Nebraska Public Power District

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CNSS913666

April 23, 1991

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Dear Sir:

Cooper Nuclear Station Licensee Event Report 91-002, Revision 0, is being forwarded as an attachment to this letter.

Sincerely,

J. M. Meacham
Division Manager of
Nuclear Operations
Cooper Nuclear Station

JMM/bjs

Attachment

cc: R. D. Martin
G. R. Horn
R. E. Wilbur
V. L. Wolstenholm
D. A. Whitman
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NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Cooper Nuclear Station	0 5 0 0 0 2 9 8	1 OF 0 5

TITLE (4) Reactor Water Cleanup Isolation Due to High System Temperature During Plant Cooldown Caused by Failed Temperature Indication and Potential Equipment Failure

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 NAMES	DOCKET NUMBER(S)
0 3	2 4	9 1	9 1	— 0 0 2	— 0 0	0 4	2 3	9 1		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10)	0 0 0	20.402(b)	20.405(c)	X 50.73(a)(2)(iv)	73.71(b)
		20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
		20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
John R. Myers	AREA CODE 4 0 2 8 2 5 - 3 8 1 1

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	
X	C E	T E	N 2 7 5	N							
E	C T	T S	M 2 3 5	N							

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 fifteen single-space typewritten lines) (16)

On March 24, 1991, at 2:38 am and, again, at 4:15 am, Reactor Water Cleanup (RWCU) System isolations occurred as a result of high temperature conditions (140 degrees Fahrenheit) downstream of the RWCU Non-Regenerative Heat Exchangers (NRHX). At the time of these occurrences, the reactor was shutdown with the Residual Heat Removal (RHR) System in the Shutdown Cooling mode of operation. Reactor water temperature was approximately 185 degrees F. The RWCU system was aligned with a flow path open to the condenser hotwell to provide for reactor vessel level control. However, to facilitate Feedwater System maintenance, the pumps were not in operation.

Since reactor vessel level control was well established, minimal flow existed in the RWCU System. It is probable that the high temperature condition occurred due to the input of residual heat from RWCU piping and components. This condition may have been compounded had there been any backflow through the check valve in the 3/4 inch subcooling line installed between the NRHX outlet and the RWCU system inlet piping. (See attached sketch). With virtually no system differential pressure, this backflow could have existed, allowing direct input of hot water.

Neither of these isolations were preceded by any indication of system high temperature. Had such indications existed, operator action could have been taken to isolate the system. It was subsequently determined that the alarm switch and temperature indicator were defective. The root cause of these equipment failures is lack of preventive maintenance and random equipment failure. Corrective actions taken included replacement of the defective components and initiation of improvements to the Preventive Maintenance (PM) program for these components to assure their operation in the future.

A. Event Description

On March 24, 1991, at 2:38 am and 4:15 am, Reactor Water Cleanup (RWCU) System isolations occurred due to high temperature in the RWCU piping downstream of the Non-Regenerative Heat Exchangers (NRHX). In both instances, the system temperature indication was normal and no alarms were received prior to the isolation. The reactor had been shut down the preceding day and was in cold shutdown. The RWCU System had been secured at approximately 2:21 am (i.e., the demineralizers isolated, the crossover valve [M074] opened, and the RWCU pumps secured) to allow isolating the Feedwater System for maintenance.

Following the first isolation, the operating staff reviewed the available indications in the Control Room and could determine no reason for the isolation. The isolation was reset and the isolation valves reopened at 3:48 am. Following the second isolation, a station operator investigated, and determined that the high temperature isolation switch (TIS-99) was tripped. Subsequent investigation by the system engineer indicated the piping in the area was hot, and the temperature switch (TIS-99) indicated approximately 137 degrees Fahrenheit. System isolation occurs at 140 degrees F.

Based on the observed temperature difference between the Control Room and local indications, the temperature sensing elements in the piping were tested. TE-97, the thermocouple which provides Control Room indication, was found to have a grounded lead. TS-115, a temperature switch which provides the high temperature alarm, was found to be worn internally and would not actuate within the required range.

B. Plant Status

The reactor was in cold shutdown, at approximately 185 degrees F and vented. The RWCU System had been secured, with the containment isolation valves open. The RWCU System was aligned to drain to the condenser.

C. Basis for Report

Closure of the RWCU inlet isolation valves (ESF components) due to high NRHX outlet temperature, a non-ESF trip function. These events are being reported in accordance with criteria prescribed by 10CFR50.73(a)(2)(iv).

D. Cause

The isolations were caused by a high temperature condition in the piping downstream of the RWCU NRHX.

The RWCU System was aligned with a flow path open to the condenser hotwell to provide for reactor vessel level control. However, to facilitate Feedwater System maintenance, the pumps were not in operation. Since reactor vessel level control was well established, minimal flow existed in the RWCU System. It is probable that the high temperature condition occurred due to the input of residual heat from RWCU piping and components. This condition may have been compounded had there been any backflow through the check valve in the 3/4 inch subcooling line installed between the NRHX outlet and the RWCU System inlet piping. With virtually no system differential pressure, this backflow could have existed, allowing direct input of hot (185 degree F) water into this section of piping. (See attached sketch). The subcooling line is designed to prevent flashing at the RWCU pump suction by providing cooled water from the outlet of the NRHX. Contributing to this condition was the lack of correct indication (TE-97) and annunciation (TS-115) of a high temperature condition.

Testing of the thermocouple indicated a lead was grounded, causing the indication in the Control Room to read a constant 80 degrees F. It is not known how long the ground had existed. The root cause of this failure is considered to be an isolated, random failure of the component.

The internal mechanisms of the temperature switch were found to be worn, preventing actuation of the microswitch. This switch, installed in 1985, is calibrated on a four year frequency, and had satisfactorily passed its last calibration in 1988. The root cause of the switch failure is an inadequate Preventive Maintenance Program, as the switch should have been replaced prior to reaching the end of its life.

F. Safety Significance

No significant effect. The RWCU high temperature isolation is a non-safety related signal which serves to protect the RWCU demineralizer resin from the effects of high temperature. Although the temperature indication and alarm did not function as designed, the isolation function of the RWCU System performed correctly upon the high temperature condition, and the isolation valves closed as designed.

F. Safety Implications

The effect of a high temperature isolation at other plant conditions would not be significantly different. In the event of an isolation with the RWCU Pumps operating, the pumps automatically trip. Removal of the RWCU System from operation has no short term impact on reactor operation.

C. Corrective Action

The failed thermocouple and temperature switch were replaced and calibrated prior to startup from the maintenance outage. The isolation switch was confirmed to be operating correctly.

A Preventive Maintenance activity will be initiated to periodically replace the temperature switch. The frequency of the switch calibration will also be increased. Based upon recent documented calibration and response checks of installed thermocouples, the failure of TE-97 is considered to be an isolated incident. Therefore, no further corrective action is warranted.

H. Similar Events

None.

SUPPLEMENTAL INFORMATION

TE-92 is a Type T Copper Constantan 300 Series thermocouple, manufactured by Nuclear Engineering Company, Incorporated. EIIS component Code - TE

TS-115 is a Model DA-7036-153 temperature switch, manufactured by Mercoid Corporation. EIIS Component Code - TS.

EIIS System Codes

Reactor Water Cleanup - CE

NRC FORM 366A (6-89) U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

APPROVED OMB NO. 3150-0104
EXPIRES: 4/30/92
ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
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TEXT (If more space is required, use additional NRC Form 366A's) (17)