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NLS2005054
June 14, 2005

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

Subject: Licensee Event Report No. 2005-001-00
Cooper Nuclear Station, Docket No. 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

/cm

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

NPG Distribution w/enclosure

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NRC FORM 366 (6-2004)

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 06/30/2007

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.

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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4. TITLE
Reactor Scram due to Reactor Level Transient and Inadvertent Rendering of High Pressure Coolant Injection Inoperable

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 05000
04	15	2005	2005	- 001 -	00	06	14	2005	FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE: 1

10. POWER LEVEL: 100

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

☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☒ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☒ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
Paul V. Fleming, Licensing Manager	(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	MANU-FACTURER	REPORTABLE TO EPIX
B	JB	FFC	N430	Y					

14. SUPPLEMENTAL REPORT EXPECTED	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
☐ YES (If yes, complete EXPECTED SUBMISSION DATE). ☒ NO				

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

On April 15, 2005 at 0436 Central Daylight Time, from 100 percent power, steady state, Cooper Nuclear Station (CNS) had a feedwater and reactor level transient followed by a low level alarm and scram. Level reached 70 inches below Instrument Zero, all control rods inserted, and reactor pressure was controlled by turbine bypass valves. High pressure coolant injection (HPCI) and reactor core isolation cooling (RCIC) automatically injected. All automatic actuations functioned as required. Level recovered with HPCI and RCIC injecting. After stopping the level drop, HPCI was rendered inoperable by erroneously positioning its auxiliary oil pump switch to PULL-TO-LOCK (PTL). It was repositioned to AUTO twenty seconds later. Cause of the level transient was a manufacturing deficiency in the installed feedwater master level controller obtained as an equivalent part from a different manufacturer to replace the previous unit. The master controller was replaced with the previous unit. The cause of the operator error was inadequate management of change for a revision to the HPCI operating procedure versus ingrained practice of placing HPCI in PTL. HPCI procedure was enhanced. Additional actions are planned to obtain a spare master level controller and to provide simulator training to operators. CNS started up and returned to power on April 17, 2005.

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

BACKGROUND

At Cooper Nuclear Station (CNS) the two Reactor Feed Pumps (RFP's) (EIIS:SJ) are single-stage, horizontal, centrifugal units using a steam driven turbine for motive power. The pumps operate in series with the condensate and condensate booster pumps (EIIS:SD) and provide the maximum design flow plus design margins at the required pressure at the reactor inlet nozzles.

The Reactor Vessel Level Control (RVLC) system (EIIS:JB), during normal power operation, automatically regulates feedwater flow into the reactor vessel. Input signals from instruments for reactor vessel water level, feedwater flow rate into the vessel, and steam flow rate from the vessel are used by RVLC. The RVLC system, including the master level controller, balances the mass flow rate of feedwater with the steam flow from the reactor vessel and provides an adjusted reactor vessel level signal to the Reactor Feed Pump Turbine (RFPT) Speed Control system (EIIS:JK) as a speed demand signal.

The High Pressure Coolant Injection (HPCI) system (EIIS: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. HPCI continues to operate until reactor vessel pressure is below the pressure at which Low Pressure Coolant Injection (EIIS:BO) operation or Core Spray System (EI1S:BM) operation can be used to maintain core cooling.

HPCI consists of a steam turbine assembly (EIIS: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" (EI1S:SB) upstream of the main steam line isolation valves (EI1S:ISV). The HPCI auxiliary lube oil system (EIIS:SL) provides oil requirements for the turbine stop and control valves on initial HPCI turbine startup.

PLANT STATUS

On April 14 and the early hours of April 15, 2005, CNS was in Mode 1, Power Operation, at 100 percent power, steady state with no unusual weather conditions, no transmission line perturbations, and no significant surveillances or plant operations in progress. Steam flow, reactor vessel water level, and feedwater flow were stable.

EVENT DESCRIPTION

On April 15, 2005 at 0436 Central Daylight Time (CDT), as reported in Event Notification EN#41601, CNS experienced a reactor feedwater and level transient followed by a reactor vessel low water level alarm and an automatic reactor scram. HPCI and Reactor Core Isolation Cooling (RCIC) (EIIS:BN) systems automatically initiated and injected into the reactor vessel. Primary Containment Isolation System (PCIS) (EIIS:JM) Groups 2, 3 and 6 isolations, and Alternate Rod Insertion (ARI) trips of Reactor Recirculation (RR) pumps (EIIS:AD) actuated on low reactor water level. RR pumps tripped, primary containment non-essential systems and Reactor Water Cleanup (RWCU) system (EIIS:CE) isolated per design. Reactor water level reached 70 inches below Instrument Zero, approximately 90 inches above the top of fuel, and recovered after HPCI and RCIC began to inject. All control rods (EIIS:AA) went full in, and reactor pressure was controlled automatically by Turbine Bypass Valves (EIIS:JI) dumping to the Main Condenser. All post scram actions occurred as expected.

After reactor water level started to recover, Control Room operators concluded that RCIC alone was sufficient to maintain reactor level and that HPCI was no longer needed. A Control Room operator was

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

then directed to remove HPCI from service. In accordance with operating procedures, at 0438, the Operator depressed the HPCI TRIP button and continued with remaining steps. At 0441 the Operator erroneously positioned the HPCI auxiliary oil pump (AOP) switch to the PULL-TO-LOCK (PTL) position. This position inhibits automatic start capability and renders HPCI inoperable. The operator immediately realized the error and reported it to the Control Room Supervisor. The Operator then repositioned the AOP switch to AUTO position, thus returning HPCI to operable status. HPCI was inoperable for 20 seconds.

RCIC was manually tripped after achieving a steady reactor vessel level of 36 inches above Instrument Zero with one RFP feeding. Operators established stable post scram conditions with PCIS isolations reset, RWCU returned to service and vessel level at plus 48 inches. The Main Turbine (EIIS:TA) which had been manually tripped was placed on the turning gear. The plant was cooled down to establish natural circulation flow and then recover RR pumps. By 1025, CNS exited emergency and abnormal operating procedures connected with the event.

Subsequent reviews focused on the causes of the automatic scram and the inappropriate action to place HPCI in PTL thus disabling its automatic safety function.

Instrumentation records showed the automatic scram closely followed a rapid lowering of demand from the RVLC system to the RFPT Speed Control system which caused RFP speed to decrease resulting in a low reactor water level which in turn caused Reactor Protection System (RPS) (EIIS:JC) to actuate and initiate the scram. Troubleshooting of circuit components associated with RVLC found that, except for the master level controller, the components responded appropriately to input signals and had appropriate calibration. During Refuel Outage 22 (RE22), the previous obsolete master level controller had been replaced with a newer controller obtained as an equivalent part from a different manufacturer. All other components in the RVLC circuitry were the same as when the previous master level controller was in service. In side-by-side tests with the previously used unit, the vendor found that the response of the two modules to large transients was different.

CNS re-installed the previous master level controller, bypassed an unnecessary summing amplifier for the steam program function in the RVLC circuit, replaced a dynamic compensator in the circuit as a precaution, and placed a hold on all further substitutions of the obsolete controllers with the newer controllers from the different manufacturer. The master level controller had been the only controller to have this substitution.

The HPCI system operating procedure was revised to clarify shutdown guidance when an initiation signal is present or cleared, and a night order was issued to make operators aware of the change. The need for procedure adherence was reinforced with the operator. The PTL error was presented as lessons learned during Just-In-Time discussions with Control Room crews involved with startup from the forced outage.

CNS started up and returned to power operation on April 17, 2005.

BASIS FOR REPORT

This event is reportable under 10 CFR 50.73(a)(2)(iv)(A) as an event that resulted in automatic actuation of systems listed in paragraph (a)(2)(iv)(B). Specifically, these were (a)(2)(iv)(B)(1) for RPS actuation resulting in a reactor scram, (a)(2)(iv)(B)(2) for PCIS groups 2 and 6 isolations, (a)(2)(iv)(B)(4) for HPCI actuation and injection into the reactor vessel, and (a)(2)(iv)(B)(5) for RCIC actuation and injection into the reactor vessel. Inhibiting HPCI automatic injection by taking the AOP mode switch to the PTL position is reportable under 10 CFR 50.73(a)(2)(v)(D) as an event or condition that could have prevented the fulfillment of the safety function of a single-train system needed to mitigate the consequences of an accident.

SAFETY SIGNIFICANCE

The lowering of RFPT A and B speed and the resulting reactor scram had negligible effect on CNS risk as described by the probabilistic risk assessment (PRA.) The event did not challenge a fuel, reactor coolant pressure, primary containment, or secondary containment boundary. The event did not impact the plant's ability to safely shutdown or maintain the reactor in a safe shutdown condition. Following the reactor vessel level reduction and scram, all mitigating equipment (HPCI, RCIC, ARI, etc.) functioned as expected. In addition, the RFPT's were functional in manual mode for reactor vessel level control following the scram. As a result, the event is bounded by the baseline PRA model and has negligible risk significance.

There is no change to the baseline PRA risk due to HPCI AOP being temporarily placed in PTL. The HPCI mitigation capability remained available for the entire duration of the shutdown evolution. Thus, the risk significance of this condition is considered negligible. The risk impact of the temporary loss of the automatic HPCI injection function for 20 seconds is limited by system re-alignment within 20 seconds by the licensed operator. The corresponding change in core damage frequency is well below the threshold for risk significance, at much less than 1.E-06/yr. Similarly, the condition screens as green in the Phase 1 of the NRC Significance Determination Process worksheets (the finding screens with no effect on the mitigating systems cornerstone.) Assuming the HPCI PTL condition represents a loss of safety function in Phase 1, the condition screens as green in Phase 2, since HPCI is fully recoverable (credit operator restoration during the actual event) and the condition is of limited duration (<3 day exposure.)

CAUSE

The cause of the automatic scram was a manufacturing deficiency in the newer master level controller obtained as an equivalent part from a different manufacturer.

The cause of the HPCI AOP being placed in PTL was inadequate management of change for a revision to the HPCI system operating procedure. Placing HPCI in PTL had been a procedural part of removing HPCI from service for many years. This method was ingrained in procedure and classroom training, and reinforced on the simulator. The new revision of the procedure changed this practice by adding a condition that if the initiation signal had cleared, then the HPCI steam admission valve should be shut rather than taking the AOP switch to PTL. The new revision became effective on March 7, 2005. However, it lacked an explicit step directing performance of a critical task (i.e., validation of the existence of the HPCI initiation signal). A Training Needs Analysis identified the appropriate training to be a review of the procedure change, but missed the opportunity to include hands-on simulator practice following the revision. Had the management of change for the procedure revision been effective, the operator, more than likely, would have properly performed the task.

CORRECTIVE ACTION

Concerning the automatic scram, the following corrective actions have been or will be taken. These actions are tracked in the CNS Corrective Action Program.

1. Remove the newer master level controller that had been installed in RE22 and replace with the master level controller that previously had been in service. This action is complete.

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

2. Obtain a spare of the previous type master level controller, consistent with current plant design configuration to install as a replacement if needed. Due 6/24/05.

Concerning HPCI being placed in PTL, the following corrective actions have been or will be taken. These actions are tracked in the CNS Corrective Action Program.

1. Revise the HPCI system operating procedure to clarify shutdown guidance when an initiation signal is present or cleared. This action is complete.

2. Provide hands-on simulator training for the changes associated with the current revision of the HPCI system operating procedure. Cover the lessons learned from this event in /operator requalification training. Due 7/29/05.

PREVIOUS EVENTS

On May 26, 2003 and November 28, 2003, CNS experienced reactor scrams. On both occasions, the reactor vessel water level lowered to the setpoint causing an automatic start of the HPCI system. During reactor water level recovery and stabilization, the HPCI AOP was taken to PTL, disabling the automatic start function of HPCI. HPCI remained available at all times during these two events. The disabling of a single train safety system is reportable but was overlooked and not included in the respective licensee event reports for the reactor scrams. This condition was reported to the NRC in LER 2004-004.

At 1915 CDT on June 1, 2004, the control room received an alarm from the HPCI exhaust drain pot high-level sensor. As a precautionary measure, the HPCI system AOP was placed in PTL. The HPCI system was declared inoperable per Technical Specification. HPCI remained available at all times. HPCI was returned to service at 1536 CDT on June 2, 2004. This condition was reported to the NRC in LER 2004-003.

On November 28, 2003, "B" RFP transferred to manual and lowered to approximately 3100 revolutions per minute causing the reactor to automatically scram on low reactor vessel water level at 2202 Central Standard Time. Subsequent to the scram, reactor vessel water level dropped to approximately 47 inches below instrument zero resulting in PCIS Groups 2, 3, and 6 isolations, start of HPCI and RCIC systems, and automatic trip of the RR pumps. An evaluation of plant response determined all control rods fully inserted and systems controlling reactor pressure and level responded as designed. This condition was reported to the NRC in LER 2003-007.

At 1425 CDT on September 18, 2002, the Control Room received annunciator, "High Pressure Coolant Injection (HPCI) Gland Seal Condenser Hotwell High Level." In accordance with the alarm response procedure, the HPCI AOP switch was placed in the PTL position at 1428 CDT. The HPCI system was declared inoperable per Technical Specification. HPCI remained available at all times. This condition was reported to the NRC in LER 2002-001.

Correspondence Number: NLS2005054

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

COMMITMENT	COMMITMENT NUMBER	COMMITTED DATE OR OUTAGE
None		