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ACCESSION NBR:9103050406 DOC.DATE: 91/02/28 NOTARIZED: NO DOCKET #
FACIL:50-316 Donald C. Cook Nuclear Power Plant, Unit 2, Indiana & 05000316
AUTH.NAME AUTHOR AFFILIATION
DROSTE,J.B. Indiana Michigan Power Co. (formerly Indiana & Michigan Ele
BLIND,A.A. Indiana Michigan Power Co. (formerly Indiana & Michigan Ele
RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 89-017-03:on 891019,discovered instrument discrepancy
between turbine-drive auxiliary feed pump test line flow
indication & process flow indication.Caused by inaccurate
flow measurement.Switches reset.W/910228 ltr.

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TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

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February 28, 1991

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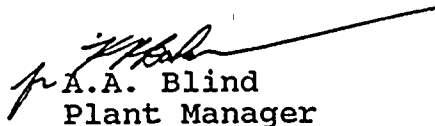
Operating Licenses DPR-74
Docket No. 50-316

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:

89-017-03

Sincerely,


A.A. Blind
Plant Manager

AAB:sb

Attachment

c: D.H. Williams, Jr.
A.B. Davis, Region III
M.P. Alexich
P.A. Barrett
J.E. Borggren
R.F. Kroeger
B. Walters - Ft. Wayne
NRC Resident Inspector
T. Colburn - NRC
J.G. Keppler
M.R. Padgett
G. Charnoff, Esq.
Dottie Sherman, ANI Library
D. Hahn
INPO
S.J. Brewer/B.P. Lauzau
B.A. Svensson


Handwritten initials, possibly 'TEPP' or similar, with a vertical line through them.

EXPIRES: 4/30/92

LICENSEE EVENT REPORT (LER)

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) D. C. Cook Plant - Unit 2										DOCKET NUMBER (2) 0 5 0 0 0 3 1 6										PAGE (3) 1 OF 0 7																																																												
TITLE (4) Loss of Turbine Driven Auxiliary Feed Pump Flow Retention Due to Inaccurate Flow Measurement																																																																																
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)																																									
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OPERATING MODE (9) 1									THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)																																																																							
POWER LEVEL (10) 1 0 0									20.402(b)									20.405(c)									50.73(a)(2)(iv)									73.71(b)																																												
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NAME J. B. Droste - Technical Engineering Superintendent																				TELEPHONE NUMBER AREA CODE 6 1 6 4 6 5 - 5 9 0 1																																																												
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																																																																																
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ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)																																																																																

This revision is being submitted to provide additional information regarding the corrective actions taken and update the Cause Description.

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 500 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 flow retention actuation setpoint was reset to an acceptable value.

The flow instrument error is believed to be caused by oscillations/turbulence across the orifice. A resolution for this deficiency is being developed.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

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) D. C. Cook Plant - Unit 2	DOCKET NUMBER (2) 0 5 0 0 0 3 1 6	LER NUMBER (6)			PAGE (3)		
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		8 9	- 0 1 7	- 0 3	0 2	OF	0 7

TEXT (If more space is required, use additional NRC Form 368A's) (17)

This revision is being submitted to provide additional information regarding the corrective actions taken and update the Cause Description.

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 flow 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 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.

Investigation has revealed that the 150 gpm difference between the process and test flow indication was initially discovered in 1978. The impact on the flow retention actuation setpoint was not realized at that time. The test and process orifices (EIIS/BA-OR) were removed and inspected in 1978. No discrepancies were noted, but it cannot be determined if the orifices were measured and verified to be the correct size. 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:

A fluid dynamic situation is believed to exist in the TDAFP discharge line, causing oscillations/turbulence across the orifice and resulting in erroneous differential pressure/flow indication. The root cause for the turbulence cannot be determined at this time. A resolution for this deficiency is being developed. An updated report will be submitted by July 30, 1991.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

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TEXT (If more space is required, use additional NRC Form 388A's) (17)

The 1978 event investigation included a statement that the 150 gpm flow discrepancy would remain under investigation. Due to turnover of personnel and inadequate tracking of such commitments at that time, no documentation of additional actions can be located.

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 flow. 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 cool down 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.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

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

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-O (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 procedure 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 commitment to resolve the 150 gpm flow discrepancy in the 1978 investigation would not be overlooked under the current control methods. Our current investigation process includes a tracking system for all activities not completed at the time the investigation is finalized.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 500 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.

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TEXT (If more space is required, use additional NRC Form 368A's) (17)

The following activities took place during the Unit 2 1990 refueling outage:

1. The Unit 2 TDAFP Discharge piping was removed and inspected both visually and dimensionally. The only anomaly noted was that weld backing rings were installed on both orifice flange to piping welds. These backing rings were removed.
2. The Unit 2 TDAFP Discharge orifice was removed and verified to be per the original specifications and in good condition. A new orifice was installed.
3. The TDAFP was rebuilt.
4. All Unit 2 Auxiliary Feedwater orifice plates were cross checked against each other and against Steam Generator level changes. The Unit 2 TDAFP discharge orifice still reads as it did at the onset of this problem in 1978. (78% of actual flow)
5. The Unit 2 TDAFP discharge orifice data was checked against existing calculations and calibration data to assure that it is conservatively operable.

The Unit 1 TDAFP configuration is identical to Unit 2 except that the pump discharge orifice is accurate. The Unit 1 TDAFP discharge orifice was removed and verified to be the correct size.

Additional testing was performed on the Unit 2 TDAFP process orifice instrument lines. A differential pressure cell was connected at the process flow orifice test connections. The various flow switches were valved out to determine if there was any change in differential pressure due to the leak-by through an individual instrument equalizing valve.

This testing had no effect on the readings obtained from the process flow instrumentation. The test line orifice (2-FFX-253) consistently read 24% higher than the process orifice (2-FFX-259).

Based on system/equipment testing, there is no reason to believe that this is a generic problem for other systems/components.

LICENSEE EVENT REPORT (LER)
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TEXT (If more space is required, use additional NRC Form 388A's) (17)

FAILED COMPONENT IDENTIFICATION:

Component ID: Turbine Driven Auxiliary Feed Pump Process Flow Orifice
Metering

Manufacturer: Vickery Simms, Inc./Barton Delta P Flow Indicating Switch

Model: MK-52 Paddle Type Orifice Plate/Barton 288A/224

PREVIOUS SIMILAR EVENTS:

None

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 500 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-430), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20545, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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TEXT (If more space is required, use additional NRC Form 305A-1) (17)

TURBINE DRIVEN AUXILIARY FEED PUMP RECIRCULATION LINEUP

FW-136 CLOSED
FRV-256 OPENED

