



Nebraska Public Power District

Always there when you need us

NLS2006003
January 11, 2006

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

Subject: Licensee Event Report No. 2005-005-00
Cooper Nuclear Station, NRC Docket 50-298, DPR-46

The purpose of this correspondence is to forward a Licensee Event Report.

Sincerely,

Stewart B. Minahan
General Manager of Plant Operations

/bm

Enclosure

cc: Regional Administrator w/enclosure
USNRC - Region IV

Senior Project Manager w/enclosure
USNRC - NRR Project Directorate IV-1

Senior Resident Inspector w/enclosure
USNRC - CNS

NPG Distribution w/enclosure

INPO Records Center w/enclosure

SORC Administrator w/enclosure

SRAB Administrator w/enclosure

CNS Records w/enclosure

IE22

LICENSEE EVENT REPORT (LER)

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

Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@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 to impose an 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.

1. FACILITY NAME

Cooper Nuclear Station

2. DOCKET NUMBER

05000298

3. PAGE

1 of 4

4. TITLE

High Pressure Coolant Injection Valve Control Power Fuse Results in Loss of Safety Function

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
11	16	2005	2005	- 005 -	00	01	11	2006		05000
										05000

9. OPERATING MODE

1

- 11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5:** (Check all that apply)
- | | | | |
|---|---|---|---|
| <input type="checkbox"/> 20.2201(b) | <input type="checkbox"/> 20.2203(a)(3)(i) | <input type="checkbox"/> 50.73(a)(2)(i)(C) | <input type="checkbox"/> 50.73(a)(2)(vii) |
| <input type="checkbox"/> 20.2201(d) | <input type="checkbox"/> 20.2203(a)(3)(ii) | <input type="checkbox"/> 50.73(a)(2)(ii)(A) | <input type="checkbox"/> 50.73(a)(2)(viii)(A) |
| <input type="checkbox"/> 20.2203(a)(1) | <input type="checkbox"/> 20.2203(a)(4) | <input type="checkbox"/> 50.73(a)(2)(ii)(B) | <input type="checkbox"/> 50.73(a)(2)(viii)(B) |
| <input type="checkbox"/> 20.2203(a)(2)(i) | <input type="checkbox"/> 50.36(c)(1)(i)(A) | <input type="checkbox"/> 50.73(a)(2)(iii) | <input type="checkbox"/> 50.73(a)(2)(ix)(A) |
| <input type="checkbox"/> 20.2203(a)(2)(ii) | <input type="checkbox"/> 50.36(c)(1)(ii)(A) | <input type="checkbox"/> 50.73(a)(2)(iv)(A) | <input type="checkbox"/> 50.73(a)(2)(x) |
| <input type="checkbox"/> 20.2203(a)(2)(iii) | <input type="checkbox"/> 50.36(c)(2) | <input type="checkbox"/> 50.73(a)(2)(v)(A) | <input type="checkbox"/> 73.71(a)(4) |
| <input type="checkbox"/> 20.2203(a)(2)(iv) | <input type="checkbox"/> 50.46(a)(3)(ii) | <input type="checkbox"/> 50.73(a)(2)(v)(B) | <input type="checkbox"/> 73.71(a)(5) |
| <input type="checkbox"/> 20.2203(a)(2)(v) | <input type="checkbox"/> 50.73(a)(2)(i)(A) | <input type="checkbox"/> 50.73(a)(2)(v)(C) | <input type="checkbox"/> OTHER |
| <input type="checkbox"/> 20.2203(a)(2)(vi) | <input type="checkbox"/> 50.73(a)(2)(i)(B) | <input checked="" type="checkbox"/> 50.73(a)(2)(v)(D) | Specify in Abstract below or in NRC Form 366A |

10. POWER LEVEL

100

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME

Paul V. Fleming, Licensing Manager

TELEPHONE NUMBER (Include Area Code)

(402) 825-2774

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
	HPCI	FU	B569	Y					

14. SUPPLEMENTAL REPORT EXPECTED

YES (If yes, complete EXPECTED SUBMISSION DATE). NO

15. EXPECTED SUBMISSION DATE

MONTH DAY YEAR

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

At 0422 Central Daylight Time (CDT) on November 16, 2005, a Control Room Operator identified that both position indicating lights for the normally closed High Pressure Coolant Injection (HPCI) Injection Valve were not illuminated. Indication could not be restored by bulb replacement or verified locally at the starter rack. This resulted in the HPCI Pump being declared inoperable. Trouble shooting by maintenance personnel determined that the fuse (Bussman type FRN-R-1) installed on positive portion of the 125 Volt Direct Current (VDC) valve control circuit was open. Both HPCI control power positive and negative side fuses were replaced with new fuses, circuit integrity was validated, and operability of the valve was verified. HPCI was returned to operable at 1055 CDT on November 16, 2005.

This event is reportable in accordance with 10 CFR 50.73(a)(2)(v)(D) as "Any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident."

The cause of the event was determined to be an intermittent over current condition in the control circuit and/or fuse weakness due to voids in the solder and poor wetting of the solder. Corrective actions to address causes include replacement and analysis of fuses with the same manufacture and date code, monitoring of the control power circuit current to validate normal operation, and replacement and analysis of the closed indicating light socket for the HPCI Injection Valve.

LICENSEE EVENT REPORT (LER)

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Cooper Nuclear Station	05000298	YEAR	SEQUENTIAL NUMBER	REVISION	2 of 4
		2005	-- 005	-- 00	

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

PLANT STATUS

Cooper Nuclear Station (CNS) was in Mode 1 (Run) at 100% power at the time of the identified condition.

BACKGROUND

The High Pressure Coolant Injection (HPCI) System (EIS:BJ) provides protection to the core for the case of a small break in the reactor coolant pressure boundary which does not result in rapid depressurization of the reactor vessel. The HPCI System permits the nuclear plant to be shutdown while maintaining sufficient reactor vessel water inventory until the reactor vessel is depressurized. The HPCI System continues to operate until reactor vessel pressure is below the pressure at which Low Pressure Coolant Injection (EIS:BO) operation or Core Spray System (EIS:BM) operation can be used to maintain core cooling.

HPCI consists of a steam turbine assembly (EIS:TRB) driving a multi-stage booster and main pump assembly and system piping, valves, controls and instrumentation. The HPCI turbine is driven by steam from the reactor which is generated by decay and residual heat. The steam is extracted from main steam line "C" (EIS:SB) upstream of the main steam line isolation valves (EIS:ISV).

The normally closed HPCI Injection Valve, a 250 Volt Direct Current (VDC) Motor Operated Valve with a 125 VDC control circuit, automatically opens upon receipt of a HPCI Initiation signal to provide emergency reactor inventory makeup flow to the reactor vessel. The valve also opens upon manual initiation of the HPCI system from either the Control Room or the Alternate Shutdown Room.

EVENT DESCRIPTION

At 0422 Central Daylight Time (CDT) on November 16, 2005, during a Control Room panel tour in preparation for night-to-day shift turnover, a Reactor Operator identified that both "Closed" and "Open" position indicating lights for the HPCI Injection Valve were not illuminated. The operator expected that the green "Closed" light should be illuminating since the HPCI system was in stand-by condition.

The Operator could not restore indication by replacing light bulbs. A Station Operator was dispatched to investigate the 250 VDC Starter Rack. No abnormal conditions were noted in the breaker cubicle. No indicating lights exist on the starter rack to indicate HPCI Injection Valve position. The Control Room determined that the problem appeared to be an open fuse in either the 250 VDC motor operator circuit or the 125 VDC control circuit. This resulted in the HPCI Pump being declared inoperable.

The Control Room Staff entered an unplanned Limiting Condition for Operation, notified the Nuclear Regulatory Commission (NRC) Senior Resident Inspector, and made an eight hour Non-Emergency report to the NRC (Event Notification number 42143).

Troubleshooting by maintenance personnel determined that the fuse (Bussman type FRN-R-1) installed on positive portion of the 125 VDC valve control circuit was open. Both control power positive and negative side fuses were replaced with new fuses, the closed indication bulb was replaced with new bulb, circuit integrity was validated, and operability of the valve was verified by stroking the valve while measuring starting and running current.

At 1055 hours CDT on November 16, 2005, HPCI system was declared operable.

LICENSEE EVENT REPORT (LER)

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Cooper Nuclear Station	05000298	YEAR	SEQUENTIAL NUMBER	REVISION	3 of 4
		2005	-- 005	-- 00	

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

BASIS FOR REPORT

The HPCI system is a single train system. This condition is reportable in accordance with 10 CFR 50.73(a)(2)(v) as "any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to.... (D) Mitigate the consequences of an accident."

SAFETY SIGNIFICANCE

The condition identified involved an open control power fuse, which resulted in the HPCI system being unavailable for less than nineteen hours. This condition was not risk significant for the following reasons:

The condition was self revealing and panel walk downs limited the time the condition existed to nineteen hours or less. The condition was discovered at 0422 CDT on November 16, 2005, and corrected no later than 1055 CDT on November 16, 2005. Procedural guidance requires system status checks be performed prior to shift turnover and verified by the oncoming shift within two hours of shift turnover. In order to bound the time HPCI was unavailable for this condition it is conservatively assumed that 12 hours elapsed since the last system status check. This results in approximately nineteen hours as the total time the condition may have existed.

The condition was limited to one mitigation system. HPCI was the only mitigation system impacted by this condition. During the time HPCI was unavailable for injection, Reactor Core Isolation Cooling (EISS:BN), the Control Rod Drive System (EISS:AA) and Feedwater (EISS:SJ) were available to provide high pressure core cooling. Additionally, if needed, the Safety Relief Valves (controlled manually or by the Automatic Depressurization System) were available to provide a means to depressurize the reactor pressure vessel so the low pressure systems could provide injection. This 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 shut down or maintain the reactor in a safe shutdown condition.

Assuming a failure probability of one for the HPCI system over a nineteen hour period results in an Incremental Core Damage Probability increase of 5.7E-09, which is less than the risk significant threshold of 1.0E-06.

This condition is considered a Safety System Functional Failure as defined in NEI 99-02, Revision 2, Regulatory Assessment Performance Indicator Guideline.

CAUSE

The cause of the event was determined to be an intermittent over current condition in the control circuit and/or fuse weakness due to voids in the solder and poor wetting of the solder.

Laboratory failure analysis was performed on the positive fuse. The failure site is located in the slow-blow element and caused by a Low Over-Current condition. Lab evidence showed that soldering material at the slow-blow element had softened to the point of allowing the spring to retract which opened one of two soldering joints. The second joint may have opened due to fatigue caused by the spring tension which resulted in the fuse opening on November 16, 2005.

CNS drawings were reviewed. The only components that could fail and cause an over current condition in the control power circuit while in standby status include the closed indicating light socket assembly in the Control Room and circuit wires and conductors, including terminal strips. All other components,

LICENSEE EVENT REPORT (LER)

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Cooper Nuclear Station	05000298	YEAR	SEQUENTIAL NUMBER	REVISION	4 of 4
		2005	-- 005	-- 00	

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

contactors and other indicating lights, were isolated from the power source by open contacts and could not have caused this condition.

CORRECTIVE ACTION

Both control power positive and negative side fuses for the HPCI Injection Valve were replaced with new fuses of the same make and model. The new fuses have a different Manufacturer Date Code. The closed indication bulb was replaced with a new bulb. Circuit integrity was validated, and operability of the valve was verified by stroking the valve while measuring starting and running current. The closed indicating light socket assembly has been replaced.

The following corrective actions are documented and being tracked in the CNS corrective action program:

1. Install a chart recorder to monitor HPCI Injection Valve control circuit current for a duration of thirty days.
2. Replace installed Bussmann FRN-R-1 fuses having a manufacturing date code of "K08" (same date code as the open fuse).
3. Perform internal inspections of removed fuses. Inspect light socket and analyze data collected from chart recorder.
4. Impose a moratorium on the purchase of any Bussmann FRN-R-1 fuses with a manufacturing date code of "K08"

PREVIOUS EVENTS

A review of CNS License Event Reports from 2000 to present reveals no other occurrences of an open fuse causing a loss of Safety Function.