

CATEGORY 2

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 9807140149 DOC. DATE: 98/07/02 NOTARIZED: NO DOCKET #
 FACIL: 50-410 Nine Mile Point Nuclear Station, Unit 2, Niagara Moha 05000410
 AUTH. NAME AUTHOR AFFILIATION
 DEAN, R. J. Niagara Mohawk Power Corp.
 DAHLBERG, K. A. Niagara Mohawk Power Corp.
 RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 98-017-00: on 980602, control room ventilation sys was declared inoperable. Caused by original design deficiency. Mod designed, tested & implemented prior to startup from RF06 to correct design deficiency. W/980702 ltr.

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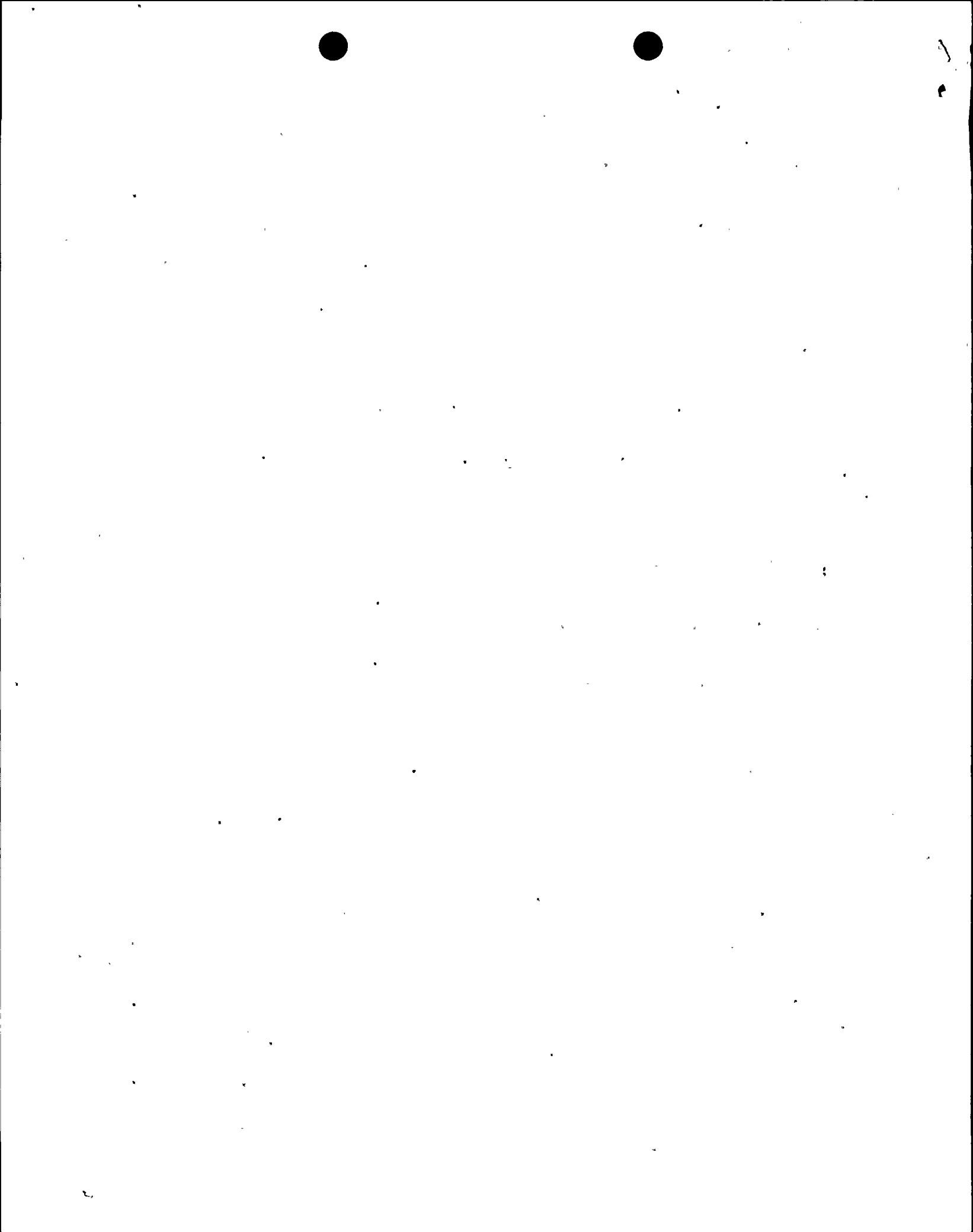
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NIAGARA MOHAWK

GENERATION
BUSINESS GROUP

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

July 2, 1998
NMP2L 1799

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

RE: Docket No. 50-410
LER 98-17

Gentlemen:

In accordance with 10CFR50.73(a)(2)(v)(D) and 10CFR50.73(a)(2)(ii)(B), we are submitting LER 98-17, "Control Room Ventilation System Inoperable Due To Original Design Deficiency."

Very truly yours,

Kim A. Dahlberg
Plant Manager - NMP2

KAD/TWP/sc
Attachment

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

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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 20535, 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) 1 OF 5 |
|---|-------------------------------|--------------------|

TITLE (4)
Control Room Ventilation System Inoperable 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 | 02 | 98 | 98 | 017 | 00 | 07 | 02 | 98 | N/A | 05000 | |
| | | | | | | | | | N/A | 05000 | |

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)(1) <input type="checkbox"/> 20.2203(a)(2)(i) <input type="checkbox"/> 20.2203(a)(2)(ii) <input type="checkbox"/> 20.2203(a)(2)(iii) <input type="checkbox"/> 20.2203(a)(2)(iv) | <input type="checkbox"/> 20.2203(a)(2)(v) <input type="checkbox"/> 20.2203(a)(3)(i) <input type="checkbox"/> 20.2203(a)(3)(ii) <input type="checkbox"/> 20.2203(a)(4) <input type="checkbox"/> 50.36(c)(1) <input type="checkbox"/> 50.36(c)(2) | <input type="checkbox"/> 50.73(a)(2)(i) <input checked="" type="checkbox"/> 50.73(a)(2)(ii) <input type="checkbox"/> 50.73(a)(2)(iii) <input type="checkbox"/> 50.73(a)(2)(iv) <input checked="" type="checkbox"/> 50.73(a)(2)(v) <input type="checkbox"/> 50.73(a)(2)(vii) | <input type="checkbox"/> 50.73(a)(2)(viii) <input type="checkbox"/> 50.73(a)(2)(x) <input type="checkbox"/> 73.71 <input type="checkbox"/> OTHER <small>(Specify In Abstract below and In Text, NRC Form 366A)</small> |
|-------------------------|---|--|--|--|

LICENSEE CONTACT FOR THIS LER (12)

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

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

| CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO NFRDS | CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO NFRDS |
|-------|--------|-----------|--------------|---------------------|-------|--------|-----------|--------------|---------------------|
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| | | | | |
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| SUPPLEMENTAL REPORT EXPECTED (14) | EXPECTED SUBMISSION DATE (15) | MONTH | DAY | YEAR |
| <input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO | | | | |

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

On June 2, 1998, Nine Mile Point Unit 2 (NMP2) personnel determined that the safety-related control room air conditioning units (ACUs) could be incapable of performing their design function of cooling safety-related equipment and providing control room habitability under certain conditions. The circuit design allowed for both ACUs to start upon a loss of offsite power and subsequent restoration of power. Investigation determined that the ACU fans were not designed for parallel operation with the current ventilation ducting size. Both ACUs running in parallel could cause operation on their performance curve in the unstable zone. This could then result in a trip of one ACU on low flow, and the loss of the second ACU, assuming a postulated single failure in the control circuitry.

The root cause of this event was that the original architect/engineer did not perform an adequate verification of the original design. Contributing to the cause was inadequate independent review by the architect/engineer. No evaluation addressed the interaction of the mechanical and electrical components.

A modification to the system was designed, tested and implemented prior to startup from the current refueling outage. Other safety-related ventilation systems were reviewed for similar design deficiencies. Other safety-related systems which share common piping and ducting will be evaluated. Design procedures will be revised to include inter-disciplinary reviews as required.



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 (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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| FACILITY NAME (1) Nine Mile Point Unit 2 | DOCKET NUMBER (2) 05000410 | LER NUMBER (6) | | | PAGE (3) 02 OF 05 |
| | | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | |
| | | 98 | - 17 | - 00 | |

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

I. DESCRIPTION OF EVENT

On June 2, 1998, Nine Mile Point Unit 2 (NMP2) personnel determined that the safety-related control room air conditioning units (ACU1A and ACU1B) could be incapable of performing their design function of cooling safety-related equipment and providing control room habitability following a Loss of Coolant Accident (LOCA) in conjunction with a Loss of Offsite Power (LOOP). The circuit design allowed for both ACUs to start upon a LOOP and subsequent restoration of power. Investigation determined that the ACU fans were not designed for parallel operation with the current ventilation ducting size. Both ACUs running in parallel could cause operation on their performance curve in the unstable zone. This could then result in a trip of one ACU on low flow, and the loss of the second ACU, assuming a postulated single failure in the control circuitry. The plant was shutdown in refueling outage six (RFO6) at the time of discovery.

While performing surveillance testing of the Division I Emergency-Diesel Generator (EDG), a Division I LOOP was simulated as part of the test. The operating ACU1A tripped and the standby ACU1B started as expected. When power was restored to Division I shortly after the standby ACU started, the flow switch for ACU1B still sensed a low flow condition in the 'B' train and the control circuitry restarted ACU1A. This resulted in both ACUs operating at the same time until ACU1B tripped on low flow due to operation in the unstable zone. It was determined that other scenarios could also result in the simultaneous operation of both units.

When an ACU trips on low flow, it is locked out and will not automatically restart until the logic is manually reset. Thus, with one ACU operating and the other ACU tripped and locked out, a single failure of the control circuitry of the operating train would prevent the flow of conditioned air to the control room. This would render the ventilation system for the control room envelope inoperable, since adequate equipment cooling and personnel habitability would not be maintained.

Evaluations have revealed that although the logic permitted parallel operation of both ACU1A and ACU1B, the associated ACU fans were neither intended nor designed for such operation. Mechanical system calculations and fan selection were based on single fan operation only. In addition, the associated radiological calculations and accident analyses are based on single fan operation of each of the three sets of divisional fans that make up the control room and relay room ventilation systems. This includes the fans for ACUs 1A and 1B, control room special filter trains FN2A and FN2B, and the relay room ACUs 2A and 2B. Technical Specification (TS) Section 3/4.7.3 criteria for the control room special filter trains are also based on single train operation. The control logic was designed to permit simultaneous operation of both trains to meet single failure criteria. This condition, when combined with other system characteristics for single fan operation, created the potential for the loss of both trains.



LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

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| Nine Mile Point Unit 2 | 05000410 | 98 | 17 | 00 | 03 OF 05 | |

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

I. DESCRIPTION OF EVENT (Cont'd)

Although the potential for this condition has existed since original startup, the train lockout and single failure problem described in this LER had not been previously noted. A heightened awareness of the need to identify discrepancies and the questioning attitude of the personnel involved with this testing revealed the full extent of the design discrepancies.

II. CAUSE OF EVENT

The root cause of this event was that the original architect/engineer did not perform an adequate verification of the original design. Mechanical design, equipment and TS criteria were based on single train operation. However, the control logic for the systems permitted simultaneous operation of both trains, which could have resulted in the loss of both trains. Contributing to the cause was inadequate independent review by the architect/engineer. No evaluation addressed the interaction of the mechanical and electrical components. An evaluation for two fan operation could have identified the described deficiency.

III. ANALYSIS OF EVENT

This event is reportable in accordance with 10CFR50.73(a)(2)(v), "Any event or condition that alone could have prevented the fulfillment of the safety function of structures or systems that are needed to: (D) Mitigate the consequences of an accident." In addition, this event is reportable in accordance with 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." If both ACU trains tripped as described above, 10CFR Part 20 and General Design Criteria (GDC) 19 radiological dose limits could have been exceeded, if no additional actions were taken.

The Control Building Heating, Ventilation and Air Conditioning System (HVC) provides ventilation and conditioned air, as well as positive pressurization and filtration of radioactive contamination for the control room envelope. The ACUs assist in providing the positive pressurization needed to meet the TS 4.7.3 special filter train criteria of positive 1/8 inch water gauge (WG) at an outside air intake flow rate of less than or equal to 1500 cubic feet per minute (cfm). Positive pressurization prevents infiltration of radioactive contamination or other harmful gasses into the control room environment. Test data indicates that one special filter train running without any additional ACU fans would provide approximately 0.05 to 0.1 inches WG positive pressure. Although one special filter train alone would not provide sufficient pressurization to meet TS criteria, the positive pressure achieved would have minimized any potential infiltration.



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

III. ANALYSIS OF EVENT (Cont'd)

It is estimated that the control room maximum design temperature of 90 degrees Fahrenheit would be reached in approximately sixteen minutes without adequate cooling. Alarms and indications for the tripping of the respective fans as well as controls to manually reset and restart the fans are provided in the control room. Thus, the operators could have easily restored any tripped fans to service. Temperature alarms are also provided such that if temperatures started to rise due to a tripped fan, the operators would have been able to recognize and correct the situation.

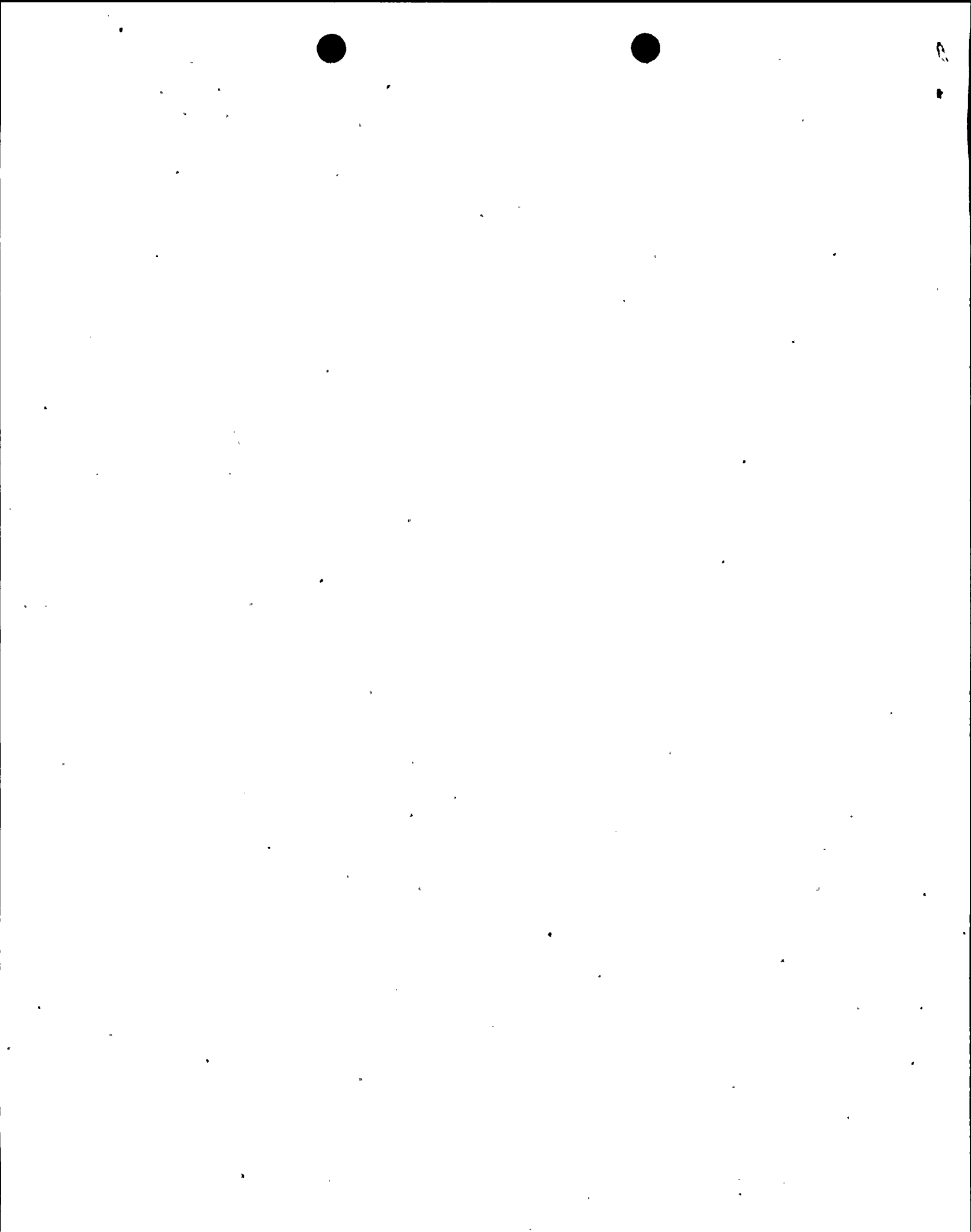
In the event of a LOCA, Niagara Mohawk Power Corporation (NMPC) would have entered the Emergency Plan and would have staffed the emergency response facilities. Additional resources would have been available to assist in evaluating plant conditions, including the radiological and environmental conditions of the control room envelope. Actions could have been taken as needed, to ensure acceptable conditions were maintained or compensated for.

Additionally, in a realistic LOCA-LOOP scenario, multiple Emergency Core Cooling Systems (ECCS) are available to minimize the potential for significant core damage. As a result, radiological consequences are 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 designed, tested and implemented prior to startup from RFO6 to correct the design deficiency. Inter-disciplinary reviews were utilized and a detailed failure modes and effects analysis was performed.
2. Other safety-related ventilation systems were evaluated for similar design discrepancies. A discrepancy was found with one set of unit coolers and was corrected prior to startup.
3. Other safety-related systems which share common piping and ducting that could create similar problems will be evaluated by October 30, 1998.
4. NMPC design practices rely on design inputs for transfer of information and do not require inter-disciplinary review of logic diagrams. Design procedures will be revised to include inter-disciplinary review of system logic diagrams. This will be completed by September 30, 1998.



LICENSEE EVENT REPORT (LER)
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| FACILITY NAME (1) Nine Mile Point Unit 2 | DOCKET NUMBER (2) 05000410 | LER NUMBER (6) | | | PAGE (3) 05 OF 05 |
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TEXT (If more space is required, use additional NRC Form 366A's) (17)

V. **ADDITIONAL INFORMATION**

- A. Failed components: none
- B. Previous similar events: none
- C. Identification of components referred to in this LER:

| COMPONENT | IEEE 803 FUNCTION | IEEE 805 SYSTEM ID |
|---|-------------------|--------------------|
| Control Building Heating, Ventilating and Air Conditioning System | N/A | VI |
| Air Handling Unit | AHU | VI |
| Fan | FAN | VI |

