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NLS2003131

January 25, 2004

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

Subject: Licensee Event Report No. 2003-007  
Cooper Nuclear Station, NRC Docket 50-298, DPR-46

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

Sincerely,

John Christensen  
Plant Manager

/dvw  
Enclosure

cc: Regional Administrator  
USNRC - Region IV

Senior Project Manager  
USNRC - NRR Project Directorate IV-1

Senior Resident Inspector  
USNRC

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

4. TITLE: Automatic Reactor Scram Following Reactor Feed System Control Malfunction

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
11	28	2003	2003	007	00				FACILITY NAME	DOCKET NUMBER
										05000
									FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE	10. POWER LEVEL	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)			
		20.2201(b)	20.2201(d)	20.2203(a)(3)(ii)	20.2203(a)(4)
1	100				
		20.2203(a)(1)	20.2203(a)(2)(i)	50.36(c)(1)(i)(A)	50.73(a)(2)(ii)(B)
		20.2203(a)(2)(ii)	20.2203(a)(2)(iv)	50.36(c)(1)(ii)(A)	50.73(a)(2)(iii)
		20.2203(a)(2)(iii)	20.2203(a)(2)(v)	50.36(c)(2)	50.73(a)(2)(iv)(A)
		20.2203(a)(2)(iv)	20.2203(a)(2)(vi)	50.46(a)(3)(ii)	50.73(a)(2)(v)(A)
		20.2203(a)(2)(v)	20.2203(a)(3)(i)	50.73(a)(2)(i)(A)	50.73(a)(2)(v)(B)
		20.2203(a)(2)(vi)		50.73(a)(2)(i)(B)	50.73(a)(2)(v)(C)
		20.2203(a)(3)(i)		50.73(a)(2)(i)(C)	50.73(a)(2)(v)(D)
				50.73(a)(2)(ii)(A)	50.73(a)(2)(vii)
				50.73(a)(2)(ii)(A)	50.73(a)(2)(viii)(A)
				50.73(a)(2)(ii)(A)	50.73(a)(2)(viii)(B)

OTHER Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER  
 NAME: Paul Fleming, Licensing and Regulatory Affairs 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
X	SJ	FC	L253	Y					

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

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

On November 28, 2003, "B" Reactor Feed Pump (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 hours. Subsequent to the scram, reactor vessel water level dropped to approximately 47 inches below instrument zero resulting in Primary Containment Isolation System Group 2, 3, and 6 isolations, start of High Pressure Coolant Injection and Reactor Core Isolation Cooling systems, and automatic trip of the Reactor Recirculation pumps. An evaluation of plant response determined all control rods fully inserted and systems controlling reactor pressure and level responded as designed.

The approximate root cause of this event is a spurious signal entered the reactor feed pump turbine controller. Immediate action was taken to place the plant in a safe shutdown condition in Mode 3 (Hot Shutdown). Prior to plant startup, 1) operators were trained on the event, 2) radio frequency interference suppression, to attenuate frequencies greater than one megahertz, was installed on the reactor feed control input signals, 3) a modification was completed that added annunciation for a RFP in manual and provided additional signal monitoring, and 4) installed ground wires from feedwater control station cases to cabinet ground bus. Subsequent to startup and still to be completed is a modification that will attenuate frequencies greater than one kilohertz. This will prevent spurious signals in the reactor feed pump turbine controller, dampen noise on the master controller, and filter noise.

**LICENSEE EVENT REPORT (LER)**

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		2003	-- 007	-- 00	

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

**PLANT STATUS**

Cooper Nuclear Station (CNS) was in Mode 1 (Run) at 100% power at the time of the automatic reactor scram.

**BACKGROUND**

The two Reactor Feed Pumps (RFPs) 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 and provide the maximum design flow plus design margins at the required pressure at the reactor inlet nozzles. The feedwater control system controls the RFPs to automatically regulate feedwater flow into the reactor vessel. The system is capable of being manually regulated.

**EVENT DESCRIPTION**

On November 28, 2003, "B" RFP [EIS:SJ] was in automatic at approximately 4600 revolutions per minute when an annunciator for "B" RFP minimum flow valve was received followed by the reactor low water level alarm. "B" RFP had transferred to manual and lowered to approximately 3100 revolutions per minute. The reactor automatically scrammed at 2202 hours on low reactor vessel water level just prior to a manual reactor scram inserted by the operators.

Subsequent to the scram, reactor vessel water level dropped to approximately 47 inches below instrument zero resulting in Primary Containment Isolation System Group 2, 3, and 6 isolations [EIS:JM], start of High Pressure Coolant Injection (HPCI) [EIS:BJ] and Reactor Core Isolation Cooling (RCIC) [EIS:BN] systems, and automatic trip of the Reactor Recirculation pumps. An evaluation of plant response determined all control rods fully inserted and systems controlling reactor pressure and level responded as designed. Reactor pressure was controlled using the Main Turbine Bypass Valves and Reactor vessel water level was maintained using "B" RFP.

The reactor vessel thermally stratified upon trip of the Reactor Recirculation Pumps [EIS:AD]. Subsequently, the reactor vessel drain temperature exceeded the 100 degrees per hour Technical Specification cooldown limit. The 100 degrees per hour Technical Specification heatup limit was exceeded for the bottom head and "B" Reactor Recirculation Pump suction when natural circulation was established by raising reactor vessel water level to 48 inches and was exceeded for the vessel drain during a controlled depressurization at low pressure.

An engineering evaluation of the thermal transients demonstrates that adequate structural integrity is maintained for the reactor pressure vessel. Supporting stress and fatigue analyses show the fatigue impact of the scram event is not significant.

**BASIS FOR REPORT**

This event is reportable in accordance with 10 CFR 50.73(a)(2)(iv)(A) as "any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B) of this section." The following systems from paragraph (a)(2)(iv)(B) actuated during this event: Reactor Protection System, HPCI, RCIC, and Containment Isolation System Groups 2 and 6.

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

CAUSE

The approximate root cause of this event is a spurious signal entered the reactor feed pump turbine controller.

SAFETY SIGNIFICANCE

This transient was caused by the "B" RFP controller switching to manual and running back to approximately 3100 revolutions per minute. All other systems responded as expected and the "B" RFP was used to control reactor water level. This event is considered a T3A transient in the PRA model. The T3A transient scenario contains the following sequence of events:

Transients that do not result in an immediate loss of the condenser as a heat sink but which can cause a trip of the feedwater system. The feedwater system can be restarted once the trip signal is removed.

The Conditional Core Damage Probability (CCDP) for this event was 7.19E-07. This was calculated setting all initiators to 0.0 except T3A. The CCDP is bounded by the average test and maintenance CDF for T3A sequences. The CCDP is less than 1E-06, therefore this event was not risk significant.

CORRECTIVE ACTIONS

Immediate Actions:

- 1) Conducted operator training on the event and on response to a transfer of the RFP to manual.
- 2) Installed radio frequency interference suppression on the reactor feed control input signals to attenuate frequencies greater than one megahertz.
- 3) Performed a modification that added annunciation for a RFP in manual and provided additional signal monitoring.
- 4) Installed ground wires from feedwater control station cases to cabinet ground bus.

Long Term Action:

CNS will perform a modification that will attenuate frequencies greater than one kilohertz. This will prevent spurious signals in the reactor feed pump turbine controller, dampen noise on the master controller, and filter noise. This modification will be completed by May 21, 2004.

PREVIOUS EVENTS

No previous events related to the feedwater controller as this was a new digital system installed during the last refueling outage.

The manual reactor scram of May 26, 2003, at CNS, due to main turbine high vibration, resulted in reactor vessel stratification with related heatup and cooldown problems similar to this event.