

Niagara Mohawk

Richard B. Abbott
Vice President
Nuclear Engineering

Phone: 315.349.1812
Fax: 315.349.4417

June 16, 2000
NMP2L 1972

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

RE: Docket No. 50-410
Licensee Event Report 00-05, Supplement 1

Gentlemen:

In accordance with 10 CFR 50.73(a)(2)(ii)(B), we are submitting Licensee Event Report 00-05, Supplement 1, "Service Water System Does Not Meet Single Failure Requirement." The report provides the cause of the event and associated corrective actions that were not determined at the time of the previous submittal.

Sincerely,



Richard B. Abbott
Vice President Nuclear Engineering

RBA/KLE/tmk
Attachment

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

LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 30.0 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) Service Water System Does Not Meet Single Failure Requirement

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)	
03	28	00	00	05	01	06	16	00	N/A		
									N/A		

OPERATING MODE (9)

5

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

POWER LEVEL (10) 000	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)	<input type="checkbox"/> 50.73(a)(2)(viii)
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(3)(I)	<input checked="" type="checkbox"/> 50.73(a)(2)(ii)	<input type="checkbox"/> 50.73(a)(2)(x)
	<input type="checkbox"/> 20.2203(a)(2)(I)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 73.71
	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(iv)	<input type="checkbox"/> OTHER
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(1)	<input type="checkbox"/> 50.73(a)(2)(v)	<i>(Specify in Abstract below and in Text, NRC Form 366A)</i>
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(vii)	

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)

On March 28, 2000, with the plant shutdown for refueling, a root cause team investigating a loss of Division II service water initiated a Deviation/Event Report to have engineering evaluate whether the service water system met single failure requirements during a loss of coolant accident. On March 30, 2000, an engineering evaluation determined that a single failure would result in the closing of the non-essential service water isolation valves. This could result in the loss of running service water pumps due to low discharge flow trips.

The cause of this condition was that the design basis of the service water system was not fully understood when design changes were implemented in 1989 to address single failure vulnerability of the non-essential service water isolation valves during a partial loss of offsite power. A contributing cause of this condition was inadequate engineering technical review of the effects of de-energizing the control circuit for the non-essential service water isolation valves without a concurrent loss of offsite power.

On April 15, 2000, a modification to the control circuitry logic of the non-essential service water isolation valves corrected the single failure condition. Lessons learned from the evaluation of this condition will be provided to engineering staff by June 30, 2000. The design change and design change review process have been substantively enhanced since this error was made.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

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 (F-330), 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)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Nine Mile Point Unit 2	05000410	00	- 05	- 01	02 OF 05

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

I. DESCRIPTION OF EVENT

On March 28, 2000, with the plant shutdown for refueling, a root cause team investigating a loss of Division II service water initiated a Deviation/Event Report to have engineering evaluate whether the service water system met single failure requirements. The root cause determination was in response to a loss of Division II service water that occurred on March 17, 2000, which is described in Licensee Event Report 00-04. On March 30, 2000, an engineering evaluation determined that service water did not meet the single failure requirement, in that a single failure could lead to the loss of all running service water pumps during a loss of coolant accident. A single failure would result in the closing of the non-essential service water isolation valves. With the isolation of the non-essential service water loads, system flow paths would be reduced resulting in reduced flow that could result in the loss of all running service water pumps due to low discharge flow trips.

On March 30, 2000 the control room was informed of the service water single failure susceptibility and declared service water inoperable and entered the action statement of Technical Specification 3.7.1.2.a.

On April 1, 2000, engineering provided a further evaluation to support the operability of service water in Modes 4 and 5 with the single failure condition present.

Non-essential service water loads may be isolated by either of two valves in series, a Division I isolation valve and/or a Division II isolation valve. The Division I motor operated isolation valves receive power from Division I power while the Division II motor operated isolation valves receive power from Division II power. On a loss of offsite power, all running service water pumps are stopped and one pump per Division is automatically restarted.

Prior to 1989, the Division I non-essential service water isolation valves would receive a close signal upon restoration of Division I power by the Division I emergency diesel after a loss of power to Division I. The Division II non-essential service water isolation valves would receive a close signal upon restoration of Division II power by the Division II emergency diesel after a loss of power to Division II. A loss of power to only one Division (partial loss of off site power) with the failure of the associated emergency diesel generator presented a condition in which none of the non-essential service water isolation valves would close.

In 1989 the closing circuitry logic of the non-essential service water isolation valves was modified to meet single failure criteria during a partial loss of offsite power. After the circuit logic modification, Division I isolation valves would automatically close on logic of EITHER of two conditions: (1) restoration of electrical power by the Division I emergency diesel generator after loss of off-site power to Division I, OR (2) a loss of all Division II service water pumps. The loss of Division II service water pumps occurs with a loss of Division II power. A similar modification was made to the closing circuitry for the Division II non-essential service water isolation valves.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 30.0 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)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Nine Mile Point Unit 2	05000410	00	05	01	03 OF 05

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

I. DESCRIPTION OF EVENT (Cont'd)

The result of these modifications was that a loss of power in Division I generated close signals for both Division I and Division II non-essential service water isolation valves and a loss of power in Division II generated close signals for both Division II and Division I non-essential service water isolation valves. After the modifications, the closing circuitry signal that indicated a loss of service water pumps was a de-energize to actuate signal. This meant that a failure of a circuit component that de-energized this portion of the closing circuitry would result in closing the non-essential service water isolation valves. If the non-essential service water isolation valves closed, without a concurrent loss of offsite power, up to five service water pumps may be tripped on low pump discharge flow. A tripping of pumps under these conditions was not recognized at the time when the 1989 modification was developed.

A design change was implemented on April 15, 2000, that modified the closing circuitry logic of the non-essential service water isolation valves. As modified, Division I isolation valves automatically close on logic of EITHER of two conditions: (1) restoration of electrical power by the Division I emergency diesel generator after loss of off-site power to Division I, OR (2) a loss of all Division II service water pumps AND a loss of power to Division II. A parallel logic modification was installed for Division II. These modifications corrected the single failure susceptibility introduced in the 1989 modification.

II. CAUSE OF EVENT

The cause of this condition was that the design basis of the service water system was not fully understood when design changes were implemented in 1989 to address single failure vulnerability of the non-essential service water isolation valves during a partial loss of offsite power. A contributing cause of this condition was inadequate engineering technical review of the effects of de-energizing the control circuit for the non-essential service water isolation valves without a concurrent loss of offsite power.

III. ANALYSIS OF EVENT

This event 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 requires that single failure criteria be met. An engineering review determined that the service water system did not meet single failure criteria during a loss of coolant accident.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 30.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-330), 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)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Nine Mile Point Unit 2	05000410	00	05	01	04 OF 05

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

III. ANALYSIS OF EVENT (Cont'd)

The service water system is designed with suitable redundancy to provide a reliable supply of cooling water during and following a design basis loss of coolant accident for essential components and systems. For the single failure identified, the non-essential valves will close, isolating the non-safety related service water loads that comprise the major flow demand on the service water system. All operating pumps will run back on their operating curves reducing flow through each pump. Each pump has a low discharge flow trip for equipment protection. The reduced flow will approach the low discharge flow trip setpoint. Whether an individual pump reaches the low discharge flow trip setpoint depends on several factors. These factors are (1) the number of pumps running and the balance of flow among the pumps, (2) the flow paths available and (3) the instrument uncertainty associated with the trip setpoint. At low flow conditions, the flow instrument uncertainty is significant. The setpoint for tripping the pump is flow less than 1000 gallons per minute for a period of 10 seconds. However, engineering has determined that due to instrument uncertainty, an actual flow of less than 2100 gallons per minute may cause a trip. With the variability of flow paths and pump configuration and the degree of instrument uncertainty, it is conservative to conclude that closure of the non-essential isolation valves could have resulted in the tripping of all running service water pumps.

The low flow trip logic does not lock out the pump following a trip and the pump can be manually restarted as soon as the low flow condition is resolved. Procedures are in place to monitor and take manual action to manage service water flow. If the non-essential service water isolation valves should close, training and procedural guidance would direct operators to promptly restore service water flow.

A probabilistic assessment that estimated the risk impact of a scenario involving single failure that can cause a loss of service water concluded that the scenario at Nine Mile Point Unit 2 has very low risk significance. The annual Core Damage Frequency associated with a single failure event that can cause a loss of service water was calculated to be 1.9E-07/yr.

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 design change was implemented to the control circuitry logic for the non-essential service water isolation valves correcting the single failure susceptibility.
2. Engineering will provide lessons learned information from the evaluation of the condition described in this report to the engineering staff, by June 30, 2000.
3. The Niagara Mohawk Power Corporation engineering design change and design change review process has been substantially enhanced since 1995 with the completion of group specific coaching sessions on design document checking and review, and significant enhancements to the project management process.

**LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION**

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 30.0 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	LER NUMBER (6)			PAGE (3) 05 OF 05
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
		00	- 05	- 01	

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

V. ADDITIONAL INFORMATION

A. Failed components: none

B. Previous similar events:

Licensee Event Reports 00-07, "Plant Outside Design Basis due to Single Failure Susceptibility of Service Water and Emergency Core Cooling Systems," describes a similar condition but the cause was attributed to original design deficiency. Since the modification that created the single failure susceptibility was installed in 1989 the corrective actions associated with Licensee Event Report 00-07 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