

Omaha Public Power District
444 South 16th Street Mall
Omaha, Nebraska 68102-2247
402/636-2000

April 4, 1994
LIC-94-0076

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Station P1-137
Washington, DC 20555

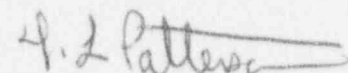
Reference: Docket No. 50-285

Gentlemen:

Subject: Licensee Event Report 94-003 for the Fort Calhoun Station

Please find attached Licensee Event Report 94-003 dated April 4, 1994. This report is being submitted pursuant to 10 CFR 50.73(a)(2)(vii). If you should have any questions, please contact me.

Sincerely,



WGG
W. G. Gates
Vice President

WGG/jrg

Attachment

c: LeBoeuf, Lamb, Greene & MacRae
L. J. Callan, NRC Regional Administrator, Region IV
S. D. Bloom, NRC Project Manager
R. P. Mullikin, NRC Senior Resident Inspector
INPO Records Center

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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 INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), 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.

FACILITY NAME (1) Fort Calhoun Station Unit No. 1	DOCKET NUMBER (2) 05000285	PAGE (3) 1 OF 5
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TITLE (4)
Inoperability of Raw Water Pumps Due to Excessive Sand Accumulation

EVENT DATE (5)			LER NUMBER (6)			REPORT NUMBER (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
03	04	94	94	-- 003	-- 00	04	04	94	FACILITY NAME	DOCKET NUMBER 05000
									FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9) 1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)									
POWER LEVEL (10) 100	20.402(b)	20.405(c)	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)	X 50.73(a)(2)(vii)	OTHER						
	20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	(Specify in Abstract below and in Text, NRC Form 366A)						
	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 James R. Geschwender, Station Licensing Engineer	TELEPHONE NUMBER (include Area Code) (402) 533-6857
--	--

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPROS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPROS
C	BI	P	B500	Y					

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE)	<input checked="" type="checkbox"/>	NO <input type="checkbox"/>	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
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ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

At 1624 on March 1, 1994, an attempt was made to start Raw Water (RW) Pump AC-10B for routine pump rotation. The Operator noted that pump motor amps appeared to stay high for a longer period of time than normal. Normally, amp meter indication will go high initially when the pump is started, but will come down after the associated pump discharge isolation valve is fully open. The Operator immediately secured the pump, AC-10B was declared inoperable and action was taken to restore the pump to operable status within Technical Specification time limits.

At 0407 on March 4, 1994, a similar incident occurred involving RW Pump AC-10C.

The primary cause of these events was determined to be elevated sand content in the river, resulting in excessive sand accumulation around the suction area of the pumps.

The normal frequency for rotation of RW pumps has been increased on an interim basis in order to minimize the possibility of excessive sand accumulation. Sparge lines will be installed at the inlets of RW pumps AC-10B and AC-10C, and an evaluation will be performed to assess whether diversion baffles should be placed on the river bed in front of the Intake Structure.

**LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION**

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (3)			PAGE (4)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Fort Calhoun Station Unit No. 1	05000285	94	-- 003 --	00	2 OF 5

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

BACKGROUND

The Fort Calhoun Station (FCS) Raw Water (RW) System is primarily designed to provide cooling for the Component Cooling Water (CCW) System, which in turn provides cooling for various plant heat loads during normal and accident conditions. Four RW pumps (AC-10A, AC-10B, AC-10C and AC-10D) are installed in the Intake Structure to provide screened river water to the CCW heat exchangers. The RW pump discharge piping is arranged as two interconnected headers, valved at the pumps and in the Auxiliary Building. Each header is designed to accommodate full flow to the CCW heat exchangers under all modes of plant operation.

The Intake Structure consists of three cells separated by concrete walls perpendicular to the river. Two cells contain one raw water pump each and one cell (Cell 'B') contains two raw water pumps (AC-10B and AC-10C).

Technical Specification (TS) 2.4 addresses operability requirements for raw water pumps. This TS allows one RW pump to be inoperable indefinitely without applying any Limiting Condition for Operation (LCO) action statement, if river water temperature is below 60 degrees Fahrenheit. When the river water temperature is greater than 60 degrees, an inoperable RW pump is to be restored to operability within seven days or the reactor is to be placed in hot shutdown.

During normal operation, one or two raw water pumps are ordinarily in operation, depending on the river temperature and the system loads. During winter months one pump is normally in service, and during summer months two pumps may be in service due to high river temperature or heavy loading of the CCW heat exchangers. Raw water pumps are normally switched each day (daily rotation) to equalize pump run time and prevent excessive sand buildup around the suction bell.

EVENT DESCRIPTION

On March 1, 1994 at 1624, with FCS in Mode 1 at approximately 100% power, an attempt was made to start RW pump AC-10C for routine pump rotation. Pump AC-10A was running at the time, and Pump AC-10D was out of service due to Intake Structure Cell 'C' having been previously isolated and pumped down for travelling screen maintenance. River water temperature was below 60 degrees F.

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

After taking the pump control switch to START, the Operator noted that motor amps appeared to stay high for a longer period of time than normal. Normally, amp meter indication will go high initially when a pump is started, but will come down after the associated pump discharge isolation valve is fully open. The Operator immediately secured the pump and AC-10B was declared inoperable, placing the plant in a seven-day LCO. Pump AC-10A remained in service.

In order to start the pump, the rotating assembly was manually rotated to dislodge accumulated sand, and the discharge isolation valve was opened. AC-10B was then successfully started and run. AC-10B was declared operable on March 1, 1994 at 2217. Also, while AC-10B was considered inoperable, Intake Structure Cell 'C' was re-flooded so that AC-10D could be returned to operable status, and AC-10C was started and run for approximately two hours to verify its operability. The frequency of RW pump rotation was temporarily increased to approximately once per twelve hours following this occurrence.

On March 4, 1994 at 0407, with FCS in Mode 1 at approximately 100% power, an attempt was made to start RW pump AC-10C for routine pump rotation. Pump AC-10B was running at the time, and Pump AC-10D was again out of service due to Intake Structure Cell 'C' having been re-isolated and pumped down for continued travelling screen maintenance. River water temperature was below 60 degrees F.

After taking the pump control switch to START, the Operator noted that motor amps appeared to stay high for a longer period of time than normal. The Operator immediately secured the pump and AC-10C was declared inoperable, placing the plant in a seven day LCO. Pump AC-10B remained in service.

In order to start the pump, the rotating assembly was manually rotated to dislodge accumulated sand, and the discharge isolation valve was opened. AC-10C was then successfully started and run. AC-10C was declared operable on March 4, 1994 at 1425. After AC-10C was run for approximately two hours, AC-10A was started for pump rotation. The frequency of RW pump rotation was temporarily increased to approximately once per eight hour shift following this occurrence.

Following review, it was determined that these events should be reported pursuant to 10 CFR 50.73(a)(2)(vii), based on the inoperability of two different RW pumps due to the same cause (i.e., excessive sand accumulation), within a relatively short period of time.

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

CONCLUSIONS

The primary cause of these events was determined to be elevated sand content in the river. Higher than normal sand content can be caused by several factors, including low river water level (which typically occurs between November and March) and/or heavy rain up-river from the plant. During such times, sand can settle out around the suction area of a secured raw water pump and accumulate significantly in a matter of days. Excessive accumulation in the area of the pump intake can result in the pump ingesting a large "slug" of sand when it is initially started. This can stop the pump from rotating, resulting in high motor amps and the potential for tripping of the associated pump motor breaker.

Intake Structure sand accumulation is not a new issue and has been identified and documented as early as 1972. More recently, three occurrences of RW pump motor breakers tripping due to excessive sand accumulation were documented in 1992, one involving AC-10B (March 1992) and two involving AC-10C (November and December 1992). Research of the operating histories of RW pumps AC-10A and AC-10D indicate that sand accumulation has not been a problem in many years. In response to these occurrences, an Engineering Change Notice (ECN 93-431) was initiated in 1993 to install sparge lines at the inlets of raw water pumps AC-10B and AC-10C. ECN 93-431 had not yet been installed when the two instances discussed in this LER occurred.

SAFETY ASSESSMENT

The safety significance of the March 1 and March 4, 1994 occurrences is considered to have been minimal. In both cases, river water temperature was below 60 degrees F, therefore one RW pump would have been sufficient to provide adequate cooling water flow in the event of a design basis accident. On both occasions two RW pumps remained operable, and TS LCO time limits for restoring operability of a third RW pump were met.

Excessive sand accumulation around the suction area of RW pumps is an issue that is potentially applicable to all four RW pumps. However, each of the recently documented occurrences (i.e., the three 1992 occurrences and the two 1994 occurrences) involved one of the two RW pumps in Intake Structure Cell 'B' (i.e., AC-10B or AC-10C). None of these occurrences involved simultaneous failure of two or more RW pumps due to excessive sand accumulation, and none of these occurrences involved failure of an operating RW pump once it has been placed in service. As a result, the probability of an event involving simultaneous common cause failures of all RW pumps is considered to be extremely low. In the unlikely event of a loss of all the RW pumps the station abnormal operating procedures direct the use of the fire protection pumps to provide cooling to the RW-CCW heat exchangers.

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CORRECTIVE ACTIONS

The following corrective actions have been or will be completed:

1. The normal frequency for rotating RW pumps has been temporarily increased to once per eight hour shift. This is being completed to minimize the possibility of excessive sand accumulation. Since this was undertaken, there have been no further incidents of sanding of the RW pumps.
2. Engineering Change Notice 93-431 is scheduled to be implemented by April 25, 1994 to install sparge lines at the inlets of RW pumps AC-10B and AC-10C. This schedule is dependent on river water temperature remaining below 60 degrees F until installation is complete, otherwise installation will be completed by December 1, 1994. Since the time that Fort Calhoun Station typically experiences sanding problems with the RW pumps (between November and March) has past, safety will not be compromised if it becomes necessary to delay this installation to December 1, 1994.
3. An evaluation will be performed to assess whether river vanes should be placed on the river bed in front of the Intake Structure to further reduce sanding. This evaluation will be based on the results of hydraulic modeling of the river and Intake Structure. This evaluation is currently scheduled to be completed by September 30, 1994.

PREVIOUS SIMILAR EVENTS

As previously discussed, there have been several occurrences of RW pump inoperability due to excessive sand accumulation. The March 1 and March 4, 1994 occurrences discussed in this LER are notable in that two different pumps were impacted within a relatively short period of time.