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**Constellation**
Nuclear

Nine Mile Point
Nuclear Station

*A Member of the*
*Constellation Energy Group*

March 15, 2002
NMP2L 2054

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

RE: Nine Mile Point Unit 2
Docket No. 50-410
NPF-69

***Subject:*** ***Supplement 1 to Licensee Event Report 01-006, "Manual Scram Due to Feedwater Pump Motor Failure"***

Gentlemen:

We are submitting Supplement 1 to Licensee Event Report (LER) 01-006, "Manual Scram Due to Feedwater Pump Motor Failure." The event is reportable in accordance with 10 CFR 50.73(a)(2)(iv)(A). Supplement 1 contains the cause and associated corrective actions that were not available at the time of submittal of the LER.

Very truly yours,

Michael F. Peckham
Unit 2 Plant General Manager

MFP/KLE/jm
Attachment

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

IE22

NRC FORM 366 U.S. NUCLEAR REGULATORY COMMISSION
(1-2001)

APPROVED BY OMB NO. 3150-0104 EXPIRES 7-31-2004

Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

# LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

| FACILITY NAME (1) | DOCKET NUMBER (2) | PAGE (3) |
|---|---|---|
| Nine Mile Point, Unit 2 | 05000410 | 1 OF 4 |

TITLE (4)
Manual Scram Due to Feedwater Pump Motor Failure

| EVENT DATE (5) | | | LER NUMBER (6) | | | REPORT DATE (7) | | | OTHER FACILITIES INVOLVED (8) | |
|---|---|---|---|---|---|---|---|---|---|---|
| MO | DAY | YEAR | YEAR | SEQUENTIAL NUMBER | REV NO | MO | DAY | YEAR | FACILITY NAME | DOCKET NUMBER |
| | | | | | | | | | | 05000 |
| 12 | 02 | 2001 | 2001 | – 006 – | 01 | 3 | 15 | 2002 | FACILITY NAME | DOCKET NUMBER |
| | | | | | | | | | | 05000 |

| OPERATING MODE (9) | 1 |
|---|---|
| POWER LEVEL (10) | 075 |

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) (11)

| | | | |
|---|---|---|---|
| 20.2201(b) | 20.2203(a)(3)(ii) | 50.73(a)(2)(ii)(B) | 50.73(a)(2)(ix)(A) |
| 20.2201(d) | 20.2203(a)(4) | 50.73(a)(2)(iii) | 50.73(a)(2)(x) |
| 20.2203(a)(1) | 50.36(c)(1)(i)(A) | X 50.73(a)(2)(iv)(A) | 73.71(a)(4) |
| 20.2203(a)(2)(i) | 50.36(c)(1)(ii)(A) | 50.73(a)(2)(v)(A) | 73.71(a)(5) |
| 20.2203(a)(2)(ii) | 50.36(c)(2) | 50.73(a)(2)(v)(B) | OTHER |
| 20.2203(a)(2)(iii) | 50.46(a)(3)(ii) | 50.73(a)(2)(v)(C) | |
| 20.2203(a)(2)(iv) | 50.73(a)(2)(i)(A) | 50.73(a)(2)(v)(D) | |
| 20.2203(a)(2)(v) | 50.73(a)(2)(i)(B) | 50.73(a)(2)(vii) | |
| 20.2203(a)(2)(vi) | 50.73(a)(2)(i)(C) | 50.73(a)(2)(viii)(A) | |
| 20.2203(a)(3)(i) | 50.73(a)(2)(ii)(A) | 50.73(a)(2)(viii)(B) | |

LICENSEE CONTACT FOR THIS LER (12)

| NAME | TELEPHONE NUMBER (Include Area Code) |
|---|---|
| Bruce W. O'Brien, Manager Unit 2 Maintenance | 315-349-4767 |

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

| CAUSE | SYSTEM | COMPONENT | MANU-FACTURER | REPORTABLE TO EPIX | CAUSE | SYSTEM | COMPONENT | MANU-FACTURER | REPORTABLE TO EPIX |
|---|---|---|---|---|---|---|---|---|---|
| E | SJ | MO | GE | Y | | | | | |

| SUPPLEMENTAL REPORT EXPECTED (14) | | EXPECTED SUBMISSION DATE (15) | MONTH | DAY | YEAR |
|---|---|---|---|---|---|
| YES (If yes, complete EXPECTED SUBMISSION DATE). | X NO | | | | |


**ABSTRACT** (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On December 2, 2001, at approximately 1449 hours, operators manually scrammed Nine Mile Point Unit 2 (NMP2) from approximately 75 percent power after the "A" Feedwater Pump tripped due to a motor failure.

Prior to the Feedwater Pump motor failure a power reduction was in progress for rodline adjustments. The motor failure created a voltage transient that resulted in the loss of hydraulic power to the "A" Recirculation Flow Control Valve (FCV), which prevented its runback operation. The runback of the "B" Recirculation FCV was not sufficient to reduce power to within the capacity of the "B" Feedwater Pump. A manual scram was inserted to preclude an automatic scram because of decreasing reactor vessel water level.

After the scram, none of the Emergency Core Cooling System equipment started or should have started. During the post scram recovery the "B" Feedwater pump tripped due to high reactor water level. Approximately 2.5 hours after the manual scram, a low reactor water level scram signal occurred with no rod motion, due to level shrink as operators were closing a Turbine Bypass Valve to control cooldown rate.

An inspection of the motor concluded that it had experienced a phase-to-phase fault and phase-to-ground fault. This resulted in a voltage transient and the tripping of the motor breaker.

The causes of the motor failure were failure to effectively implement the Corrective Action Program and a faulty motor design that led to corona induced damage. Contributing causes include inadequate communication and insufficient motor monitoring.

Corrective actions include revising the Corrective Action program, disseminating lessons learned to site management and appropriate staff, correcting the motor design flaw, rewinding pump motors and establishing a motor testing program.

| FACILITY NAME (1) | DOCKET (2) NUMBER (2) | LER NUMBER (6) | | | PAGE (3) |
|---|---|---|---|---|---|
| | | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | |
| Nine Mile Point, Unit 2 | 05000410 | 2001 | -- 006 -- | 01 | 2 OF 4 |

**NARRATIVE** *(If more space is required, use additional copies of NRC Form 366A)* **(17)**

## I. Description of Event

On December 2, 2001, at approximately 1400 hours Nine Mile Point Unit 2 (NMP2) began a power reduction from full power in order to perform a rodline adjustment. At approximately 1448 hours the "A" Feedwater Pump tripped due to an electrical fault on the motor. After the motor tripped, a runback of the "A" and "B" Recirculation Flow Control Valves (FCV) should have reduced power to within the capacity of the "B" Feedwater Pump. However, the motor failure had created a voltage transient that resulted in the loss of hydraulic power to the "B" Recirculation FCV, which prevented its runback operation. Control room operators attempted to reduce power to within the capacity of one Feedwater Pump. At approximately 1449 hours, after receiving a half scram due to low reactor water level, operators manually scrammed NMP2 from approximately 75 percent power to preclude an automatic scram because of decreasing reactor vessel water level.

After the scram, none of the Emergency Core Cooling System (ECCS) equipment started or should have started. The voltage transient caused the Reactor Water Cleanup filters to isolate which resulted in the loss of the Reactor Water Cleanup System. During the post scram recovery, at approximately 1705 hours, the "B" Feedwater pump tripped due to high reactor water level. The high reactor water level was caused by leakage past the closed feedwater level control valves and the inability to direct water from the reactor vessel to the condenser through the Reactor Water Cleanup System. At approximately 1721 hours, a low reactor vessel water level scram signal occurred as operators were closing a Turbine Bypass Valve to control cooldown rate. Additionally, the low reactor vessel water level resulted in an isolation signal to Primary Containment Isolation valve groups 4 and 5, which were already closed. The Reactor Water Cleanup System was restored to service at approximately 1735 hours allowing water in the reactor vessel to be directed to the condenser.

An inspection of the motor concluded that it had experienced a phase-to-phase fault and a phase-to-ground fault as a result of corona induced damage. This resulted in a voltage transient and the tripping of the motor breaker. The motor is a 14,100 horsepower, 13.2 Kilovolt motor. Corona degradation was initially noted in 1991 in the "B" Feedwater Pump motor. In 1992 corona degradation was identified in all three Feedwater Pump motors. In 1995 the "B" Feedwater Pump motor failed due to corona induced damage. Following the "B" Feedwater Pump motor failure all three Feedwater Pump motors were rewound. In November 2000 wedge damage was noted on the "B" Feedwater Pump motor and the frequency of inspection was changed from yearly to every six months for the "B" Feedwater Pump motor. A plan was established to rewind all three motors starting with "B", which was planned for January 2002. In October 2001, during an inspection conducted after a reactor scram, damage was again noted on the "A" Feedwater Pump motor. The motor was inspected and repaired and was considered by the Maintenance and Engineering Organizations as acceptable for use.

## II. Cause of Event

The cause of the manual reactor scram was the failure of the "A" Feedwater Pump motor. The causes of the motor failure were a failure to effectively implement the Corrective Action program and a faulty motor design that resulted in corona induced damage. The damage to the "A" Feedwater Pump motor after the scram in October 2001 resulted in the motor condition being placed into the Corrective Action program with a preliminary disposition required prior to plant startup. The preliminary disposition focused on repairing the damaged insulation, not on assessing the overall condition of the motor or the risks and consequences of running the motor.

Poor communication between Engineering, Maintenance, and a vendor who assisted with the inspection of the "A" Feedwater Pump, after the October 2001 scram, is a contributing cause. An additional contributing cause was ineffective corrective action to address the corona damage after the "B" Feedwater Pump failed in 1995.

## III. Analysis of Event

This event is reportable in accordance with 10 CFR 50.73(a)(2)(iv)(A), because of the manual actuation of the Reactor Protection System (RPS) and the automatic actuation of the RPS and containment isolation signals as a result of low reactor vessel water level during the scram recovery.

No ECCS equipment started and plant conditions post scram did not result in any demand for ECCS equipment. A post scram review concluded that equipment functioned as designed. Both Reactor Core Isolation Cooling and High Pressure Core Spray were available.

A probabilistic risk review concluded that the estimated Conditional Core Damage Probability for this event was 3.8E-7. The event is not considered risk significant.

Based on the above, the manual scram resulting from the failure of the "A" Feedwater Pump motor did not pose a threat to the health and safety of the public or plant personnel.

## IV. Corrective Actions

1. The "A" Feedwater Pump motor was rewound.
2. A preventive maintenance activity was initiated to rewind or replace the feedwater pump motors on a four-year interval.
3. A specification for a new motor design was written to correct the design flaw that resulted in corona damage.
4. Ownership of issues in the Corrective Action Program including preliminary dispositions will be re-enforced to Managers through a briefing. The briefing will be completed by April 1, 2002.
5. The "B" and "C" Feedwater Pumps will be rewound by July 1, 2002.
6. A plan for testing motors will be implemented by September 1, 2002.
7. A revision will be made to the Corrective Action Program to require an assessment of risks and consequences in the preliminary dispositions of issues in the Corrective Action Program. The revision will be completed by August 30, 2002.

| FACILITY NAME (1) | DOCKET (2) NUMBER (2) | LER NUMBER (6) | | | PAGE (3) |
|---|---|---|---|---|---|
| | | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | |
| Nine Mile Point, Unit 2 | 05000410 | 2001 | -- 006 -- | 01 | 4 OF 4 |

**NARRATIVE** *(If more space is required, use additional copies of NRC Form 366A)* (17)

## V . Additional Information

A. Failed Components:
14,100 horsepower, 13.2 Kilovolt motor, Manufactured by General Electric, model number 5K881387C1

B. Previous similar events:
Feedwater Pump "B" failed in 1995 due to corona induced damage but did not result in a reactor scram. Corrective actions should have prevented the failure of the "A" Feedwater Pump. Licensee Event Report (LER) 99-03, Revision 1, "ADS Nitrogen Leakage in Excess of NMP2 Technical Specification Limits," and LER 99-01, Revision 1, "NMP2 Outside The Design Basis Due to Safe Shutdown Service Water Pump Bay Unit Coolers Being Out-of-Service," describe events whose causes or contributory causes are identified as inadequate corrective action. The corrective actions of these LERs were specific to the events and would not have prevented the failure of the "A" Feedwater Pump. LER 01-02, Revision 1, "Rated Thermal Power Exceeded When Recirculation Flow Control Valve Malfunctioned," identified the cause as weaknesses in the implementation of the corrective action process. This cause is similar to the cause of the "A" Feedwater Pump failure. Corrective actions of LER 01-02 are on going efforts to address weaknesses in the corrective action process and should prevent events similar to the "A" Feedwater pump failure when fully instilled throughout the organization.

C. Identification of components referred to in this Licensee Event Report

| Components | IEEE 805 System ID | IEEE 803A Function |
|---|---|---|
| Reactor Core Isolation Cooling | BN | N/A |
| High Pressure Core Spray | BG | N/A |
| Reactor Protection System | JC | N/A |
| Reactor Recirculation System | AD | N/A |
| Containment Isolation Control System | JM | N/A |
| Reactor Water Cleanup System | CE | N/A |
| Turbine Bypass System | SB | N/A |
| Feedwater System | SJ | N/A |
| Condensate System | SG | N/A |
| Control Rod Drive System | AA | N/A |
| Condenser | SG | COND |
| Pump | AD, CE, SG, SJ | P |
| Motor | SJ | MO |
| Valve | AD, SJ, JM, SB | FCV, ISV, LCV, V |
| Filter | CE | FLT |