



August 24, 2001  
NMP2L 2028

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

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

***Subject:       Licensee Event Report 01-003, "Methodology Error Results in Inoperable Oscillation Power Range Monitors"***

Gentlemen:

In accordance with 10 CFR 50.73(a)(2)(i)(B), 10 CFR 50.73(a)(2)(v)(A) and 10 CFR 50.73(a)(2)(vii)(A), we are submitting Licensee Event Report (LER) 01-003, "Methodology Error Results in Inoperable Oscillation Power Range Monitors."

Very truly yours,

A handwritten signature in black ink, appearing to read "M. F. Peckham", with a long horizontal line extending to the right.

Michael F. Peckham  
Plant Manager – Unit 2

MFP/KLE/mlg  
Attachment

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

*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
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TITLE (4)  
Methodology Error Results in Inoperable Oscillation Power Range Monitors

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
06	29	2001	2001	003	00	08	24	2001		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)(ix)(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)	50.73(a)(2)(iv)(A)	73.71(a)(4)
	20.2203(a)(2)(i)	50.36(c)(1)(ii)(A)	X 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)	OTHER Specify in Abstract below or in NRC Form 366A
	20.2203(a)(2)(iii)	50.46(a)(3)(ii)	50.73(a)(2)(v)(C)	
	20.2203(a)(2)(iv)	50.73(a)(2)(i)(A)	50.73(a)(2)(v)(D)	
	20.2203(a)(2)(v)	X 50.73(a)(2)(i)(B)	X 50.73(a)(2)(vii)	
	20.2203(a)(2)(vi)	50.73(a)(2)(i)(C)	50.73(a)(2)(viii)(A)	
	20.2203(a)(3)(i)	50.73(a)(2)(ii)(A)	50.73(a)(2)(viii)(B)	

LICENSEE CONTACT FOR THIS LER (12)	
NAME W. R. Yaeger, Manager Nuclear Engineering Services	TELEPHONE NUMBER (Include Area Code) 315-349-7834

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)									
CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

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 June 29, 2001, Nine Mile Point Unit 2 was operating at approximately 100 percent power when a Part 21 notification was received from General Electric (GE) informing Niagara Mohawk Power Corporation (NMPC) that the Oscillation Power Range Monitors (OPRM) setpoints could be non-conservative. The OPRMs were declared inoperable and the action statement of Technical Specification 3.3.1.1, "Reactor Protection System Instrumentation," was entered. As required by the action statement, alternate methods to detect and suppress thermal-hydraulic instabilities were implemented, which allowed continued operation for 120 days with the OPRMs inoperable. On July 2, 2001, GE informed NMPC that the Unit 2 OPRMs could be returned to operable by limiting the rod line to less than or equal to 102 percent. On July 12, 2001, after administrative controls were established to limit the rod line to less than or equal to 102 percent, the OPRMs were returned to operable. On July 19, 2001, GE provided NMPC with revised OPRM setpoints that would allow removing the rod line limitation. The revised OPRM setpoints were implemented on July 25, 2001, and the 102 percent rod line limitation was removed. At the time of the Part 21 notification, procedural guidance directed operators to terminate thermal hydraulic events by manually tripping the reactor.

The apparent cause of the methodology error is inadequate design input considerations, because the strong dependency on bundle power was not recognized in the OPRM setpoint methodology.

This event is reportable in accordance with 10 CFR 50.73(a)(2)(i)(B), 10 CFR 50.73(a)(2)(v)(A) and 10 CFR 50.73(a)(2)(vii)(A) in that the potential non-conservatism could result in OPRM setpoints that may not provide Minimum Critical Power Ratio (MCPR) Safety Limit protection for thermal hydraulic stability events.

**LICENSEE EVENT REPORT (LER)**

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		2001	-- 003	-- 00	

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

**I. Description of Event**

On June 29, 2001, Nine Mile Point Unit 2 was operating at approximately 100 percent power when a Part 21 notification was received from General Electric (GE) informing Niagara Mohawk Power Corporation (NMPC) that the Oscillation Power Range Monitors (OPRM) setpoints could be non-conservative. The OPRMs were declared inoperable, and the action statement of technical specification 3.3.1.1, "Reactor Protection System Instrumentation," was entered. As required by the action statement, alternate methods to detect and suppress thermal-hydraulic instabilities or oscillations were implemented, which allowed continued operation for 120 days with the OPRMs inoperable. In accordance with GE recommendations, the OPRMs were not disabled, as the system would still provide a measure of automatic protection even if it did not meet the licensing criteria for Minimum Critical Power Ratio (MCPR) Safety Limit protection.

On July 2, 2001, as requested by NMPC, GE provided results of calculations concluding that the Unit 2 OPRMs would provide MCPR Safety Limit protection for a thermal-hydraulic event with their current setpoints provided the rod line was limited to less than or equal to 102 percent. On July 12, 2001, after administrative controls were established to limit the rod line to less than or equal to 102 percent, the OPRMs were returned to an operable status. On July 19, 2001, as requested by NMPC, GE provided the revised OPRM setpoints that would allow removing the rod line limitation. The revised OPRM setpoints were implemented on July 25, 2001, and the 102 percent rod line limitation was removed.

The OPRM system consists of four redundant and separate channels whose purpose is to detect neutron flux oscillations indicative of thermal-hydraulic instabilities and to generate a reactor trip signal before the MCPR Safety Limit is exceeded. MCPR is a ratio of the fuel assembly power that would result in the onset of boiling transition to the actual fuel assembly power. The MCPR Safety Limit is set such that 99.9 percent of the fuel rods are expected to avoid boiling transition if the limit is not violated. The operating limit MCPR is established to ensure that no fuel damage results during anticipated operational occurrences. Although fuel damage does not necessarily occur if a fuel rod actually experiences boiling transition, the critical power at which boiling transition is calculated to occur has been adopted as a fuel design criterion. The OPRM system generates a reactor trip on a two out of four logic.

The OPRM setpoint calculation methodology utilizes generic curves that are obtained by plotting the ratio of Delta Critical Power Ratio to Initial Critical Power Ratio versus Oscillation Magnitude (DIVOM). Two generic curves are specified: one for core-wide mode oscillations and one for regional mode oscillations. The regional DIVOM curve is used for Unit 2 OPRM setpoint determinations. A non-conservative deficiency was identified in the regional mode DIVOM curve for high peak bundle power-to-flow ratios. This non-conservatism resulted in OPRM trip setpoints that could not be shown, using the licensed methodology, to provide adequate MCPR Safety Limit protection for a thermal-hydraulic instability event.

**II. Cause of Event**

The apparent cause of the methodology error is inadequate design input considerations, because a strong dependency of the DIVOM curve on bundle power was not recognized. The effect of bundle power on the DIVOM relationship existed when the methodology was originally developed, but limiting conditions were not modeled adequately. Therefore, the magnitude of the contribution of a key parameter (peak bundle power) for regional mode oscillations was not recognized. Thus, the regional mode DIVOM curves were not adequate for high peak bundle powers. Improved modeling techniques produced anticipated oscillations for more limiting conditions and revealed the effect.

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

**III. Analysis of Event**

This event is reportable in accordance with 10 CFR 50.73(a)(2)(i)(B), 10 CFR 50.73(a)(2)(v)(A) and 10 CFR 50.73(a)(2)(vii)(A). The DIVOM curve for regional mode oscillations, used for establishing OPRM setpoints, may be non-conservative for some plant operating conditions. This potential non-conservatism could result in stability trip system setpoints that may not provide MCPR Safety Limit protection for a thermal-hydraulic instability event. Because of the non-conservatism, all OPRM channels were declared inoperable. The OPRMs would have been inoperable since activation of their trip function in April 2000, exceeding the action statement requirement.

The OPRM system consists of four redundant and separate channels whose purpose is to detect neutron flux oscillations indicative of thermal-hydraulic instabilities and generate a reactor trip signal before MCPR Safety Limit is exceeded. The MCPR Safety Limit is set such that 99.9 percent of the fuel rods are expected to avoid boiling transition if the limit is not violated. Although fuel damage does not necessarily occur if a fuel rod actually experiences boiling transition, the critical power at which boiling transition is calculated to occur has been adopted as a fuel design criterion. The OPRM system generates a reactor trip on a two-out-of-four logic. In accordance with GE recommendations, the OPRMs were not disabled, as the system would still provide a measure of automatic protection even if it did not meet the licensing criteria for MCPR Safety Limit protection.

The OPRM reactor trip function was implemented in April 2000. Prior to activation of the OPRM reactor trip function, procedural controls were in place for detecting and suppressing thermal-hydraulic instabilities. These controls remained in place after activation of the OPRM reactor trip function and were in place at the time of the Part 21 notification. If an instability condition had existed, procedural controls would have directed operators to terminate the instability event by manually tripping the reactor, regardless of OPRM status.

The OPRMs are not modeled in the Probabilistic Risk Analysis (PRA). A PRA screening of the event concluded that the non-conservative setpoint would not affect the Average Power Range Monitor normal power inputs to the Reactor Protection System or the Anticipated Transient Without Scram System, and therefore was qualitatively considered non-risk significant.

Based on the above, the non-conservative OPRM setpoints did not pose a threat to the health and safety of plant personnel or the public.

**IV. Corrective Actions**

1. Revised OPRM setpoints were implemented on July 25, 2001.
2. Verify that the OPRM setpoints for the next cycle core design are determined using a conservative DIVOM curve. This verification will be accomplished before the start of the next cycle.
3. Evaluate the need for a license amendment based upon GE effort to develop and license a new methodology for establishing OPRM setpoints.

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

**V. Additional Information**

1. Failed Components: None
2. Previous similar events: None
3. Identification of components referred to in this Licensee Event Report

<u>Components</u>	<u>IEEE 805 System ID</u>	<u>IEEE 803A Function</u>
Oscillation Power Range Monitors	IG	N/A
Average Power Range Monitors	IG	N/A
Reactor Protection System	JC	N/A
Fuel rod	AC	ROD