



**Constellation  
Energy Group**

Nine Mile Point  
Nuclear Station

January 7, 2003  
NMP2L 2080

United States Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, DC 20555

Subject: Nine Mile Point Unit 2  
Docket No. 50-410, NPF-69

Licensee Event Report 02-004, "Reactor Trip Due to Main Steam Isolation Valve Failure"

Gentlemen:

In accordance with, 10 CFR 50.73(a)(2)(iv)(A), we are submitting Licensee Event Report 02-004, "Reactor Trip Due to Main Steam Isolation Valve Failure."

Very truly yours,

Lawrence A. Hopkins  
Plant General Manager

LAH/KLE/mlg  
Attachment

cc: Mr. H. J. Miller, NRC Regional Administrator, Region I  
Mr. G. K. Hunegs, NRC Senior Resident Inspector

IE22

LICENSEE EVENT REPORT (LER)

Estimated burden per response to comply with this mandatory information collection request. 50 hours Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@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 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.

FACILITY NAME (1)  
Nine Mile Point, Unit 2

DOCKET NUMBER (2)  
05000410

PAGE (3)  
1 OF 4

TITLE (4)  
Reactor Trip Due to Main Steam Isolation Valve Failure

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
11	11	2002	2002	004	00	01	07	2003		05000
										05000

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) (11)				
		20.2201(b)		20.2203(a)(3)(ii)	50.73(a)(2)(ii)(B)	50.73(a)(2)(x)(A)
POWER LEVEL (10)	100	20.2201(d)		20.2203(a)(4)	50.73(a)(2)(iii)	50.73(a)(2)(x)
		20.2203(a)(1)		50.36(c)(1)(i)(A)	X 50.73(a)(2)(iv)(A)	73.71(a)(4)
		20.2203(a)(2)(i)		50.36(c)(1)(ii)(A)	50.73(a)(2)(v)(A)	73.71(a)(5)
		20.2203(a)(2)(ii)		50.36(c)(2)	50.73(a)(2)(v)(B)	X OTHER
		20.2203(a)(2)(iii)		50.46(a)(3)(ii)	50.73(a)(2)(v)(C)	Part 21
		20.2203(a)(2)(iv)		50.73(a)(2)(i)(A)	50.73(a)(2)(v)(D)	
		20.2203(a)(2)(v)		50.73(a)(2)(i)(B)	50.73(a)(2)(vii)	
		20.2203(a)(2)(vi)		50.73(a)(2)(i)(C)	50.73(a)(2)(vii)(A)	
		20.2203(a)(3)(i)		50.73(a)(2)(ii)(A)	50.73(a)(2)(vii)(B)	

LICENSEE CONTACT FOR THIS LER (12)

NAME D. P. Bosnic, General Supervisor Work Management	TELEPHONE NUMBER (Include Area Code) 315-349-7952
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
B	SB	ISV	R340	Y					

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE).	X NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On November 11, 2002, at approximately 0515 hours, with Nine Mile Point Unit 2 (NMP2) at 100 percent power, an outboard main steam isolation valve (MSIV) disc separated from its stem allowing the disc/piston assembly to drop into the valve seat. This led to the rapid loss of flow in the "B" Main Steam Line resulting in a steam pressure transient.

As result of increasing reactor pressure, the reactor scrambled due to a "Reactor Pressure High" trip signal. After the reactor scram, all MSIVs received closure signals and closed. The cause of the closure signals to the MSIVs was a "Main Steam Line High Flow" MSIV auto-isolation signal. The high main steam line flow was caused by the increased reactor pressure and flow being restricted to three of the four main steam lines.

The reactor scram and MSIV closure are reportable in accordance with 10 CFR 50.73(a)(2)(iv)(A). This report also constitutes a Part 21 Notification.

The cause was a deficient MSIV design that did not ensure the proper stem-to-disc thread loading. Contributors to the failure were marginal thread dimensions and inadequate torque specifications during assembly. Five of eight MSIVs had been modified incorporating an improved design. The failed MSIV had not been modified.

The corrective action was the incorporation of a modified stem-to-disc connection on the three remaining unmodified valves.

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Nine Mile Point, Unit 2	05000410	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 4
		2002	-- 004	-- 00	

NARRATIVE (If more space is required, use additional copies of NRC Form 366A) (17)

**I. Description of Event**

On November 11, 2002, at approximately 0515 hours, with Nine Mile Point Unit 2 (NMP2) at 100 percent power, an outboard main steam isolation valve (MSIV) disc separated from its stem allowing the disc/piston assembly to drop into the valve seat. This caused the "B" Main Steam Line (MSL) flow to go to zero. The instantaneous loss of "B" MSL flow resulted in a momentary reduction of pressure downstream of the four main steam lines. The turbine controls, sensing this reduction of pressure downstream of the MSIVs initiated the closing of all turbine control valves in an attempt to maintain upstream pressure.

As the turbine control valves started closing, pressure in the reactor increased and steam flow in the remaining steam lines also increased. Main steam line equalizing header pressure rose and continued to rise due to increasing reactor pressure and increasing steam flow through the remaining three main steam lines. The turbine control valves then began to open as a result of the overpressure condition in the equalizing header. Turbine Bypass Valve 'A' fully opened and Turbine Bypass Valve 'B' started to open. The reactor scrambled at this time due to a "Reactor Pressure High" trip signal. Approximately one second after the reactor scram, all MSIVs received a "Main Steam Line High Flow" auto-isolation signal and started to close. The high main steam line flow was caused by the increased reactor pressure and flow restricted to only three of the four main steam lines.

With the MSIVs closed, safety relief valves (SRV) 2MSS\*PSV128 and 2MSS\*PSV133 opened automatically in the relief mode. Pressure control was then established using manual operation of SRV's. Reactor water level initially dropped below the level 3 setpoint of 159.3 inches and was returned to approximately 195 inches using reactor feedwater pump 2FWS-P1B. Upon manually opening an SRV to maintain pressure, a swell in reactor water level caused a level 8 signal that tripped the operating feedwater pump. The operating crew started the Reactor Core Isolation Cooling System, in accordance with procedures, as a means to maintain reactor level and to assist with pressure control.

As designed, both recirculation pumps automatically downshifted to slow speed when reactor water level dropped below the level 3 setpoint of 159.3 inches following the scram. Both reactor recirculation pumps continued to operate at slow speed after the event.

No structures, systems, or components were inoperable at the start of the event that would have exacerbated the event. Operators and required equipment responded as expected.

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NARRATIVE (If more space is required, use additional copies of NRC Form 366A) (17)

**II. Cause of Event**

The cause of the loss of steam flow through "B" MSL and the subsequent reactor scram was a separation of the disc from the stem in MSIV 2MSS\*AOV7B. This was caused by a deficient design from the manufacturer that did not ensure the proper stem-to-disc thread loading. The deficient design resulted in the mechanical separation at the stem-to-disc threaded and pinned connection due to vibration. Contributors to the failure were marginal thread dimensions and inadequate torque specifications during assembly of the threaded and pinned connection between the stem and disc.

A visual inspection of the failed stem-to-disc threaded and pinned connection identified that the portion of the stem in the area directly below the pin had fatigued and cracked. The pin was undamaged and still would have prevented rotational disengagement. Significant vibration induced thread damage to the stem and disc was observed, which ultimately resulted in the stem pullout.

A modification to upgrade the configuration, identified as an enhancement to the original stem-to-disc design of the MSIVs, had been performed on five of the eight NMP2 MSIVs. The primary purpose of the modification was to improve the leak tightness of the MSIVs while also incorporating a one-piece piston/disc assembly and a welded stem-to-disc design. The subject MSIV for this event was in the group of unmodified valves that were awaiting the modification. Results of Local Leak Rate Testing (LLRT) were used as the threshold for installation of the modification. The valve had not experienced an LLRT failure since the modified design was available, and therefore had not been updated with the new valve internals.

**III. Analysis of Event**

This event is reportable because of the resulting automatic actuation of a valid reactor trip, in accordance with 10 CFR 50.73(a)(2)(iv)(A). Additionally, this report constitutes a Part 21 Notification. No significant safety consequences resulted from this event because all required safety systems were available and functioned as designed.

The MSIVs are provided to isolate the MSL to limit the release of radioactive material and the drainage of water from the reactor due to a main steam line break outside Containment.

The design of the MSIVs allows normal steam flow to aid in closing the valve, and higher inlet pressure tends to hold the valve closed. Degradation of the stem prior to this event would not have prevented the disc from being shut, thus providing the required MSIV isolation. The second MSIV in the "B" MSL, 2MSS\*AOV6B, functioned as designed.

The Reactor Core Isolation Cooling System was available and functioned properly to remove decay heat from the reactor following the shutdown.

No Emergency Core Cooling Systems actuated during the event or should have actuated.

A Probabilistic Risk Assessment (PRA) evaluation was performed on this event, and the review concluded that the Conditional Core Damage Probability resulting from this event is 8.97E-07. As indicated by the PRA evaluation results, this event was of very low risk significance.

Based on the above, the event did not pose a threat to the health and safety of plant personnel or the public.

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NARRATIVE (If more space is required, use additional copies of NRC Form 366A) (17)

**IV. Corrective Actions**

A disc/stem modification was performed on the three previously unmodified MSIVs, 2MSS\*AOV7B, 2MSS\*AOV6A, and 2MSS\*AOV7A. The modification consisted of a new valve disc design that incorporates a new stem/disc assembly and provides an improved method of attachment between the pilot disc and stem.

**V. Additional Information**

- Failed Components:  
MSIV Make/Model: Rockwell 26" Wye-Pattern Globe Valve, model 1612JMMNTY
- Previous similar events:  
NMP2 has not experienced any previous similar reactor trips or reportable events due to MSIV stem-to-disc connection failures.
- Identification of components referred to in this Licensee Event Report

<u>Components</u>	<u>IEEE 805 System ID</u>	<u>IEEE 803A Function</u>
Main Steam System	SB	N/A
Feedwater System	SJ	N/A
Turbine Bypass System	JI	N/A
Turbine Control System	JJ	N/A
Reactor Recirculation System	AD	N/A
Reactor Core Isolation Cooling	BN	N/A
Reactor	AC	N/A
Pump	BN, SJ, AD	P
Valve	SB, JI, JJ	ISV, PCV, FCV, RV
Vessel	AD	VSL