



**Constellation**  
Nuclear

Nine Mile Point  
Nuclear Station

*A Member of the  
Constellation Energy Group*

December 5, 2001  
NMP2L 2039

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 01-005, "Maximum Licensed Power Exceeded  
Due to Non-conservative Moisture Carryover Fraction"***

Gentlemen:

In accordance with License Condition 2.F, we are submitting Licensee Event Report 01-005, "Maximum Licensed Power Exceeded Due to Non-conservative Moisture Carryover Fraction."

Very truly yours,

Michael F. Peckham  
Unit 2 Plant General Manager

MFP/KLE/cld  
Attachment

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

JE22

## LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

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 [bjr1@nrc.gov](mailto:bjr1@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)

Maximum Licensed Power Exceeded Due to Non-conservative Moisture Carryover Fraction

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	06	2001	2001	005	00	12	05	2001	FACILITY NAME	DOCKET NUMBER
										05000
OPERATING MODE (9)		1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) (11)							
POWER LEVEL (10)		100	20.2201(b)			20.2203(a)(3)(ii)			50.73(a)(2)(ii)(B)	50.73(a)(2)(ix)(A)
			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)			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)	License Condition 2.F.
			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)(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	TELEPHONE NUMBER (Include Area Code)
Raymond J. Dean, Manager Engineering	315-349-4240

## 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)

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

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

On November 6, 2001, with Nine Mile Point Unit 2 (NMP2) at approximately 100 percent power, Nine Mile Point Nuclear Station, LLC (NMPNS) determined that NMP2 had exceeded licensed thermal power (eight hour average) due to an inaccurate moisture carryover fraction used in the thermal power calculation. On October 1, 2001, NMP2 became aware that General Electric (GE) had identified a condition that could result in plants exceeding their licensed thermal power. GE had determined that the moisture carryover fraction could be non-conservative for BWR 4 and later plants. When informed of this information NMP2 reduced thermal power by 2 MegaWatts Thermal (MWt) and limited maximum thermal power to 3465 MWt providing a 2 MWt margin to the licensed power limit of 3467 MWt. This condition was also entered into the corrective action program to determine if NMP2 had exceeded licensed thermal power. On November 6, 2001, after having determined that the actual moisture carryover fraction was lower than the value that had been assumed and after having reviewed historical operating data, NMPNS concluded that the licensed thermal power rating (eight hour average) had been exceeded by as much as 2 MWt.

The cause is inadequate design inputs by GE. The moisture carryover fraction constant is specified by GE, which is used in the plant's computer to determine core thermal power.

Corrective actions included reducing power by 2 MWt and modifying the moisture carryover fraction after determining that the NMP2 moisture carryover fraction was approximately 0.0 percent.

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		2001	--    005	--    00	

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

### I. Description of Event

General Electric (GE) recently evaluated the impact of assumed values for moisture carryover on the calculation of core thermal power. There is no plant instrumentation that measures the value of the moisture carryover fraction and the term is a correction factor that is provided by GE and included in the feedwater energy portion of the heat balance. Testing using Sodium-24 has identified that the amount of moisture carryover in BWR-4 and later model plant designs is significantly less than that assumed in the core thermal power calculation. The heat balance calculation used an assumed value of 0.1 percent for the moisture carryover fraction whereas the Sodium-24 tests indicate the actual value is closer to zero. GE determined that the difference between the actual and assumed values for moisture carryover results in a calculated core thermal power that is approximately 2.8 MegaWatts Thermal (MWt) non-conservative at full power for a 3400 MWt plant.

On receipt of this operating experience, on October 1, 2001, Nine Mile Point Unit 2 (NMP2) implemented an administrative limit on maximum thermal power of 3465 MWt. This provided a 2 MWt margin to the licensed thermal power limit of 3467 MWt. A 2MWt margin was sufficient because of unrelated conservatism in the core thermal power calculation. The calculation uses a fixed value for unmonitored Control Rod Drive flow to the seals of the Reactor Recirculation pumps and the Reactor Water Cleanup pumps. The actual flow value is approximately 40 percent less than the assumed value. This provides a margin of at least 1 MWt in the calculation. At this time, Nine Mile Point Nuclear Station, LLC (NMPNS) placed the issue into the corrective action program to determine the impact on NMP2.

Using Sodium-24 measurements, NMP2 plant chemistry confirmed that the moisture carryover fraction was approximately 0.0 percent. Based upon the chemistry data, NMP2 concluded that the thermal power calculation was non-conservative by approximately 2 MWt. NMP2 reactor engineering then reviewed historical data to determine if there were any instances of the eight-hour average of thermal power exceeding the licensed maximum thermal power. On November 6, 2001, NMP2 engineering and NMP2 reactor engineering concluded that there were instances when NMP2 had exceeded its thermal limit by approximately 2 MWt. The Control Room was notified and a 24-hour notification to the Nuclear Regulatory Commission was made in accordance with License Condition 2.F.

### II. Cause of Event

The apparent cause is inadequate design inputs by GE. The moisture carryover fraction constant is specified by GE, which is used in the plant's computer to determine reactor core thermal power.

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

### III. Analysis of Event

GE determined that the moisture carryover assumption used in calculating reactor core thermal power in the plant process computer may be non-conservative. The moisture carryover fraction is an input to the plant process computer heat balance calculations that is provided by GE. The value provided by GE was 0.1 percent. Measurements made by NMP2 chemistry confirmed that the moisture carryover fraction is approximately 0.0 percent. The impact on NMP2 is that the core thermal power calculation understates the core thermal power indication by about 2.0 MWt. A review of plant data confirmed that NMP2 had exceeded its licensed thermal limit (an eight hour average) by approximately 2 MWt. Therefore, NMP2 has operated at power levels in excess of Operating License Condition 2.C.(1). This is reportable in accordance with License Condition 2.F, which states that "Except as otherwise provided in the Technical Specifications or Environmental Protection Plan, Nine Mile Point Nuclear Station, LLC shall report any violations of the requirements contained in Section 2.C of this license in the following manner: initial notification shall be made within 24 hours to the NRC Operations Center via the Emergency Notification System, with written followup within 30 days in accordance with the procedures described in 10 CFR 50.73(b), (c), and (e)."

The use of a carryover fraction of 0.1 percent, while non-conservative, does not represent a safety issue. The change in core thermal power is an order of magnitude less than the precision of the MCPDR safety limit evaluation process. A bias in the carryover fraction of 0.1 percent in the core thermal power evaluation represents a small increase (less than 1 percent) in the probability that the core thermal power will exceed the nominal rated power by more than 2 percent. This is documented by GE Report dated September 2001, "Impact of Steam Carryover Fraction on Process Computer Heat Balance Calculations."

A probabilistic risk review concluded that the 2 MWt overpower condition was not risk significant.

Based on the above, the use of the non-conservative moisture carryover fraction did not pose a threat to the health and safety of the public or plant personnel

### IV. Corrective Actions

1. NMP2 limited maximum reactor power to 3465 MWt to provide a 2 MWt margin to the licensed thermal power to account for the non-conservative moisture carryover fraction in the core thermal power calculation.
2. The constant representing the moisture carryover in the plant process computer thermal power calculation was changed from 0.1 percent to 0.0 percent and the administrative reactor power limit of 3465 MWt was removed.

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

## V. Additional Information

A. Failed Components:  
None

B. Previous similar events:

Licensee Event Report (LER) 95-11, "Operation in Excess of 100 Percent Rated Core Thermal Power Due to Core Thermal Power Calculation Methodology Error," describes a condition in which NMP2 had exceed rated core thermal power because approximately 24 gallons per minute flow from the Control Rod Drive system was not considered in the thermal power calculation. The corrective actions of LER 95-11 would not have prevented the overpower described in LER 01-005, since the moisture carryover fraction is an assumed input provided by GE. LER 01-003, "Methodology Error Results in Inoperable Oscillation Power Range Monitors," describes a condition in which the Oscillation Power Range Monitors (OPRM) trip setpoint provided by GE was non-conservative as a result of inadequate design input considerations. The corrective actions were specific to the OPRMs and would not have prevented the overpower condition. Additionally, LER 01-002, "Rated Thermal Power Exceeded When Recirculation Flow Control Valve Malfunctioned," describes a condition in which rated thermal power was exceeded by 3 percent when a recirculation flow control valve malfunctioned. The corrective actions described in LER 01-002 would not have prevented the event described in LER 01-005.

C. Identification of components referred to in this Licensee Event Report

<u>Components</u>	<u>IEEE 805 System ID</u>	<u>IEEE 803A Function</u>
Reactor Recirculation System	AD	N/A
Reactor Water Cleanup System	CE	N/A
Control Rod Drive System	AA	N/A
Oscillation Power Range Monitors	JC	N/A
Pump	AD, CE	P
Seal	AD, CE	SEAL
Valve	AD	FCV
Computer	ID	N/A