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SUBJECT: LER 89-017-00:on 891019,loss of turbine driven auxiliary feed pump flow retention.

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November 17, 1989

United States Nuclear Regulatory Commission
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Docket No. 50-316

Document Control Manager:

In accordance with the criteria established by 10 CFR 50.73 entitled Licensee Event Reporting System, the following report is being submitted:

89-017-00

Sincerely,

A.A. Blind
Plant Manager

AAB:clw

Attachment

cc: D.H. Williams, Jr.
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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)
D. C. Cook Plant - Unit 2	0 5 0 0 0 3 1 6	1 OF 0 5

TITLE (4)
Loss of Turbine Driven Auxiliary Feed Pump Flow Retention

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)
1 0	1 9	8 9	8 9	0 1 7	0 0	1 1	1 7	8 9		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9): 1

POWER LEVEL (10): 1 0 0

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

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)	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)	X 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
J. B. Droste - Technical Engineering Superintendent	AREA CODE 6 1 6 4 6 5 - 5 9 0 1

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

CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS	

SUPPLEMENTAL REPORT EXPECTED (14)

X YES (If yes, complete EXPECTED SUBMISSION DATE) ☐ NO

EXPECTED SUBMISSION DATE (15): MONTH 1 2 DAY 2 2 YEAR 8 9

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

On October 19, 1989 with Unit 2 in Mode 1 (Power Operation) at 100 percent Rated Thermal Power, during surveillance testing, an NRC Inspector conducting an IST Audit discovered an instrument discrepancy between the Turbine Driven Auxiliary Feedpump (TDAFP) test line flow indication and the process flow indication. The process flow instrument indicated a flow of 550 gpm while actual flow was 700 gpm. The process flow instrumentation actuates a flow retention signal when the TDAFP flow reaches 975 gpm to prevent pump runout. The flow retention function would have actuated at a TDAFP flow of approximately 1225 gpm and would not have prevented pump runout, in the event of an accident such as a feedwater line break. The flow and process instrumentation for the other Unit 1 and 2 Auxiliary Feedwater Pumps was checked, no similar deficiencies exist.

The cause for the flow instrument error is almost certainly an incorrectly sized orifice. This has not been confirmed as an extended outage will be needed to remove the process instrument orifice due to its location.

The flow retention actuation setpoint was reset to an acceptable value. This deficiency was originally discovered in 1978. The 1978 event is being investigated. An updated report will be submitted by December 22, 1989.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
D. C. Cook Plant Unit 2	0 5 0 0 0 3 1 6	8 9	— 0 1 7	— 0 0	0 2 OF 0 5

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

CONDITIONS PRIOR TO OCCURRENCE:

Unit 2 in Mode 1 (Power Operation), at 100 percent Rated Thermal Power.

DESCRIPTION OF EVENT:

On October 19, 1989 at 0900 hours, an NRC Inspector conducting an IST Audit discovered an instrument discrepancy between the Turbine Driven Auxiliary Feedpump (TDAFP) (EIIS/BA-P) test line flow indication (FFX-253) and the in-series process flow indicating switches (FFS-258 and FFS-260)(EIIS/BA-FS). Attached is a drawing describing the configuration of these instruments. Instrumentation at the process flow switches indicated a flow of 550 GPM while test instrumentation indicated a flow of 700 GPM. The process flow switch actuates a flow retention signal when the TDAFP flow reaches 975 GPM. This flow retention function prevents pump runout during a feedwater line break. With the process instrumentation reading 78 percent of actual flow, the flow retention function would have actuated at a TDAFP approximate flow of approximately 1225 GPM. Therefore, flow retention would not have actuated before pump runout occurred. The process flow indication had not been used for testing since 1978. The test orifice had been used exclusively.

On November 10, 1989, this event was determined to be reportable. A one-hour notification was made to the NRC Emergency Notification System per 10 CFR 50.72(b)(ii)(B).

CAUSE OF EVENT:

The cause for the process flow instrument error almost certainly an incorrectly sized flow orifice. This has not been confirmed. An extended outage is needed to remove the process instrumentation orifice because of its location amongst other lines. This activity is being scheduled for the next refueling outage (September, 1990).

Initial calculations lead us to believe that the process flow orifice size is 5.62 inches instead of the 5.062 inches required.

Investigation has revealed that the 150 GPM difference between the process and test flow indication was initially discovered in 1978. At this time, it would appear that the impact on the flow retention actuation setpoint was not realized. The 1978 event is being investigated. An updated report will be submitted, by December 22, 1989, to add information about the 1978 event.

ANALYSIS OF EVENT:

This event would have resulted in the flow retention function to actuate at a TDAFP flow of approximately 1225 GPM. At this value, pump runout would have occurred in the event of an accident such as a feedwater line break. This condition is reportable per 10 CFR 50.73(b)(ii)(B) as a condition outside the design basis of the plant.

Although the TDAFP may have been unavailable for certain accident conditions, the condition is not believed to have significant implications for public health and safety. In addition to the TDAFP, there are also two motor-driven auxiliary feedwater pumps (MDAFP), each of which feed two steam generators. In the event of a transient such as a loss of normal feedwater, in which the steam generators do not depressurize, the TDAFP would not be expected to reach runout flows. A feedwater line break would result in a drop in steam generator pressure followed by an eventual repressurization of the intact steam generators. Runout of the pump would be possible in this case. However, the accident analysis for Unit 2 takes no credit for auxiliary feedwater for the first ten minutes and then assumes delivery of only 600 gpm to the three intact steam generators. This amount is well within the capability of the two MDAFPs, each of which are rated at approximately 450 gpm with steam generator pressure at the safety valve setpoint.

A steam line break would also result in an initial depressurization of the steam generators, and therefore runout of the pump would be possible in this case. The Unit 2 steam line break analysis assumes maximum auxiliary feedwater flow, including the TDAFP delivering runout condition flow rates. This is because high auxiliary feedwater flow rates aggravate the primary system cooldown caused by the steam line break, resulting in a greater core power level during the accident due to the negative moderator temperature coefficient. Therefore, failure of the TDAFP due to runout operation would not adversely affect the steam line break accident analysis.

In the unlikely event that the Unit 2 MDAFPs would not be available, auxiliary feedwater would still be available via an existing cross-tie with Unit 1. The use of this cross-tie is covered in the plant's emergency operating procedures. Emergency procedure E-0 (reactor trip or SI) requires verification of adequate auxiliary feedwater flow. If adequate flow does not exist, the operator is instructed to use procedure FR-H.1 (Response to Loss of Secondary Heat Sink), and from this procedure is directed to procedure 4023.001.001 (Emergency Remote Shutdown). Attachment LS-2 of this procedure contains instructions for cross-tying the Unit 1 east MDAFP to the Unit 2 west MDAFP header, and the Unit 1 west MDAFP to the Unit 2 east MDAFP header.

In conclusion, auxiliary feedwater would reasonably be expected to be available even if the TDAFP was lost due to runout operation. The source of this auxiliary feedwater would be from the Unit 2 MDAFPs, or alternately from the Unit 1 MDAFPs, via the cross-tie connection. The emergency operating procedures provide the operator with adequate guidance for coping with the loss of the TDAFP. It is therefore believed that the condition did not represent a significant threat to public health and safety.

CORRECTIVE ACTIONS:

The Unit 2 TDAFP test orifice was removed and verified to be the correct size. Calibration of the test and process instruments were verified. The Unit 1 TDAFP and the Unit 1 and 2 Motor Driven Auxiliary Feed Pumps (EIIS/BA-P) test and process flow indications were compared and found to be acceptable.

On October 25, 1989, the Unit 2 TDAFP process flow indicating switches, which provide flow retention actuation, were reset for proper actuation. The verified test orifice was used as a standard for determining the process orifice curve. The flow instrument orifice will be removed and examined during the next refueling outage, currently scheduled to end in September 1990.

TURBINE DRIVEN AUXILIARY FEED PUMP RECIRCULATION LINEUP

FW-136 CLOSED
FRV-256 OPENED