NRC FORM 366 U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104
EXPIRES:

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)	DOCKET NUMBER (2)	PAGE (3)
Nine Mile Point Unit 2	05000410	1 OF 4

TITLE (4)
Potential Standby Gas Treatment System Inoperability Due To Original Design Deficiency

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)
06	24	98	98		023		00	07	24	98	N/A	05000
											N/A	05000

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)(2)(v)	☒ 50.73(a)(2)(i)	☐ 50.73(a)(2)(viii)
	☐ 20.2203(a)(1)	☐ 20.2203(a)(3)(i)	☒ 50.73(a)(2)(ii)	☐ 50.73(a)(2)(x)
	☐ 20.2203(a)(2)(i)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(iii)	☐ 73.71
	☐ 20.2203(a)(2)(ii)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(iv)	☐ OTHER
	☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(1)	☐ 50.73(a)(2)(v)	*(Specify in Abstract below and in Text, NRC Form 366A)*
	☐ 20.2203(a)(2)(iv)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(vii)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
R.J. Dean, Engineering Manager - NMP2	(315) 349-4240

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

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

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 June 24, 1998, Nine Mile Point Unit 2 (NMP2) personnel determined that the secondary containment emergency recirculation unit coolers (UCs) 2HVR*UC413A and B may have been incapable of performing their design function. The UCs are designed for a staggered start and single UC operation. However, due to the lag in the response time of the flow switches combined with allowances for uncertainty for timer relays, the UC fans could have operated in parallel, contrary to design. Both UCs running in parallel could have caused operation on their performance curve in the unstable zone. This could then have resulted in a trip of one UC on low flow, and the loss of the second UC, assuming a postulated single failure in its control circuitry. The plant was in a shutdown condition in refueling outage six (RFO6) at the time of discovery.

The root cause of this event was that the original architect/engineer did not perform an adequate analysis of the original design in that inherent instrument response time lags and uncertainties were not considered. A contributing cause was that the original architect/engineer did not perform an adequate independent safety review in that the original failure modes and effects analysis did not adequately address single failure scenarios.

A modification to the system was implemented prior to startup from RFO6. NMP2 will evaluate other systems for similar instrumentation problems.

I. DESCRIPTION OF EVENT

On June 24, 1998, Nine Mile Point Unit 2 (NMP2) personnel determined that the secondary containment emergency recirculation unit coolers (UCs) 2HVR*UC413A and B may have been incapable of performing their design function. The UCs are designed for a staggered start and single UC operation. However, due to the lag in the response time of the flow switches combined with allowances for uncertainty for timer relays, the UC fans could have operated in parallel, contrary to design. Both UCs running in parallel could have caused operation on their performance curve in the unstable zone. This could then have resulted in a trip of one UC on low flow, and the loss of the second UC, assuming a postulated single failure in its control circuitry. The plant was in a shutdown condition in refueling outage six (RFO6) at the time of discovery.

When a UC trips on low flow, it is locked out and will not automatically restart until the logic is manually reset. Thus, with one UC operating and the other UC tripped and locked out, a single failure of the control circuitry of the operating train could have prevented adequate cooling of the secondary containment and thus impacted the ability of the Standby Gas Treatment (GTS) System to perform its design function without manual operator action.

This deficiency was identified as a result of a corrective action for a similar problem with the control room air conditioning units (ACUs) (see LER 98-17, dated July 2, 1998). The corrective action involved evaluating other safety-related ventilation systems for similar design deficiencies.

A review of previous corrective action documents in the Deviation/Event Report (DER) database indicated that various DERs recorded parallel operation and tripping of 2HVR*UC413A and B fans. A 1992 DER had previously determined that the potential loss of both UCs was acceptable. However, the secondary containment drawdown requirements were later revised and thus, invalidated the conclusions of the 1992 DER. A disposition to a subsequent DER in 1995 accepted the current design based on the same conclusions drawn in 1992. A 1996 DER again identified the same deficiency. A design change was proposed, but the deficiency was not recognized as an operability concern and therefore, was not resolved in a timely manner. These were missed opportunities to resolve the problem earlier.

II. CAUSE OF EVENT

The root cause of this event was that the original architect/engineer did not perform an adequate analysis of the original design in that inherent instrument response time lags and uncertainties were not considered. A contributing cause was that the original architect/engineer did not perform an adequate independent safety review in that the original failure modes and effects analysis did not adequately address single failure scenarios. Although not a direct contributor to the original design deficiency, inadequate evaluation by NMP2 personnel of events recorded in previous DERs resulted in the problem not being resolved earlier.

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 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." Loss of the degraded unit cooler at the start of a postulated design basis Loss of Coolant Accident (LOCA) or other accident conditions requiring GTS operation, could have resulted in GTS not meeting its design basis of drawing the secondary containment pressure to less than or equal to a negative 0.25 inches water gauge within the stipulated drawdown time of one hour.

Alarms would have been received in the control room on a UC automatic trip, UC failure to start and UC discharge air high temperature. These alarms would have alerted operators of UC failure or problems. The ability to reset and manually start the UCs is provided in the control room, and thus, could have limited the impact of loss of cooling to a relatively short period. In addition, both GTS trains are 100 percent capacity each and both trains start on an initiation signal per design. The combination of both trains operating until one of the trains was manually secured, would have offset to some degree, if not completely, the loss of cooling that would have occurred for a short period of time. Although no analysis is available, it is reasonable to assume that under actual accident conditions, both GTS trains operating together would have established some negative pressure in the secondary containment, if not the required negative 0.25 inches water gauge within the required drawdown period. Based on the above, the release of unfiltered airborne radioactivity from the secondary containment would have been minimal and thus the resultant doses would likely have been less than 10CFR50, Appendix A, GDC 19 or 10CFR100 acceptance criteria. After the operators had restored cooling by manually starting one of the UCs, the required negative pressure of 0.25 inches water gauge or lower would have been established, thus restoring design conditions.

In the event of a LOCA, Niagara Mohawk Power Corporation (NMPC) would have entered the Emergency Plan and would have staffed the emergency response facilities. Additional resources would have been available to assist in evaluating plant conditions, including the radiological and environmental conditions of the secondary containment and potential release paths outside containment. Actions could have been taken as needed, to ensure acceptable conditions were maintained or compensated for. Additionally, in a realistic LOCA-Loss of Offsite Power (LOOP) scenario, multiple Emergency Core Cooling Systems (ECCS) would have been available to minimize the potential for significant core damage. As a result, radiological consequences would have been expected to be significantly lower than the design bases assumptions.

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 modification was implemented prior to startup from RFO6 to correct the design deficiency. Design activities were coordinated between Electrical and Mechanical Design groups.

2. Other safety-related ventilation systems were evaluated for similar design deficiencies involving parallel fan operation and no others were identified.

3. Other systems where similar types of relays and flow switches are used will be evaluated for similar deficiencies. This will be completed by December 31, 1998.

4. The need to evaluate all aspects of a deficient condition, including interaction between electrical and mechanical components and potential design deficiencies will be stressed in Engineering and Technical Support department staff meetings by September 30, 1998.

5. Engineering will stress in staff meetings the inappropriate aspects of using uncontrolled design information (e.g., DER dispositions, etc.). This will be completed by September 30, 1998.

V. ADDITIONAL INFORMATION

A. Failed components: none

B. Previous similar events: LER 98-17, "Control Room Ventilation System Inoperable Due To Original Design Deficiency," identified a design problem with the control room ACUs. Corrective actions from LER 98-17 regarding reviews of safety-related systems and revisions to design procedures are ongoing. The deficiency described in this LER was identified as a result of the corrective actions from LER 98-17.

C. Identification of components referred to in this LER:

COMPONENT	IEEE 803 FUNCTION	IEEE 805 SYSTEM ID
Standby Gas Treatment System	N/A	BH
Unit Cooler	FCU	BH