NIAGARA MOHAWK
GENERATION
BUSINESS GROUP

NINE MILE POINT NUCLEAR STATION/LAKE ROAD, P.O. BOX 63, LYCOMING, NEW YORK 13093

September 21, 1998
NMP1L 1361

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

RE: Docket No. 50-220
LER 98-16

Gentlemen:

In accordance with 10CFR50.73(a)(2)(i)(B) and 10CFR50.73(a)(2)(ii)(B), we are submitting LER 98-16, "Core Spray Pump Motor Bearing Cooling Flow Outside Design Basis Requirement."

Very truly yours,

Robert G. Smith

Robert G. Smith
Plant Manager - NMP1

RGS/GJG/sc

xc: Mr. H. J. Miller, Regional Administrator
Mr. B. S. Norris, Senior Resident Inspector
Records Management

NRC FORM 366 U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

APPROVED OMB NO. 3150-0104
EXPIRES:

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)	DOCKET NUMBER (2)	PAGE (3)
Nine Mile Point Unit 1	05000220	1 OF 6

TITLE (4)
Core Spray Pump Motor Bearing Cooling Flow Outside Design Basis 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)
08	20	98	98		016		00	09	21	98	N/A	
											N/A	

OPERATING MODE (9): 1

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

POWER LEVEL (10): 100

- ☐ 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	TELEPHONE NUMBER
P. Mazzaferro, Manager, Technical Support - NMP1	(315) 349-1019

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO EPIX		CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO EPIX

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
☐ YES *(If yes, complete EXPECTED SUBMISSION DATE)*	☒ NO				

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

On August 20, 1998, Niagara Mohawk Power Corporation (NMPC) determined that the Nine Mile Point Unit 1 (NMP1) Core Spray (CS) pump number 122 motor bearing cooling water flow had been less than the design required flow rate since 1990. In April 1996, thermography measurements for CS pump 122 indicated higher differential temperatures on cooling water lines than the other CS pumps. The significance of this condition was not recognized and corrected at that time, nor during subsequent thermography measurements in 1996 and 1997. In addition, when identified on July 15, 1998, an incorrect assessment of operability was made.

The cause of the initial inoperability was an error in maintenance reassembly that crimped the cooling coil and subsequent inadequate Post Maintenance Testing (PMT).

The cause for not recognizing the condition for several years was inadequate evaluation of test data and inadequate PMT. Additionally, NMPC personnel were not rigorous in the evaluation of the condition in July 1998 when there was a suspicion that flow in the cooling lines was restricted.

Planned and completed corrective actions include repair of the CS pump motor cooling coil, revising the PMT procedure, training of maintenance and operations personnel, and personnel counseling in accordance with NMPC's policies.

I. DESCRIPTION OF EVENT

On August 20, 1998, Niagara Mohawk Power Corporation (NMPC) determined that the Nine Mile Point Unit 1 (NMP1) Core Spray (CS) pump number 122 motor bearing cooling water flow had been less than the design required flow for an extended period of time. The cooling water flow was measured to be approximately 0.6 gpm, versus a design required flow of 4.5 gpm. Damage to the cooling coil most likely occurred in early 1990 as a result of maintenance activities to support a Core Spray System hydrostatic test. Therefore, CS pump 122 was considered to have been inoperable for 8 years.

In 1995, NMPC began using thermography equipment on a quarterly basis to measure CS pump and Containment Spray pump motor temperatures. In July 1995, thermography measurements indicated a higher differential temperature (motor bearing cooling water temperature outlet to inlet) on Containment Spray pump 111 as compared to the three other Containment Spray pumps. In April 1996, thermography measurements for CS 122 motor bearing cooling water differential temperature was higher than the other three core spray pumps but not as high as Containment Spray pump 111.

In the period from July 1995 to April 1997, several maintenance activities were undertaken to correct the high differential temperature condition of Containment Spray pump 111. The maintenance activities included an inspection of the in line strainer, adjusting the pressure control valve and blowing air through the cooling coil. On each occasion, Post Maintenance Test (PMT) data revealed no change in differential temperature across the cooler. No Deviation/Event Reports (DERs) were written.

CS pump 122 was assumed to be performing similar to Containment Spray pump 111 and, thus, corrective actions were not pursued. Thermography measurement in 1996 and 1997 continued to show differential temperatures on CS 122 higher than the other three CS pumps.

On July 15, 1998, NMPC maintenance personnel initiated DER 1-98-2185 after a review of the thermography data history. The required design flow rate for the CS pump motor cooler is 4.5 gpm, and the maintenance engineer believed that the differences in differential temperature may have been an indication of low cooling water flow. The Station Shift Supervisor (SSS) reviewed this DER and considered the pump operable based upon satisfactory quarterly testing (including pump motor bearing temperature), results from an extended pump run during 1997, no degrading trend in pump or motor performance and information provided by the IST Supervisor and Operations Manager. Subsequent review and evaluation by the station and engineering staff included information from a 1991 DER, on a related deviation, that appeared to indicate that the CS pump could perform its safety function with no cooling water flow. Therefore, an action plan for further testing was developed using ultrasonic flow measurements and scheduled for completion with the normal quarterly surveillance test schedule.

In response to questions that arose during an NRC Safety System Engineering Inspection (SSEI) on the Core Spray System (August 10-21, 1998) NMPC reviewed the source data which was used for the disposition of the 1991 DER. The 1991 data had been used to evaluate elevated cooling water inlet temperature. A portion

I. DESCRIPTION OF EVENT (Cont'd)

of the Equipment Qualification (EQ) data, which had been utilized in the 1991 DER disposition, appeared to justify zero motor cooler flow since the motor temperatures would remain acceptable due to air cooling. However, the data did not consider the heat load impact of the CS pump thrust requirements on the motor, and therefore, was inappropriate for use in the operability determination. The data did support operability of Containment Spray pump 111 with no cooling water to the pump motor bearing.

On August 20, 1998, NMPC performed testing on CS pump 122, and determined that the actual cooling water flow was approximately 0.6 gpm. At that time, CS pump 122 was declared inoperable, and Technical Specification 3.1.4 action b was entered. Maintenance personnel disassembled the pump motor and found a crimp in the end of the cooling coil. The crimp was repaired and CS pump 122 was returned to service on August 22, 1998.

A review of maintenance and test records for CS pump 122 indicated that maintenance personnel worked on the CS pump motor cooler in 1990 and 1994. In 1994, cooling water piping upstream of the cooling coils was replaced and the cooling coils were not likely disconnected. Therefore, it is likely that the cooler was crimped in 1990 when the piping was reinstalled following a hydrostatic test. NMPC assumes that the cooler flow has been degraded since 1990.

II. CAUSE OF EVENT

The cause of the initial failure and start of the inoperability was due to errors in maintenance reassembly and subsequent inadequate PMT of the CS pump 122 motor cooler. The cause of the crimp in the cooling coil has been determined to be knowledge deficiency. To tighten the end coupling of the cooling water piping, a wrench must be used on each side of the coupling. It appears that the maintenance personnel who performed the disassembly and reassembly of the coupling were not aware of this requirement. An adequate PMT was not performed to verify sufficient cooling water flow following reassembly.

The degraded condition existed for several years because of inadequate evaluation and inadequate PMT. Station personnel erroneously concluded that the nature of the maintenance: inspecting an in line strainer, adjusting a pressure control valve and blowing air through the cooling coil, demonstrated clear lines and therefore, it was concluded that the differential temperature condition must be baseline. The same thought process was applied to CS 122 without actually undertaking maintenance. The PMT following the above maintenance was inadequate. The thermography data after these activities was similar to the previous data and it should have been interpreted as indicating that the condition had not been corrected. A DER should have been generated to properly assess operability and provide a more thorough evaluation. Additionally there was temperature data available prior to 1988 that indicated unimpeded cooling water flow through the

II. CAUSE OF EVENT (Cont'd)

Core Spray pump motor bearing cooler, but this data was not utilized to assess the significance of the thermography data. Personnel evaluating cooling water flow concerns used only the data obtained by the new thermography techniques. Thermography data was used almost exclusively by the Inservice Testing (IST) Group. Other departments were not sufficiently involved in the identification and resolution of issues.

The cause of the incorrect initial operability determination in July 1998 was that the personnel involved were not rigorous enough in their evaluations. During subsequent review and evaluation by NMPC staff, insufficient rigor was applied and design source documents were not researched until August 20, 1998. The staff relied, inappropriately, on a disposition of the 1991 DER that was for a related deviation, that was not appropriate for evaluating cooling water flow. The staff interpreted the technical information as being applicable to both containment and core spray pumps, while due to a different pump thrust requirement the test data only supported the evaluation applicable to the containment spray pumps.

III. ANALYSIS OF EVENT

This event is reportable in accordance with 10CFR50.73(a)(2)(i)(B) "Any operation or condition prohibited by the plant's Technical Specifications" and 10CFR50.73(a)(2)(ii) "Any event or condition that resulted in the condition of the nuclear power plant, including its principle 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".

Section XV.2.4.4 of the Updated Final Safety Analysis Report (UFSAR) indicates that only one core spray pump injecting through one core spray sparger is sufficient to maintain 10CFR50.46 limits. In the worse case scenario that CS pump 122 would have been the only operating pump, it would have functioned for hours (based upon an engineering evaluation) into the accident. During this time frame, the peak clad temperature would have been reached and reversed without significantly damaging the fuel. Following a postulated failure of CS pump 122 due to motor bearing damage, operators would have maintained adequate core cooling via other injection sources, including Containment Spray Raw Water intertie to Core Spray, as directed by the Emergency Operating Procedures (EOPs). Therefore, there would not have been any threat to the health and safety of the general public or plant personnel.

IV. CORRECTIVE ACTIONS

1. Core Spray pump 122 was repaired and retested satisfactorily.
2. Cooling water flow for the remaining CS pumps has been measured with acceptable results.

IV. CORRECTIVE ACTIONS (Cont'd)

3. The applicable PMT procedure will be revised by November 1, 1998 to enhance the guidance on PMTs to verify motor cooler flow if connections are disturbed.

4. The design of the pump cooler and actions to prevent damage were reviewed with the Electrical and Mechanical Maintenance departments by the General Supervisor, Mechanical and Electrical Maintenance.

5. The maintenance procedure used for work on the Core Spray and Containment Spray pumps and motors will be revised to incorporate information on the cooling water lines by November 1, 1998.

6. The Plant Manager has reinforced the expectations for rigorous research for verifying equipment operability with respect to design and licensing basis information with members of the Operations, Maintenance, Technical and Engineering staff.

7. Training, utilizing the case study technique, will be provided to appropriate NMP1 Operations Support, Maintenance, Technical Support and Engineering personnel to further ingrain the necessity of rigorous evaluations into daily work habits and proper PMT to ensure operability by November 15, 1998.

8. The IST Supervisor has been coached to initiate DERs based upon trend data in order to alert Plant Management of potential problems, and to involve other departments in the evaluation and resolution of problems. Plant Management and engineering personnel will, therefore, become more involved to provide more effective and timely resolution of these problems. Additionally, all past data is evaluated when rendering decisions on operability.

9. The Operations Manager has reinforced actions required of the SSS for operability determinations at the most recent SSS/Operations Manager bi-weekly meeting. A case study of this event will be covered with all SROs by November 15, 1998. This LER and associated root cause will be incorporated into the SSS Qualification Guide by November 15, 1998.

V. ADDITIONAL INFORMATION

A. Failed components: none.

B. Previous similar events: none.

V. ADDITIONAL INFORMATION (Cont'd)

C. Identification of components referred to in this LER:

COMPONENT	IEEE 803 FUNCTION	IEEE 805 SYSTEM ID
Core Spray Pumps 111, 121, 112, 122	P	BM
Containment Spray Pump 111	P	BO