**Nebraska Public Power District**
*Nebraska's Energy Leader*

NLS2001112
December 17, 2001

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

Gentlemen:

Subject: Licensee Event Report No. 2001-005
Cooper Nuclear Station, NRC Docket 50-298, DPR-46

The subject Licensee Event Report is forwarded as an enclosure to this letter.

Sincerely,

J. A. Hutton
Plant Manager

/dnm
Enclosure

cc: Regional Administrator
USNRC - Region IV

Senior Project Manager
USNRC - NRR Project Directorate IV-1

Senior Resident Inspector
USNRC

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NRC FORM 366 (7-2001) 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

# LICENSEE EVENT REPORT (LER)

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

| 1. FACILITY NAME | 2. DOCKET NUMBER | 3. PAGE |
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| Cooper Nuclear Station | 05000298 | 1 OF 5 |

**4. TITLE**

High Pressure Coolant Injection (HPCI) Overspeed Trip Reset Valve Spring Failure Results in HPCI Unavailability

| 5. EVENT DATE | | | 6. LER NUMBER | | | 7. REPORT DATE | | | 8. OTHER FACILITIES INVOLVED | |
|---|---|---|---|---|---|---|---|---|---|---|
| MO | DAY | YEAR | YEAR | SEQUENTIAL NUMBER | REV NO | MO | DAY | YEAR | FACILITY NAME | DOCKET NUMBER |
| 10 | 17 | 2001 | 2001 | – 005 – | 0 | 12 | 17 | 2001 | FACILITY NAME | DOCKET NUMBER |

| 9. OPERATING MODE | 1 |
|---|---|
| 10. POWER LEVEL | 099 |

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

| | | | |
|---|---|---|---|
| 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) | 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 Specify in Abstract below or in NRC Form 366A |
| 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) | x 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) | |

**12. LICENSEE CONTACT FOR THIS LER**

| NAME | TELEPHONE NUMBER (Include Area Code) |
|---|---|
| Paul Fleming - Licensing Manager | 402-825-2774 |

**13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT**

| CAUSE | SYSTEM | COMPONENT | MANU-FACTURER | REPORTABLE TO EPIX | CAUSE | SYSTEM | COMPONENT | MANU-FACTURER | REPORTABLE TO EPIX |
|---|---|---|---|---|---|---|---|---|---|
| B | BJ | 12 | R290 | Y | | | | | |

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

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


On October 17, 2001, at 14:30 Central Standard Time, the High Pressure Coolant Injection (HPCI) System was declared inoperable when the HPCI trip mechanism did not automatically reset during the quarterly Inservice Test (IST) and Technical Specification (TS) surveillance. At the time when the system was declared inoperable, the plant was operating at approximately 99 percent power.

The inability to reset the trip mechanism resulted from a failure of an actuator spring associated with the system mechanical hydraulic overspeed trip auto-reset control valve. The cause of this event was age degradation of the spring.

Immediate actions consisted of replacement of the valve actuator spring and diaphragm, re-running the IST and TS surveillances, and declaring HPCI operable. Long term corrective actions include preparing a preventive maintenance order to replace the valve assembly at ten year intervals from date of manufacture.

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

PLANT STATUS:

Cooper Nuclear Station (CNS) was in Mode 1, Power Operation, at approximately 99 percent steady state power when the event occurred.

BACKGROUND:

The High Pressure Coolant Injection (HPCI)[EIIS: BJ] System is provided to assure that the reactor is adequately cooled to limit fuel clad temperature in the event of a small break in the nuclear system and loss of coolant which does not result in rapid depressurization of the reactor vessel. The HPCI overspeed trip mechanism prevents excessive speed and subsequent damage to the turbine and its driven equipment following a malfunction of the normal speed control system or as a result of an abnormal operating condition that renders the speed control system inadequate. When activated, the overspeed trip system shuts off the flow of steam to the turbine via the turbine stop valve and allows the turbine and its driven equipment to come to a stop. As a protective system, the overspeed trip mechanism does not function under normal operating conditions.

The overspeed trip mechanism consists of a hydraulic circuit (see illustration on Page 5) which operates during an overspeed trip condition (or when the trip mechanism is manually actuated) which moves the trip mechanism to the open position. The oil supplied from the mechanical hydraulic overspeed trip auto reset control valve (HPCI-HOV-PCV2770)[EIIS: BJ/12] to the trip mechanism maintains the trip mechanism open long enough to dump the oil pressure that normally maintains the turbine stop valve (HPCI-HOV-10)[EIIS: BJ/5] open. The decreasing pressure on the diaphragm closes the valve (due to the actuator spring). This terminates the oil supply to the overspeed trip mechanism allowing the trip mechanism to reset. However, during the test performed on October 17, 2001, the overspeed trip mechanism did not reset, due to HPCI-HOV-PCV2770 not going to the closed position. It has been determined that the actuator spring associated with this valve had failed due to age degradation.

Prior to the spring and diaphragm replacement on October 18, 2001, there were no records supporting that the spring had been replaced in the valve. The Dresser Rand vendor manual for the Terry Turbine and associated Robertshaw valve has no recommended preventive maintenance (PM) on any parts beside the diaphragm. Replacement parts purchased from General Electric (GE) contained a spring with a different form and instructions to install it with the diaphragm. The GE instructions specified the life of the valve body and spring as 20 years. Further investigation revealed that the original spring design appears to be marginal and does not have the expected design life per the Vendor manual.

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

EVENT DESCRIPTION:

On October 17, 2001, at 14:02 Central Standard Time, the HPCI System was declared inoperable for the purpose of performing the required quarterly Inservice Test (IST) and Technical Specification (TS) surveillances. The purpose of these surveillances is to ensure that the turbine trip mechanism is able to perform its equipment protection function before HPCI is tested to its surveillance requirements. At about 14:30, these surveillances were terminated due to a failure of the HPCI trip mechanism auto reset function. HPCI remained inoperable for 48 hours and 38 minutes following the declaration. However, it remained available during that time, except for approximately seven hours and 26 minutes for troubleshooting and corrective maintenance. At the time when the system was declared inoperable, the plant was operating at approximately 99% percent power.

During the quarterly IST and TS surveillance run, the HPCI trip mechanism is exercised to verify normal working condition. The test is performed with the auxiliary lube oil pump running by manually tripping the trip mechanism and verifying the turbine stop valve (HPCI-HOV-10) closes and then re-opens. When performed on October 17, 2001, HPCI-HOV-10 closed as expected but did not re-open. Therefore, the HPCI overspeed trip function did not automatically reset. The trip mechanism was manually reset. The system was declared inoperable as a result of failure to meet the surveillance procedure acceptance criterion requiring the turbine stop valve to open when the local turbine trip knob is released.

Subsequent investigation determined that the failed component was the actuator spring of the mechanical hydraulic overspeed trip auto reset control valve, HPCI-HOV-PCV2770, which is a Robertshaw valve, model VC-210-BLR. The actuator spring and diaphragm on the valve were replaced, post maintenance testing was performed, and the appropriate surveillances were satisfactorily completed.

BASIS OF REPORT:

The unplanned unavailability of HPCI is reportable as an "event or condition that could have prevented fulfillment of a safety function" under 10CFR50.73(a)(2)(v)(D).

CAUSE:

The cause of this event was age degradation of the spring causing a loss of its mechanical properties until it was unable to perform its design function (closure of the valve to automatically reset the trip mechanism).

The Reactor Core Isolation Cooling (RCIC)[EIIS: BN] system does not have an automatic reset feature on turbine overspeed. Resetting the overspeed trip device on RCIC requires manual operator action. The condition found on HPCI does not apply to RCIC.

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

SAFETY SIGNIFICANCE:

The subject failure of HPCI overspeed auto-reset function has the potential to reduce the reliability of the system during scenarios where the system trips on overspeed. This is primarily attributed to turbine controller failure. For sequences that require HPCI for injection; Reactor Core Isolation Cooling, Control Rod Drive and feedwater provide redundant high pressure core cooling. If needed, Reactor Pressure Vessel (RPV) depressurization and low pressure injection systems provides the final backup to HPCI. If it is assumed that the overspeed reset is unavailable, then all HPCI failure events caused by overspeed would render the system unavailable for subsequent RPV level control. The CNS Probabilistic Safety Assessment model includes HPCI failure due to HPCI-HOV-10 (closed fails closed at 6E-03/demand) on the initial system start demand. The impact of the subsequent HPCI failure to restart is estimated by assuming overspeed trip occurs at a bounding value (includes additional turbine failure to run contributions.) The impact on core damage frequency is less than 1.E-06/yr, and is not considered safety significant for temporary plant conditions.

The condition did not challenge a fuel, reactor coolant pressure, primary containment, or secondary containment boundary, nor did it impact the plant's ability to safely shutdown or maintain the reactor in a safe shutdown condition. The loss of the HPCI overspeed trip does not result in an unanalyzed condition nor impact safety functions of other equipment. Therefore, the safety significance of this event is low.

CORRECTIVE ACTIONS:

A. Immediate Corrective Actions Taken to Correct Condition

1. Replaced the actuator spring and diaphragm on the Mechanical Hydraulic Overspeed Trip Auto-Reset Control Valve HPCI-HOV-PCV2770. Completed 10/18/01

2. Performed applicable surveillance testing satisfactory. After review of surveillances and corrective maintenance declared system operable. Completed 10/19/01

3. Performed Design and Configuration control for HPCI-HOV-PCV2770 replacement parts. Completed 11/21/01

B. Long Term Corrective Actions to Prevent Recurrence

1. Prepare PM to replace HPCI-HOV-PCV2770 at ten year intervals from date of manufacture, include instructions to ensure that the replacement valve is less than seven years old. Due Date: 3/15/2002

PREVIOUS SIMILAR EVENTS

There have been no similar reportable events in the last three years.

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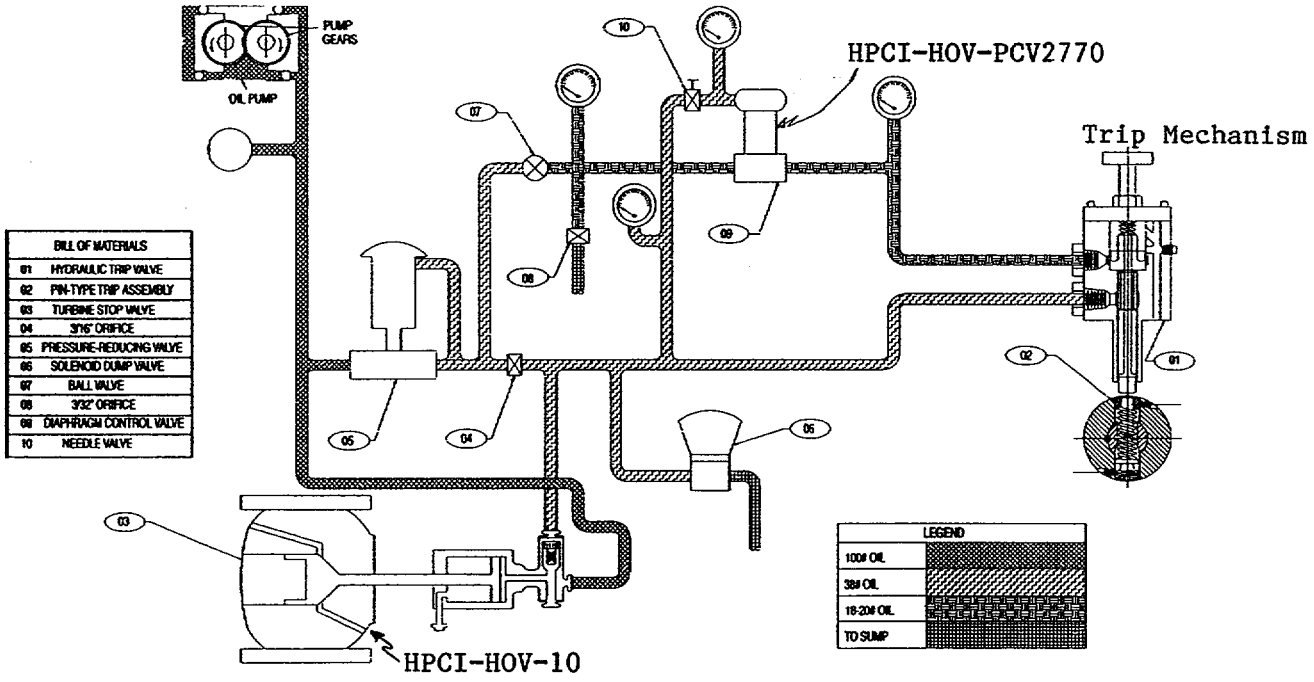
**NARRATIVE** *(If more space is required, use additional copies of NRC Form 366A)* **(17)**




**Overspeed Trip System, Hydraulic Schematic**

Correspondence Number: NLS2001112

The following table identifies those actions committed to by the District in this document. Any other actions discussed in the submittal represent intended or planned actions by the District. They are described for information only and are not regulatory commitments. Please notify the NL&S Manager at Cooper Nuclear Station of any questions regarding this document or any associated regulatory commitments.

| COMMITMENT | COMMITTED DATE OR OUTAGE |
|---|---|
| Prepare PM to replace HPCI-HOV-PCV2770 at ten year intervals from date of manufacture, include instructions to ensure that the replacement valve is less than seven years old. | March 15, 2002 |
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