

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Oconee Nuclear Station, Unit 2	DOCKET NUMBER (2) 0 5 0 0 0 2 7 1 0	PAGE (3) 1 OF 0 4
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TITLE (4)
Reactor Trip on Loss of Main Feedwater

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)
04	22	85	85	004	01	03	11	86	N/A		0 5 0 0 0
									N/A		0 5 0 0 0

OPERATING MODE (9) 1

POWER LEVEL (10) 012.9

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

20.402(b)	20.408(a)	50.73(a)(2)(vi)	73.71(b)
20.408(a)(1)(i)	50.38(a)(1)	50.73(a)(2)(vii)	73.71(a)
20.408(a)(1)(ii)	50.38(a)(2)	50.73(a)(2)(viii)	OTHER (Specify in Abstract below and in Part 366A)
20.408(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(ix)(A)	
20.408(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(ix)(B)	
20.408(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME S. G. Godwin, Licensing	TELEPHONE NUMBER 710 14 317 131-1213 1612
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC
X	EIA	XIFMIRG	080	Y					

SUPPLEMENTAL REPORT EXPECTED (14)

YES (if yes, complete EXPECTED SUBMISSION DATE) NO

EXPECTED SUBMISSION DATE (15)

MONTH	DAY	YEAR

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

On April 22, 1985 at 1100 hours, Oconee 2 tripped from 29% of full power on loss of main feedwater. A short circuit in a terminal block on the 2T transformer resulted in the loss of motor control center 2XC. The auxiliary oil pump (AOP) to the 2A Main Feedwater Pump Turbine (MFWPT) depends on this motor control center for power; with the AOP out of service the 2A MFWPT tripped on low oil pressure, resulting in an anticipatory reactor trip on loss of main feedwater.

The unit was stabilized at hot shutdown conditions. Investigation into the cause of the loss of the motor control center identified the problem and the terminal block was repaired. The reactor was critical at 1328 hours, and the unit was back on line at 1723 hours.

The health and safety of the public were not affected.

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		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
			04	01	02	OF

TEXT (if more space is required, use additional NRC Form 366A (1-77))

Background:

All MFWPT lubrication and control is supplied by the lubricating and hydraulic oil system. The system is composed of an oil storage tank, two motor driven pumps and a turbine shaft driven pump for supplying the oil to the system. Also included are an oil cooler and filter for that portion of the system which is used for lubrication, pressure regulation valves for maintaining the pressure required for turbine controls and turbine lubrication, and the necessary piping and instrumentation.

The main oil pump is a dual, positive displacement gear pump driven through a gear train by the turbine shaft. This shaft driven pump is designed to meet the total oil requirements of the turbine hydraulic and lubricating oil system over the major portion of the turbine speed range. The high pressure auxiliary oil pump (AOP) is a motor-driven centrifugal pump which furnishes oil for the hydraulic and lubrication systems at startup and low turbine speeds. A second auxiliary motor-driven pump is called the Emergency Oil Pump (EOP) and is included in the lubrication system. The EOP is also a centrifugal pump but of lower capacity than the AOP. The EOP supplies oil for lubrication requirements only and is intended for use when the turbine is on turning gear.

Description of Occurrence:

When the Oconee 2 outage for Cycle 8 refueling began in February 1985, the 2T transformer was tagged out for routine maintenance. The tag-out process included the 2T transformer cooling fans. Although tagging out the cooling fans was not required for the routine transformer maintenance, the issuing of the tags for the fan was unquestioned.

At 1044 hours on April 22, 1985, the emergency feeder breaker to the 2T transformer cooling fans was closed; this was part of the usual process for switching auxiliary components from the 2T to the CT2 transformer. Immediately upon closure of the breaker, the 2XC motor control center tripped causing the 2A main feedwater pump turbine (MFWPT) auxiliary oil pump to trip. A low hydraulic oil pressure alarm occurred approximately 1 minute later for the 2A MFWPT. The 2T cooling fans emergency feeder breaker was opened, and the 2XC motor control center was isolated at 1055 hours so that the cause for the malfunction could be investigated and repaired.

Near 1100 hours, the 2A MFWPT tripped on apparent low hydraulic oil pressure. The strip chart record indicated 182 psig oil pressure prior to and following the trip. The alarm which corresponds to an oil pressure decrease below 75 psig did not occur. The erroneous oil pressure reading was apparently due to a sticking chart recorder pen indicator. The 2B MFWPT was in standby, as is normal at low power level. Since the shaft oil pump, which is internal to the 2A MFWPT, was inadequate to provide the necessary hydraulic oil pressure, the reactor experienced an anticipatory reactor trip on loss of main feedwater.

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

The Emergency Feedwater Pumps (EFWPs) started automatically at 1101 hours after the unit tripped so as to maintain steam generator levels. On the primary side, with the 2A High Pressure Injection (HPI) pump in service, 2HP-26 opened to help maintain RCS inventory. The 2B HPI pump also started automatically on low reactor coolant pump seal flow and operated for approximately six minutes. The posttrip response to the induced transient was normal.

It was determined that a ground existed in the emergency feeder breaker circuitry. The normal feed to motor control center 2XC was reset and power to 2XC was returned at 1114 hours. With the AOP again operable, the 2A MFWPT was restarted and the EFWPs were secured by 1127 hours. The reactor was critical at 1327 hours. At 1330 hours, investigation of the ground which caused the 2XC trip was begun. The generator breakers were closed and the unit was operating at 1723 hours.

Another investigation was initiated when motor control center 2XB tripped at 1810 hours, after the normal feeder breaker to the 2T transformer cooling fans was closed.

Cause of Occurrence:

The investigations of the failures which caused the losses of motor control centers 2XC and 2XB identified two separate grounded terminal boards, both physically located within the 2T transformer. The heaters contained within the transformer serve to prevent the formation of moisture in the interior of the transformer cabinet where the faulty terminal boards were discovered. These heaters had been put out of service during the routine transformer maintenance and had been reenergized only approximately two days prior to the event. Apparently moisture had accumulated on the terminal boards and provided a flash point when the circuit was energized. The heaters did not have sufficient time to dry the moisture on the terminal boards, and so enough moisture remained to provide a short circuit path to ground.

A contributing cause to this incident was that the tagging out of the 2T transformer cooling fans was not required during the refueling outage. Had the fans been left operable, it is possible that the moisture-induced short-circuit failures would not have occurred.

Reviews of past incidents indicate no reactor trips which occurred due to the loss of motor control center 2XC. The failure of terminal boards due to grounding is not considered to be a recurring problem. Recurring problems with the MFWPT internal shaft driven oil pumps were described in LER 269/84-07; corrective actions were outlined in that report to improve shaft oil pump operation, and these actions remain outstanding.

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

Analysis of Occurrence:

The unit was stabilized at hot shutdown conditions after the trip. All ICS control stations were in auto except the 2B MFWP before the trip and responded appropriately during the transient. There were no Engineered Safeguard actuations. The A RPS channel was bypassed because of instrumentation problems. The pressurizer relief valves were not challenged. The Technical Specification maximum cooldown rate of 50°F per ½ hour was not approached. The main steam relief valves operated properly. Reactor Coolant system parameters conformed to normal post trip response: average temperature stabilized at about 550°F; minimum pressurizer level was 100 inches. Reactor coolant system pressure reached a minimum of 1900 psi before being stabilized at 2100 psi. A second makeup pump started automatically on low reactor coolant pump seal flow and was secured after 6 minutes. The EFwPs started immediately following the trip and maintained the steam generator levels at 25 inches. The steam generator levels reached a minimum of approximately 23 inches before EFw restored the levels. No Technical Specifications were exceeded and there were no radioactive releases. If this event had occurred at a higher power level greater than 53% FP, the 2B MFWPT would have been in service.

Depending on the power level, each FWPT's shaft oil pump may have been able to maintain hydraulic oil pressure and have prevented the FWPTs from tripping. In this case, a reactor trip on indicated loss of feedwater would have been avoided. Therefore, the health and safety of the public were not affected.

Corrective Action:

The immediate corrective action stabilized the unit at hot shutdown conditions. Supplemental corrective action included the investigation, discovery, and replacement of the grounded terminal boards in the two sets of feeder breaker circuitry internal to the 2T transformer.

Additionally, the sticking chart recorder pen indicator was freed so that MFWPT hydraulic oil pressure could be accurately read. The 2T transformer heaters were checked and found to performing properly.

A feasibility study has been initiated on better organizing the tag-out process by computerization. Also, as planned action, minimum tag-out requirements will be reviewed with the object of maintaining the operation of the main transformer heaters during outages to prevent any accumulation of moisture inside the transformer circuitry box.

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March 10, 1986

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U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: Oconee Nuclear Station, Units 1, 2 & 3
Docket Nos. 50-269, -270, -287
LER 270/85-04, Rev. 1

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a) (1) and (d), attached is a revision to Licensee Event Report 270/85-04, dated May 31, 1985, concerning a Unit 2 reactor trip on loss of main feedwater which occurred on April 22, 1985. This report is submitted in accordance with 10 CFR 50.73(a)(2)(iv). This event was considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

H.B. Tucker

Hal B. Tucker

SGG:slb

Attachment

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Document Control Desk

March 10, 1986

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