REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 8705280280 DOC. DATE: 87/05/20 NOTARIZED: NO DOCKET #
FACIL: 50-270 Oconee Nuclear Station, Unit 2, Duke Power Co. 05000270

AUTH. NAME	AUTHOR AFFILIATION
MCDOWELL, W. H.	Duke Power Co.
TUCKER, H. B.	Duke Power Co.
RECIP. NAME	RECIPIENT AFFILIATION

SUBJECT: LER 87-004-00: on 870420, reactor tripped following main feedwater pump trip setting. Caused by failure of A loop BTU limit multiplier module. Unit stabilized at hot shutdown conditions. Multiplier module replaced. W/870520 ltr.

DISTRIBUTION CODE: IE22D COPIES RECEIVED: LTR 1 ENCL 1 SIZE: 5
TITLE: 50.73 Licensee Event Report (LER), Incident Rpt, etc.

NOTES: AEOD/Ornstein: 1cy. 05000270

	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
	PD2-3 LA	1	1	PD2-3 PD	1	1
	PASTIS, H	1	1			
INTERNAL:	ACRS MICHELSON	1	1	ACRS MOELLER	2	2
	AEOD/DOA	1	1	AEOD/DSP/ROAB	2	2
	AEOD/DSP/TPAB	1	1	DEDRO	1	1
	NRR/DEST/ADE	1	0	NRR/DEST/ADS	1	0
	NRR/DEST/CEB	1	1	NRR/DEST/ELB	1	1
	NRR/DEST/ICSB	1	1	NRR/DEST/MEB	1	1
	NRR/DEST/MTB	1	1	NRR/DEST/PSB	1	1
	NRR/DEST/RSB	1	1	NRR/DEST/SGB	1	1
	NRR/DLPQ/HFB	1	1	NRR/DLPQ/QAB	1	1
	NRR/DOEA/EAB	1	1	NRR/DREP/RAB	1	1
	NRR/DREP/RPB	2	2	NRR/PMAS/ILRB	1	1
	NRR/PMAS/PTSB	1	1	REG FILE 02	1	1
	RES DEPY GI	1	1	RGN2 FILE 01	1	1
EXTERNAL:	EG&G GROH, M	5	5	H ST LOBBY WARD	1	1
	LPDR	1	1	NRC PDR	1	1
	NSIC HARRIS, J	1	1	NSIC MAYS, G	1	1
NOTES:		1	1			

TOTAL NUMBER OF COPIES REQUIRED: LTTR 43 ENCL 41

NRC Form 366 (9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/85

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1): Oconee Nuclear Station, Unit 2

DOCKET NUMBER (2): 0 5 0 0 0 2 7 0

PAGE (3): 1 OF 0 4

TITLE (4): Reactor Trip From High Steam Generator Level Caused By Equipment Failure

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 4	2 0	8 7	8 7	0 0 4	0 0	0 5	2 0	8 7		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9): N

POWER LEVEL (10): 0 8 7

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)	[X] 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)	[ ] 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: Wendy H. McDowell, Licensing

TELEPHONE NUMBER: AREA CODE 7 0 4 — 3 7 3 - 8 8 7 8

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	J A			NO					

SUPPLEMENTAL REPORT EXPECTED (14)

[ ] YES *(If yes, complete EXPECTED SUBMISSION DATE)* [X] NO

EXPECTED SUBMISSION DATE (15): MONTH DAY YEAR

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

On April 20, 1987 at 0533 hours, Unit 2 tripped from 87% Full Power on high Steam Generator level. This trip was due to a failed module in the "A" loop BTU limit section of the Integrated Control System (ICS). The ICS responded by decreasing Feedwater (FDW) flow to the "2A" Once Through Steam Generator (OTSG) and increasing flow to the "2B" OTSG. When the "2B" OTSG level reached 96% on the operating range level indication, the Main Feedwater Pumps (MFDWP) and the Main Turbine (MT) tripped. The reactor tripped on the Turbine/Reactor anticipatory trip.

The immediate corrective action was to stabilize the unit at hot shutdown conditions. The supplemental corrective actions included investigating the cause of the transient, identifying the failed ICS multiplier module, and replacing it.

The root cause of this event was the failure of the ICS multiplier module in the ICS BTU limit loop "A" circuitry.

No technical specification limits were exceeded, and there was no release of radioactivity. As such, the health and safety of the public was not affected.

IE22

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6) YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	PAGE (3)
Oconee Nuclear Station, Unit 2	0 5 0 0 0 2 7 0	8 7	— 0 0 4 —	0 0	0 2 OF 0 4

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

Background

The Integrated Control System (ICS) provides coordination of the Reactor, Steam Generator Feedwater control, and Turbine for all operating conditions. The ICS includes four subsections.

A. Unit Load Demand Control
B. Integrated Master Control
C. Steam Generator Feedwater Control (SGFC)
D. Reactor Control

The subsection of the ICS in which the failure occurred, leading to the reactor trip, was the SGFC. The SGFC receives a Feedwater Demand Signal from the Integrated Master Control, modifies the signal to obtain the desired steam conditions, and applies the modified signal to position Feedwater Flow Controls such as feedwater control valves and feedwater pump speed.

The purpose of the BTU limit circuitry is to protect the Main Turbine from moisture in the steam coming from the Steam Generator. The BTU limit circuitry limits the demand for feedwater by considering the conditions of:

o Reactor Coolant Flow
o Feedwater Temperature
o Steam Generator Pressure
o Reactor Outlet Temperature (T_{hot})

Description of Occurrence

On April 20, 1987, at 0532 hours, Unit 2 was operating at 87% Full Power; limited by high Steam Generator levels. At approximately 0533 hours, with the ICS in the integrated mode, a Main Feedwater System transient occurred. A Multiplier Module in the "A" loop BTU limit circuit failed. This failure caused the ICS to reratio FDW. FDW is reratioed in order to maintain the difference between the cold leg temperatures (ΔTc) at 0°F. As flow decreased to the "A" Steam Generator it increased to the "B" OTSG. The control room received the "Steam Generator BTU Limit" Statalarm, and the "B" OTSG reached the high level limit Turbine/Main Feedwater Pump (MFDWP) trip setting. At 0533:22, the Reactor tripped following the turbine and MFDWP trips. After the trip, reactor power decreased to a post-trip decay heat level, with all control and safety rods inserted.

Following the trip, the Reactor Coolant System (RCS) temperature (T_{ave}) dropped from a pre-trip maximum of approximately 578°F. to a post-trip minimum of 548°F. The cooldown rate of 100°F./Hr. was not exceeded. Over-cooling or overheating of the reactor coolant system did not occur. The pressurizer level decreased from 234 inches to a minimum of approximately 109 inches. No additional High Pressure Injection (HPI) pumps were started. The RCS pressure increased from an initial value of 2135 psig to approximately 2292 psig and then dropped to a minimum of approximately 1915 psig. RCS pressure stabilized at about 2080 psig about 10

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6) YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	PAGE (3)
Oconee Nuclear Station, Unit 2	0 5 0 0 0 2 7 0	8 7	— 0 0 4 —	0 0	0 3 OF 0 4

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

minutes into the transient. Pressurizer relief and the code safety valves were not challenged. The turbine bypass valves and Main Steam Relief Valves (MSRVs) opened as expected. Steam pressure decreased and remained below the turbine bypass valves opening setpoint. Later, steam pressure was lowered to approximately 950 psig to reseat a MSRV. Feedwater was supplied by the Emergency Feedwater (EFW) system for approximately one hour and eight minutes. All three EFW pumps started automatically as designed. The "A" and "B" Steam Generator levels dropped from approximately 205 and 241 inches, respectively, to a post-trip minimum of 21.2 and 18.2 inches respectively and leveled off at approximately 25 inches.

The Turbine Header Pressure was reduced in order to reseat the MSRV. It appeared to reseat at approximately 950 psig. While the MSRV was unseated, it did not remove enough steam from the Steam Generator to cause an overcooling of the Reactor Coolant System.

Cause of Occurrence

The root cause of this reactor trip on high steam generator level was the failure of the "A" loop BTU limit multiplier module. The plant response was as expected. All variables remained within the limits of Category "A" Events, as defined by the B&W Owners Group Trip Reduction program.

The nature of the initiating condition and the rapid effect on the operating system did not provide the Control Room Operators with sufficient time to bring the Steam Generator level under control manually. As always, this response time is limited, but because the Steam Generators are operating at high levels, the response time is even less. Therefore, another contributing cause to this trip is considered to be the fouling of the Steam Generators causing operation with higher than desired levels.

An NPRDS database search revealed four previous failures of the Bailey Multiplier Module, model # 6618210-1. All of these failures have been at Oconee. A database search of previous Station Incident Investigation Reports reveals that over the past five years two other incidents have occurred that were due to a failure of a BTU limit signal. One incident involved the actual failure of an input to the BTU limit circuit. The other incident was apparently caused by the same multiplier module associated with this incident. A comparison of corrective actions for this incident vs. the earliest one is not applicable because the failure modes are not the same. This incident is considered a recurring event with low frequency.

Corrective Action

The immediate corrective action was to stabilize the unit at hot shutdown conditions.

Supplemental corrective actions included replacing the multiplier module.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6) YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	PAGE (3)
Oconee Nuclear Station, Unit 2	0 5 0 0 0 2 7 0	8 7	— 0 0 4	— 0 0	0 4 OF 0 4

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

Also a Station Problem Report was written to remove the BTU limit circuit output while the units are at power. This modification (NSM 2680) has been completed on Units 2 and 3 and is scheduled to be installed on Unit 1 during the next refueling outage. Removing the BTU limit signal from service while the unit is at power operation would prevent any spurious or erroneous signals in this circuit from causing transients or trips. However it would still be in service post-trip to help prevent overfeed of the Steam Generators.

Analysis of Occurrence

The unit was stabilized at hot shutdown after the reactor trip. Integrated Control System control stations were in auto before the trip and Control Operators responded to mitigate the effects of the transient. The Pressurizer Code Relief Valves were not challenged. Main steam pressure was properly controlled by the Main Steam Relief Valves and the Turbine Bypass Valve System. Technical Specifications' maximum cooldown rate of 50°F per .5 hours on Reactor Coolant System temperature (T_{cold}) was not approached. The pressurizer level reached a minimum level of approximately 109 inches. The pressurizer level was stabilized with the use of normal makeups. The Reactor Coolant System pressure reached a minimum of about 1915 psig before being brought back up and stabilized at 2080 psig. The Reactor Protective System reacted in accordance with the design features to prevent Reactor Coolant System overpressurization. No Technical Specification limits were exceeded, and there was no release of radioactivity; therefore, the health and safety of the public were not affected.

DUKE POWER COMPANY
P.O. BOX 33189
CHARLOTTE, N.C. 28242

HAL B. TUCKER
VICE PRESIDENT
NUCLEAR PRODUCTION

TELEPHONE
(704) 373-4531

May 20, 1987

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

Subject: Oconee Nuclear Station
Docket No. 50-270
LER 270/87-04

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a) (1) and (d), attached is Licensee Event Report (LER) 270/87-04 concerning a reactor trip from high steam generator level due to equipment failure while the unit was operating at 87% full power.

This report is submitted in accordance with §50.73(a)(2)(iv). This event is considered to be of no significant with respect to the health and safety of the public.

Very truly yours,

Hal B. Tucker

Hal B. Tucker

WHM/34/sbn

xc: Dr. J. Nelson Grace
Regional Administrator, Region II
U. S. Nuclear Regulatory Commission
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

Ms. Helen Pastis
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Mr. J. C. Bryant
NRC Resident Inspector
Oconee Nuclear Station

American Nuclear Insurers
c/o Dottie Sherman, ANI Library
The Exchange, Suite 245
270 Farmington Avenue
Farmington, CT 06032

INPO Records Center
Suite 1500
1100 Circle 75 Parkway
Atlanta, Georgia 30339

M&M Nuclear Consultants
1221 Avenue of the Americas
New York, New York 10020

IE22
'11