



Exelon Generation®

10 CFR 50.73

NMP1L 3057
November 3, 2015

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Nine Mile Point Nuclear Station, Unit 1
Renewed Facility Operating License No. DPR-63
Docket No. 50-220

Subject: NMP1 Licensee Event Report 2015-004, Automatic Reactor Scram Due to Main Steam Isolation Valve Closure

In accordance with the reporting requirements contained in 10 CFR 50.73(a)(2)(v)(C), please find enclosed NMP1 Licensee Event Report 2015-004, Automatic Reactor Scram Due to Main Steam Isolation Valve Closure.

There are no regulatory commitments contained in this letter.

Should you have any questions regarding the information in this submittal, please contact Dennis Moore, Site Regulatory Assurance Manager, at (315) 349-5219.

Respectfully,

William J. Traffon
Plant Manager, Nine Mile Point Nuclear Station
Exelon Generation Company, LLC

WJT/KJK

Enclosure: NMP1 Licensee Event Report 2015-004, Automatic Reactor Scram Due to Main Steam Isolation Valve Closure

cc: NRC Regional Administrator, Region I
NRC Resident Inspector
NRC Project Manager

TE22
MRR

Enclosure

NMP1 Licensee Event Report 2015-004

Automatic Reactor Scram Due to Main Steam Isolation Valve Closure

Nine Mile Point Nuclear Station, Unit 1

Renewed Facility Operating License No. DPR-63



LICENSEE EVENT REPORT (LER)
(See Page 2 for required number of digits/characters for each block)

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA, Privacy and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to Infocollects.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

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4. TITLE
Automatic Reactor Scram Due to Main Steam Isolation Valve Closure

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
9	4	2015	2015	004	00	11	3	2015	N/A	N/A
									FACILITY NAME	DOCKET NUMBER
									N/A	N/A

9. OPERATING MODE **11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)**

1	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)
100	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)
	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER
	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

LICENSEE CONTACT Dennis Moore, Site Regulatory Assurance Manager	TELEPHONE NUMBER (Include Area Code) (315) 349-5219
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13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
B	SB	TV	Numatics	Y	N/A	N/A	N/A	N/A	N/A

14. SUPPLEMENTAL REPORT EXPECTED **15. EXPECTED SUBMISSION DATE**

YES (If yes, complete 15. EXPECTED SUBMISSION DATE) NO

MONTH	DAY	YEAR
N/A	N/A	N/A

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On Friday September 4th, 2015 at 09:16:04, Nine Mile Point Unit 1 automatically scrambled from approximately 100% rated power due to an inadvertent Main Steam Isolation Valve (MSIV) isolation. This event is reportable under 10 CFR 50.72 (b)(2)(iv)(B) and 10 CFR 50.73(a)(2)(iv)(A) as any event or condition that resulted in a manual or automatic actuation of any of the systems listed in 10 CFR 50.73(a)(2)(iv)(B). During quarterly surveillance testing, the MSIV failed to stop its close stroke and reopen automatically per design, due to a failed MSIV pilot test valve. The root cause of the event was an inadequate application of the designed pilot test valve for MSIV control, resulting in the pilot test valve internals binding during the surveillance test. The failed pilot valve spool and cage assembly were replaced. The corrective action to prevent recurrence is to replace the MSIV pilot valves with an industry proven design.

The event described in this LER is documented in the plant's corrective action program.



**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA, Privacy and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to Infocollects.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

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NARRATIVE

I. DESCRIPTION OF EVENT

A. PRE-EVENT PLANT CONDITIONS:

Prior to the event, Nine Mile Point Unit 1 (NMP1) was operating at 100 percent power. Operators were performing the Feedwater and Main Steam Line Power Operated Isolation Valves Partial Exercise and Associated Functional Testing of Reactor Protection System Trip Logic surveillance test when the event occurred.

B. EVENT:

On Friday September 4th, 2015 at 09:16:04, Nine Mile Point Unit 1 automatically scrammed from approximately 100% rated power due to an inadvertent Main Steam Isolation Valve (MSIV) isolation. While testing the second of two Main Steam Isolation Valves, MSIV-01-03 (MSIV-112) failed to stop its close stroke and reopen automatically per design. The MSIV full closure of MSIV-112 caused steam flow in the opposite Main Steam Line to rise to the Main Steam Line Break high steam flow setpoint and caused a Reactor Protection System (RPS) Main Steam Line Isolation signal. The closure of the remaining MSIVs caused an automatic reactor scram.

The Reactor scram was automatically initiated due to a full MSIV closure which resulted in a Lo-Lo Reactor Water Level occurrence. Containment and Vessel Isolation, Core Spray sequence initiation, Control Room Emergency Ventilation, Emergency Cooling initiation, and a trip of all Reactor Recirculation Pumps occurred automatically, as designed, as a result of actuation of the Lo-Lo Reactor Water Level relays.

Feedwater / High Pressure Coolant Injection (HPCI) level control operates over a wide range of conditions. The operating conditions during an MSIV closure scram resulted in rapid changes in level due to void collapse in the core. During this event, the feed and condensate pumps operated in the HPCI mode as designed and restored reactor water level to the normal level set point. Review of plant operating data has concluded that the Feedwater system functioned as designed.

Due to the MSIV Isolation, Emergency Condensers were initially utilized to maintain reactor pressure. The initial pressure band established was 600-800 psig, first on the Emergency Condensers and later on the Turbine Bypass Valves following restoration of Main Steam Line 12. MSIV-112, Main Steam Line 11 Outboard Isolation Valve, failed to reopen when Control Room Operators attempted to reopen it due to the failed pilot valve. Emergency Cooling and Core Spray operated as designed. Emergency Condensers were automatically initiated based on Low Reactor Water Level and were manually manipulated for pressure control while Turbine Bypass Valves were unavailable. During the initial transient, after the MSIV closure, one Solenoid-Actuated Relief Valve, ERV-122, lifted in response to the reactor pressure increase, as designed.

After the scram, ERV-122 failed to fully reseal after pressure lowered below its lift setpoint. Operator action was required per procedures N1-SOP-1.4 and N1-EOP-4 (due to lowering reactor

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pressure and increasing Torus temperature) to manually close ERV-122. Although Core Spray pumps automatically started due to Lo-Lo Reactor Water Level, Core Spray did not inject due to Reactor Pressure remaining above the Core Spray injection setpoint (365 psig).

Nine Mile Point Unit 2 (NMP2) was unaffected by the automatic reactor scram at NMP1.

The Reactor Scram was a 4-hour ENS notification required by 10 CFR 50.72(b)(2)(iv)(B). An 8-hour NRC ENS notification was required by 10 CFR 50.72(b)(3)(iv)(A) for a valid actuation of the Containment and Vessel Isolation, Core Spray sequence initiation, and Emergency Cooling initiation. The 4-hour and 8-hour ENS notification (#51369) was completed on September 4, 2015 at 1258 hours. Therefore, this LER is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(iv)(A).

The event has been entered into the plant's corrective action program as IR 2551180.

C. INOPERABLE STRUCTURES, COMPONENTS, OR SYSTEMS THAT CONTRIBUTED TO THE EVENT:

MSIV-112 failed to stop its close stroke and reopen automatically per design. This was due to binding of the pilot valve internals. The pilot valve internals were replaced, post maintenance testing completed satisfactorily, and MSIV-112 was declared operable prior to startup.

D. DATES AND APPROXIMATE TIMES OF MAJOR OCCURRENCES AND OPERATOR ACTIONS:

The dates, times, and major occurrences and operator actions for this event are as follows:

September 4, 2015

- 0905 Surveillance testing on MSIV 111 is completed with no complications
- 0911: Control room operator places the Test Switch for MSIV-112 in the test position to support testing.
- 0913: Control room operator momentarily places MSIV-112 control switch to CLOSE position and the following sequence of events occurs:
 - RPS Channel 11 half scram is received (as expected)
 - MSIV-112 green light on (as expected)
 - MSIV-112 red light on (as expected)
 - MSIV-112 mimic light on (as expected)
 - MSIV-112 yellow light illuminated bright then dim in approximately 20-23 seconds (as expected)
 - The Control Room Operator expected the MSIV-112 green light to go off. The light stayed lit and reactor pressure and power begins to rise.
 - Narrow Range Reactor Pressure rises to approximately 1055 psig and appears to stabilize. Average Power Range Monitors (APRMs) are stable at 102% and the operator attempts to lower power with Recirculation Flow as pressure continues to slowly rise.

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- Outboard MSIV closes
- 0914: APRM high level and Reactor Pressure Vessel high pressure alarms
- 0916: Automatic Reactor SCRAM followed by Reactor Vessel Level Lo-Lo signals and ERV 122 automatic opening, as expected. On the Lo-Lo signal, the following system actuations automatically occurred, as expected:
 - Reactor Water Cleanup Isolation
 - Containment Isolation
 - Core Spray sequence start
 - Trip of all Reactor Recirculation Pumps
 - Control Room Emergency Ventilation
- 0931: ERV-122 was manually shut due to not fully seating after pressure lowered. While ERV-122 was open, pressure control was maintained with the Emergency Condensers and then via the Turbine Bypass Valves.

E. METHOD OF DISCOVERY:

The condition was recognized by Operations when the indicating lights for MSIV-112 did not respond as expected and the valve did not automatically reopen during surveillance testing.

F. SAFETY SYSTEM RESPONSES:

All safety systems responded as expected, including the opening of ERV-122. While ERV-122 did not fully seat, it was closed manually in accordance with procedures and pressure control was maintained with the Emergency Condensers and Turbine Bypass Valves.

II. CAUSE OF EVENT:

The root cause of the event was an inadequate application of the designed pilot test valve for MSIV control. Design tolerances between the spool and cage assemblies of this component are very small which is susceptible to binding. The binding was caused by inadequate provisions in the design of the pilot valve to ensure that proper alignment is obtained during assembly.

III. ANALYSIS OF THE EVENT:

This event is reportable under 10 CFR 50.72 (b)(2)(iv)(B) and 10 CFR 50.73(a)(2)(iv)(A) as any event or condition that resulted in a manual or automatic actuation of any of the systems listed in 10 CFR 50.73(a)(2)(iv)(B). The following systems listed in 10 CFR 50.73(a)(2)(iv)(B), actuated during this event.

- RPS system, including reactor scram
- High Pressure Cooling Injection (HPCI)
- Core Spray
- Isolation (Emergency) Condenser
- Containment Isolation

Plant performance was within expected analyzed conditions. Although Core Spray pumps automatically started due to Lo-Lo Reactor Water Level, Core Spray did not inject due to Reactor Pressure remaining above its injection setpoint (365 psig). Complications existed post- scram due to ERV-122 failing to fully

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reset after pressure lowered below its lift setpoint. Operator action was required per procedures N1-SOP-1.4 and N1-EOP-4 (due to lowering reactor pressure and increasing Torus temperature) to manually close ERV-122. All other safety systems and balance of plant equipment operated as expected. Post-event analysis and testing in the simulator determined that reaching the Lo-Lo Reactor Water Level setpoint from the initial conditions associated with this event should be expected.

There were no actual nuclear safety consequences associated with this event. During the transient, the emergency cooling system initiated automatically and one Solenoid-Actuated Relief Valve was sufficient to keep pressure below the lift setpoints of the other five Solenoid-Actuated Relief Valves, as designed. This event is bounded by the analysis in UFSAR Section XV 3.5 for Main Steam Line Isolation Valve Closure (with Scram) and Section XV 3.11 for Inadvertent Actuation of One Solenoid Relief Valve.

Based on the above discussion, it is concluded that the safety significance of this event is low and the event did not pose a threat to the health and safety of the public or plant personnel.

IV. CORRECTIVE ACTIONS:

A. ACTION TAKEN TO RETURN AFFECTED SYSTEMS TO PRE-EVENT NORMAL STATUS:

Measures taken to return the plant to pre-event status included replacing the failed MSIV pilot valve spool and cage assembly prior to restart.

B. ACTION TAKEN OR PLANNED TO PREVENT RECURRENCE:

Interim actions include revising the quarterly surveillance procedure to require a load drop to prevent a SCRAM should a failure occur prior to implementing the Corrective Action to Prevent Recurrence; revising the maintenance procedure to provide additional details during reassembly to ensure spring binding is not present; and revision to procurement requirements.

The following corrective action to prevent recurrence is planned:

Replace the MSIV pilot valves with an industry proven design.

V. ADDITIONAL INFORMATION:

A. FAILED COMPONENTS:

The spool/cage assembly for the pilot test valve for MSIV-112 failed. The pilot test valve is a Numatics JPA series, model 12PAD4, air actuated pilot valve.

B. PREVIOUS LERs ON SIMILAR EVENTS:

One previous LER was submitted by NMP1, LER 80-07, describing failure of the MSIV pilot valves due to rust in the instrument air system. The failure at that time occurred when the plant was already shutdown for maintenance. The corrective actions at that time were to clean and inspect the valve internals.

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C. THE ENERGY INDUSTRY IDENTIFICATION SYSTEM (EIS) COMPONENT FUNCTION IDENTIFIER AND SYSTEM NAME OF EACH COMPONENT OR SYSTEM REFERRED TO IN THIS LER:

<u>COMPONENT</u>	<u>IEEE 803 FUNCTION IDENTIFIER</u>	<u>IEEE 805 SYSTEM IDENTIFICATION</u>
Pilot Valve	TV	SB
Main Steam Isolation Valve	ISV	SB
Solenoid-Actuated Relief Valve	RV	SB
High Pressure Coolant Injection System	N/A	BJ
Reactor Protection System	N/A	JC
Main Steam System	N/A	SB
Containment Isolation System	N/A	JM
Emergency Condenser System	N/A	BL
Core Spray System	N/A	BM
Reactor Water Cleanup System	N/A	CE
Reactor Recirculation System	N/A	AD
Control Room Emergency Ventilation System	N/A	VI

D. SPECIAL COMMENTS:

None