Nebraska Public Power District

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NLS970096
May 9, 1997

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

Gentlemen:

Subject: Licensee Event Report No. 97-002
Cooper Nuclear Station, NRC Docket 50-298, DPR-46

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

Sincerely,

M. F. Peckham
Plant Manager

/rar
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 (4-95) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 04/30/98

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

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

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TITLE (4)

Safety Relief Valves Found Outside Technical Specification Limiting Safety System Setting

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
04	09	97	97	-- 002 --	00	05	09	97	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)			
POWER LEVEL (10)	0	20.2201(b)	20.2203(a)(2)(v)	50.73(a)(2)(i)	50.73(a)(2)(viii)
		20.2203(a)(1)	20.2203(a)(3)(i)	50.73(a)(2)(ii)	50.73(a)(2)(x)
		20.2203(a)(2)(i)	20.2203(a)(3)(ii)	50.73(a)(2)(iii)	73.71
		20.2203(a)(2)(ii)	20.2203(a)(4)	50.73(a)(2)(iv)	OTHER
		20.2203(a)(2)(iii)	50.36(c)(1)	50.73(a)(2)(v)	Specify in Abstract below or in NRC Form 366A
		20.2203(a)(2)(iv)	50.36(c)(2)	X 50.73(a)(2)(vii)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Roy A. Radloff, Licensing Engineer	(402) 825-5117

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
B	SB	RV	T020	Y						
B	SB	RV	D243	Y						

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

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

While in cold shutdown for the current refueling outage (RE17), eight Safety Relief Valves (SRVs) were removed and sent to the Wyle testing facility in Banning, California for testing in accordance with CNS Technical Specifications (TS). In the period between April 9-13, 1997, all eight of the SRV lift pressures were found higher than the TS Limiting Safety System Settings tolerance of +/- 11 psi, (1%).

The cause of the SRV setpoint drift is attributed to corrosion bonding of the pilot disc to the pilot seat, (NUREG 1022, Appendix B, Cause Code B - Design, Manufacturing, Construction/Installation). CNS installed the Boiling Water Reactor Owners Group (BWROG) recommended Platinum-Stellite pilot disc in four SRVs during 1994. Test results for RE16 showed promising performance improvements after nine months of service. Performance data for the Platinum-Stellite disc has been extrapolated to indicate that the SRVs should remain within the Proposed CNS Improved Technical Specification (iTS) setpoint limits (+/- 3%) for an operating cycle of no more than ten and one half (10.5) months. CNS will continue to monitor industry efforts to resolve the corrosion bonding issue and implement appropriate maintenance and/or modification activities during a mid-cycle outage. The outage will be scheduled during a window that ensures the valves will be in service for no longer than ten and one half (10.5) months.

In addition, three Safety Valves (SVs) were also tested at the same facility in accordance with CNS TS. In the period between April 9-11, 1997, two of the SV lift pressures were found to be lower, and the remaining SV lift pressure was found to be higher than TS Limiting Safety System Setting tolerance of +/- 13 psi, (1%).

Failure of the Safety Valves to meet a +/- 1% tolerance appears to be a result of the tolerance being too restrictive, (NUREG 1022, Appendix B, Cause Code B - Design, Manufacturing, Construction/Installation). Past performance indicates that the repeatability of the lift pressure set spring is within the Proposed CNS ITS tolerance of +/- 3%. The SVs are considered to be functioning as designed. The only previous failure of a SV which experienced a setpoint drift above the +/- 13 psi (1%) tolerance, was determined by the manufacturer to be indicative of normal vaive performance.

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

PLANT STATUS

Cooper Nuclear Station (CNS) was in cold shutdown for the current refueling outage (RE17) at the time of discovery.

EVENT DESCRIPTION

Eight Safety Relief Valves (SRVs) [EIIS identifier - RV] were removed and sent to the Wyle testing facility in Barstow, California for testing in accordance with CNS Technical Specifications (TS). In the period between April 9-13, 1997, all eight of the SRV lift pressures were found higher than the TS Limiting Safety System Settings tolerance of +/- 11 psi, (1%).

In Addition, three Safety Valves (SVs) [RV] were also tested at the same facility in accordance with CNS TS. In the period between April 9-11, 1997, two of the SV lift pressures were found to be lower, and the remaining SV lift pressure was found to be higher than TS Limiting Safety System Setting tolerance of +/- 13 psi, (1%).

The SVs and SRVs were refurbished as necessary and recertified. New style 0.3% Platinum-Stellite pilot discs were used in the SRVs. The results of the testing are as follows:

Location	S/N	Set Press	As Found 1st,2nd,3rd Lifts	% Drift (Neg. value)	Test Date
MS-RV-70ARV	BL-02463	1240	1217, 1219, abort	(1.85), (1.69), n/a	04/09/97
MS-RV-70BRV	BL-02462	1240	1226, 1201, abort	(1.13), (3.14), n/a	04/10/97
MS-RV-70CRV	BL-02461	1240	1262, 1243, abort	1.77, 0.24, n/a	04/11/97
MS-RV-71ARV	382	1100	1167, 1110, 1106	6.09, .091, 0.55	04/10/97
MS-RV-71BRV	384	1100	1165, 1107, 1107	5.91, 0.63, 0.63	04/13/97
MS-RV-71CRV	383	1090	1209, 1085, 1084	10.92, (0.46), (0.55)	04/12/97
MS-RV-71DRV	387*	1080	1122, 1088, 1085	3.88, 0.74, 0.46	04/09/97
MS-RV-71ERV	377*	1090	1185, 1088, 1084	8.72, (0.18), (0.55)	04/11/97
MS-RV-71FRV	381*	1080	1114, 1079, 1080	3.14, (0.09), none	04/11/97
MS-RV-71GRV	376*	1100	1135, 1110, 1110	3.18, 0.9, 0.9	04/11/97
MS-RV-71HRV	386	1090	1168, 1105, 1101	7.16, 1.38, 1.01	04/13/97

* Denotes valves with BWROG recommended platinum stellite discs.

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CAUSE

The cause of the SRV setpoint drift is attributed to corrosion bonding of the pilot disc to the pilot seat, (NUREG 1022, Appendix B, Cause Code B - Design, Manufacturing, Construction/Installation).

The SRVs installed at CNS are Target Rock Model 7567F two stage pilot actuated valves which are typical of the valves used for BWRs. Setpoint drift of the Target Rock SRVs above their required setpoint tolerance of one percent has been an industry wide problem for which the BWR Owners Group (BWROG) has been actively pursuing resolution for over ten years. Industry information has identified that radiolytically produced hydrogen and oxygen can concentrate in the immediate vicinity of the pilot disc and seat interface as a result of the condensation of reactor steam. The BWROG concluded in approximately 1992 that the major contributor to corrosion induced upward setpoint drift is concentrated oxygen, which increases the electro-chemical potential of the pilot disc material. The BWROG recommended replacing the Stellite 6 pilot discs in the SRVs with new pilot discs of Stellite 6 alloyed with 0.3% platinum (Stellite 6^{b}). The platinum acts as a catalyst to recombine the oxygen and hydrogen in the vicinity of the disc and seat interface to maintain the oxygen concentration to a level consistent with a very low corrosion rate.

CNS has been operating continuously from December 1995 until March 1997 with the exception of a short duration reduction in power in January 1996 to accomplish turbine generator repairs, and a ten day outage in June 1996 to replace a leaking fuel assembly. Four of the SRVs were equipped with the BWROG recommended Platinum-Stellite pilot discs. These Platinum-Stellite discs had been installed during the 1994 extended mid-cycle outage. Three of the four SRVs equipped with the new discs had passed the previous outage (RE16) as-found testing Technical Specification setpoint tolerance of +/-1%. The three SRVs were reinstalled without performing any refurbishment activities prior to installation. The combined service time for the discs in these valves was twenty-four months. The fourth SRV equipped with the Platinum-Stellite disc failed as-found testing 1% tolerance during RE16 and was refurbished prior to reinstallation for the last cycle of operation.

Testing performed at South West Research Institute on two of the pilot discs, one Platinum-Stellite alloy and one Stellite 6, confirmed that corrosion induced bonding indications were present for both of the pilot discs.

Failure of as-found setpoint testing for SRVs has been an industry wide problem for several years. Eight SRVs were tested in October 1995 with the result that four of the eight were higher than their required tolerance of +/- 11 psi. Eight SRVs were tested in December 1994 with four of the eight valves having test results higher than the required tolerance, and one was below the tolerance. Eight SRVs were tested in 1993 with seven of the eight valves having test results higher than the required tolerance. A review of previous failures has revealed no correlation between the magnitude of setpoint drift and either location or serial number.

The SVs are model 3777QA RT22 spring loaded valves which are typical for Main Steam applications in BWRs and PWRs. Failure of the Safety Valves to meet a +/- 1% tolerance appears to be a result of the tolerance being too restrictive, (NUREG 1022, Appendix B, Cause Code B - Design, Manufacturing, Construction/Installation). A primary causal factor for downward drift is valve seat leakage. This is widely accepted in the industry. There was no evidence of seat leakage present for the two SVs which lifted at a lower pressure than the setpoint tolerances. The only previous failure of a SV which experienced a setpoint drift on the high side of the +/- 13 psi (1%) tolerance, was determined by the manufacturer to be indicative of normal valve performance (LER 88-009). Past performance indicates that the repeatability of the lift pressure set spring is within the Proposed CNS ITS tolerance of +/- 3%. The SVs are considered to be functioning as designed.

Industry experience was previously reviewed by a search of the NPRDS data base for similar failures (LER 95-017-01). Approximately 70 SV failures were reviewed from six plants. Roughly two out of three of the SV failures at these facilities were as-found setpoint below the acceptable range.

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

CNS experience is consistent with the nuclear industry experience. Roughly two out of three of the CNS SV failures were as-found setpoints below the acceptable range.

SAFETY SIGNIFICANCE

General Electric (GE) has previously performed a bounding analysis for CNS to identify the upper bound for SRV and SV pressure lift setpoint drift (NEDC-31628P, SRV Setpoint Tolerance Analysis For Cooper Nuclear Station, October 1988). The GE analysis, based on the CNS limiting over-pressure event of MSIV Closure with Flux Scram, shows that as long as the SRVs all lift at or below 1210 psig and the SVs all lift at or below 1277 psig, there will be adequate margin available to avoid any potential plant safety concerns and there is no significant safety impact in vessel over pressure margin, thermal limits, ECCS/LOCA performance, HPCI/RCIC performance, containment response, containment integrity, or steam line integrity. Appendix C of the Supplemental Reload Licensing Report (SRLR) for Cycle 17 documents the reload analysis of over pressure events using a +/- 3% setpoint tolerance and also documents the analysis performed using the upper limit values of NEDC-31628P. In the case of the results from RE-17, the SRVs lifted at various pressures ranging from 1114 psig to 1209 psig and the SVs lifted between 1217 and 1262 psig. These lift pressures are well below the bounding case of all of the SRVs at 1210 psig and all of the SVs at 1277 psig.

CNS has identified that the bounding analysis for 1210 psig upper bound setpoint on the SRVs and 1277 psig for the SVs did not include the Anticipated Transient Without Scram (ATWS) Analysis. CNS is contracting with GE to conduct this analysis, which is expected to demonstrate that with the upper bound setpoint for the SRVs and SVs, CNS can meet the licensing basis requirements for ATWS pressures as well. The results of this analysis are expected to be available in November 1997.

The reduced lift setpoint of the SVs is not a safety concern since a lower setpoint will ensure that the valve will open to provide over-pressure protection for the vessel. The reduced lift setpoint could be an operational concern, but in this case, substantial margin remained between the normal operating pressure of approximately 1000 psig and the lowest as-found setpoint of 1217 psig.

CORRECTIVE ACTIONS

Data obtained from previous operating cycles indicates that the BWROG recommended 0.3% Platinum-Stellite pilot disc does not completely solve the corrosion bonding problem, but does improve the ability of the SRVs to meet the Technical Specification Safety Setting limits. The data also indicates that longer cycles seem to reduce the performance of the Platinum-Stellite discs. Based on this data, CNS has refurbished all eight SRVs with new Platinum-Stellite pilot discs prior to reinstalling the valves for the upcoming cycle. The performance data has been extrapolated to indicate that the SRVs should remain within CNS Proposed ITS Technical Specification setpoint limits for an operating cycle of no more than ten and one half (10.5) months. CNS is also concurrently pursuing a TS Change to expand the tolerance of the Safety Setting limit for the SRV setpoint to +/- 3%, (NLS970091), dated May 2, 1997. CNS will continue to monitor industry efforts to resolve the corrosion bonding issue and implement appropriate maintenance and/or modification activities during a mid-cycle outage. The outage will be scheduled during a window that ensures the valves will be in service for no longer than 10.5 months.

A summary of corrective actions follows:

1. CNS has installed new Platinum-Stellite pilot discs in all eight SRVs prior to reinstallation.

2. CNS will continue to monitor industry efforts associated with resolving SRV setpoint drift.

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3. CNS will shutdown within a window such that the SRVs will be in service for no more than a 10.5 months as committed to in submittal (NLS970091), Confirmation of Commitment, P. D. Graham to USNRC dated May 2, 1997. During this shutdown CNS will implement appropriate maintenance and/or modification activities to ensure SRV setpoints will remain within TS limits.

PREVIOUS EVENTS

LER 95-017 Safety/Relief and Safety Valves Found Outside Technical Specification Limiting Safety System Setting

LER 94-033 Safety Relief Valve Setpoint Variance Not Within Technical Specification Limits

LER 93-013 Safety/Relief and Safety Valve Setpoint Variance Not Within Technical Specification Limits

LER 91-015 Safety/Relief and Safety Valve Setpoint Variance Not Within Technical Specification Limits

LER 90-003 Safety/Relief and Safety Valve Setpoint Variance Not Within Technical Specification Limits

LER 89-015 Safety Relief Valve Setpoint Variance Not Within Technical Specification Limits

LER 88-009 Setpoint Variance and Operability Concerns Associated With Safety Relief Valves Discovered During Surveillance Testing

LER 86-032 Main Steam Safety Relief Valve Setpoint Drift and Stuck Pilot Valve Inoperability Discovered During Scheduled Valve Testing and Refurbishment

LER 85-003 Setpoint Drift of Safety and Safety Relief Valves

Correspondence No: NLS970096

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 to the NRC for the NRC's information 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	COMMITTED DATE OR OUTAGE
CNS is contracting with GE to conduct an analysis which is expected to demonstrate that with the upper bound setpoint for the SRVs and SVs, CNS can meet the licensing basis requirements for ATWS pressures. The results of this analysis are expected to be available in November 1997.	N/A