



November 6, 2001  
NMP1L 1622

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

RE:                      Nine Mile Point Unit 1  
                             Docket No. 50-220  
                             DPR-63

***Subject:        115 kilovolt Line 4 Inoperable due to Inadequate Analysis of Design Change***

Gentlemen:

In accordance with 10 CFR 50.73(a)(2)(i)(B) and 10 CFR 50.73(a)(2)(v)(D) we are submitting Licensee Event Report 01-002, "115 kilovolt Line 4 Inoperable due to Inadequate Analysis of Design Change."

Very truly yours,

A handwritten signature in cursive script, appearing to read "LA Hopkins".

Lawrence A. Hopkins  
Plant Manager – Unit 1

LAH/KLE/cld  
Attachment

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

## 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 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 1

DOCKET NUMBER (2)

05000220

PAGE (3)

1 OF 4

TITLE (4)

115 kilovolt Line 4 Inoperable due to Inadequate Analysis of Design Change

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	
09	07	2001	2001	002	00	11	06	2001	FACILITY NAME	DOCKET NUMBER	
										05000	
									FACILITY NAME	DOCKET NUMBER	
										05000	
OPERATING MODE (9)		1									
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)		OTHER		
			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)		X	50.73(a)(2)(v)(D)			
			20.2203(a)(2)(v)		X	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

R. G. Randall, Manager Engineering

TELEPHONE NUMBER (Include Area Code)

315-349-2445

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 September 7, 2001, at 2040 hours with Nine Mile Point Unit 1 (NMP1) at approximately 100 percent power, 115 kilovolt (kV) Line 4 was declared inoperable. Technical Specification 3.6.3.b Limiting Condition for Operation (LCO) was entered, allowing continued operation for seven days with Line 4 inoperable. Two 115 kV offsite power sources, Line 1 and Line 4, serve NMP1. The Technical Specification Bases 3.6.3/4.6.3 state that either line can provide the power required for a Loss of Coolant Accident (LOCA). On September 7, 2001, Niagara Mohawk Power Corporation (NMPC) determined that Line 4 could not provide the power required for a LOCA when Line 1 is out of service. The voltage on Line 4 during a unit trip with a LOCA, with Line 1 out of service, would decrease and actuate the Degraded Voltage Relays (DVR) transferring the Unit 1 Emergency Core Cooling System (ECCS) loads to the diesel generators. The voltage decrease is due to the additional load applied during a unit trip with a LOCA as compared to normal plant operation.

On September 12, 2001, at 1803, Line 4 was returned to operable following tap changes to reserve station service transformers XF-101N and XF-101S and procedure changes to boost Line 4 voltage and secure non-essential loads when Line 1 is inoperable.

The cause of the inoperability of Line 4 was inadequate review of the design change installed in March of 1995 that raised the DVR setpoints. Contributing causes were inadequate consideration of design basis and inadequate communications between NMPC Power Control, the offsite organization that maintains voltage on the 115 kV lines, and NMP1 Design Engineering. Detailed requirements were not provided to Power Control, and NMP1 Design Engineering failed to verify that Power Control could maintain sufficient Line 4 voltage with Line 1 out of service.

Corrective actions include tap changes to reserve station service transformers XF-101N and XF-101S, implementing the Power Control State Estimator Program for monitoring 115 kV bus voltage, and procedure changes to address Line 4 voltage concerns when Line 1 is out of service. Additionally, more rigorous design and review processes have been implemented since 1995.

## LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2) NUMBER (2)	LER NUMBER (6)			PAGE (3)
Nine Mile Point, Unit 1	05000220	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 4
		2001	-- 002	-- 00	

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

### I. Description of Event

On September 7, 2001, at 2040 hours, with Nine Mile Point Unit 1 (NMP1) at approximately 100 percent power, 115 kilovolt (kV) Line 4 was declared inoperable. The Limiting Condition for Operation (LCO) of Technical Specification 3.6.3.b was entered, allowing continued operation for seven days with Line 4 inoperable. NMP1 is served by two 115 kV offsite power sources identified as Line 1 and Line 4 that terminate at a common 115 kV bus. The Technical Specification Bases 3.6.3/4.6.3 state that either line will provide the power required for a Loss of Coolant Accident (LOCA). On September 7, 2001, Niagara Mohawk Power Corporation (NMPC) determined that Line 4 could not provide the power required for a unit trip with a LOCA when Line 1 is out of service. The voltage on Line 4 during a unit trip with a LOCA, with Line 1 out of service, would decrease and actuate the Degraded Voltage Relays (DVR) transferring the Unit 1 Emergency Core Cooling System (ECCS) loads to the diesel generators. The voltage decrease is due to the additional load applied during a unit trip with a LOCA compared to normal plant operation. The additional loading is the result of the fast transfer of station service loads to the offsite 115 kV power system, combined with the loading of ECCS equipment onto the 115 kV emergency power boards during a unit trip with a LOCA. The NMPC conclusion that Line 4 could not support unit trip with LOCA loads was based upon discussions with NMPC Power Control, the offsite organization that maintains voltage on the 115 kV lines, and use of the Power Control State Estimator Program.

The Power Control State Estimator Program is a computer program that models grid conditions on a real time basis and calculates grid voltages for a number of contingencies. In May 2001, Power Control began using the Power Control State Estimator Program to monitor NMP1 115 kV bus voltage on a trial basis. Prior to September 7, 2001, NMP1 was aware that if Line 1 were inoperable, compensatory actions would be required of Power Control to raise Line 4 voltage. NMP1 concluded that these compensatory actions taken by Power Control to maintain Line 4 voltage would maintain Line 4 operable; that is, capable of supplying LOCA loads. However, NMP1 had not adequately communicated the Line 4 requirements or adequately evaluated the adequacy of the compensatory actions to maintain Line 4 voltage. Following an August 30, 2001, Line 1 outage, NMP1 requested that Power Control run the Power Control State Estimator Program to verify that the administrative controls would be able to maintain Line 4 voltage for the unit trip with LOCA contingency. When the unit trip with LOCA loading was considered, the results of the Power Control State Estimator Program indicated that, independent of Line 1, Line 4 could not provide sufficient voltage to support accident loads without exceeding system bus voltage limits. On September 7, 2001, with information provided by Power Control representatives, NMP1 Design Engineering concluded that during the August 30, 2001, Line 1 outage, Power Control would not have been able to maintain sufficient voltage to Line 4 to preclude DVR actuation during a unit trip with a LOCA and that Line 4 did not conform with the bases of Technical Specification 3.6.3.

After declaring Line 4 inoperable, the following actions were taken:

1. Operations protected the remaining sources of power (Line 1, Emergency Diesel Generators 102 and 103).
2. NMP1 initiated a Configuration Change to change the tap settings on transformers XF-101N and XF-101S.
3. NMP1 revised Operations procedures and conducted training.
4. The Power Control procedures were revised to fully implement the Power Control State Estimator Program.
5. A review of previously identified issues, both industry and plant specific, was conducted to determine if there were any unresolved issues related to Line 4 or 115 kV line voltage. None were identified.

On September 12, 2001 at 1803, after completion of tap changes on transformers XF-101N and XF-101S, Line 4 was declared operable, and NMP1 exited the LCO of Technical Specification 3.6.3.b.

A review of this event identified that Line 4 lost the capability to independently support LOCA loads when the DVR setpoint was increased in March 1995. NMP1 changed the setpoint as a result of findings during the 1991 Unit 1 Electrical Distribution System Functional Inspection (EDSFI) conducted by the NRC. Since 1995, opportunities to identify the Line 4 deficiency have occurred during NMP1 reviews of industry events and internal assessments. The conclusion that Line 4 was satisfactory, based upon the compensatory actions, formed the inappropriate basis for NMP1 responses to the industry events and internal assessments.

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

### II. Cause of Event

Line 4 lost the capability to independently support LOCA loads when, in March 1995, a design change increased the DVR setpoints. The cause was an inadequate analysis of the design change. The focus of the design change was to develop DVR setpoints that would ensure adequate voltage to plant equipment. The capability of the 115 kV lines to maintain voltage above the new DVR setpoints and preclude separation from offsite power during a unit trip with a LOCA was not thoroughly evaluated. NMP1 Electrical Design concluded that existing administrative controls implementing compensatory actions by Power Control could maintain sufficient voltage on Line 4.

Contributing causes were inadequate consideration of the design basis and inadequate communications between NMP1 and Power Control. Detailed requirements were not given to Power Control, and the ability of Power Control to maintain sufficient voltage on Line 4 during a unit trip with a LOCA when Line 1 is out of service was not verified.

### III. Analysis of Event

This event is reportable in accordance with 10CFR50.73(a)(2)(i)(B), "Any operation or condition which was prohibited by the plant's Technical Specifications...." Line 4 was determined to have been incapable of performing its design function since the modification of the DVR setpoints in 1995; therefore, operation would not have been in compliance with Technical Specification 3.6.3.b which would have allowed operation for seven days with Line 4 inoperable. The event is also reportable in accordance with 10CFR50.73(a)(2)(v), "Any event or condition that could have prevented the fulfillment of the safety function of structures or systems....," because the inoperability of Line 1 would result in unavailability of offsite power since Line 4 would have been considered incapable of performing its design function.

During a unit trip with a LOCA and with Line 1 unavailable, transfer of house loads to the offsite 115 kV power system, combined with the starting of ECCS equipment would result in the 115 kV Line 4 voltage dipping below the DVR actuation setpoints, which would result in separation from offsite power and startup of the emergency diesel generators. This scenario would have resulted in the transfer of the ECCS equipment from the offsite power system to the emergency diesel generators prior to completing startup of the equipment. A Probabilistic Risk Assessment (PRA) review was performed on this event, and the review concluded that the Core Damage Frequency resulting from this event is 5.0E-08. As indicated by the PRA review results, this event was of very low risk significance.

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

### IV. Corrective Actions

1. Changed the tap settings on reserve station service transformers XF-101N and XF-101S.
2. Revised appropriate NMP1 Operations procedures and conducted training.
3. Revised appropriate Power Control procedures and fully implemented the Power Control State Estimator Program.
4. Issued the following documents: procedure NEP-DES-29, Transmission System Design Interface, Engineering Specification E-174, Grid Interface Specification, and NER-1E-015, NMP1 Offsite Grid Voltage Regulation Study. These documents reconstituted and documented the offsite design basis and implemented procedural requirements for communications interface with power control.
5. Position specific training will be implemented for appropriate engineering personnel on the design and licensing basis associated with the offsite power topical area. This action will be completed by December 31, 2001.

Additionally, more rigorous design and review verification processes have been developed and implemented since 1995 to improve the quality of Engineering products. Included in these processes are the Independent Verification, Design Review Board and Independent Technical Oversight.

### V. Additional Information

A. Failed Components:  
None

B. Previous similar events:  
A review of Licensee Event Reports (LER) identified four previous LERs whose causes were either design deficiency or inadequate design analysis. The cause identified in LER 96-009, "Potential Overstressed Pipe Supports Caused by Design Deficiency"; LER 97-001, "Pipe Supports Outside Design Basis Because of Design Deficiency"; and LER 98-006, "Design Deficiency Associated with Control Room Emergency Ventilation System Radiation Monitors," is design deficiency. The cause of LER 98-005, "Unrecognized Breach of Secondary Containment Due to Inadequate Design Analysis," is identified as inadequate design analysis. These LERs were written after the DVR setpoint change had been implemented, and the corrective actions would not have lead to the discovery of the deficiency in the DVR design change.

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>
115 kV Offsite Power	FK	N/A
Emergency Diesel Generators	EK	DG
Emergency Core Cooling Systems	BM	N/A
Transformer	FK	XFMR
Relay	EK	RLY