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NLS2003079

July 17, 2003

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

Subject: Licensee Event Report 2003-002  
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

/cb  
Enclosure

cc: Regional Administrator  
USNRC - Region IV

Senior Project Manager  
USNRC - NRR Project Directorate IV-1

Senior Resident Inspector  
USNRC

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**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 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

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**4. TITLE****TECHNICAL SPECIFICATION PROHIBITED OPERATION DUE TO SAFETY RELIEF VALVE TEST FAILURES**

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	
05	19	2003	2003 - 002 - 00			07	17	2003	FACILITY NAME	DOCKET NUMBER	
										05000	
									FACILITY NAME	DOCKET NUMBER	
										05000	
<b>9. OPERATING MODE</b>		1	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)</b>								
<b>10. POWER LEVEL</b> 100			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)			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)				

**12. LICENSEE CONTACT FOR THIS LER**

<b>NAME</b> Paul V. Fleming, Licensing & Regulatory Affairs Manager	<b>TELEPHONE NUMBER (Include Area Code)</b> 402-825-2774
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**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	SB	RV	T020	Y					

**14. SUPPLEMENTAL REPORT EXPECTED**

<b>YES</b> (If yes, complete EXPECTED SUBMISSION DATE)	<b>X</b> <b>NO</b>	<b>15. EXPECTED SUBMISSION DATE</b>	<b>MONTH</b>	<b>DAY</b>	<b>YEAR</b>

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

On May 19, 2003, a review of Target Rock safety relief valve (SRV) test data, provided by Wyle Laboratories, determined that four of eight SRV pilot valve assemblies failed to lift within their Technical Specification (TS) lift setpoint. Specifically, one SRV with a setpoint of 1080 +/- 32.4 psig lifted at 1168 psig, two SRVs with a setpoint of 1090 +/- 32.7 psig lifted at 1130 psig and 1166 psig respectively and one SRV with a setpoint of 1100 +/- 33.0 psig lifted at 1228 psig. The discovery was made as a result of routine TS surveillance testing of the pilot valve assemblies. Cooper Nuclear Station (CNS) was at 100 percent rated reactor power at the time of the determination.

Examination determined that sufficient corrosion bonding existed between the SRV pilot valve assembly Stellite 21 disc and the pilot valve Stellite 6 in-body seat to cause the SRV pilot valves to lift outside TS setpoint tolerances. As documented in CNS Licensee Event Report 1999-004-01, this is a recurring problem at CNS and within the industry. The valves were replaced with tested and certified spare valves.

This event is considered to have no safety significance from a Probabilistic Safety Assessment Risk evaluation standpoint. This event does not create a core damage scenario. There is no change to the CNS core damage frequency or the large early release frequency. This condition also has no impact on the Reactor Pressure Vessel pressure relief function capability. Even under postulated failure conditions, there is no associated risk increase to the plant.

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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 at the time of discovery.

## BACKGROUND

The Safety Relief Valves (SRVs) [EIS: SB] installed at CNS are Target Rock Model 7567F two stage pilot actuated valves which are common for this type of application at Boiling Water Reactors (BWR). Failure of the Target Rock SRV pilot assemblies to lift within their upper setpoint tolerance of + 3.0% due to corrosion bonding is a long standing industry problem.

In 1997, CNS installed 0.3% Platinum-Stellite pilot discs in all eight SRVs installed in the plant. While improved performance was noted, data showed that the Boiling Water Reactor Owners Group recommended 0.3% Platinum-Stellite pilot discs did not completely solve the corrosion bonding problem. Stellite 21 was reported to have better corrosion resistance characteristics than 0.3% Platinum-Stellite. A review of SRV pilot assembly lift data from another BWR plant which has had Stellite 21 pilot discs installed since 1984 indicated minimal set point drift problems. As a result, in March 1998, CNS installed eight SRVs pilot assemblies comprised of Stellite 21 pilot discs and Stellite 6 in-body seats.

During Refueling Outage (RFO) 21 two complete SRVs and six SRV pilot assemblies were removed from the plant and replaced with refurbished/certified spares. The removed SRVs were shipped to Wyle Laboratories for required testing.

## EVENT DESCRIPTION

Four Target Rock SRVs failed to automatically actuate at the required Technical Specification (TS) set point during as found testing.

SRV pilot assembly serial number (S/N) 384 failed it's initial lift test (initial lift pressure at 1228 psig, which is 11.6% above set point of 1100 psig.) In accordance with testing program requirements three more lifts were performed on the pilot assembly. All subsequent lifts were less than or equal to 0.5% above it's set point. CNS Engineering witnessed the testing of the remaining seven SRVs. A Nitrogen (N<sub>2</sub>) lift test was performed on each pilot valve assembly as a diagnostic test for indication of corrosion bonding prior to the setpoint lift test. A pilot disc found to be stuck during the N<sub>2</sub> lift test is a positive indication of a corrosion bond.

Three additional SRVs failed as found testing. The results of the testing are as follows:

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CIC	Set Point	Pilot Assembly S/N	AS FOUND Lift 1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> , & 4 <sup>th</sup>	Pilot Disc Stuck at N <sub>2</sub> Lift Test
MS-RV-71ARV	1100	376	1112 (+1.1%), 1096 (-0.4%), 1092 (-0.7%), 1091 (-0.8%)	NO
MS-RV-71BRV	1100	382	1114 (+1.3%), 1104 (+0.4%), 1104 (+0.4%), 1101 (0.1%)	NO
MS-RV-71CRV	1090	386	1197 (+0.6%), 1096 (+0.6%), 1097 (+0.6%), 1094 (+0.4%)	NO
MS-RV-71DRV	1080	378	1168 (+8.4%), 1097 (+1.6%), 1089 (+0.8%), 1081 (+0.1%)	YES
MS-RV-71ERV	1090	383	1166 (+6.9%), 1096 (+0.6%), 1095 (+0.5%), 1091 (+0.1%)	YES
MS-RV-71FRV	1080	380	1095 (+1.4%), 1088 (+0.7%), 1082 (+0.2%), 1081 (+0.1%)	YES
MS-RV-71GRV	1100	384	1228 (+11.6%), 1106 (+0.5%), 1104 (+0.4%), 1102 (+0.2%)	YES
MS-RV-71HRV	1090	377	1130 (+3.7%), 1099 (-0.1%), 1091 (+0.1%), 1092 (+0.2%)	YES

CNS Engineering witnessed the disassembly of pilot assembly S/N 384 in an attempt to determine a possible cause for the initial as found high lift. All of the internal components were found to be free of any foreign material contamination. There were no unusual signs of any binding or rubbing. Examination of this pilot valve assembly combined with the lift test results indicated that corrosion bonding between the pilot disc and the pilot seat (a stuck pilot disc) was the apparent cause for the high as found initial lifts of the four subject SRVs.

Since the installation of the Stellite 21 pilot discs during Mid Cycle Outage 98-01, the performance of the CNS SRVs had been very good. Prior to the testing of the SRVs removed during RFO 21, CNS had experienced only one as found high lift failure in a population of 24 as found test results.

Two pilot assemblies were sent to Southwest Research Institute (SRI) for analysis. The pilot valve assemblies sent were the worst performing pilot assembly (S/N 384) and the best performing pilot assembly (S/N 386). In addition, a new unused pilot disc was sent to SRI for analytical base line information. SRI performed the following analyses to determine any changes in the makeup of the corrosion layer on the valves: Scanning Electron Microscope, Energy Dispersive X-Ray Spectroscopy and Low Magnification Stereo-Microscope Photography. These same analyses were completed in 1999 when CNS had a similar problem.

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

The results of the 1999 and 2003 analyses were similar. CNS Engineering and SRI metallurgists analyzed the SRI test results in conjunction with CNS specific operational information. It was concluded that there was no evidence of plant chemistry, maintenance activities or operational activities contributing to the formation of corrosion bonding.

The test data indicated that there was an oxide layer on both pilot discs. The oxide layer consisted of elements characteristic of a Stellite 21/ Stellite 6 corrosion bond. The data was similar to the data taken by SRI in the previous investigation. No new or unexpected contaminants were identified in the oxide layer. The seating areas of the two pilot bodies were examined using a stereomicroscope at low magnification. The oxide layer in the seating area of pilot assembly S/N 386 was consistent with what had been seen previously. The oxide layer had areas of thick and thin coverage.

The oxide layer in the seating area of pilot assembly S/N 384 was not consistent with what had been seen in prior examinations. Its seating area was not uniform and had areas of thick and thin coverage. There were some extremely thin areas of oxide coverage in the seating area.

The high lift of the subject SRV was due to corrosion bonding.

BASIS FOR REPORT

This event is being reported as a condition prohibited by plant Technical Specifications per 10 CFR 50.73(a)(2)(i)(B).

CAUSE

The root cause for the safety relief valves not opening at their set point was that corrosion bonding between the Stellite 21 pilot discs and the Stellite 6 pilot body seats prevented the valves from actuating at or below their TS set point limit.

SAFETY SIGNIFICANCE

This event is considered to have no safety significance from a Probabilistic Safety Assessment Risk evaluation standpoint. This event does not create a core damage scenario. There is no change to the CNS core damage frequency or the large early release frequency. This condition also has no impact on the Reactor Pressure Vessel pressure relief function capability. Even under postulated failure conditions, there is no associated risk increase to the plant.

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A similar condition was evaluated in Significant Condition Report (SCR) 99-0346 (LER 1999-004). SCR 99-0346 referenced a General Electric analysis which demonstrates that as long as the SRVs all lift at or below 1210 psig, there will be adequate margin available to avoid any potential plant safety concerns. The evaluation performed for the Supplemental Reload Licensing Report uses the value of 1210 psig for the opening pressure of all the SRVs. The test result for one SRV was above 1210 psig but the remaining 7 SRVs lifted well below the 1210 psig value. Even if all SRVs open at 1210 psig and all Safety Valves (SVs) open at 1277 psig, there is still 68 psi margin between the calculated CNS peak pressure (1307 psig) and the ASME code over pressure protection limit of 1375 psig. This margin along with the 7 SRVs lifting well below 1210 psig and the SVs historically lifting well below 1277 psig provide assurance that the ASME code over pressure requirement of 1375 psig would not be exceeded.

## CORRECTIVE ACTIONS

The SRV pilot valve assemblies removed for testing were replaced with certified pilot valve assemblies containing Stellite 21 pilot discs and Stellite 6 pilot body seats during CNS RFO 21.

## PREVIOUS EVENTS

LER 1999-004-01 Safety Relief Valve Found Outside Technical Specification Safety Function Lift Setpoint  
LER 1998-006 Safety Relief Valve Found Outside Technical Specification Limiting Safety System Setting  
LER 1997-002 Safety Relief Valve Found Outside Technical Specification Limiting Safety System Setting  
LER 1995-017 Safety/Relief and Safety Valves Found Outside Technical Specification Limiting Safety System Setting

ATTACHMENT 3 LIST OF REGULATORY COMMITMENTS©
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Correspondence Number: NLS2003079

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 & Regulatory Affairs Manager at Cooper Nuclear Station of any questions regarding this document or any associated regulatory commitments.

COMMITMENT	COMMITTED DATE OR OUTAGE
None	