



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

April 28, 2020

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

SUBJECT: JAMES A. FITZPATRICK NUCLEAR POWER PLANT – INTEGRATED
INSPECTION REPORT 05000333/2020001

Dear Mr. Hanson:

On March 31, 2020, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at James A. FitzPatrick Nuclear Power Plant. On April 23, 2020, the NRC inspectors discussed the results of this inspection with Mr. Pat Navin, Site Vice President, and other members of your staff. The results of this inspection are documented in the enclosed report.

Two findings of very low safety significance (Green) are documented in this report. Two of these findings involved violations of NRC requirements. We are treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2 of the Enforcement Policy.

If you contest the violations or the significance or severity of the violations documented in this inspection report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region I; the Director, Office of Enforcement; and the NRC Resident Inspector at James A. FitzPatrick Nuclear Power Plant.

If you disagree with a cross-cutting aspect assignment in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region I; and the NRC Resident Inspector at James A. FitzPatrick Nuclear Power Plant.

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,

X /RA/

Signed by: Erin E. Carfang

Erin E. Carfang, Chief
Reactor Projects Branch 1
Division of Reactor Projects

Docket No. 05000333
License No. DPR-59

Enclosure:
As stated

cc w/ encl: Distribution via LISTSERV®

SUBJECT: JAMES A. FITZPATRICK NUCLEAR POWER PLANT – INTEGRATED
INSPECTION REPORT 05000333/2020001 DATED APRIL 28, 2020

DISTRIBUTION: (VIA EMAIL)
 DLew, RA (R1ORAMAIL RESOURCE)
 RLorson, DRA (R1ORAMAIL RESOURCE)
 DCollins, DRP (R1DRPMAIL RESOURCE)
 BWellington, DRP (R1DRPMAIL RESOURCE)
 JYerokun, DRS (R1DRSMAIL RESOURCE)
 PKrohn, DRS (R1DRSMAIL RESOURCE)
 MFerdas, DRP
 ECarfang, DRP
 CLally, DRP
 EMiller, DRP, SRI
 DMerzke, DRP, RI
 ATrudell, DRP, AA
 OLopez-Santiago, RI, OEDO
 RidsNrrPMFitzPatrick Resource
 RidsNrrDorlLpl1 Resource
 ROPReports Resource

DOC NAME: G:\DRP\BRANCH1\FitzPatrick\REPORTS\2020 Inspection Reports\FitzPatrick 20001.docx
 ADAMS ACCESSION NUMBER: ML20119A050

<input checked="" type="checkbox"/> SUNSI Review		<input checked="" type="checkbox"/> Non-Sensitive <input type="checkbox"/> Sensitive		<input checked="" type="checkbox"/> Publicly Available <input type="checkbox"/> Non-Publicly Available	
OFFICE	RI/DRP	RI/DRP	RI/DRP		
NAME	EMiller per email	CLally	ECarfang		
DATE	4/27/20	4/27/20	4/28/20		

OFFICIAL RECORD COPY

U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report

Docket Number: 05000333

License Number: DPR-59

Report Number: 05000333/2020001

Enterprise Identifier: I-2020-001-0038

Licensee: Exelon Generation Company, LLC

Facility: James A. FitzPatrick Nuclear Power Plant

Location: Oswego, NY

Inspection Dates: January 1, 2020 to March 31, 2020

Inspectors: E. Miller, Senior Resident Inspector
D. Beacon, Resident Inspector
C. Hobbs, Reactor Inspector
D. Merzke, Acting Resident Inspector
S. Pindale, Senior Reactor Inspector
R. Rolph, Health Physicist
A. Turilin, Reactor Inspector

Approved By: Erin E. Carfang, Chief
Reactor Projects Branch 1
Division of Reactor Projects

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee's performance by conducting an integrated inspection at James A. FitzPatrick Nuclear Power Plant, 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

Failure to Manage Risk and Compensatory Measures during HPCI Testing			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000333/2020001-01 Open/Closed	[H.14] - Conservative Bias	71111.13
The inspectors identified a Green finding and associated non-cited violation (NCV) of Title 10 of the <i>Code of Federal Regulations</i> (10 CFR) 50.65(a)(4), "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," when Exelon did not assess and manage the increase in risk for online maintenance activities. Specifically, on November 21, 2019, the inspectors identified during ST-4E, "HPCI and SGT Logic System Functional and Simulated Automatic Actuation Test," that Exelon staff failed to evaluate operator compensatory actions associated with the high pressure coolant injection (HPCI) system prior to a change of the base calculation of risk to the station. As a result, the station did not have procedures in place to ensure restoration of the system, if called upon, while the system was out of service for testing.			

Fuel Cycle 23 Fuel Leaks			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Barrier Integrity	Green NCV 05000333/2020001-02 Open/Closed	None (NPP)	71152
The inspectors documented a self-revealing Green finding and associated non-cited violation (NCV) of Technical Specification 5.4.1, "Procedures," when Exelon did not maintain adequate procedures for check valve maintenance. Specifically, FitzPatrick's procedure for reassembly of swing check valves following maintenance did not provide adequate guidance for securing the disc stem nut to the disc stem for condensate system check valves. As a result, condensate booster pump 33P-9C catastrophically failed on June 24, 2016. Failure of this pump introduced foreign material into the reactor coolant system which led to five fuel failures in the following fuel cycle that ended on September 10, 2018.			

Additional Tracking Items

None.

PLANT STATUS

FitzPatrick began the inspection period at rated thermal power. On January 31, 2020, FitzPatrick experienced an automatic reactor scram due to a feedwater transient, entering forced outage J1F24. On February 7, 2020, following repairs to the feedwater system, operators commenced a reactor startup. On February 7, 2020, FitzPatrick was synchronized to the grid, ending J1F24. On February 8, 2020, FitzPatrick reached 65 percent power, and later reduced reactor power to 55 percent due to additional feedwater system maintenance. On February 13, 2020, following repairs to the feedwater system, operators continued power ascension and reached 100 percent. On March 16, 2020, operators reduced reactor power to 65 percent to perform condenser waterbox tube leak repairs. On March 17, 2020, following condenser tube repair, operators restored reactor power to 100 percent. FitzPatrick 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/readingrm/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." From January 1 – March 19, 2020, 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.

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 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 during which they conducted plant status activities as described in IMC 2515, Appendix D, and observed risk significant activities when warranted. In addition, resident and regional baseline inspections were evaluated to determine if all or portions 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 the cases where it was determined the objectives and requirements could not be performed remotely, management elected to reschedule the inspection to a later date.

REACTOR SAFETY

71111.01 - Adverse Weather Protection

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

- (1) The inspectors evaluated the adequacy of the overall preparations to protect risk-significant systems from an impending winter storm on January 17, 2020.

71111.04 - Equipment Alignment

Partial Walkdown Sample (IP Section 03.01) (6 Samples)

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

- (1) 'A' core spray system on January 25, 2020
- (2) 'A' shutdown cooling system on February 3, 2020
- (3) High pressure coolant injection system on March 5, 2020
- (4) 'B' standby liquid control system on March 17, 2020
- (5) 'B' and 'D' emergency diesel generators on March 18, 2020
- (6) 71DC-9 temporary 125-volt direct current battery charger on March 24, 2020

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) West cable tunnel, fire area/zone IC/CT-1 on January 15, 2020
- (2) Motor generator set room, fire area/zone IA/MG-1 on January 22, 2020
- (3) 'A' battery room, 272' elevation, fire area/zone III/BR-1 on March 3, 2020
- (4) 'A' battery charger room, 272' elevation, fire area/zone III/BR-2 on March 3, 2020
- (5) 'A' and 'B' low pressure coolant injection battery and inverter rooms, 344' elevation, fire area/zone IX/RB-1A on March 3, 2020

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) Reactor building east and west crescent (emergency core cooling system pump rooms) on February 11, 2020

Cable Degradation (IP Section 03.02) (1 Sample)

The inspectors evaluated cable submergence protection in:

- (1) Underground manhole MH-7A, 115-kilovolt switchyard following sump pump failure, on March 17, 2020

71111.11Q - Licensed Operator Regualification 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 control rod exercising on January 11, 2020, and reactor downpower and scram activities on January 31, 2020.

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

- (1) The inspectors observed a simulator evaluation that involved main turbine high vibrations, a loss of a 4.16-kilovolt safety-related bus (10500), a small break loss of coolant accident, and a failure to scram on January 30, 2020.

71111.12 - Maintenance Effectiveness

Maintenance Effectiveness (IP Section 03.01) (2 Samples)

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

- (1) Instrument air system on January 28, 2020
- (2) Emergency diesel generator bays associated with structural monitoring of safety-related structures on January 29, 2020

71111.13 - Maintenance Risk Assessments and Emergent Work Control

Risk Assessment and Management Sample (IP Section 03.01) (5 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) Risk assessment associated with ST-4E, HPCI and SGT Logic System Functional and Simulated Actuation Test on January 7, 2020
- (2) 115-kilovolt offsite power source Line 3 during Line 4 outage on January 14, 2020
- (3) Elevated risk during 'B' reactor recirculation motor generator set exciter brush replacement on January 22, 2020
- (4) 'A' shutdown cooling system while in service on February 4, 2020
- (5) 'A' reactor feedwater pump following pump seal failure on February 10, 2020

71111.15 - Operability Determinations and Functionality Assessments

Operability Determination or Functionality Assessment (IP Section 03.01) (5 Samples)

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

- (1) Reactor water level reference leg '3B' backfill system on January 3, 2020

- (2) Containment atmosphere analyzer solenoid operated valves subject to Part 21 on January 29, 2020
- (3) Rising trend with suppression pool water level on March 19, 2020
- (4) 71EPA-RPS-1B2T, 'B' electrical protection assembly following overvoltage relay trip on March 23, 2020
- (5) 'B' containment atmosphere dilution (CAD) sample pump equipment qualification due to missed replacement preventive maintenance on March 26, 2020

71 111.18 - Plant Modifications

Temporary Modifications and/or Permanent Modifications (IP Section 03.01 and/or 03.02) (2 Samples)

The inspectors evaluated the following temporary or permanent modifications:

- (1) Permanent Modification: Engineering Change (EC) 630147, Number of Low Pressure Coolant Injection (LPCI) Inverter Fans Allowed Out of Service under Alarm Response Procedure 09-8-3-15, on January 15, 2020
- (2) Permanent Modification: OP-27A, Reactor Water Level Reference Leg Backfill System Change to Out of Service Time Determination, on January 21, 2020

71111.19 - Post-Maintenance Testing

Post-Maintenance Test Sample (IP Section 03.01) (12 Samples)

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

- (1) 'B' emergency diesel generator turbocharger lubricating oil pump following breaker corrective maintenance on January 15, 2020
- (2) 66AOV-100B, reactor building ventilation inlet isolation valve following solenoid replacement on January 15, 2020
- (3) 02-2MOV-53B, 'B' reactor water recirculation discharge isolation valve motor replacement on February 4, 2020
- (4) 12MOV-15, reactor water cleanup inboard isolation valve following repair on February 4, 2020
- (5) 29BPV-3, bypass valve #3 following electro-hydraulic fluid leak repair on February 4, 2020
- (6) 34FWS-4A, 'A' feed water pump discharge check valve repairs following failure on February 6, 2020
- (7) 'A' service air compressor following compressor maintenance on February 19, 2020
- (8) 94P-2(M), turbine lube oil emergency bearing oil pump motor following control circuit fuse installation on March 9, 2020
- (9) 31P-7B(M), 'B' reactor feedwater turbine emergency lube oil pump motor following control circuit fuse installation on March 11, 2020
- (10) 71EPA-RPS1B2T, 'B' reactor protection system electrical protection assembly following over-voltage protection relay replacement on March 12, 2020
- (11) 94P-13(M), hydrogen seal oil emergency pump motor following control circuit fuse installation on March 17, 2020
- (12) 31P-7A(M), 'A' reactor feedwater turbine emergency lube oil pump motor following control circuit fuse installation on March 18, 2020

71111.20 - Refueling and Other Outage Activities

Refueling/Other Outage Sample (IP Section 03.01) (1 Sample)

- (1) Forced outage J1F24 from January 31, 2020 – February 7, 2020
- (2) Refuel outage J1R24 risk planning on March 27, 2020 (Partial)

71111.22 - Surveillance Testing

The inspectors evaluated the following surveillance tests:

Surveillance Tests (other) (IP Section 03.01) (3 Samples)

- (1) ST-9BB, 'B' and 'D' Emergency Diesel Generator Test, on January 7, 2020
- (2) ISP-22-1, RCIC Turbine Exhaust Diaphragm High Pressure Instrument Functional Test/Calibration, on February 25, 2020
- (3) ISP-150B, RCIC Auto Isolation Instrument Functional Test/Calibration, on February 25, 2020

Inservice Testing (IP Section 03.01) (1 Sample)

- (1) ST-24J, RCIC Flow Rate and Inservice Test (IST), on February 24, 2020

Containment Isolation Valve Testing (IP Section 03.01) (1 Sample)

- (1) ST-39B-X14, Type C Leak Rate Test of RWCU Suction Line VLVS (IST), on February 5, 2020

RADIATION SAFETY

71124.04 - Occupational Dose Assessment

Source Term Characterization (IP Section 03.01) (1 Sample)

- (1) The inspectors evaluated licensee performance as it pertains to radioactive source term characterization.

External Dosimetry (IP Section 03.02) (1 Sample)

- (1) The inspectors evaluated licensee performance as it pertains to external dosimetry that is used to assign occupational dose.

Internal Dosimetry (IP Section 03.03) (1 Sample)

The inspectors evaluated the following internal dose assessments for actual internal exposures:

- (1) The inspectors reviewed air sample results for work on reactor water cleanup valve 12MOV-15. All workers wore powered air purifying hood respirators and no dose was assigned. The highest air sample activity was 1.674 DAC for air sample 20028.

Special Dosimetric Situations (IP Section 03.04) (1 Sample)

The inspectors evaluated the following special dosimetric situations:

- (1) The dose assessment for three declared pregnant workers.

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) (1 Sample)

- (1) January 1, 2019 - December 31, 2019

IE03: Unplanned Power Changes per 7000 Critical Hours Sample (IP Section 02.02) (1 Sample)

- (1) January 1, 2019 - December 31, 2019

IE04: Unplanned Scrams with Complications (USwC) Sample (IP Section 02.03) (1 Sample)

- (1) January 1, 2019 - December 31, 2019

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) FitzPatrick Fuel Cycle 23 Fuel Leaks (IR 4097375, ACE CR-JAF-2016-02246)

71153 - Followup of Events and Notices of Enforcement Discretion

Event Followup (IP Section 03.01) (1 Sample)

- (1) Planned downpower to 65 percent to perform waterbox repairs on March 16, 2020

INSPECTION RESULTS

Failure to Manage Risk and Compensatory Measures During HPCI Testing			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000333/2020001-01 Open/Closed	[H.14] - Conservative Bias	71111.13
<p>The inspectors identified a Green finding and associated NCV of 10 CFR 50.65(a)(4), "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," when Exelon did not assess and manage the increase in risk for online maintenance activities. Specifically, on November 21, 2019, the inspectors identified during ST-4E, "HPCI and SGT Logic System Functional and Simulated Automatic Actuation Test," that Exelon staff failed to evaluate operator compensatory actions associated with the high pressure coolant injection (HPCI) system prior to a change of the base calculation of risk to the station. As a result, the station did not have procedures in place to ensure restoration of the system, if called upon, while the system was out of service for testing.</p>			
<p><u>Description:</u> On November 21, 2019, Exelon staff performed ST-4E, "HPCI and SGT Logic System Functional and Simulated Automatic Actuation Test," Revision 58. This test is performed once every 2 years, and involves opening breakers associated with nine HPCI valves and two standby gas treatment (SGT) system valves to prevent operation during testing. The inspectors identified that performance of this test historically would result in reclassification of station risk to an elevated condition due to HPCI not being available. However, the station attempted to reclassify station risk to the normal baseline during performance of the test by briefing an equipment operator on which HPCI valves would need to be restored if the HPCI system was called upon for a design basis event.</p> <p>WC-AA-101-1006, "Online Risk Management and Assessment," Revision 3, Section 4.3.2 provides direction for making changes to the base calculation of configuration risk for the station. The inspectors noted there was no documentation for the change in risk determination, and approvals were not obtained as required by section 4.3.2. Procedure WC-AA-101, "Online Work Control Process," Revision 29, Attachment 5 provides guidance to make a system available through operator action. The guidance directs an "evaluation to take into consideration the number of actions required, and the environment conditions are expected." The inspectors found that by not having an approved evaluation and procedure containing restoration actions, the elevated risk condition had not been properly mitigated. The inspectors determined that HPCI may trip when called upon, if not restored in a specific sequence that would allow the system to start up and operate properly.</p> <p><u>Corrective Actions:</u> The station entered this condition into the corrective action program as IR 04313552. The station updated the model work order to have a dedicated operator briefed, stationed and with no other concurrent duties. The station also shared an operations crew learning update regarding the event, and guidance regarding the importance of having adequate compensatory actions associated with risk mitigation actions.</p> <p><u>Corrective Action References:</u> IR 04313552</p>			

Performance Assessment:

Performance Deficiency: The inspectors determined that the failure to assess and manage the increased risk for online maintenance activity associated with ST-4E, "HPCI and SGT Logic System Functional and Simulated Automatic Actuation Test" was contrary to 10 CFR 50.65(a)(4), "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants."

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Procedure Quality attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, on November 21, 2019, the inspectors identified during ST-4E, "HPCI and SGT Logic System Functional and Simulated Automatic Actuation Test," that Exelon staff failed to evaluate operator compensatory actions associated with the HPCI system prior to a change of the base calculation of risk to the station. As a result, the station did not have procedures in place to ensure restoration of the system, if called upon, while station risk was assumed to be very low (Green). Additionally, this issue is similar to Example 8.d of Inspection Manual Chapter 0612 Appendix E, "Examples of Minor Issues," issued January 1, 2020, because the overall risk assessment would result in a higher licensee-established risk category, and because the credited function would not have been maintained due to the failure to identify proper sequence of risk mitigative compensatory actions.

Significance: The inspectors assessed the significance of the finding using Appendix K, "Maintenance Risk Assessment and Risk Management SDP." The inspectors used Flowchart 1, "Assessment of Risk Deficit," to analyze the finding and calculated incremental core damage probability, and because the incremental core damage probability deficit was less than 1E-6, this finding was determined to be of very low safety significance (Green).

Cross-Cutting Aspect: H.14 - Conservative Bias: Individuals use decision making-practices that emphasize prudent choices over those that are simply allowable. A proposed action is determined to be safe in order to proceed, rather than unsafe in order to stop. The inspectors determined that the finding had a cross-cutting aspect of Conservative Bias within the cross-cutting area of Human Performance because Exelon staff attempted to place the station in a very low risk condition without evaluating risk and establishing procedures as compensatory measures.

Enforcement:

Violation: The inspectors identified a violation of 10 CFR 50.65(a)(4), which states, in part, that, "...the licensee shall assess and manage the increase in risk that may result from the proposed maintenance activities." Exelon procedure WC-AA-101-1006, "Online Risk Management and Assessment," Revision 3, section 4.3.2 provides direction for making changes to the base calculation of configuration risk for the station and for obtaining station approval. Procedure WC-AA-101, "Online Work Control Process," Revision 29, Attachment 5 provides guidance to make a system available through operator action. Contrary to the above, on November 21, 2019, the inspectors identified that Exelon did not assess and manage the increase in risk for online maintenance activities during ST-4E, "HPCI and SGT Logic System Functional and Simulated Automatic Actuation Test." Specifically, Exelon staff failed to evaluate risk and operator compensatory actions in accordance with WC-AA-1010-1006 and WC-AA-101 prior to a change of the base calculation of risk to the

station. As a result, the station did not have procedures in place to ensure restoration of the HPCI system, if called upon, while station risk was assumed to be very low (Green).

Enforcement Action: This violation is being treated as an NCV, consistent with Section 2.3.2 of the Enforcement Policy.

Fuel Cycle 23 Fuel Leaks

Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Barrier Integrity	Green NCV 05000333/2020001-02 Open/Closed	None (NPP)	71152

The inspectors documented a self-revealing Green finding and associated NCV of Technical Specification 5.4.1, "Procedures," when Exelon did not maintain adequate procedures for check valve maintenance. Specifically, FitzPatrick's procedure for reassembly of swing check valves following maintenance did not provide adequate guidance for securing the disc stem nut to the disc stem for condensate system check valves. As a result, condensate booster pump 33P-9C catastrophically failed on June 24, 2016. Failure of this pump introduced foreign material into the reactor coolant system which led to five fuel failures in the following fuel cycle that ended on September 10, 2018.

Description: On June 24, 2016, operators initiated a manual scram which caused the 'C' condensate booster pump (33P-9C) to trip, as expected. Shortly after the trip, operators heard a loud noise coming from 33P-9C and noted that the pump was spinning backwards. Additionally, bearing temperatures on the pump and motor spiked, and the 'C' condensate booster pump and motor catastrophically failed. Upon disassembly and inspection of 33P-9C internals, foreign material was found lodged between the pump impeller and cast iron pump casing. The foreign material was identified as the disc nut and part of the threaded disc nut stem missing from the 'C' condensate booster pump discharge check valve (33CND-28C). Before the check valve failed in 2016, it was disassembled and inspected three times since 1990. Each time, the integrity of the valve assembly was found in poor condition. Tack or spot welds were placed between the disc stem and disc stem nut to prevent the nut from backing off the stem. The tack welds holding the disc nut in place were either degraded and cracked, or failed, allowing the nut to back completely off the stem and become loose in the system. From 2007 to 2016, the tack welds retaining the disc nut to disc stem on all three condensate booster pump check valves were found either cracked or broken.

FitzPatrick resumed power operations on July 7, 2016, shutdown for a refueling outage on January 14, 2017, and then returned to power operation following reactor startup on February 25, 2017. On May 8, 2017, there was an increase in radiochemistry isotope levels that were consistent with a new fuel leak, and on May 12, 2017, power suppression testing (PST) was performed to identify and suppress the fuel defect. The PST results indicated a defect in a fuel assembly located in the area of control cells 06-27 and 06-31. Control rods 06-27 and 06-31 were fully inserted to suppress the local power around the location of the fuel leaks and minimize further degradation during the fuel cycle. Immediate corrective actions included instituting an adverse condition monitoring plan (ACMP), which specified actions to be taken if chemistry sample data increased beyond specific limits for certain isotopes. In addition, a failed fuel monitoring team (FFMT) was convened to meet routinely throughout the fuel cycle to discuss trends and actions associated with the fuel defects. Three additional power suppressions were performed on August 15, 2017,

November 5, 2017, and December 19, 2017, due to suspected leaking fuel bundles. Following the final power suppression on December 19, 2017, FitzPatrick operated the remainder of the fuel cycle with five control rods fully inserted.

On September 10, 2018 operators commenced a reactor shutdown for a planned refueling and maintenance outage (RFO23). During the refueling outage, a comprehensive inspection of the reactor fuel was performed through in-mast sipping of fuel assemblies and vacuum-can sipping. Two of the three assemblies containing fuel defects identified through PST during the operating cycle were confirmed and identified through in-mast sipping. The third fuel defect plus two additional unknown defects were identified through more sensitive vacuum-can sipping for a total of five confirmed fuel leaks during fuel cycle 23. All fuel assemblies with identified leaks were discharged into the spent fuel pool and not re-used in the current FitzPatrick fuel cycle (fuel cycle 24). Additional corrective actions taken during the refueling outage included a full core offload and inspection of all fuel assemblies from the core for foreign material, an inspection of all discharged fuel assemblies residing in the spent fuel pool for foreign material, development of a foreign material exclusion (FME) improvement plan that included focused walkdowns of the refueling floor, and a reactor fuel bundle nose cleaning using an underwater vacuum to remove debris from all fuel assemblies that would be re-used in the next fuel cycle. Hot cell debris collected from the fuel bundle nose cleanings was sent for analysis to Canadian Nuclear Laboratories and Exelon Power labs.

FitzPatrick completed a root cause investigation of the fuel defects under IR 4097375 following the FME analysis conducted by offsite specialists in February 2020. The root cause investigation determined the cause of the fuel bundle leaks was debris fretting due to foreign material residing in the reactor vessel in the vicinity of the fuel bundles. The most probable source of the foreign material came from the catastrophic failure of 'C' condensate booster pump, as a result of the failure of 'C' condensate booster pump discharge check valve in June 2016. This failure resulted in debris being transported to the reactor vessel via feedwater injection and entering the reactor fuel.

Corrective Actions: On September 12, 2018, MP-059.12, "Swing Check Valves Without Operators (ISI)," was revised under IR 4097375, to specify that for future maintenance work, a seal weld will be used to attach the disc stem nut to the disc stem for check valves in the condensate system. A seal weld provides better structural support for the disc nut than tack welds and a cotter pin. Installing cotter pins into the valves potentially introduces a foreign material source because the cotter pins would have the potential to break or come loose within the system.

Corrective Action References: IR 4097375, ACE CR-JAF-2016-02246

Performance Assessment:

Performance Deficiency: The inspectors determined that FitzPatrick did not maintain adequate procedural guidance for maintenance of swing check valves in the condensate system. This was a performance deficiency that was within FitzPatrick's ability to foresee and correct and should have been prevented. Specifically, quality-related maintenance procedure MP-059.12, did not provide adequate guidance for securing the disc stem nut to the disc stem for condensate check valves which led to the catastrophic failure of the 'C' condensate booster pump check valve and introduction of metal debris into the reactor vessel in June 2016.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Procedure Quality attribute of the Barrier Integrity cornerstone and adversely affected the cornerstone objective to provide reasonable assurance that physical design barriers protect the public from radionuclide releases caused by accidents or events. Specifically, on June 24, 2016, the 'C' condensate booster pump discharge check valve (33CND-28C) failed to seat and introduced foreign material into the reactor vessel, due to inadequate guidance for maintenance and repair of condensate system check valves, which resulted in fuel clad damage and fuel leaks that increased the possibility of adversely impacting nuclear safety.

Significance: The inspectors assessed the significance of the finding using Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." Question 1 of Exhibit 3 was answered "no" to the question of did the finding involve control manipulations that unintentionally added positive reactivity that challenged fuel cladding integrity. Question 2 was also answered "no" to the question of did the finding result in a mismanagement of reactivity by operators that challenged fuel cladding integrity. Question 3 was answered "no" to the question of did the finding result in the mismanagement of foreign material exclusion or reactor coolant chemistry control program that challenged fuel cladding integrity (e.g., loose parts, material controls). Specifically, the fuel defects of 2017 and 2018 did not place the plant in an unanalyzed condition, adversely impact any fundamental assumptions regarding fuel failure used in the accident analysis (such as fuel failure temperature or oxidation rate) or result in reactor coolant specific activity exceeding any TS 3.4.6 limits. Therefore, the inspectors determined the fuel cladding integrity was not significantly challenged and that the finding is of very low safety significance (Green).

Cross-Cutting Aspect: Not Present Performance. No cross-cutting aspect was assigned to this finding because the inspectors determined the finding did not reflect present licensee performance.

Enforcement:

Violation: Technical Specification (TS) 5.4.1, "Procedures," states, in part, that written procedures shall be established, implemented, and maintained covering the applicable procedures recommended in Regulatory Guide 1.33, Appendix A, November 1972. Regulatory Guide 1.33, Appendix A, Section I, "Procedures for Performing Maintenance," states that maintenance that can affect the performance of safety-related equipment should be properly preplanned and performed in accordance with written procedures, documented instructions, or drawings appropriate to the circumstances.

Contrary to this requirement, prior to September 12, 2018, Exelon did not adequately establish, implement, and maintain written procedures covering an applicable procedure recommended in Appendix A of Regulatory Guide 1.33, November 1972, in that maintenance on the 'C' condensate booster pump check valve that could affect the performance of safety-related equipment such as the reactor fuel, was not preplanned and performed in accordance with a written procedure appropriate to the circumstances.

Specifically, on three occasions, between 1990 and 2016, the 'C' condensate booster pump check valve was disassembled and inspected in accordance with quality related maintenance procedure MP-059.12. Each time, the integrity of the valve assembly was found in poor condition, and, in accordance with the procedure, tack welds were used between the disc stem and disc stem nut to prevent the nut from backing off the stem. However, this

procedural direction was not appropriate to correct the condition, because the tack welds were continually found to be degraded and broken.

On June 24, 2016, the welds failed, allowing the nut to back completely off the stem. This resulted in a catastrophic failure of condensate booster pump 33P-9C, and the introduction of foreign material from the pump and discharge check valve into the safety related reactor coolant system, leading to five fuel leaks in the following fuel cycle that ended on September 10, 2018.

Enforcement Action: This violation is being treated as an NCV, consistent with Section 2.3.2 of the Enforcement Policy.

EXIT MEETINGS AND DEBRIEFS

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

- On April 23, 2020, the inspectors presented the integrated inspection results to Mr. Pat Navin, Site Vice President, and other members of the licensee staff.
- On February 12, 2020, the inspectors presented the health physicist inspection results to Mr. Joseph Pacher, Site Vice President, and other members of the licensee staff.
- On April 1, 2020, the inspectors presented the FitzPatrick fuel cycle 23 fuel leaks inspection results to Mr. Richard Sullivan, Regulatory Assurance Manager, and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.04	Drawings	FM-17A	Flow Diagram Radwaste System 20	44
		FM-17B	Flow Diagram Radwaste System 20	50
		FM-19A	Flow Diagram Fuel Pool Cooling & Clean-up	45
		FM-20A	Flow Diagram Residual Heat Removal System 10	72
		FM-23A	Flow Diagram Core Spray System 14	49
		FM-25A	Flow Diagram High Pressure Coolant Injection System 23	75
	Miscellaneous	DBD-014	Design Basis Document for the Core Spray System 014	10
	Procedures	OP-13D	RHR Shutdown Cooling	34
		OP-14	Core Spray System	40
		OP-17	Standby Liquid Control System	52
		OP-22	Diesel Generator Emergency Power	68
		ST-4N	HPCI Quick Start, Inservice, And Transient Monitoring Test (IST)	73
71111.05	Corrective Action Documents Resulting from Inspection	04312077		
	Fire Plans	PFP-PWR02	West Cable Tunnel/Elev 258' Fire Area/Zone IC/CT-1	05
		PFP-PWR04	Battery Room Complex/Elev. 272', 282' Fire Area/Zone III/BR-1, III/BR-2, IV/BR-3, BR-4, XVI/BR-5	02
		PFP-PWR23	Motor Generator Set Room/Elev. 300' Fire Area/Zone IA/MG-1	05
		PFP-PWR27	Reactor Building/Elev. 344' Fire Area/Zone IX/RB-1A	04
71111.06	Corrective Action Documents	04326657		
	Work Orders	04326657		
71111.11Q	Procedures	OP-27	Recirculation System	085
		OP-65	Startup and Shutdown Procedure	126
		ST-20C	Control Rod Operability for Fully Withdrawn Control Rods	31
71111.12	Corrective Action Documents	04194506		
		04208557		

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		04220158		
	Miscellaneous	JAF-RPT-07-00006	Maintenance Rule Structural Monitoring Report	Multiple Revisions
	Procedures	EN-DC-150	Condition Monitoring of Maintenance Rule Structures	12
		ER-AA-450	Structures Monitoring	8
71111.13	Procedures	OP-AA-108-117	Protected Equipment Program	5
		OU-AA-103	Shutdown Safety Management Program	21
		ST-4E	HPCI and SGT Logic System Functional and Simulated Automatic Actuation Test	58
		WC-AA-101	On-Line Work Control Process	29
		WC-AA-101-1006	On-Line Risk Management and Assessment	3
	Work Orders	04650507		
71111.15	Corrective Action Documents	04305671		
		04312098		
	Miscellaneous	QDR 71.01	EXO Sensor H2 & O2 Monitoring System, Model 115D211	2
		TM100-11	Technical Manual Solenoid Operating Valve PN 1015005-3 PN 1015005-2	February 1983
	Procedures	OP-27A	Reactor Water Level Reference Leg Backfill System	14
		OP-AA-108-115	Operability Determinations (CM-1)	22
		ST-1CA	Outside Primary Containment Isolation Valve Exercise Test (IST)	002
71111.18	Calculations	93-033	Steady-State Design Operation of Backfill System	A
		JSED-93-0719, C.D.I. Technical Note No. 93-16	James A. FitzPatrick Nuclear Power Plant Out-of-Service Time Analysis for the Reactor Water Level Backfill System	0
	Corrective Action Documents	04301611		
	Engineering Evaluations	EC 630147	Technical Evaluation for Increasing the Number of Fans Allowed Out of Service for LPCI Inverters	
	Miscellaneous	Vendor Manual G953-0002	GUTOR Model PDW 3400-400/600-EA Inverter	001
	Procedures	ARP-09-8-3-15	LPCI MOV IPS A 71INV-3A Minor Alarm Trouble	8
		MST-071.29	LPCI Charger-Inverter Performance Surveillance Test	15

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.19		ODSO-17	Operator Plant Tour and Operating Logs	89
		OP-27A	Reactor Water Level Reference Leg Backfill System	15
	Corrective Action Documents	04314634		
		04314832		
		04315093		
		CR-JAF-2009-02166		
		CR-JAF-2012-06590		
	Drawings	FM-24A	Flow Diagram Reactor Water Cleanup System 12	72
	Engineering Changes	630560	Valve 12MOV-15 Manual Backseat	0
		630580	12MOV-15 Seal Weld	0
	Miscellaneous		Valve Packing Datasheet: 12MOV-15	2
		A391-0057	Anchor/Darling Valve Company Installation Operation and Maintenance Manual Double Disc Gate Valve	8
		SEP-APJ-007	James A. FitzPatrick Nuclear Power Plant Primary Containment Leakage Rate Testing (Appendix J) Program Section	10
	Procedures	MP-059.41	Limitorque Motor Operator Model SB/SMB-0-4 Corrective and Overhaul Maintenance Requirements	32
		MP-059.51	Limitorque Actuators Inspection and Lubrication	38
		MP-059.77	Nozzle Check Valve Maintenance	5
		OP-39	Breathing, Instrument, and Service Air System	39
		ST-39B-X14	Type C Leak Test of RWCU Suction Line VLVS (IST)	15
	Work Orders	04722380		
		04822818		
		04879739		
		04938652		
		05005014		
		05016658		
		80390629		
		80424890		
		80454311		

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.20	Corrective Action Documents	04319690		
	Corrective Action Documents Resulting from Inspection	04314611		
	Procedures	AOP-31	Loss of Condenser Vacuum	25
		ARP 09-6-1-30	SJAE STM PRESS LO	4
		ARP 09-6-4-11	RFPT A VIB HI	9
		CY-AB-120-100	Reactor Water Chemistry	20
		OP-2A	Feedwater System	81
		OP-65	Startup and Shutdown Procedure	126
		OU-JF-103-101	JAF Reactor Pressure Vessel Water Inventory Control	0
		RAP-7.3.16	Plant Power Changes	57
		ST-26J	Heatup and Cooldown Temperature Checks	24
71111.22	Procedures	ARP 93ECP-B-2	Low Lube Oil Pressure	4
		ISP-150B	RCIC Auto Isolation Instrument Functional Test /Calibration (ATTS)**	42
		ISP-22-1	RCIC Turbine Exhaust Diaphragm High Pressure Instrument Functional Test/Calibration	38
		ST-24J	RCIC Flow Rate and Inservice Test (IST)	53
		ST-9BB	EDG B and D Full Load Test and ESW Pump Operability Test	16
71124.04	Corrective Action Documents	04222261		
		04226421		
		04231538		
		04268514		
		04274778		
		04292222		
		04292348		
		04316312		
	Miscellaneous		2019 Landauer InLight Audit Report	2/6/2019
			Landauer NVLAP Certification	01/01/2020 -

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
				12/31/2020
			GEL Laboratories Environmental Laboratory Quarterly Quality Assurance Report	April 15, 2019
			GEL Laboratories Environmental Laboratory Quarterly Quality Assurance Report	July 31, 2019
			GEL Laboratories Environmental Laboratory Quarterly Quality Assurance Report	October 30, 2019
			GEL Laboratories Environmental Laboratory Quarterly Quality Assurance Report	February 7, 2020
	Procedures	RP-AA-203	Exposure Control and AUTHORIZATION	5
		RP-AA-203-1003	Restriction for Individuals Receiving Medical Radioactive Isotope Treatments	1
		RP-AA-210	Dosimetry Issue, Usage, and Control	29
		RP-AA-210-1004	Shallow Dose Equivalent Program Review	0
		RP-AA-211	Personnel Dosimetry Performance Verification	14
		RP-AA-215	Calculating and Crediting Dose from Noble Gas Exposure	1
		RP-AA-216	Dose Assessment for Contaminated Wounds	0
		RP-AA-220	Bioassay Program	14
		RP-AA-220-1001	Collection and Handling of in-vitro Bioassay Samples	2
		RP-AA-221	Review, Correction, and Analysis of Whole Body Count Data	3
		RP-AA-222	Methods for Estimating Internal Exposure from in-VIVO and in-VITRO Bioassay Data	6
		RP-AA-224	CEDE Dose Tracking Using Lapel Air Samplers	4
		RP-AA-250	External Dose Assessments from Contamination	8
	Radiation Surveys	20003	General Area Air Sample Dry Well 268'	2/2/2020 0425-0435
		20008	Breathing Zone Air Sample	2/2/2020
		20011	Breathing Zone Air Sample	2/3/2020
		20012	General Area Air Sample Machine Shop 12 MOV 15	2/3/2020 1155-1210
		20016	Breathing Zone Air Sample	2/3/2020
		20017	Breathing Zone Air Sample	2/4/2020
		20018	Breathing Zone Air Sample	2/4/2020

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		20023	General Area Air Sample Dry Well 292' 12 MOV 15	2/5/2020 1205-1217
		20026	Breathing Zone Air Sample	2/5/2020
		20028	General Area Air Sample Dry Well 292'	2/2/2020 0130-0140
		20029	General Area Air Sample Outside Dry Well Entrance	2/2/2020 0425-0435
		20034	General Area Air Sample Dry Well 268'	2/3/2020 2225 - 2/4/2020 2240
		20035	General Area Air Sample Dry Well 292'	2/3/2020 2225 - 2/4/2020 2240
		20036	General Area Air Sample Dry Well 292'	2/5/2020 1730 - 2/6/2020 0310
		20037	General Area Air Sample Dry Well 268'	2/5/2020 1737 - 2/6/2020 0312
		20039	General Area Air Sample Dry Well 292'	2/2/2020 0514-0524
		20040	Breathing Zone Air Sample	2/6/2020
		20045	General Area Air Sample Dry Well 292'	2/5/2020 1019-1027
71151	Miscellaneous	NEI 99-02	Regulatory Assessment Performance Indicator Guideline	07
71152	Corrective Action Documents	CR-JAF-2016-02246	Apparent Cause Evaluation - 33CND-28C (Condensate Booster Pump C Discharge Check Valve) Failed to Isolate Following Reactor Scram.	
		IR 4097375	Root Cause Investigation for FitzPatrick Cycle 23 Fuel Defects	

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
	Drawings	FM-33A	Flow Diagram of Condensate System 33	64
		FM-33C	Flow Diagram of Condensate System 33	29
		FM-34A	Flow Diagram of Feedwater System 34	74
	Procedures	EN-MA-118	Foreign Material Exclusion - Entergy	10
		ER-AA-400-1001	Check Valve Monitoring and Preventive/Predictive Maintenance Program	14
		MA-AA-716-008	Foreign Material Exclusion Program - Exelon	14
		MA-AA-716-008-1000	Definitions and Measurements of FME Events - Exelon	6
		MP-059.12	Swing Check Valves Without Operators (ISI)	25
		MP-059.47	Anchor Darling Swing Check Valves with Air Actuators (IST)	7
	Work Orders	449263		
		449327		
		449329		
71153	Corrective Action Documents	04314313		
		04316427		
	Procedures	OP-AA-108-114	Post Transient Review	13
	Work Orders	04647475		