

LICENSEE EVENT REPORT (LER)

Facility Name (1) Byron, Unit 1 Docket Number (2) 0 5 0 0 0 4 5 4 Page (3) 1 of 0 3

Title (4) REACTOR TRIP CAUSED BY MAIN FEEDWATER PUMP TRIP DUE TO A BROKEN WIRE IN THE THRUST BEARING WEAR CIRCUITRY

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 8	1 1	8 7	8 7	0 1 8	0 1	0 9	0 7	8 8	NONE	0 5 0 0 0 1 1

OPERATING MODE (9) 1 THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)

POWER LEVEL (10) <u>9 7</u>	<input type="checkbox"/> 20.402(b)	<input type="checkbox"/> 20.405(a)(1)(i)	<input type="checkbox"/> 20.405(a)(1)(ii)	<input type="checkbox"/> 20.405(a)(1)(iii)	<input type="checkbox"/> 20.405(a)(1)(iv)	<input type="checkbox"/> 20.405(a)(1)(v)	<input type="checkbox"/> 20.405(c)	<input type="checkbox"/> 50.36(c)(1)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(i)	<input type="checkbox"/> 50.73(a)(2)(ii)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)	<input type="checkbox"/> 50.73(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(vii)(A)	<input type="checkbox"/> 50.73(a)(2)(vii)(B)	<input type="checkbox"/> 50.73(a)(2)(x)	<input type="checkbox"/> 73.71(b)	<input type="checkbox"/> 73.71(c)	<input type="checkbox"/> Other (Specify in Abstract below and in Text)
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LICENSEE CONTACT FOR THIS LER (12)

Name Tom Higgins, Operating Engineer Ext. 2215 TELEPHONE NUMBER 8 1 5 2 3 4 - 5 4 4 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
X	S J	P W	1 2 0	Y					

SUPPLEMENTAL REPORT EXPECTED (14)

Yes (If yes, complete EXPECTED SUBMISSION DATE) NO

Expected Submission Date (15) _____

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

On August 11 Byron Unit One was at 97% power when an alarm for the 1B Feedwater Pump Thrust Bearing Wear annunciated. A unit load reduction was initiated to facilitate taking the feedwater pump off line. Then the pump tripped. A load reduction to 50% power was initiated, but not in time as the Reactor tripped on low steam generator level. All plant safety systems responded as expected. A feedwater isolation signal was generated at 1129 by a High-2 level in the 1C Steam Generator Level. The actuation alerted the operators to the problem, and they isolated flow to the affected steam generator and restored the level to normal.

The thrust bearing wear circuitry was checked and a broken wire to one of the proximity probes was found. The wire was repaired and the instrument calibrated. To ensure the pump was operable, a check of the shaft play was done. No excessive wear was detected. During the startup the feedwater pump was monitored and found to have no operational problems.

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TEXT Energy Industry Identification System (EIIIS) codes are identified in the text as [xx]

A. PLANT CONDITIONS PRIOR TO EVENT:

Event Date/Time 8/11/87 / 1015

Unit 1 MODE 1 - Power Operation Rx Power 97 RCS [AB] Temperature/Pressure 584°F / 2238 psig

B. DESCRIPTION OF EVENT:

At 1011 on August 11, 1987, with Unit 1 at 97 percent reactor power, the 1B Main Feedwater Pump (MFP) [SJ] thrust bearing wear annunciator activated in the Main Control Room. In anticipation of removing the 1B MFP from service, the Nuclear Station Operator (NSO) (licensed reactor operator) programmed the Main Turbine [TB] Digital Electrohydraulic Control [JJ] system to reduce main generator electrical output at a rate of 20 Megawatts-electric (MWe) per minute. Prior to any power reduction at 1013 the 1B MFP tripped. The NSO initiated a Main Turbine runback at a rate of 2000 MWe per minute to 559 MWe. During the load reduction the excess heat generated by the reactor-turbine power mismatch was removed by the opening of the Condenser Steam Dumps [SB] and the Steam Generator Power Operated Relief Valves (PORV's). In addition the Pressurizer [AB] PORV's opened at 1014 for approximately five seconds to reduce pressurizer pressure from a peak value of 2310 psig. When main generator load reached the target value, all narrow range steam generator levels were steady between 46 and 51 percent.

At 1015 the 1D Steam Generator narrow range level decreased below the low-low setpoint of 40.8 percent, and an automatic reactor trip occurred. The low level condition resulted from the feedwater-steam flow mismatch in conjunction with indicated level "shrink" caused by the closure of the Steam Generator PORV. The 1A and 1B Auxiliary Feedwater Pumps (AFP) [BA] automatically started to supply feedwater to all steam generators in response to the low-low steam generator level signal. The control room operators entered and complied with the "Reactor Trip or Safety Injection - Unit 1 Emergency Operating Procedure" (1BEP-0). A Feedwater Isolation occurred as expected due to the reactor trip coincident with low Reactor Coolant Average Temperature (TAVG). At 1034 the 1B AFP was stopped. At 1127 the 1A AFP was stopped. At 1129 a P-14 Steam Generator Water Level High-2 Feedwater Isolation occurred due to level in excess of 81.4 percent in the 1C steam generator. The NSO took action to restore the 1C steam generator level to normal and at 1145 reset the feedwater isolation signal. The Startup Feedwater Pump was started and aligned to supply feedwater to all steam generators. The plant was stable in Hot Standby at approximately 1200.

This Licensee Event Report (LER) is submitted in accordance with 10CFR50.73(a)(2)(iv) due to the automatic Reactor Protection System [JG] and Engineered Safety Feature Systems actuations.

C. CAUSE OF EVENT:

The Main Feedwater Pump tripped on thrust bearing wear due to a broken wire on the proximity probe. This caused the wear detector to indicate a large axial displacement and picked up the trip circuit.

The subsequent Reactor Trip was due to the load reduction not being started as soon as the Feedwater Pump tripped. The operator had to program the load rate and end point in the DEH computer. This delay was sufficient to allow the Steam Generator levels to decrease to the Reactor Trip Setpoint.

The feedwater isolation occurred 1 hour and 14 minutes after the Reactor Trip and was due to a High-2 level in the 1C Steam Generator. The level increased in the 1C Steam Generator to the High-1 level setpoint where an annunciator should have alarmed warning the operator of increasing Steam Generator level. No alarm was received. The level continued to increase without an alarm condition until the High-2 level was reached where the Feedwater Isolation occurred. The cause of the Feedwater Isolation was a cognitive personnel error on the part of the NSO.

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D. SAFETY ANALYSIS:

The loss of a Main Feedwater Pump at power initiated the event. The subsequent Load Rejection and Reactor Trip was mitigated by the safety systems. At no time was the safety of public, plant personnel or plant equipment endangered. All safety systems operated as expected.

E. CORRECTIVE ACTIONS:

The 1B Feedwater Pump supervisory instrumentation was repaired and recalibrated. Furthermore, the automatic trips on thrust bearing wear on all four Turbine-driven Feedwater Pumps, Unit 1 and 2, have been disabled. In addition, it was recommended that Braidwood Station also remove their trips on thrust bearing wear. To ensure the pump was operable, a check of the shaft play was done. No excessive wear was detected. During the subsequent plant startup the feedwater pump was monitored and found to have no operational problems.

Investigation of the 1C steam generator high-level annunciator failure did not reveal any reason for the failure.

F. PREVIOUS OCCURRENCES:

LER NUMBER	TITLE
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NONE

G. COMPONENT FAILURE DATA:

a) MANUFACTURER	NOMENCLATURE	MODEL NUMBER	MFG PART NUMBER
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Not Applicable

b) RESULTS OF NPRDS SEARCH:

There have been 3 occurrences where Thrust Bearing Failures have caused Main Feedwater Pump Trips.



Commonwealth Edison
Byron Nuclear Station
4450 North German Church Road
Byron, Illinois 61010

September 7, 1988

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

Dear Sir:

The enclosed Licensee Event Report from Byron Generating Station is being transmitted to you as a supplemental report.

This report is number 87-018-01; Docket No. 50-454.

Sincerely,

R. Pleniewicz
Station Manager
Byron Nuclear Power Station

Enclosure: Licensee Event Report No. 87-018-01

cc: A. Bert Davis, NRC Region III Administrator
P. Brochman, NRC Senior Resident Inspector
INPO Record Center
CECo Distribution List

Ltr: BYRON 88-0945 (1921M/0206M)