Nebraska Public Power District
Nebraska's Energy Leader

NLS2002002
January 8, 2002

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

Subject: Licensee Event Report No. 2001-007
Cooper Nuclear Station, NRC Docket 50-298, DPR-46

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

Sincerely,

J. A. Hutton
Plant Manager

/dwv
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 (7-2001) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 7-31-2004

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LICENSEE EVENT REPORT (LER)

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

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Cooper Nuclear Station	05000298	1 OF 4

4. TITLE

Excessive Primary Containment Leakage Discovered During Local Leak Rate Testing of Reactor Feedwater Check Valves

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	09	2001	2001	– 007 –	0	01	08	2002	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE	5
10. POWER LEVEL	000

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

	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)		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)	x	50.73(a)(2)(ii)(A)		50.73(a)(2)(viii)(B)		

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
Paul Fleming, Licensing Manager	402-825-2774

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	SJ	ISV	A391	Y					

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

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

On November 9, 2001 during refuel outage RE20, due to exceeding the test equipment capability, local leak rate tests (LLRTs) could not quantify the valve leakage through three of the four reactor feedwater check valves (RFCVs). As a result the Primary Containment Leak Rate requirements of the Cooper Technical Specifications Administrative Controls Section 5.5.12 were exceeded. The plant was in Mode 5, refueling operations, at the time of discovery. All three valves were declared inoperable. The fourth RFCV passed as-found LLRT, but subsequently failed LLRT following maintenance.

The root cause for the RFCVs LLRT failures is that the technical understanding of the dual (soft) seat design was incorrect. This resulted in not maintaining the metal-to-metal hard seats in a condition to provide adequate sealing capability at higher differential pressure.

Immediate corrective action taken was to restore valve condition. Three RFCVs were reconditioned with the soft seat design maintained. The remaining RFCV was reconditioned with the soft seat removed. As-left LLRTs were satisfactory. Long term corrective action will be to: 1) revise the maintenance procedure to reflect lessons learned, 2) revise preventive maintenance to have the maintenance procedure actions performed each cycle, and 3) review historical LLRT records to determine if there are other primary containment isolation valves that have a history of repetitive failure.

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

PLANT STATUS

Cooper Nuclear Station (CNS) was in Mode 5, refueling operations, at the time of discovery for the identified condition.

BACKGROUND

The safety objective of Primary Containment [EIIS:NH] is to provide the capability, in conjunction with other engineered safeguard features, to limit the release of fission products in the event of a postulated design basis accident so that offsite doses will not exceed the guideline values set forth in 10CFR100. The Technical Specification (TS) operability requirements for Primary Containment Isolation Valves (PCIVs) [EIIS:ISV] help ensure that an adequate primary containment boundary is maintained during and after an accident by minimizing potential leakage paths to the environment.

Maintaining the primary containment operable requires compliance with the visual examinations and leakage rate test requirements of the Primary Containment Leakage Rate Testing Program. 10CFR50, Appendix J, Option B, Type-C Local Leak Rate Tests (LLRT's) are periodically performed on the testable containment isolation valves including the Reactor Feedwater Check Valves (RFCVs) [EIIS:ISV] in accordance with TS. These tests are in conformance with current requirements of 10CFR50, Appendix J, with certain NRC approved exceptions. LLRTs are performed with air at a pressure of 58 pounds per square inch unless specific exceptions have been approved by the NRC. The test duration is of sufficient length to determine repeatable results.

The primary containment boundary for feedwater lines is made up of two RFCVs in series on each 18" reactor feedwater (RF) line A or B. RF outboard and inboard check valves are RF-CV-13CV, -14CV on line A and -15CV, -16CV on line B. The function of these valves is to prevent backflow to the feedwater pumps [EIIS:SJ;P] and act as isolation valves for primary containment. The check valves must open during feedwater system operation and close when the feedwater system [EIIS:SJ] is not in operation. The check valves must also close to maintain the primary containment pressure boundary.

The RFCVs are Anchor Darling 18 inch, 900 pounds per square inch tilting disc check valves. The valves are essential and seismic Class IS. The valves must meet the requirements of 10CFR50, Appendix J, Type C Testing and they are included in the In-Service Testing and Check Valve Surveillance Programs.

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

EVENT DESCRIPTION

On November 9, 2001, the LLRT for RF-CV-13CV, RF-CV-14CV, and RF-CV-15CV could not quantify the valve leakage due to exceeding the test equipment capability. As a result the Primary Containment Leak Rate requirements, La, of the Cooper Technical Specifications Administrative Controls Section 5.5.12 were exceeded. The plant was in Mode 5, refueling operations at the time of discovery. All three valves were declared inoperable. This was reported to the NRC per 10CFR50.72(b)(3)(ii)(A). RF-CV-16CV passed as-found LLRT, but failed LLRT following maintenance.

BASIS OF REPORT

The RFCVs LLRT failures are characterized as a condition that results in the nuclear power plant, including its principal safety barriers, being seriously degraded. This is reportable per 10CFR50.73(a)(2)(ii)(A).

CAUSE

When the RFCVs have a differential pressure across the disc (compressed to the point of the metal seating surfaces making contact) and the hard seats have imperfections (low spots), leakage by the hard seat can cause erosion in the soft seat and soft seat compression can cause permanent, non-uniform deformation. The erosion and non-uniform deformation of the soft seat can cause a leakage path across the soft seat at lower differential pressures, i.e. LLRT testing.

The root cause for the three RFCVs failing the RE20 as-found LLRT is that the technical understanding of dual (soft) seat design was incorrect. This resulted in not maintaining the metal-to-metal hard seats in a condition to provide adequate sealing capability at higher differential pressure.

SAFETY SIGNIFICANCE

The RFCVs provide primary containment isolation in the event of fission product release and reactor coolant pressure boundary isolation in the event of a RF line break. The outboard RFCVs provide both a containment pressure boundary and injection flow boundary for high pressure injection, while the inboard RFCVs function as a backup containment pressure boundary. Gross failure of the valves could adversely impact primary containment isolation, reactor coolant pressure boundary and high pressure core injection functions. Inspection found that the RFCVs were fully closed, were not bound and in the fully seated position. The "as-found" seat leakage pathway was no more than 0.002 inches for the entire circumference of the seat facing for the failed valves. The "as-found" evaluation indicates that LLRT failure is primarily the result of soft seat degradation. The valves were inspected and the leakage pathway quantified such that while the expected leakage had an incremental effect on core damage frequency and large early release frequency, the risk

impact is negligible and is enveloped by the baseline Level 1 and Level 2 PSA model. Therefore, the degraded soft seats do not create a safety significant condition that would result in an unacceptable increase in radiological risk.

CORRECTIVE ACTIONS

Immediate Actions

1 RF-CV-13, RF-CV-14, and RF-CV-15 valve condition was restored and the valves passed as-left LLRT. Additionally, RF-CV-14 was modified to eliminate the soft seat and associated hardware from the valve disc.

2. RF-CV-16 valve condition was restored and it passed as-left LLRT.

Long Term Actions

1. Revise maintenance procedure to reflect lessons learned from RE20 RFCV maintenance. (Due 3/15/2002)

2. Revise preventive maintenance program to require RE20 maintenance actions in the maintenance procedure to be performed each cycle. (Due 3/15/2002)

3. Review historical LLRT records to determine if other PCIVs have a history of repetitive failure. Results of this review will be addressed by the corrective action program. (Due 3/15/2002)

PREVIOUS EVENTS

March 2000	RF-15CV failed LLRT with an unquantifiable leak rate
October 1998	RF-14CV, RF-15CV, and RF-16CV failed LLRT

Correspondence Number: NLS2002002

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 for information only and are not regulatory commitments. Please notify the NL&S Manager at Cooper Nuclear Station of any questions regarding this document or any associated regulatory commitments.

COMMITMENT	COMMITTED DATE OR OUTAGE
Revise maintenance procedure to reflect lessons learned from RE20 RFCV maintenance.	3/15/02
Revise preventive maintenance program to require RE20 maintenance actions in the maintenance procedure to be performed each cycle.	3/15/02
Review historical LLRT records to determine if other PCIVs have a history of repetitive failure. Results of this review will be addressed by the corrective action program.	3/15/02