

CATEGORY 1

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9908040113 DOC.DATE: 99/07/26 NOTARIZED: NO DOCKET #
FACIL:50-410 Nine Mile Point Nuclear Station, Unit 2, Niagara Moha 05000410
AUTH.NAME AUTHOR AFFILIATION
BOSNIC,D; Niagara Mohawk Power Corp.
PALEOLOGOS,N. Niagara Mohawk Power Corp.
RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 99-010-00:on 990624,NMP,Unit 2 automatically tripped from 100% power.Caused by failure of feedwater master controller.Operators performed scram recovery actions & placed plant in stable condition.With 990726 ltr.

DISTRIBUTION CODE: IE22T COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 8
TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

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Niagara Mohawk

July 26, 1999
NMP2L 1880

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

RE: Docket No. 50-410
LER 99-10

Gentlemen:

In accordance with 10 CFR 50.73(a)(2)(iv) and 10 CFR 50.73(a)(2)(v), we are submitting Licensee Event Report 99-10, "Unit 2 Reactor Trip due to a Feedwater Master Controller Failure."

Very truly yours,



Nick Paleologos
Plant Manager - NMP2

NCP/CES/kap
Attachment

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

030121

9908040113 990726
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11
IEL-2



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 07 |
|---|-------------------------------|----------------------|

TITLE (4)

Unit 2 Reactor Trip due to a Feedwater Master Controller Failure

| 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 | 99 | 99 | 010 | 00 | 07 | 26 | 99 | 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% | <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 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 checked="" 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 checked="" type="checkbox"/> 50.73(a)(2)(v) | (Specify in Abstract below and in Text, NRC Form 366A) |
| | <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 Don Bosnic - Operations Manager | TELEPHONE NUMBER (315) 349-7952 |
|---|------------------------------------|

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 |
|-------|--------|-----------|--------------|--------------------|-------|--------|-----------|--------------|--------------------|
| X | SJ | ECBD | B045 | Yes | X | EL | RLY | A500 | Yes |

SUPPLEMENTAL REPORT EXPECTED (14)

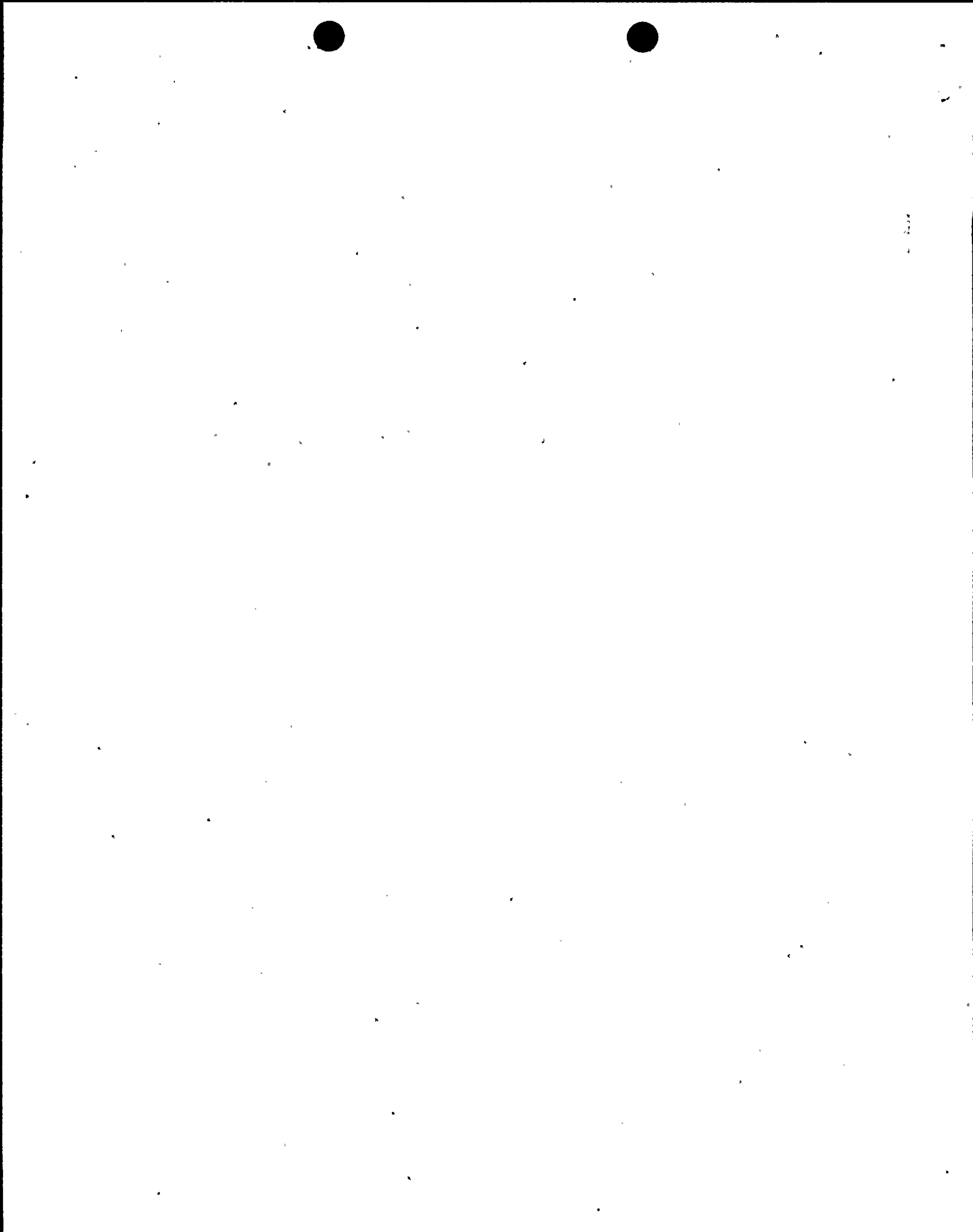
| | | | | | |
|--|--|-------------------------------|-------|-----|------|
| <input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE) | <input checked="" type="checkbox"/> NO | EXPECTED SUBMISSION DATE (15) | MONTH | DAY | YEAR |
|--|--|-------------------------------|-------|-----|------|

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

On June 24, 1999, at 3:41 p.m., Nine Mile Point Unit 2 automatically tripped from 100 percent power. The cause of the transient was a low reactor water level due to a failure of the feedwater master controller. Additionally, there was an unexpected partial loss of offsite power (Line 5) and the reactor core isolation cooling system failed to perform correctly in the automatic mode of operation.

The cause of the reactor trip was failure of a manual-tracking card in the feedwater master controller due to aging. The cause of the loss of Line 5 was failure of one of the main generator output breaker individual fault relays. The primary cause of the reactor core isolation cooling system flow oscillations was air found in the flow transmitter, with a contributing cause of a miscalibrated flow controller.

Corrective actions included: stabilizing the plant, replacing the feedwater manual-tracking card, replacing the main generator output breaker individual fault relay, calibrating the flow controller, and venting the reactor core isolation cooling system transmitter.



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-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.

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| Nine Mile Point Unit 2 | 05000410 | 99 | - | 010 | - 00 | 02 OF 07 |

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

I. DESCRIPTION OF EVENT

On June 24, 1999, at 3:41 p.m., Nine Mile Point Unit 2 automatically tripped from 100 percent power. The cause of the transient was a low reactor water level due to a failure of the feedwater master controller.

Maintenance technicians were preparing to flush the feedwater flow instrument lines in accordance with a work order package. To support the work order package, operators prepared to shift the feedwater level control system from three element to single element control by shifting the master controller to manual. Immediately after this step was performed, the controller output dropped to zero and the feedwater level control valves started to close. The licensed operator noted that the level control valves were closing and attempted to manually open the valves. After verifying the valves did not open, feedwater flow was low, and reactor water level was decreasing, the operator returned the feedwater master controller to automatic. The valves began reopening to slow the reactor water level decrease. Seconds later, a reactor trip signal at Level III (159.3 inches) was received. Reactor water level started to increase until an offsite power source (Line 5) was de-energized resulting in tripping the feedwater and condensate booster pumps supplied from this electrical source. The subsequent condensate transient caused the remaining condensate booster and feedwater pumps to trip on low suction pressure.

The reactor trip resulted in a main turbine trip on reverse power as designed. The turbine trip caused a fast transfer of both 13.8 kV buses to offsite power sources. The fast transfer was completed with one 13.8 kV bus transferring to Line 5 and the other transferring to Line 6. Shortly, after the fast transfer of the 13.8 kV buses was completed, Line 5 breakers tripped unexpectedly. Division I and III lost electrical power and, as designed, both diesel generators automatically started and energized their respective buses. Prior to the event, part of the electrical system was in an off-normal condition to support planned circuit breaker maintenance. The off-normal electrical line-up resulted in the loss of power to all of the turbine electrohydraulic control system pumps and the offgas system. With the loss of electrohydraulic control system pumps and the offgas system, the condenser was eventually unavailable.

During the reactor trip, reactor water level reached a minimum of 115 inches (129.4 inches above the top of active fuel) and a maximum of 205 inches. Primary Containment Isolation Groups 4 (residual heat removal radwaste discharge and sampling valves) and 5 (residual heat removal shutdown cooling valves and other system valves) isolated due to reactor water level falling below the isolation setpoint of 159.3 (Level III). The Primary Containment Isolation Groups 4 and 5 valves were in their normal, closed position; therefore, the valves did not change position.

The operators initiated the reactor core isolation cooling system to maintain reactor vessel level following the loss of the feedwater and condensate booster pumps, and noted flow oscillations while the flow controller was in automatic. The operators placed the flow controller in manual and the oscillations stopped. Operators then used the reactor core isolation cooling system to restore and maintain reactor water level. Oscillations



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

I. DESCRIPTION OF EVENT (Cont'd)

were observed during each of three occasions in automatic and stopped with the flow controller in manual.

The maximum reactor pressure recorded during the transient was 1019 psig. The operators closed the outboard main steam isolation valves to minimize the cooldown rate and to isolate the condenser, which was losing vacuum as a result of the loss of electrical power to the offgas system. The main steam system safety relief valves were manually cycled to control reactor pressure by directing steam to the suppression pool.

II. CAUSE OF EVENT

The cause of the reactor trip was determined to be a failure of the feedwater master controller. Specifically, the manual-tracking card failed to provide an output signal when the feedwater master controller was switched from automatic to manual mode of operation. The manual-tracking card functions to track the feedwater level control valve in the automatic mode of operation and to maintain valve position in the manual mode of operation. The manual-tracking card failed due to aging.

Line 5 was de-energized because the backup protection scheme for the main generator output breakers tripped open all 345 kV breakers adjacent to Breaker R-230. This de-energized the 345 kV bus that powered Line 5. The cause of the backup protection scheme initiating was the failure of one individual fault relay on the main generator output breakers.

The cause of the reactor core isolation cooling system failure to operate in automatic control was determined to be air found in the flow transmitter sensing lines. The air had accumulated in the flow transmitter from the process stream. A contributing cause was a miscalibrated flow controller. The derivative setting on the flow controller was improperly set.

III. ANALYSIS OF EVENT

This event is considered reportable under 10 CFR 50.73(a)(2)(iv) and 10 CFR 50.73(a)(2)(v). 10 CFR 50.73(a)(2)(iv) requires a report when any event or condition resulted in manual or automatic actuation of any engineered safety features, including the reactor protection system. 10 CFR 50.73(a)(2)(v) requires a report when any event could have prevented the fulfillment of the safety function of a system to remove residual heat.



LICENSEE EVENT REPORT (LER)
TEXT CONTINUATIONESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION
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TEXT (If more space is required, use additional NRC Form 366A's) (17)

III. ANALYSIS OF EVENT (Cont'd)

The reactor trip was the design response to a low reactor water level. All control rods fully inserted in response to the reactor trip signal. The operators manually initiated the reactor core isolation cooling system. Although automatic control of the reactor core isolation cooling system did not function properly, operators were able to use the manual control to maintain reactor water level. The high pressure core spray system was operable at the time of the event and is designed to initiate on a Level II signal (108.8 inches). The automatic depressurization system and the low pressure emergency core cooling systems were operable throughout this event.

The conditional core damage probability for this event has been analyzed using Nine Mile Point Unit 2 probabilistic risk assessment model. The analysis included de-energizing Line 5 and the unavailability of the feedwater system and the condenser. The analysis does recognize the potential for recovery of the three systems. The analysis considered the reactor core isolation cooling system available because the system functioned to maintain reactor water level. Based on the analysis, the conditional core damage probability is 3.0E-06.

The plant response was in accordance with the Updated Safety Analysis Report transient analysis for a loss of feedwater flow, with the exception of reactor core isolation cooling system flow oscillations in the automatic mode of operation.

Based on the above analysis, there were no adverse safety consequences as a result of this event. The reactor trip posed no threat to the health and safety of the general public or plant personnel.

IV. CORRECTIVE ACTIONS

- Operators performed scram recovery actions, and placed the plant in a stable condition.
- Maintenance personnel replaced the feedwater manual-tracking card with a new card.
- Based on discussions with the vendor and the industry, Technical Support personnel will develop recommendations on improving the reliability of the feedwater manual-tracking card by August 31, 1999.
- Maintenance personnel replaced the faulty relay on the main generator output breaker.
- Nine Mile Point Unit 2 will perform a failure analysis of the failed relay and develop additional corrective actions based on the results of this evaluation, if necessary, by November 1, 1999.



LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

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IV. CORRECTIVE ACTIONS (Cont'd)

6. Maintenance personnel bench calibrated the reactor core isolation cooling system flow controller, checked the flow transmitter for noise and grounds, vented transmitter sensing lines, and verified dynamic tuning of the flow controller.
7. Procedure N2-OSP-ICS-R002, "RCIC [Reactor Core Isolation Cooling] System flow Test," was revised to include criteria for early prediction of flow/pressure oscillations and to incorporate the use of the plant computer system parameters for trending data against a baseline. The revised procedure was performed during plant startup.
8. Procedure N2-OSP-ICS-Q@002, "RCIC [Reactor Core Isolation Cooling] Pump and Valve Operability Test and System Integrity Test and ASME [American Society of Mechanical Engineers] XI Functional Test," was revised to include a step to detect precursors to flow oscillations and to include a step to have maintenance perform system tuning if required. The pump and flow controller portions of the revised procedure were performed during plant startup.
9. Maintenance personnel are reviewing, verifying, and improving procedures to ensure proper performance and documentation of all required reactor core isolation cooling system tuning and calibration activities by August 31, 1999.
10. Trending of transmitter sensing line venting results is being used to determine the frequency required to ensure the reactor core isolation cooling system flow transmitter is free of air.
11. An electronic dampening circuit modification for the reactor core isolation cooling flow transmitter will be completed by the end of Refueling Outage 7.

V. ADDITIONAL INFORMATION

A. Failed components:

- The feedwater manual-tracking card failed on June 24, 1999, which was the cause of the transient.
- An individual fault-relay on the main generator output breaker failed on June 24, 1999, which was the cause of de-energizing Line 5.



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V. ADDITIONAL INFORMATION (Cont'd)

B. Previous similar events:

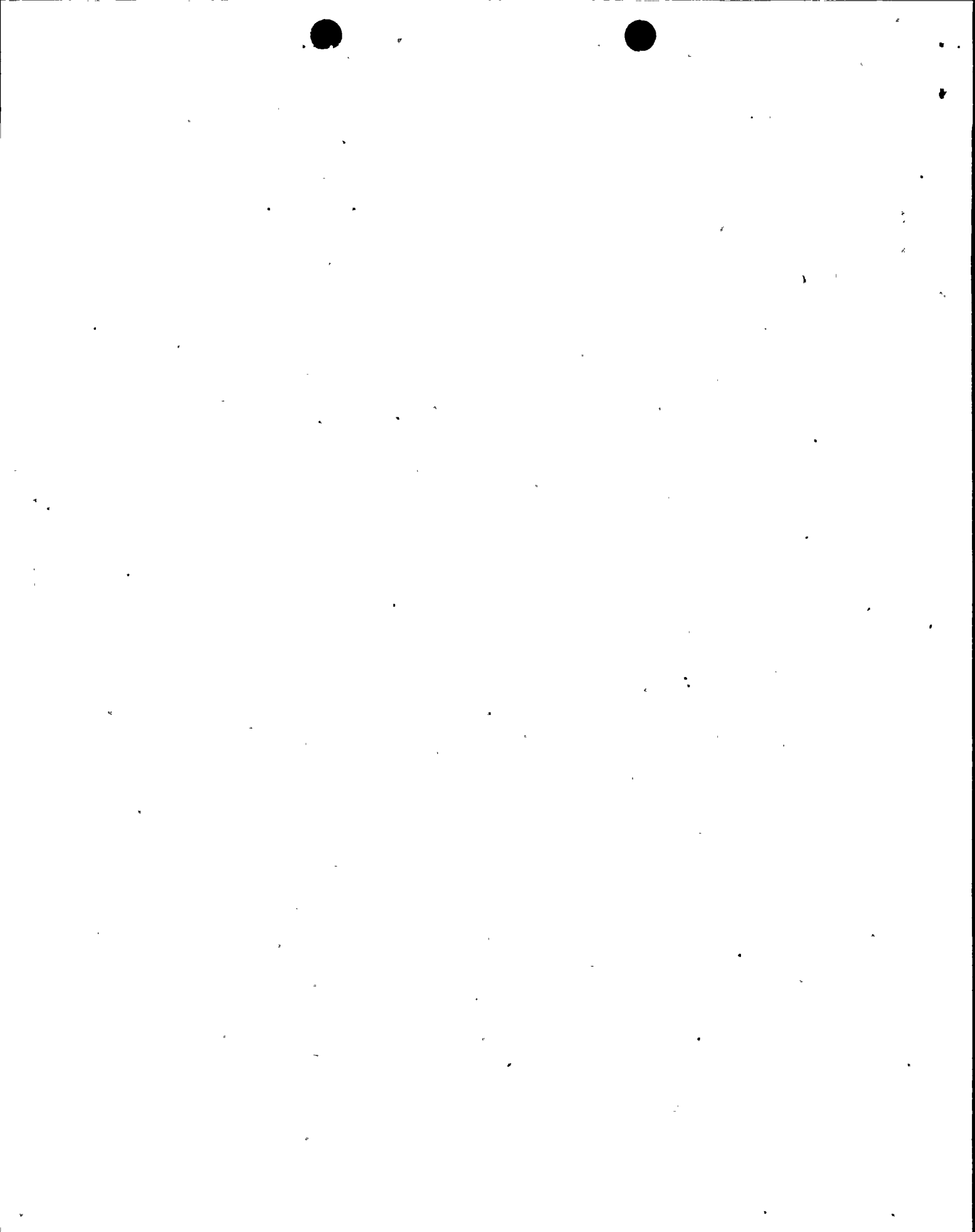
Nine Mile Point Unit 2 has had a number of instances where engineered safety feature actuations occurred (License Event Reports 97-04, 96-04, 98-05, 98-06, 98-13, and 99-05). The root causes of these licensee event reports were different than the root cause for this event. Therefore, the corrective actions from these licensee event reports would not have prevented this engineered safety feature actuation from occurring.

Licensee Event Reports 95-10 and 98-06 document partial losses of offsite power. Both of these instances, the breaker backup protection scheme functioned as designed. The root causes of these licensee event reports were different than the root cause for this event. Therefore, the corrective actions from these two licensee event reports would not have prevented this partial loss of offsite power.

Licensee Event Report 99-05 documented a failure of the reactor core isolation cooling system. The root cause was determined to be that the overspeed trip mechanism on the trip throttle valve was incorrectly aligned. Again the root cause was different; therefore, the corrective actions from Licensee Event Report 99-05 would not have prevented this reactor core isolation cooling system failure.

C. Identification of components referred to in this licensee event report:

| Components | IEEE 803A Function | IEEE 805 System ID |
|---|--------------------|--------------------|
| Reactor Core Isolation Cooling System | N/A | BN |
| Reactor Core Isolation Cooling Flow Controller | FC | BN |
| Reactor Core Isolation Cooling Flow Transmitter | FT | BN |
| Residual Heat Removal Shutdown Cooling Valve | ISV | BO |
| Residual Heat Removal Isolation Valve | ISV | BO |
| Electrical Bus | BU | EA and EB |



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V. ADDITIONAL INFORMATION (Cont'd)

C. Identification of components referred to in this licensee event report (Cont'd):

| | | |
|--|------|----|
| Electrical Breakers | BKR | FK |
| Electric Relay | RLY | EL |
| Main Turbine | TRB | TA |
| Turbine Electrohydraulic Control Pump | P | JJ |
| Safety Relief Valves | RV | SB |
| Main Steam Isolation Valves | ISV | SB |
| Reactor Feedwater Pumps | P | SJ |
| Reactor Feedwater Master Controller | LC | SJ |
| Reactor Feedwater Manual-Tracking Card | ECBD | SJ |
| Reactor Feedwater Level Control Valve | LCV | SJ |
| Condensate Booster Pumps | P | SD |
| Condenser | COND | SG |
| Offgas System | N/A | WF |
| High Pressure Core Spray | N/A | BG |
| Diesel Generator | DG | EK |
| Suppression Pool | N/A | NH |

