



May 15, 2000
NMP2L 1962

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

RE: Docket No. 50-410
Licensee Event Report 00-07

Gentlemen:

In accordance with 10 CFR 50.73(a)(2)(ii)(B), we are submitting Licensee Event Report 00-07, "Plant Outside Design Basis due to Single Failure Susceptibility of Service Water and Emergency Core Cooling Systems."

Sincerely,

A handwritten signature in black ink, appearing to read "M. Peckham".

Michael F. Peckham
Plant Manager - NMP2

MFP/KLE/tmk
Attachment

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

TE22

RGH-001

LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503

FACILITY NAME (1)

Nine Mile Point Unit 2

DOCKET NUMBER (2)

05000410

PAGE (3)

01 OF 05

TITLE (4)

Plant Outside Design Basis due to Single Failure Susceptibility of Service Water and Emergency Core Cooling Systems

EVENT DATE (5)

LER NUMBER (6)

REPORT DATE(7)

OTHER FACILITIES INVOLVED (8)

MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
04	13	00	00	07	00	05	15	00	N/A	
									N/A	

OPERATING MODE (9)

4

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)

POWER LEVEL (10)

000

- 20.2201(b)
- 20.2203(a)(1)
- 20.2203(a)(2)(I)
- 20.2203(a)(2)(ii)
- 20.2203(a)(2)(iii)
- 20.2203(a)(2)(iv)

- 20.2203(a)(2)(v)
- 20.2203(a)(3)(I)
- 20.2203(a)(3)(ii)
- 20.2203(a)(4)
- 50.36(c)(1)
- 50.36(c)(2)

- 50.73(a)(2)(I)
- 50.73(a)(2)(ii)
- 50.73(a)(2)(iii)
- 50.73(a)(2)(iv)
- 50.73(a)(2)(v)
- 50.73(a)(2)(vii)

- 50.73(a)(2)(viii)
- 50.73(a)(2)(x)
- 73.71
- OTHER
(Specify in Abstract below and in Text, NRC Form 366A)

LICENSEE CONTACT FOR THIS LER (12)

NAME

Stephen E. Geier, Manager Engineering Unit 2

TELEPHONE NUMBER

(315) 349-7887

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

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE)

NO

EXPECTED SUBMISSION DATE (15)

MONTH DAY YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single space typewritten lines) (16)

April 13, 2000, the plant was shutdown for refueling in Mode 4. A review of the service water pumps' low discharge flow trip setpoint uncertainty and its impact on the service water system concluded that a single failure of the High Pressure Core Spray (HPCS) diesel, onsite power source to Division III Emergency Core Cooling Systems (ECCS), to start following a Loss of Offsite Power (LOOP), could result in a low flow demand for service water and consequently, loss of all service water pumps due to the current setting of the low flow trip. This is contrary to the criteria stated in General Design Criteria 44. Additionally, the failure of the HPCS diesel to start during a Loss of Coolant Accident concurrent with a LOOP could result in the loss of Division I ECCS and Division III ECCS, leaving only Division II ECCS operating.

The cause was that the original design of the service water system did not consider all possible low flow conditions that may contribute to the tripping of the service water pumps.

A temporary modification was implemented that provided additional service water flow by throttling flow through the Division I and Division II Residual Heat Removal heat exchangers. A permanent corrective action will be to remove the service water pump low discharge flow protective trips.

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		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
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TEXT (If more space is required, use additional NRC Form 366A's) (17)

I. DESCRIPTION OF EVENT

April 13, 2000, while the plant was shutdown for refueling, Niagara Mohawk Power Corporation (NMPC) identified that because of the service water pumps' low discharge flow trip, a single failure of the High Pressure Core Spray (HPCS) diesel to start can result in the loss of Division I and Division III Emergency Core Cooling Systems (ECCS) during a Loss of Coolant Accident (LOCA) concurrent with a Loss of Offsite Power (LOOP) and a loss of Division I and Division II service water during a LOOP. This was identified during the extent of condition review from of a previously identified single failure susceptibility in the automatic closing circuitry of the non-essential service water isolation valves. The single failure susceptibility in the automatic closing circuitry of the non-essential service water isolation valves is described in Licensee Event Report 00-05, "Service Water Does Not Meet Single Failure Requirement."

The HPCS diesel is the onsite source of power to Division III ECCS. The HPCS diesel can be supplied by either Division I or Division II service water. If the HPCS diesel starts, discharge valves to Division I and Division II service water open, establishing service water flow. If the HPCS diesel fails to start these valves do not open.

During a LOOP, the failure of the HPCS diesel to start could result in actuating the low discharge flow trips of the running service water pumps in Division I and Division II. Each service water pump has a low discharge flow protective trip set at less than 1000 gallons per minute (gpm) with a time delay of 10 seconds. However, engineering has determined that due to instrument uncertainty, the upper analytical limit for the trip setpoint is 2100 gpm. With no service water flow to the HPCS diesel, service water flow could be less than 2100 gpm, which could result in the service water pumps tripping on low flow.

Additionally, NMPC identified that if the HPCS diesel failed to start during a LOCA concurrent with a LOOP, the Division I running service water pump could trip on low discharge flow. In this scenario, Division II service water is not lost because of additional service water demand associated with the LOCA. The loss of Division I service water results in the loss of Division I ECCS. The single failure of the HPCS diesel, the onsite source of power to Division III ECCS, could result in the loss of Division I ECCS and Division III ECCS leaving only Division II ECCS operating.

On April 17, 2000, a temporary modification was implemented that provided additional service water flow by throttling flow through the Division I and Division II Residual Heat Removal (RHR) heat exchangers. This ensures that there is sufficient flow demand for the service water system to preclude tripping the service water pumps on low discharge flow during the LOOP and LOCA concurrent with a LOOP scenarios.

On May 9, 2000, removal of the service water pumps' low discharge flow protective trips was approved. After the low discharge flow trips are removed from each service water pump, the temporary modification directing additional service water through the RHR heat exchangers will be removed.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

II. CAUSE OF EVENT

The cause was that the original design of the service water system did not consider all possible low flow conditions that may contribute to the tripping of the service water pumps.

III. ANALYSIS OF EVENT

This condition is reportable in accordance with 10 CFR 50.73(a)(2)(ii)(B), "Any event or condition that resulted in the condition of the nuclear power plant, including its principal safety barriers, being seriously degraded; or that resulted in the nuclear power plant being: (B) In a condition that was outside the design basis of the plant." The service water system design basis and ECCS design basis require that single failure criteria be met. An engineering review determined that the service water system did not meet single failure criteria during a LOOP and that ECCS did not meet single failure criteria during a LOCA concurrent with a LOOP.

Previous engineering evaluations have concluded that there would be sufficient service water flow to support the safety function of the service water system, however the current evaluations are more restrictive. Current evaluations consider instrument uncertainty, various pump conditions and equipment availability during postulated events. Not all service water system loads can be assumed available as evaluated in the past. Equipment cooling flow requirements that are based on area temperature and equipment heat loads cannot be assumed to be immediately available. The net effect is that service water flow considered during a LOOP and LOCA concurrent with a LOOP is lower than previously evaluated. The lower flow combined with the setpoint uncertainty on the upper limit of the low flow trip creates conditions where the running service water pumps may trip.

Each pump is provided with a low discharge flow trip for equipment protection. The setpoint for tripping the pump is flow less than 1000 gpm with a time delay of 10 seconds. However, engineering has determined that due to instrument uncertainty, an actual flow of less than 2100 gpm may cause a trip.

A LOOP signal closes non-essential service water isolation valves, isolates Division I service water from Division II service water, establishes one service water pump in Division I and one service water pump in Division II and sends a start signal to the HPCS diesel. The HPCS diesel supplies onsite power to Division III ECCS.

The HPCS diesel can be supplied by either Division I or Division II service water. If the HPCS diesel starts, discharge valves to Division I and Division II service water open, establishing service water flow. If the HPCS diesel fails to start these valves do not open.

If the HPCS diesel fails to start during a LOOP scenario then, using revised service water flow values, the Division I and Division II service water pumps may trip due to low discharge flow.

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III. ANALYSIS OF EVENT (Cont'd)

If the HPSCS diesel fails to start during a LOCA concurrent with a LOOP scenario the Division I service water pump may trip due to low discharge flow. Division I service water provides cooling to the Division I Emergency Diesel. Loss of Division I service water results in the loss of the Division I Emergency Diesel which results in the loss of Division I ECCS. Because of LOCA associated loads with Division II service water, the Division II service water flow is sufficient to prevent actuating the low discharge flow trip on the running service water pump.

In the scenarios described above whether a running pump trips depends upon uncertainty associated with the low flow trip setpoint and the actual service water load at the time of the scenario. However, if the running service water pumps had tripped, the low flow trip logic does not lock out the pump and the pump can be manually restarted as soon as the low flow condition is resolved. If the service water pumps had tripped, training and procedural guidance would have directed operators to take manual actions to promptly restore service water flow.

A probabilistic assessment that estimated the risk impact of a scenario involving a single failure of Division III ECCS that could result in a loss of Division I ECCS concluded that the scenario at Nine Mile Point Unit 2 has very low risk significance.

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

IV. CORRECTIVE ACTIONS

1. A temporary modification was implemented that throttled service water flow through Division I and Division II RHR heat exchangers. The additional service water flow corrected the service water pump susceptibility to low discharge flow trips.
2. Niagara Mohawk Power Corporation will implement a permanent plant modification that will remove the low discharge flow trips from the service water pumps. This modification will be implemented by June 23, 2000.

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V. INFORMATION ADDITIONAL

A. Failed components: none

B. Previous similar events:

Licensee Event Reports 98-23, "Potential Standby Gas Treatment System Inoperability Due to Original Design Deficiency", 98-17 "Control Room Ventilation Inoperable Due to Original Design Deficiency" and 96-10 "Inoperability of Redundant Safety-Related Chillers Caused by Design Analysis Deficiency" have similar root causes, inadequate original design. The corrective actions associated with these reports could not have prevented the condition described in this report.

C. Identification of components referred to in this LER:

Component	IEEE 803A Function	IEEE 805 System ID
Service Water System	N/A	BI
Pumps	P	BI
Valves	ISV	BI
Diesel Generator	DG	EK
High Pressure Core Spray*	N/A	BG
Low Pressure Core Spray*	N/A	BM
Low Pressure Core Injection*	N/A	BP
Automatic Depressurization System*	N/A	BN
Residual Heat Removal Heat Exchanger	HX	BP

*Emergency Core Cooling System comprises these systems