2020, through June 30, 2021

IE04: Unplanned Scrams with Complications Sample (IP Section 02.03) (2 Samples)

- (1) Unit 1 for the period of July 1, 2020, through June 30, 2021
- (2) Unit 2 for the period of July 1, 2020, through June 30, 2021

MS09: Residual Heat Removal Systems (IP Section 02.08) (2 Samples)

- (1) Unit 1 for the period of July 1, 2020, through June 30, 2021
- (2) Unit 2 for the period of July 1, 2020, through June 30, 2021

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) Identification, evaluation and corrective action in response to NRC-identified submerged safety-related cables in manhole 103W (IR 4440505)

71153 – Follow-Up of Events and Notices of Enforcement Discretion

Event Follow-Up (IP Section 03.01) (1 Sample)

- (1) Unit 1 high pressure coolant injection system declared inoperable on September 23, 2020 (Event Notification # 55484)

INSPECTION RESULTS

Minor Performance Deficiency	71152
<p>Minor Performance Deficiency: Exelon procedure ER-AA-300-150, Cable Condition Monitoring Program, Step 4.5.20.3, states “Issue reports shall be issued to document as-found conditions of underground structures, documenting adverse conditions;” and “Inspection and pumping frequencies shall be adjusted as necessary when cables are found submerged.” Contrary to this, the inspectors identified that safety-related low voltage power cables were submerged in standing water inside of manhole 103-west (MH103W) during video review of Exelon’s manhole inspection under Work Order 4317542, and no issue report had been generated by Exelon to document the as-found adverse condition. In addition, the inspectors identified that work order instructions directed maintenance to de-water the manhole prior to the engineering inspection of the manhole. The inspectors further noted that the manhole inspection was performed by a structural engineer in accordance with the structures monitoring program, but the cable condition monitoring program engineer was not involved with the manhole inspection. The inspectors also identified the condition existed during the previous MH103W inspection performed in 2016. In response, Exelon generated Issue Report 4440505, and added the issue to the station’s priority work list to expedite manhole inspection and troubleshooting of the dewatering system pump and high-level alarm.</p> <p>Screening: The inspectors determined the performance deficiency was minor. The inspectors screened this performance deficiency in accordance with IMC 0612, Appendix B, “Additional Issue Screening Guidance,” effective date January 1, 2021, and determined it was minor, because there were no cable failures that adversely impacted a cornerstone objective; and because the performance deficiency did not have the potential to lead to a more significant safety concern if left uncorrected, based on satisfactory cable insulation resistance test results that did not indicate a degrading trend in cable insulation material.</p>	

EXIT MEETINGS AND DEBRIEFS

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

- On October 22, 2021, the inspectors presented the integrated inspection results to Mr. Frank Sturniolo, Site Vice President and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.05	Corrective Action Documents	4444518	Degraded radio communications in the U2 air compressor room	09/03/2021
	Corrective Action Documents Resulting from Inspection	4433791	NRC ID: Door 205 was found opened and unattended	07/08/2021
71111.06	Corrective Action Documents	4445260	Drain backup - reactor building unit 1	09/08/2021
		4445404	Unit 2 turbine building floor drain clogged	09/09/2021
71111.11Q	Corrective Action Documents	4447358	Bently Nevada VMS 'A' host computer is not functional	09/19/2021
		4447419	4.0 critique for post-summer load drop	09/19/2021
71111.12	Corrective Action Documents	4434220	Check valve leaks by excessively	07/09/2021
		4436263	ESW check valve 011-0063 leaks by	07/21/2021
	Corrective Action Documents Resulting from Inspection	4443659	RT-1-011-875-0 acceptance criteria requires updating	08/31/2021
		4451105	Enhancement for leak testing in ST-6-011-231-0	10/06/2021
71111.13	Corrective Action Documents	4377721	Momentary U1 div 4 sfgd battery ground alarm	10/19/2020
		4425639	Div 4 sfgd battery grounds during D14 DG run	05/25/2021
		4430559	Unit 1 div 4 safeguards battery ground alarm	06/21/2021
		4437109	D14 D/G loss of control during surveillance testing	07/26/2021
		4437110	Div 4 sfgd battery grounds during D14 DG run	07/26/2021
		4437112	U1 div 4 safeguard battery charger trouble following D14 DG trip	07/26/2021
		4437519	D14 LSRA relay out of tolerance	07/28/2021
		4439018	4.0 critique for D14 D/G abnormal indications	08/04/2021
	4440855	D14 OCC critique	08/16/2021	
	Corrective Action Documents Resulting from Inspection	4438504	D14 additional monitoring needed for the next run per ODM	08/02/2021
71111.15	Corrective Action Documents	4437521	FME - 'C' MSLP PM identified missing parts	07/28/2021
		4438598	GNF2 flow blockage report applicability concerns	08/03/2021

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		4443530	Erroneous LGS U2 flow blockage MFLCPR penalty	08/30/2021
		4444088	NF RPV lost parts improvement AR	09/01/2021
71111.18	Corrective Action Documents	4447613	WO needed to remove TCC 630223 from 2A and 2D LPCI lines	09/20/2021
	Engineering Changes	630223	Vibration Instrumentation Installed on HV-051-2F041D and HV-051-2F041A	Revision 1
	Work Orders	4945745		
71111.19	Corrective Action Documents	4442159	Gross fail on trip unit	08/23/2021
		4442993	Procedure MA-AA-716-012 needs improved guidance	08/27/2021
		4445747	PCRA requested to incorporate maintenance procedure MA-AA-716-012	09/10/2021
		4452175	D234-D-G-19 power wires swapped at thermal o/L relay	10/11/2021
	Corrective Action Documents Resulting from Inspection	4443727	CAP product needed for HV-051-1F006A failed PMT	08/31/2021
		4443735	Timeliness for HV-051-1F006A investigation	08/31/2021
		4447960	Procedure MA-AA-716-012 needs improved guidance	09/22/2021
Work Orders	5044941			
71111.22	Corrective Action Documents	4417604	Tech spec surveillance changes for 10 CFR 50.69	04/19/2020
71153	Corrective Action Documents	4448242	U1 HPCI unsat response during ST-6-055-230-1	09/23/2021
		4448568	CCP: U1 HPCI RSP emerg S/D switch drawing error	09/25/2021
		4448701	PIS-056-1N653 gross fail during ST-2-055-101-1	09/26/2021
		4448719	Unit 1 HPCI - minor oil leak at PCV-056-149	09/26/2021
		4449311	10C201 power supply light flickering	09/29/2021
		4449379	Proactive replacement of HS-056-262	09/29/2021