**Constellation Energy**
Nine Mile Point Nuclear Station

P.O. Box 63
Lycoming, New York 13093

July 1, 2004
NMP1L 1848

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

SUBJECT: Nine Mile Point Unit 1
Docket No. 50-220; DPR-63

Licensee Event Report 04-001, "Manual Reactor Scram and Cooldown Rate Exceeding Technical Specification Limits Due to Electromatic Relief Valve Failure to Close"

Gentlemen:

In accordance with 10 CFR 50.73(a)(2)(i)(A), 10 CFR 50.73(a)(2)(i)(B), and 10 CFR 50.73(a)(2)(iv)(A), we are submitting Licensee Event Report 04-001, "Manual Reactor Scram and Cooldown Rate Exceeding Technical Specification Limits Due to Electromatic Relief Valve Failure to Close."

Very truly yours,

Lawrence A. Hopkins
Plant General Manager

LAH/JRH/jm
Attachment

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

IE22

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

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 1 | 05000220 | 1 OF 5 |

TITLE (4)

Manual Reactor Scram and Cooldown Rate Exceeding Technical Specification Limits Due to Electromatic Relief Valve Failure to Close

| 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 |
| 05 | 02 | 2004 | 2004 | 001 | 00 | 07 | 01 | 2004 | FACILITY NAME | DOCKET NUMBER 05000 |

| OPERATING MODE (9) | 1 |
|---|---|
| POWER LEVEL (10) | 19 |

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) | X | 50.73(a)(2)(i)(A) | 50.73(a)(2)(v)(D) | | |
| 20.2203(a)(2)(v) | X | 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) |
|---|---|
| M. Steven Leonard, General Supervisor Licensing | 315-349-4039 |

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 |
|---|---|---|---|---|---|---|---|---|---|
| A | SB | PSV | Dresser Valve | 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 May 2, 2004, at approximately 0209 hours, while conducting post-maintenance testing following plant startup, Electromatic Relief Valve (ERV) 123 would not reclose following remote manual actuation. Efforts to close the ERV failed and at 0217 hours the plant was manually scrammed. High Pressure Coolant Injection initiated on low Reactor Water Level due to the level transient associated with the scram as expected. Reactor cooldown rate exceeded Technical Specification limits for the first hour following the scram. An engineering evaluation concluded that 10 CFR 50 Appendix G requirements were not violated and that structural integrity of the Reactor Pressure Vessel (RPV) was not compromised.

The root cause for the ERV failure to close was "inadequate use of procedures." The failure resulted from improper assembly of the pilot valve following maintenance. An extra gasket erroneously installed in the pilot valve assembly allowed bypass leakage around the pilot valve causing the main valve to remain open after the pilot valve was closed.

The excessive cooldown rate resulted from the stuck open ERV, which limited the ability to control the rate of RPV depressurization and cooldown.

The ERV was disassembled and reassembled correctly. Subsequent testing demonstrated satisfactory valve performance.

# LICENSEE EVENT REPORT (LER)

| FACILITY NAME (1) | DOCKET (2) NUMBER (2) | LER NUMBER (6) | | | PAGE (3) |
|---|---|---|---|---|---|
| | | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | |
| Nine Mile Point, Unit 1 | 05000220 | 2004 | -- 001 -- | 00 | 2 OF 5 |

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

## I. Description of Event

On April 26, 2004, Nine Mile Point, Unit 1 (NMP1), was shutdown (Planned Outage 04-02), in part to perform repairs to Electromatic Relief Valve (ERV) 123 because of elevated main valve tail pipe temperature. ERV 123 is one of six Technical Specification (TS) required solenoid-actuated pressure relief valves providing Reactor Pressure Vessel (RPV) overpressure protection. The repair work discovered a steam cut on the small bore pipe union inside the valve enclosure. The main valve and pilot valve were replaced with a valve assembly that had been tested by Wyle Labs. To verify the leak tightness of the small bore piping, the pilot valve internals were removed and a test flange installed to facilitate pressurizing the piping between the union and the pilot valve. After the leak test, the pilot was reassembled in accordance with an approved plant procedure. All post assembly testing was performed satisfactory.

Reactor startup from Planned Outage 04-02 commenced on May 1, 2004, at approximately 1150 hours. At 0110 hours on May 2, 2004, power ascension was placed on hold to permit performance of post-maintenance testing on ERV 123 following repairs. In addition, Suppression Pool Cooling had been placed in service as directed by the test procedure.

On May 2, 2004, at approximately 0209 hours, with NMP1 operating at 19 percent power and with Suppression Pool Cooling in service, ERV 123 was opened using the control switch. Approximately 14 seconds later, re-closure was attempted by taking the control switch to close. After taking the switch to close, indications were that the pilot valve repositioned to close; however, the ERV remained open. Operators executed pre-planned steps from the appropriate procedure for a stuck open ERV including:

- Pulling control room fuses
- Cycling the control switch
- Pulling in-plant fuses
- Depressing the timer reset button

After completing all available options for ERV closure with unsuccessful results, the reactor was shut down at approximately 0217 hours by insertion of a manual scram as directed by procedure. A plant shutdown is required under these conditions by TS 3.1.5b due to less than the minimum number (6) of operable solenoid-actuated pressure relief valves. A manual scram was inserted to mitigate the continuous heat input into the suppression pool from the stuck open relief valve. Maximum Suppression Pool temperature during the event was limited to 104 degrees F, below the TS limit of 110 degrees F.

Plant systems functioned as expected with the exception of the stuck open relief valve. Plant response included a High Pressure Coolant Injection (HPCI) initiation due to low Reactor Water Level (< 53") from the level transient associated with the scram.

At approximately 0218 hours, Main Steam Isolation Valves (MSIVs) were closed to minimize the rate of reactor depressurization and associated plant cooldown. With the MSIVs closed, plant depressurization and cooldown rate were effectively determined by the stuck open relief valve. Technical Specification 3.2.1, "Reactor Vessel Heatup and Cooldown Rates," states:

> During the startup and shutdown operations of the reactor, the reactor vessel temperature shall not be increased more than 100 degrees F in any one hour period nor decreased more than 100 degrees F in any one hour period.

Contrary to these requirements, a 221.9 degree F cooldown occurred during the first hour following the scram.

Shutdown Cooling was placed in service at approximately 0358 hours. Shortly thereafter, at approximately 0430 hours, Operators entered the drywell and successfully closed the manual block valve for ERV 123 which terminated

| FACILITY NAME (1) | DOCKET (2) NUMBER (2) | LER NUMBER (6) | | | PAGE (3) |
|---|---|---|---|---|---|
| | | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | |
| Nine Mile Point, Unit 1 | 05000220 | 2004 | -- 001 | -- 00 | 3 OF 5 |

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

## I. Description of Event (Cont'd.)

steam flow from the ERV. Cooldown was subsequently controlled at less than 100 degrees F per hour using Shutdown Cooling until cold shutdown conditions were achieved at 0919 hours.

The failure of ERV 123 is reportable in accordance with 10 CFR 50.73(a)(2)(i)(A) as a failure that resulted in a Technical Specification required shutdown. Exceeding the Technical Specification cooldown limit is reportable in accordance with 10 CFR 50.73(a)(2)(i)(B) as operation prohibited by the Technical Specifications. The manual scram is reportable under 10 CFR 50.73(a)(2)(iv)(A) as an event or condition that resulted in manual or automatic actuation of the Reactor Protection System (RPS), including reactor scram or reactor trip. The automatic HPCI initiation is also reportable under 10 CFR 50.73(a)(2)(iv)(A) as an event or condition that resulted in manual or automatic actuation of an Emergency Core Cooling System.

## II. Cause of Event

The **direct cause** for ERV 123 failing to close is that a gasket was inappropriately installed between the upper solenoid bracket assembly and the pilot valve body.

The **root cause** is inadequate use of procedures. Specifically, the ERV maintenance procedure does not direct installing a gasket; however, a new gasket was installed.

Troubleshooting and valve disassembly identified that an additional gasket was installed in the pilot valve assembly. The gasket was inappropriately installed since the procedure did not direct its installation. The additional gasket prevented the adequate "crush" of the pilot valve bushing assembly gasket. This, in turn, allowed steam to bypass the pilot valve and discharge directly to the pilot valve tailpiece. When the valve was manually actuated for testing at 900 psig, the ERV opened as expected. When the valve was given a close signal, the bypass leakage around the pilot valve prevented steam pressure equalization across the main seat, causing the main valve to remain open.

The bypass leakage around the pilot valve was sufficient to hold the pilot valve open. Inadequate use of procedures is thus the root cause for the event, leading to the direct cause, inappropriate installation of an extra gasket in the pilot valve assembly.

Investigation determined that the extra gasket was installed following post maintenance pressure testing of the valve pilot assembly. Pressure testing included replacing the upper solenoid bracket assembly with a blank flange and test gasket. Following the pressure test, the upper solenoid bracket assembly was reinstalled within the pilot valve assembly. At this point, contrary to procedure, a worker improperly installed a spare test gasket between the upper bracket assembly and pilot valve body as part of the final assembly.

| FACILITY NAME (1) | DOCKET (2) NUMBER (2) | LER NUMBER (6) | | | PAGE (3) |
|---|---|---|---|---|---|
| | | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | |
| Nine Mile Point, Unit 1 | 05000220 | 2004 | -- 001 -- | 00 | 4 OF 5 |

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

## III. Analysis of Event

Upon determination that ERV 123 could not be reclosed, the reactor was shutdown by means of a manual scram to minimize uncontrolled heat addition to the suppression pool. Following the scram, plant equipment performed as designed with the exception of the stuck open ERV. Inability to close the ERV limited ability to control plant depressurization and cooldown rate. Actions were taken to minimize the cooldown rate, including promptly closing MSIVs. Despite these actions, TS cooldown rate limitations were exceeded during the first hour following the scram. The cooldown in the first hour was 221.9 degrees F. The subsequent cooldown in the following 1 and 1/2 hour period was approximately 60 degrees F. Temperature was then stabilized and held constant for approximately 3 hours prior to completing the cooldown to cold shutdown conditions. This event is considered a blowdown event which was bounded by the design basis 300 degree emergency cooldown analyses. The design basis allows for 10 emergency cooldown events at the maximum cooldown rate of 300 degrees per hour.

Operator action to insert a manual scram in a timely fashion limited suppression pool maximum temperature during the event to 104 degrees F, less than the TS maximum of 110 degrees F, assuring operability of the pressure suppression function of primary containment throughout the event.

Engineering evaluations conducted prior to unit restart were based upon conservative cooldown rate assumptions. These evaluations determined that the stuck open ERV event did not create conditions outside the design basis of the plant and that no supplemental inspections or reviews were required prior to plant startup.

Evaluations included the following:

- An ASME XI, Appendix E evaluation was conducted which determined that Appendix E criteria were met and that structural adequacy was assured for all vessel regions throughout the event. In addition, the actual event cooldown was compared to a core-not-critical Pressure and Temperature Limit curve (P/T curve) derived based upon an assumed 225 degrees F in one hour temperature change and based upon existing NMP1 P/T curve methods. The vessel stresses due to the event were shown to remain acceptable from a fracture mechanics standpoint.

- The transient thermal stresses created from this event were reviewed and determined to be bounded by the RPV stress, fatigue and fracture analysis 300 degree per hour emergency cooldown normal/upset stress and fatigue analyses. As such, no supplemental inspection or review requirements apply.

- An evaluation concluded that no thermal stratification between the lower plenum and the beltline occurred during the event.

- The core shroud repair tie rod assemblies design basis analyses were reviewed and determined to be acceptable for this event.

- A thermal-mechanical assessment of the fuel concluded that the impact of the event on the fuel was negligible. In addition, a review of fuel cladding TS Limiting Safety System Settings and supporting Bases indicated that there was no impact on fuel reliability due to the rapid cooldown.

- A review determined that the event is bounded by the Upper Shelf Energy equivalent margin analysis.

- A review of various recirculation piping flaw and fatigue evaluations was performed. The review concluded that the transient thermal stresses created from this event had no impact on the conclusions of the previous calculations.

Based upon satisfactory performance of plant systems and based upon engineering evaluations of the effects of the event, the event did not pose a threat to the health and safety of plant personnel or the public.

# LICENSEE EVENT REPORT (LER)

| FACILITY NAME (1) | DOCKET (2) NUMBER (2) | LER NUMBER (6) | | | PAGE (3) |
|---|---|---|---|---|---|
| | | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | |
| Nine Mile Point, Unit 1 | 05000220 | 2004 | -- 001 -- | 00 | 5 OF 5 |

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

## IV. Corrective Actions

ERV 123 was disassembled and repaired. Post maintenance testing and subsequent performance were satisfactory.

## V. Additional Information

A. Failed Components:

Electromatic Relief Valve 123 Dresser Industries Model 6-1525VX-3-NC060

B. Previous similar events:

LER 2000-004 reported lifting and failure to close of ERV 111. ERV failure was caused by a bent pilot valve stem. The event occurred during plant startup with reactor power at less than one percent thermal power and with reactor pressure at approximately 30 psig. Although this event also involved an ERV failure to close, the cause and circumstances differ. Corrective actions from LER 2000-004 would not have prevented the current event.

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

| Components | IEEE 805 System ID | IEEE 803A Function |
|---|---|---|
| Electromatic Relief Valve | SB | PSV |
| High Pressure Coolant Injection | BJ | N/A |
| Reactor Pressure Vessel | SB | RPV |
| Suppression Pool | NH | N/A |
| Main Steam Isolation Valves | SB | ISV |
| Shutdown Cooling System | BO | N/A |
| Reactor Protection System | JC | N/A |