



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

REGION III
2443 WARRENVILLE ROAD, SUITE 210
LISLE, ILLINOIS 60532-4352

September 10, 2019

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

SUBJECT: LASALLE COUNTY STATION, UNITS 1 AND 2 – DESIGN BASIS ASSURANCE
INSPECTION (TEAMS) INSPECTION REPORT 05000373/2019012 AND
05000374/2019012

Dear Mr. Hanson:

On August 27, 2019, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at LaSalle County Station, Units 1 and 2 and discussed the results of this inspection with Mr. P. Hansett and other members of your staff. The results of this inspection are documented in the enclosed report.

The NRC inspectors did not identify any finding or violation of more than minor significance.

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/

Karla K. Stodter, Chief
Engineering Branch 2
Division of Reactor Safety

Docket Nos. 05000373 and 05000374
License Nos. NPF-11 and NPF-18

Enclosure:
As stated

cc: Distribution via LISTSERV®

Letter to Bryan C. Hanson from Karla K. Stoedter dated September 10, 2019.

SUBJECT: LASALLE COUNTY STATION, UNITS 1 AND 2 – DESIGN BASIS ASSURANCE INSPECTION (TEAMS) INSPECTION REPORT 05000373/2019012 AND 05000374/2019012

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

Docket Numbers: 05000373 and 05000374

License Numbers: NPF-11 and NPF-18

Report Numbers: 05000373/2019012 and 05000374/2019012

Enterprise Identifier: I-2019-012-0010

Licensee: Exelon Generation Company, LLC

Facility: LaSalle County Station, Units 1 and 2

Location: Marseilles, IL

Inspection Dates: July 22, 2019 to August 27, 2019

Inspectors: J. Benjamin, Senior Reactor Inspector
J. Gilliam, Reactor Inspector
S. Kobylarz, Contractor
J. Park, Reactor Inspector
S. Sheldon, Project Engineer
M. Yeminy, Contractor

Approved By: Karla K. Stoedter, Chief
Engineering Branch 2
Division of Reactor Safety

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee's performance by conducting a design basis assurance inspection (teams) inspection at LaSalle County 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

Type	Issue Number	Title	Report Section	Status
URI	05000373,05000374/ 2019012-01	Main Steam Isolation Valve Fast Stoke Time Test	71111.21M	Open

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.

REACTOR SAFETY

71111.21M - Design Bases Assurance Inspection (Teams)

The inspectors evaluated the following components and listed applicable attributes, permanent modifications, and operating experience:

Design Review - Risk-Significant/Low Design Margin Components (IP Section 02.02) (5 Samples)

- (1) Unit 2 High Pressure Core Spray Motor
 - Material condition and configuration (e.g., visual inspection during a walkdown)
 - Normal, abnormal, and emergency operating procedures
 - Consistency amongst design and licensing bases and other documents
 - System health report, maintenance effectiveness and records, and corrective action history
 - Equipment/environmental controls and qualification
 - Design calculations
 - Motor sizing
 - Cable sizing
 - Motor voltage
 - Overcurrent protection
 - Overcurrent relay calibration testing

- (2) Unit 2 High Pressure Core Spray Diesel
 - Material condition and configuration (e.g., visual inspection during a walkdown)
 - Normal, abnormal, and emergency operating procedures
 - Consistency amongst design and licensing bases and other documents
 - System health report, maintenance effectiveness and records, and corrective action history
 - Equipment/environmental controls and qualification
 - Design calculations:
 - Minimum starting air pressure
 - Fuel oil net positive suction head available
 - Jacket water cooling heat exchanger removal capability
 - Diesel frequency variances

- Testing:
 - Air receiver check valves
 - Jacket water cooling heat exchanger heat removal capability
- (3) Unit 2 High Pressure Core Spray Room Cooling
- Material condition and configuration (e.g., visual inspection during a walkdown)
 - Normal, abnormal, and emergency operating procedures
 - Consistency amongst design and licensing bases and other documents
 - System health report, maintenance effectiveness and records, and corrective action history
 - Room cooling system removal capability calculation
 - Testing:
 - Heat load removal capability
 - Adequate fan flow verification
- (4) Unit 2 High Pressure Core Spray Division 3 Bus 243
- Material condition and configuration (e.g., visual inspection during a walkdown)
 - Normal, abnormal, and emergency operating procedures
 - Consistency amongst design and licensing bases and other documents
 - System health report, maintenance effectiveness and records, and corrective action history
 - Equipment/environmental controls and qualification
 - Calculations:
 - Electrical breaker coordination
 - Bus loading
 - Under voltage protection
- (5) Unit 1 120 VAC Reactor Protection Bus A
- Material condition and configuration (e.g., visual inspection during a walkdown)
 - Normal, abnormal, and emergency operating procedures
 - Consistency amongst design and licensing bases and other documents
 - System health report, maintenance effectiveness and records, and corrective action history
 - Equipment/environmental controls and qualification
 - Design calculations:
 - Cable sizing
 - Electrical protection assembly setpoints
 - Scram solenoid required voltage

Design Review - Large Early Release Frequency (LERFs) (IP Section 02.02) (1 Sample)

- (1) Unit 2 "A" Train Inboard Main Steam Isolation Valve (MSIV)
 - Normal, abnormal, and emergency operating procedures
 - Consistency amongst design and licensing bases and other documents
 - System health report, maintenance effectiveness and records, and corrective action history
 - Testing:
 - Fast stroke time
 - Slow stroke time
 - MSIV minimum required thrust to close calculation

Modification Review - Permanent Mods (IP Section 02.03) (5 Samples)

- (1) Engineering Change (EC) 0000400261: Install Keylock Switches to Bypass MSIV Isolations
- (2) EC 0000399671: Main Steam Line Low Pressure Switch Replacement
- (3) EC 0000398190: Klockner Moeller Motor Control Center Bucket Replacement
- (4) EC 0000621375: Increase High Pressure Core Spray Room Accident Temperature to 155 degrees Fahrenheit
- (5) EC 0000403210: Main Steam Line Solenoid Status Indication Replacement

Review of Operating Experience Issues (IP Section 02.06) (2 Samples)

- (1) NRC Information Notice 2015-13: MSIV Failure Events
- (2) NRC Information Notice 2010-023: Malfunctions of Emergency Diesel Generator Speed Switch Circuits

INSPECTION RESULTS

Unresolved Item (Open)	Main Steam Isolation Valve Fast Stoke Time Test 05000373,05000374/2019012-01	71111.21M
<p><u>Description:</u> The inspectors identified an Unresolved Item concerning the licensee's inboard and outboard MSIVs fast closure time testing. The test is required by Technical Specification (TS) Surveillance Requirement (SR) 3.6.1.3.6 and verifies the MSIVs will stroke within the time frames assumed within the Updated Final Safety Analysis Report (UFSAR) Chapter 15 accident analysis assumptions.</p> <p>LaSalle Station UFSAR Section 5.4.5.1 discusses the design basis functions of the MSIVs are, in part, to: (1) isolate the main steam lines within the time established by the design basis accident analysis to limit the release of reactor coolant; (2) close the main steam lines slowly enough that simultaneous closure of all steam lines does not exceed the nuclear system design limits; and (3) to use local stored energy (pneumatic and/or springs) to close at least one isolation valve in each steam line without relying on the continuity of any variety of electrical power to furnish the motive force to achieve closure.</p> <p>The MSIVs are pneumatically operated valves and are assisted closed by springs. Under normal operating and static shutdown testing conditions, the pneumatic supply to the actuator is provided by the nonsafety-related instrument nitrogen system for the inboard MSIVs and</p>		

the nonsafety-related instrument air system for the outboard MSIVs at a nominal pressure of approximately 100 psig. The test is conducted at normal atmospheric conditions. During limiting accident conditions, the pneumatic supply is provided by the safety-related MSIV pneumatic accumulators at a design pressure of 90 psig as discussed in design basis calculation L-002756, "Main Steam Isolation Valve Actuator Sizing Assessment," Revision 2. This calculation also assumes the design basis accident atmospheric conditions that pneumatic actuators will vent against are 40 psig for the inboard MSIVs located in the drywell and 29 psig for the outboard MSIVs located in a steam tunnel.

Technical Specification SR 3.6.1.3.6 requires the MSIV isolation time of greater than or equal to 3 seconds and less than or equal to 5 seconds. The UFSAR Chapter 15, Section 15.2.4, "Inadvertent MSIV Closure," accident analysis assumes a minimum closure time of 3 seconds as an input into a hydraulic analysis that supports the accident analysis conclusion *"the consequences of MSIV closure, whether involving all MSIVs or a single MSIV, do not result in any temperatures nor pressures in excess of the criteria for which the fuel clad, pressure vessel, or containment are designed; therefore, these barriers maintain their safety integrity."* The UFSAR Chapter 15.4.6, "Steam System Pipe Break Outside of Containment," assumes that MSIV(s) shut within 5 seconds as an input to determine the radiological consequences of the various accidents are within the regulatory requirements.

The licensee implemented Procedure LOS-PC-Q2, "Primary Containment Isolation Valves Operability Test and Inservice Inspection for Modes 4, 5 or Defueled," Revision 2, to perform MSIV isolation time testing to satisfy SR 3.6.1.3.6. The procedure contained an acceptable band of greater than or equal to 3 seconds and less than or equal to 4.5 seconds for the as-found MSIV static isolation time testing. The upper limit of 4.5 seconds was to account for the full valve closure as identified in Section D.3 of the procedure to ensure the TS SR requirement of less than or equal to 5 seconds criterion was satisfied.

The inspectors reviewed the licensee's LOS-PC-Q2, Rev. 2, test procedure, TS 3.6.1.3.6 requirement, UFSAR Chapter 15 accident analysis description and assumptions, and the MSIV actuator and valve design and identified an issue of concern. The acceptance criteria established in LOS-PC-Q2 did not appear to account for design basis accident conditions that could influence MSIV travel speed. Specifically:

1. Actual steam flow through the MSIVs would assist in valve closure thus the inspectors expected the MSIVs would shut quicker as compared to the no steam flow test conditions. Therefore, the inspectors were concerned the LOS-PC-Q2 test criteria of greater than or equal to 3 seconds did not verify the UFSAR Chapter 15 Section 15.2.4, "Inadvertent MSIV Closure," assumption.
2. Actual MSIV pneumatic piston delta pressure could be as low as 50 psid, (i.e., safety related supply (90 psig)) - accident atmospheric conditions (40 psig)). The inspectors expected the MSIVs would close slower during the limiting design basis conditions compared to the testing conditions that used a greater delta pressure of approximately 100 psid to close the MSIVs. Therefore, the inspectors were concerned the LOS-PC-Q2 test acceptance criteria of less than or equal to 4.5 seconds did not verify the UFSAR Chapter 15.4.6, "Steam System Pipe Break Outside of Containment," assumption.

Planned Closure Actions: After the team's August 8, 2019, technical debrief, the licensee provided additional information related to the Inservice Test Program and associated licensing correspondence. With this new information, the station's Inservice Test Program, the program basis document, and other pertinent documents need to be reviewed to ascertain their relevance to the licensee's periodic verification the MSIVs will close within the timeframe assumed within TS SR 3.6.1.3.6 and the UFSAR Accident Analyses. Therefore, this issue is considered an unresolved item pending completion of inspector review and evaluation for final conclusion.

Licensee Actions: The licensee entered this issue into their Corrective Action Program as Action Request 04269959, "NRC ID – MSIV Stroke Time Design Basis Question," on August 6, 2019. The licensee performed an evaluation under EC 628962, "Impact Evaluation of Accident Conditions on MSIV Stroke Time," and reasonably concluded that the MSIVs remained operable based on recent test results and accounting for the elevated pressure and steam flow data.

Corrective Action References: Action Request 04269959, "NRC ID – MSIV Stroke Time Design Basis Question," dated August 6, 2019

EXIT MEETINGS AND DEBRIEFS

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

- On August 27, 2019, the inspectors presented the design basis assurance inspection (teams) inspection results to Mr. P. Hansett and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.21M	Calculations	4266/19-65	Power Cable Ampacities 8kV, 5kV, and 600 V	1
		97-197	Thermal Model of LaSalle Station High Pressure Core Spray Diesel Jacket Water Coolers	A01
		DG-08	Net Positive Suction Head for High Pressure Core Spray Diesel Generator Fuel Pumps	0
		EAD-4	Relay Setting for 4.16kV Safety Related Busses	2
		EMD-020821	Analysis of HVAC Seismic Hangers in Reactor Building	0
		EMD-027963	Design Stress Report for the Miscellaneous Accumulators (MSIV, ADS, MSR, FWIV)	0
		EMD-028452	Equipment Qualification Report of High Pressure Core Spray Pump	0
		L-000579	Evaluation of HPCS Diesel Generator Operation during HPCS Diesel Generator Cooling Water Strainer Automatic Backwash	0
		L-001197	HPCS Pump Discharge Flow Indication Accuracy During Surveillance Testing Under Normal Conditions	0 and 0A
		L-001678	Overvoltage, Undervoltage, and Underfrequency Related Setpoint Calculation for the Electrical Protection Assembly Associated with the Reactor Protection System	1
		L-001821	Allowable Leakage for the DG Air Start Subsystems Division I II III	0
		L-002080	Calculation of the HPCS, LPCS, and LPCI Min Flow for Input to LOCA-ECCS Calculations	0
		L-002276	Calculation of the HPCS, LPCS and LPCI Minimum Required Pump Head to Meet the LOCA Analysis Assumptions	0 and 0A
		L-002320	WS13b – Vortex Worksheet for HPCS	1
		L-002404	CSCS Cooling Water System Road Map Calculation	4
		L-002716	Low-Low Set (LLS) Reset Evaluation	2
		L-002756	Main Steam Isolation Valve Actuator Sizing Assessment	2 and 2A
		L-003364	Auxiliary Power Analysis	3
		L-003364	Auxiliary Power Analysis	3
		MAD 89-0019	MSIV & MSR Accumulator Sizing Review	1
MS-16	MSIV Closure Times	0		

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		MS-17	MSIV Closure Time RPV Level	0
		VD-3A	HPCS Diesel Generator Room Ventilation System	0
	Corrective Action Documents	02600694	OPEX Eval NRC IN 2015-13, Main Steam Isolation Valve Failure	12/09/2015
		4105079	Damage to Bus 143-1	02/16/2018
		4137776	Paint Chipping in Front of Bus 243	05/15/2018
		CR 04232586	2B Air Dryer Does Not Blown Down	03/24/2019
		CR 04265521	VX Design Analysis Uses 95 F Outside Air Temperature	07/17/2019
		Corrective Action Documents Resulting from Inspection	04266766	Main Control Room LGA Locker Keys
	CR 04266352		2B DG Air Intake Found Partially Dirty	07/23/2019
	CR 04269899		NRC DBAI 2019 Error in Design Analysis L-003364	08/06/2019
	CR 04270294		DG Ventilation Room Cooling Calculation	08/07/2019
	Drawings	1E-0-4454	Schematic Diagram Diesel Generator 0 Annunciator System Part 4	P
		1E-1-4-4216AA	Schematic Diagram Reactor Protection M-G Set Control System C71B	T
		1E-1-4223AM	Schematic Diagram HPCS DG-1B Generator/Engine Control System E22B Part 12	T
		1E-2-4000AN	Key Diagram 4160V Switchgear 243 2AP07E	D
		1E-2-4000AN	4160V Switchgear 243 (2AP07E)	D
		1E-2-4000M	Station Key Diagram 6900V & 4160V Switchgears	F
		1E-2-4223AE	Schematic Diagram High Pressure Core Spray System E22B	P
		1E-2-4223AM	Schematic Diagram HPCS DG-2B Generator/Engine Control System E22B Part 12	U
		74-2130-2	24 Inch Manhole Drawing	4
		M-132	P&ID Diesel Oil System	5
		M-134	P&ID CSCS Equipment Cooling Water Systems	8G
		M-141	P&ID High Pressure Core Spray (HPCS)	AS
		M-1444	P&ID Diesel Generator Room Ventilation System	J
		M-1446	P&ID HPCS Diesel Generator Room Switchgear Room and Pump Room Ventilation Systems	4
		M-83	P&ID Diesel Generator Auxiliary Systems	8C
VPF 3069-151		Performance Test Curve for 2E22-C001	2	

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
	Engineering Changes	VPF 3389-001	GE Outline (Induction Motor)	8
		398190	KM Cubicle Replacement for Unit 1- Online 2016	2
		400261	(U1) Install Keylock Switches to Bypass MSIV Isolations	0
		407089	Low Low Set (LLS) Pressure Switch Dead Band Requirement	0
		628962	Impact Evaluation of Accident Conditions on MSIV Stroke Time	0
		EC 0000356798	Operation of Diesel Generator Ventilation Systems (VD) with the Outside Air Recirculation Air and Exhaust Air Dampers Locked in a Fixed Position	0
		EC 0000384525	Revise Required Flows in Unit 2 CSCS Division III to Recover Margin	1
		EC 0000388666	Revise Design Analyses for UHS Temperature of 107 F	1
		EC 0000621375	Increase HPCS Room Accident Temperature to 155 F	0
	EC 0000626725	1B HPCS DG Heat Exchanger Thermal Performance Test Evaluation	0	
	Miscellaneous	GE Letter EBO-8-287	from G. J. Diederich (ComEd) from Jerry A. Miller (GE), dated July 5, 1988, "Justification for Start-Up and Continued Operation LaSalle-1 Outboard MSIV B21-F028A"	
		LS-PSA-005.01	Reactor Protection System System Notebook	4
		NDIT No. LS-0703	Repairs to Safety Related ASME Code Section III Class 2 HPCS Pump Discharge Check Valves 1(2)E22-F024	12/18/1998
		OPXR 01156200-05	IN 2010-023 Malfunctions of Emergency Diesel Generator Speed Switch Circuits	04/28/2011
		TSM 000	Viking Pump Technical Service Manual	J
		Vendor Manual - Binder # J-0828	GE - Electrical Protection Assembly Tab 2	09/24/1999
		VTIP J-0505 Tab 2	Anchor/Darling Valve Company – Maintenance Manual for Tilting Disc Check Valves	12/1987
	Procedures	ER-AA-321	Administrative Requirements for Inservice Testing	13
		GL 89-13	Program Basis Document	13
		LAP-200-3	Key Control	58
		LGA-001	RPV Control	18
		LGA-003	Primary Containment Control Flow Chart	18
		LGA-010	Failure to Scram	18

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		LGA-MS-101	Unit 1 Using Main Condenser as Heat Sink in ATWS	3
		LOP-AP-04	Racking in G.E. 4160 Volt Motor Operated Air Circuit Breaker	15
		LOP-AP-18	Returning 4160 Volt Bus 143(243) from Diesel Generator 1B(2B) Power to the Normal Source	10
		LOP-DG-04	Diesel Generator Special Operation	80
		LOP-HP-02M	Unit 2 High Pressure Core Spray Mechanical Checklist	18
		LOP-HP-03	Preparation for Standby Operation of High Pressure Core Spray System (HPCS)	19
		LOP-RP-03	RPS Bus A Transfer	35
		LOS-DG-Q3	1B(2B) Diesel Generator Auxiliaries Inservice Test	77
		LOS-DG-SR7	Division 3 DG Cooling Water System Flow Test	19
		LOS-HP-Q1	HPCS System Inservice Test	74
		LOS-PC-Q2	Primary Containment Isolation Valves Operability Test and Inservice Inspection for Modes 4, 5 or Defueled	58
		NES-EIC-20.04	Analysis of Instrument Channel Setpoint and Instrument Loop Accuracy	6
		OP-LA-102-106	LaSalle Station Operator Response Time Program	12
	Work Orders	01762772-01	LOS-PC-Q2 Att 2A: U-2 MSIV Operability and IST Inspections	02/15/2015
		01858550-01	U2 HPCS System Biennial Comprehensive IST Pump Test	11/30/2017
		01903122-01	LOS-PC-Q2 Att 1A: U-1 MSIV Operability and IST Inspections	03/18/2018
		01906487-01	EP U1 LTS-600-7 Inboard MSIV Accumulator Check Valves ASME XI Inservice Inspection	03/10/2018
		04858721	LOS-HP-Q1 U2 HPCS	02/15/2019
		04889148-01	OP LOS-HP-Q1 U2 HPCS Pump Run Att. 2A (Week 12)	05/28/2019
		970106677-01	Inspect Check Valve Per LSP-300-30	01/22/1999
		970106677-02	Perform Weld Build-Up on Disc Per NDIT-LS-0703 Upgrade 2	12/30/1998
		WO 01177383	MA-LA-773-532 Attachment 27, U2 HPCS Pump 243 Cubicle 004 Relay Cals	05/10/2010
WO 01365518		EWP Replace Terminations on 2E22-C001	03/29/2017	
WO 01665020	MA-LA-773-532 Attachment 27, U2 HPCS Pump 243 Cubicle 004 Relay Cals	10/31/2016		
WO 01836645	Diesel Generator Heat Exchanger Thermal Performance Monitoring	12/27/2018		

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		WO 04624092-01	EWP: Megger U-2 HPCS Motor per LEP-GM-120	03/26/2019
		WO 04824378	Sample HPCS Pump Motor Bearing Oil Per EQ-LS008 Tab E	05/28/2019
		WO 04888513	LOS-DG-Q3 DG A/C Check Valve Test	05/30/2019
		WO 04888514	LOS-DG-Q3 2B DG A/C Check Valve Test	05/30/2017