Nebraska Public Power District
Nebraska's Energy Leader

NLS2000005
January 31, 2000

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

Gentlemen:

Subject: Licensee Event Report No. 1999-009
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. McDonald
Plant Manager

/rar
Enclosure

cc: Regional Administrator
USNRC - Region IV

Senior Project Manager
USNRC - NRR Project Directorate IV-1

Senior Resident Inspector
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NRC FORM 366 (6-1998) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 06/30/2001

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 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. If 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)

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TITLE (4)

Failure to Meet Acceptance Criteria Associated with Reactor Equipment Cooling System Operability Requirements Results in Non-Compliance with Technical Specification Limiting Condition for Operation 3.7.3

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
										05000
12	30	1999	1999	-- 009 --	00	1	31	2000	FACILITY NAME	DOCKET NUMBER
										05000

OPERATING MODE (9)	1
POWER LEVEL (10)	100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

	20.2201(b)		20.2203(a)(2)(v)	X	50.73(a)(2)(i)
	20.2203(a)(1)		20.2203(a)(3)(i)		50.73(a)(2)(ii)
	20.2203(a)(2)(i)		20.2203(a)(3)(ii)		50.73(a)(2)(iii)
	20.2203(a)(2)(ii)		20.2203(a)(4)		50.73(a)(2)(iv)
	20.2203(a)(2)(iii)		50.36(c)(1)		50.73(a)(2)(v)
	20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)

	50.73(a)(2)(viii)
	50.73(a)(2)(x)
	73.71
	OTHER
	Specify in Abstract below or in NRC Form 366A

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
S. R. Mahler, Assistant Manager Nuclear Licensing and Safety	(402) 825-3811

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
X	CC	FCU	N191	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)

On December 30, 1999 at 0850, a leak with the potential to impact the operability of the Reactor Equipment Cooling (REC) [EIIS:CC] system was identified. System walkdowns and a corresponding increase in drywell unidentified leakage rate indicated that the REC leak was located in the drywell. Increased system inventory monitoring identified a slow increase in the leak rate, and the REC system was declared inoperable in accordance with acceptance criteria associated with Technical Specification Limiting Condition for Operation 3.7.3 at 1600 hours.

At 2130 on December 30, 1999, the Nuclear Regulatory Commission verbally granted a Notice of Enforcement Discretion (NOED) which allowed continued operation of Cooper Nuclear Station (CNS). The safety basis of the NOED was contained in a previously submitted License Amendment request which would permit an increase in REC system leakage and the use of the Service Water [EIIS:KW] system to provide required cooling in a post Loss of Coolant Accident condition. The REC system leakage rate continued to increase and CNS initiated a controlled shutdown to identify and isolate the leak at 1152 on January 8, 2000. The NOED was no longer required upon entry into Mode 3.

Subsequent activities identified leakage in one of the drywell fan coil units (FCU) [EIIS:FCU] which corresponds to the previously identified leakage rate. The apparent cause of the leakage is a form of pitting corrosion. The FCU has been isolated from the system until it can be replaced during the refueling outage scheduled for March 2000.

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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 Mode 1 at approximately 100 percent power at the time of this event.

BACKGROUND

The following discussion represents the current interpretation of the design and licensing basis for the Reactor Equipment Cooling (REC) system:

The REC [EIIS:CC] system is designed to provide cooling water for the removal of heat from equipment required for a safe reactor shutdown (essential loads) following a Design Basis Accident (DBA) or transient. The REC System also provides cooling to unit components, as required, during normal operation (non-essential loads). In the event of a loss of REC system pressure, automatic valving [EIIS:20] is provided to shut off supply to non-essential loads, thus assuring supply to the essential loads.

The REC System consists of two subsystems, each consisting of two pumps [EIIS:P], a heat exchanger [EIIS:HX], valves, piping and associated instrumentation. A surge tank [EIIS:TK], located at the highest point of the system, accommodates system volume changes, maintains static pressure in the system, detects gross leaks in the REC System, and provides a means for adding water. Either of the two subsystems is capable of providing the required cooling capacity to support the required systems with one REC pump operating. The two subsystems have sufficient redundancy and independence from each other such that no active component failure in one subsystem will affect the operability of the other. Additionally, each subsystem is provided with Service Water (SW) [EIIS:KW] backup cross tie valves to provide required component cooling in the event of a passive failure, such as a Class I seismic pipe break.

Cooling water is pumped by the REC pumps, delivered to the REC heat exchangers, which are cooled by the Service Water system, and then to the components through two main headers. After removing heat from the components, the water is recirculated back to the REC pump suction.

Either REC subsystem has sufficient capacity with one pump operating to transfer the essential services design cooling heat load during postulated transient or accident conditions.

The REC subsystems are independent of each other to the degree that each has separate controls, power supplies, and the operation of one does not depend on the other. In the event of a DBA, one subsystem of REC is required to provide the minimum heat removal capability assumed in the safety analysis for the system to which it supplies cooling water. To ensure this requirement is met, two subsystems of REC must be operable. At least one subsystem will operate, if the worst single active failure occurs coincident with the loss of offsite power.

A subsystem is considered operable when it has two operable pumps, one operable heat exchanger, and an operable flow path capable of transferring the water to the appropriate equipment. Each REC subsystem's operability requires that its service water backup cross tie valves be operable. The operability of the REC system is also based on having a visible water level in the surge tank gauge glass and a maximum supply water temperature of 95°F.

The source of make-up water to the REC system is the non-essential Demineralized Water system [EIIS:KC]. In the event of a DBA, this make-up water source can not be relied on to perform its intended function. System leakage limits, measured by level changes in the surge tank, were established and incorporated into

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daily operator rounds to ensure the REC system was capable of supplying long term (30 day) post DBA cooling requirements.

The primary area coolers supplied by the REC system are the Reactor Building Emergency Core Cooling System pump quad fan coil units (FCU), the High Pressure Coolant Injection (HPCI) room cooler, and the drywell FCUs. The cooling coils for these units, with the exception of the HPCI unit, are manufactured from 5/8 inch diameter 0.049 inch wall thickness copper tubes corresponding to UNS C12200. The cooling coils for the HPCI unit are also manufactured from copper.

EVENT DESCRIPTION

The December 30, 1999 station operator tour, completed at 0850, identified a decrease in the REC surge tank level indicative of a potential leak in the system which could impact the operability of the REC system. The accessible portions of the system were walked down with no significant leakage noted. During the regularly scheduled pump down of the drywell floor drain sump, completed at 0800, a corresponding increase in drywell unidentified leakage was noted. Increased monitoring of the REC system inventory identified a slow but steady increase in the leak rate. At 1600 on December 30, 1999, both subsystems of REC were declared inoperable in accordance with the requirements of Technical Specification (TS) Limiting Conditions for Operation (LCO) 3.7.3 due to system leakage.

The District subsequently requested and was verbally granted discretion in the enforcement of the Required Actions Completion Time requirements of TS LCO 3.7.3 at 2130 on December 30, 1999. The safety basis of the Notice of Enforcement Discretion (NOED) is contained in a previously submitted proposed License Amendment request which would allow an increase in the REC system allowable leakage (require the REC system water inventory to be sufficient to supply required cooling for 7 days vs. 30 days), and the use of the Service Water system to provide cooling to the REC system critical headers in a post Loss of Coolant Accident Condition. The granting of the NOED would also avoid undesirable transients as a result of forcing compliance with the TS and, thus, minimize potential safety consequences and operational risks.

The observed rate of leakage continued to increase and at 1152 on January 8, 2000, Cooper Nuclear Station entered Mode 3 to identify and isolate the leakage in the inaccessible portions of the REC system. The NOED was no longer required upon entering Mode 3. CNS entered Mode 4 at 2353 on January 8, 2000, with no indication that the established leakage rate was exceeded.

Subsequent activities identified leakage in drywell fan coil unit "C" which can be closely correlated to the level changes observed in the REC system surge tank. The leaking fan coil unit has been isolated from the system and the NOED is being closed.

BASIS OF REPORT

This event is reportable under the requirements of 10CFR50.73(a)(2)(I) as any operation or condition prohibited by the plant's Technical Specifications.

CAUSE

The apparent cause of the REC system leakage is a form of pitting corrosion that is occurring within the drywell fan coil units. The root cause of the pitting corrosion cannot be positively determined until a sample from the leaking drywell fan coil unit has been obtained and analyzed. The drywell fan coil units were

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inspected during the forced outage of September of 1999 and positive leaks were identified in 2 (FCU "B" and "D") of the 4 units. During the forced outage of January of 2000, a leak was identified in "C" drywell fan coil unit.

Samples from a Reactor Building quad fan coil unit that also exhibited leakage in September of 1999 were analyzed by Structural Integrity Associates, Inc. with the following results: "The apparent root cause of the through-wall pitting appeared to be underdeposit corrosion beneath iron-rich products from the corrosion of the carbon steel piping upstream of the cooler." The cooler materials that are presently experiencing this type of corrosion are copper-based alloys.

A potential contributing cause of declaring the REC system inoperable and the subsequent request for the NOED is that the design and licensing bases of the SW backup to REC cross-tie is not readily available.

SAFETY SIGNIFICANCE

The safety significance of this event is low. Operation with increased leakage limits for the REC system with reliance on the SW system to provide a backup source of cooling for the system critical headers was previously evaluated for the proposed License Amendment request. The evaluation concluded that there are no significant safety concerns associated with operation of the plant in the configuration associated with this event. A separate evaluation concluded that the operating characteristics of the REC system and the materials of the fan coil unit cooling coils would not lead to a catastrophic loss of REC system function.

In addition, a Probabilistic Safety Assessment analysis of the event was evaluated in four phases: the time of the event until beginning of shutdown, plant shutdown transition to cold shutdown, plant in cold shutdown, and plant startup transition to full power. The results indicate that the incremental increases in Core Damage Probability (CDP) and Large Early Release Probability (LERP) were well within the acceptance threshold for temporary increases in CDP (1.0E-06) and LERP (1.0E-07.) It should be noted that the increase in CDP and LERP were due to plant shutdown evolutions, not the effects of REC system leakage on continued operation.

Problem Identification Report (PIR) 4-05831 was written on December 30, 1999, and has been evaluated as a non-functional failure. This was based on an observed decrease in REC surge tank level of 1 5/8 inches between December 29, 1999 at 0815 and December 30, 1999 at 0850. This leakage is within the limits for the REC system to remain operable for 30 days post Loss of Coolant Accident (LOCA).

PIR 4-05842 was written on December 31, 1999, and has been evaluated as a Maintenance Rule functional failure. This was based on an observed decrease in REC surge tank level of 6 inches between December 30 at 0850 and December 31 at 0702. This leakage is outside the design basis analytical limits for the REC system to remain operable for 30 days post LOCA.

CORRECTIVE ACTIONS

Immediate Corrective Actions:

Based on a license change request that was previously submitted to the NRC to "allow SW to serve as a backup to REC system post LOCA," and supplemental information provided by CNS, enforcement discretion was requested and granted "from the Required Action Completion Time requirements of Cooper Nuclear

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Station (CNS) Technical Specification Limiting Conditions of [for] Operation (LCO) 3.7.3." Compensatory measures associated with the NOED included:

> "Operations crews on shift this weekend have been briefed on the NOED and the license amendment information. This briefing covered REC vulnerabilities and NRC concerns during certain postulated accident scenarios. Operations crews not working this weekend will be briefed as they return to shift rotation.
>
> CNS TS require monitoring of the REC Surge Tank level on a once per 24-hour frequency. As a compensatory measure, the Operations department has initiated administrative guidance to monitor the Surge Tank level every two hours to ensure changes are noticed and responded to in a timely manner.
>
> ..... If the REC system inventory leakage rate should increase to a point that compliance with the proposed seven-day inventory requirement cannot be met, CNS will comply with the actions statements in TS LCO 3.7.3."

Completed Interim Corrective Actions:

CNS entered Mode 3 at 1152 on January 8, 2000, and the NOED was no longer required. Inspection of the fan coil units identified the "C" drywell fan coil unit cooling coil to be the source of the leak. No leaks were observed in the "A", "B" or "D" units or other components cooled by REC within the drywell. Leakage from the "C" unit was consistent with the observed surge tank level decrease prior to the plant shutdown. The calculated leakage rate from the "C" unit was not in excess of the established leakage limits.

The piping to the "C" drywell fan coil unit cooling coil has been blind flanged to prevent further leakage from this unit.

Other Corrective Actions:

CNS will replace the four drywell fan coil unit cooling coils during Refueling Outage RE-19 scheduled for March 2000.

CNS will obtain a sample from "C" drywell fan coil unit and have the sample sent for analysis to confirm the failure mechanism. This action will be completed within 30 days of startup from RE-19.

CNS will evaluate the current licensing and design bases for the SW-REC intertie to ensure it is being applied appropriately. This action will be completed by March 20, 2000.

PREVIOUS EVENTS

Two previous events related to REC system inventory or the request for NOED have been identified.

LER 97-008 documents the CNS request for Enforcement Discretion from the actions of TS 3.7.A.5.d (prior to implementation of Improved Technical Specifications). The actions of this specification required the reactor to be in a cold shutdown condition within 24 hours, if the requirements of TS 3.7.A.5.b (limiting the time period the reactor could be in the Run mode with oxygen concentration greater than 4 percent by volume to 24 hours) could not be met. A drywell entry was made with the plant at approximately 15%

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power to repair leaking feedwater vent valves. The previous TS requirements for Containment Oxygen Concentration, coupled with a procedural inadequacy associated with Containment inerting, did not allow sufficient time to perform the drywell entry and re-inert Containment.

LER 97-014 documents the potential of open sample valves in the non-critical REC header to prevent the mitigation of accident consequences under certain less than DBA conditions. This event was attributed to a lack of understanding of the design basis of the system vice equipment leakage.

REFERENCES

CNS letter NLS990050, dated June 15, 1999, "Proposed License Amendment
Service Water Backup to the Reactor Equipment Cooling Post LOCA."
Cooper Nuclear Station, NRC Docket 50-298, DPR-46

CNS letter NLS990126, dated January 1, 2000, "Request for Enforcement Discretion and Supplement to Proposed License Amendment Request."
Cooper Nuclear Station, NRC Docket 50-298, DPR-46

Correspondence No: NLS2000005

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

COMMITMENT	COMMITTED DATE OR OUTAGE
CNS will replace the four drywell fan coil unit cooling coils during Refueling Outage RE-19 scheduled for March 2000.	Prior to startup from Refueling Outage RE-19
CNS will obtain a sample from "C" drywell fan coil unit and have the sample sent for analysis to confirm the failure mechanism.	30 days after startup from Refueling Outage RE-19
CNS will evaluate the current licensing and design bases for the SW-REC intertie to ensure it is being applied appropriately.	March 20, 2000