CATEGORY 1

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9708080075 DOC.DATE: 97/07/30 NOTARIZED: NO DOCKET #
FACIL:50-269 Oconee Nuclear Station, Unit 1, Duke Power Co. 05000269

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SUBJECT: LER 97-008-00:on 970701,manual RT occurred due to equipment failure while shut down.Operators attempted to take manual control of feedwater.in response to erratic indications.W/ 970730 ltr.

DISTRIBUTION CODE: IE22T COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 8
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July 30, 1997

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

Subject: Oconee Nuclear Station Unit
Docket Nos. 50-269, -270, -287
Licensee Event Report 269/97-08, Revision 00
Problem Investigation Process No.: 1-097-2012

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a) (1) and (d), attached is Licensee Event Report 269/97-08, concerning a Manual Trip of the Unit 1 Reactor Protective System while Shutdown.

This report is being submitted in accordance with 10 CFR 50.73(a)(2)(iv). This event is considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

W. R. Mc Collum, Jr.

/fts

Attachment

1/1
IE22

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Oconee Nuclear Station

NRC FORM 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMD NO. 3150-0104 EXPIRES: 04/30/98

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Oconee Nuclear Station, Unit One	05000 269	1 of 6

TITLE (4) Manual Reactor Trip Due To Equipment Failure While Shut Down

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 NAME	DOCKET NUMBER(S)
										05000
07	01	97	97	- 08	- 00	07	30	97		05000

OPERATING MODE (9): N

POWER LEVEL (10): 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)	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	TELEPHONE NUMBER (AREA CODE)	
Rick T. Bond, Safety Review Manager	(864)	885-3043

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
F	SJ	RLY	G080	NO					

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
	YES (*if yes, complete EXPECTED SUBMISSION DATE*)	X NO				

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

On July 1, 1997, Unit 1 was at hot shutdown (2180 Psig, 538F) with the Reactor Protective System (RPS) reset and Control Rod group 1 withdrawn 50%, per procedure. The 1A Main Feedwater Pump (MFDWP) was in operation. At approximately 0727 hours, alarms indicated the feedwater (FDW) system was swinging. The operators attempted to control FDW in manual, but the system did not respond as expected. At 0755:42 hours, the 1A MFDWP tripped on high discharge pressure. Per procedure, the operator manually tripped the RPS at 0755:47 hours. The group 1 control rods tripped into the core from their initial position at 50% withdrawn. An Anticipated Transient Without Scram (ATWS) mitigation system started the Emergency FDW pumps. The unit was stabilized on Emergency FDW. The reactor was sub-critical throughout the event. The root cause of this event is equipment failure of a circuit board in the 1A MFDWP Turbine control system. Corrective actions were to make temporary repairs pending receipt of a new circuit board. This event had no impact on safety.

BACKGROUND

The Oconee startup and shutdown procedures require having the Reactor Protective System (RPS) [EIIS:JC] reset and Control Rod group 1 withdrawn 50%, where practical, while the unit is subcritical. This provides the capability for rapid negative reactivity insertion for response to postulated reactivity events.

The RPS will trip, and drop any withdrawn control rods into the core, on loss of Main Feedwater (FDW) [EIIS:SJ]. However, this trip is not active until the unit is above 1.75% Full Power.

The ATWS (Anticipated Transient Without Scram) Mitigation Actuation Circuitry (AMSAC) [EIIS:JC] system monitors FDW Pump discharge pressure. It is placed in service when the Control Rod Drive system is reset, prior to withdrawing control rods for start-up. It will automatically initiate Emergency FDW [EIIS:BA] if both channels detect low discharge pressure (<770 Psig) on both Main FDW pumps. AMSAC will also trip the main turbine, which will then generate an anticipatory RPS trip signal if power is above a designated setpoint.

DESCRIPTION OF EVENT

On July 1, 1997, Unit 1 was sub-critical at hot shutdown (2180 Psig, 538F). The Reactor Protective System (RPS) was reset and Control Rod group 1 was withdrawn 50%, per procedure. The 1A Main Feedwater (FDW) Pump (MFDWP) was in service and the 1B MFDWP was off.

At approximately 0727 hours, computer alarms indicated low FDW control valve delta-pressure (Dp), low MFDWP discharge pressure, and low Steam Generator (SG) [EIIS:SG] level.

The operators took FDW control and the 1A MFDWP to manual at 0735 hours, but they concluded that the pump did not respond properly. The decision was made to initiate procedure steps to start 1B MFDWP in parallel with attempts to resolve the problem with 1A MFDWP. The 1A MFDWP sped up and tripped on high discharge pressure at 0755:42. This left the unit with no FDW in service.

As the pump slowed down, discharge pressure dropped below 770 Psig. The ATWS (Anticipated Transient Without Scram) Mitigation Actuation Circuitry (AMSAC) system actuated and started the 1A and 1B Motor Driven Emergency FDW Pumps (MDEFWPs) and the Turbine Driven Emergency FDW Pump (TDEFWP). AMSAC would have also tripped the Main Turbine/Generator, but that was already tripped since the unit was shutdown.

In accordance with procedural guidance, the Operator manually tripped the RPS at 0755:47 hours. The group 1 control rods tripped into the core from their initial position at 50% withdrawn.

The operators entered the Emergency Operating Procedure, which includes post-trip response, and AP/1/A/1700/19, "Loss of Main Feedwater". The TDEFWP was stopped at 0759 hours, by procedure, after the operators confirmed that the MDEFWPs had started and were running properly.

At the time of the Emergency FDW system actuation, the 1A SG flow reached a peak of approximately 1309 gpm and exceeded a flow limit of 1098 gpm for about 7 seconds. This limit was established to limit SG tube flow induced vibration. An operability evaluation by Systems Engineering determined that no damage occurred to the SG tubes due to the short duration of the excessive flows. A Problem Investigation Process (PIP) report was initiated for documentation and trending of this event.

This excess flow caused 1A SG level to increase to 43 inches before the 1A SG Emergency FDW control valve could respond. The cooling effect of this flow caused the 1A SG pressure to dip from approximately 880 Psig to 820 momentarily before stabilizing at 867 Psig.

The secondary side response caused a slight effect on the Reactor Coolant System (RCS). RCS temperature went from 537F to 532F. RCS pressure dropped from 2153 to 2131 Psig then returned to 2155 Psig. Pressurizer level varied between 219 and 213 inches.

The post-trip review performed by Reactor Engineering concluded that these system responses, other than the momentary high Emergency FDW flow, were all within normal expectations for a trip while subcritical.

The operators resumed start-up of the 1B MFDWP at approximately 0820 hours and exited the Emergency Operating Procedure.

At 0925 hours, a four hour notification was made to the NRC.

The 1B MFDWP was placed in service and the MDEFWPs were secured at 1021 hours.

Instrument and Electrical (I&E) Technicians investigated the 1A MFDWP controls. A problem was found with a circuit which detects the position of the motor gear unit and provides feedback to the pump speed controller [EIIS:SC]. A replacement circuit board was not available. Therefore, on July 3, 1997, a temporary modification was implemented to correct the problem until a new circuit board can be obtained and installed.

CONCLUSIONS

This event is reportable under 10CFR73(a)(2)(iv) as a manual actuation of the Reactor Protective System.

The operator at the controls acted properly and in accordance with existing guidance to manually trip the Reactor Protective System.

The root cause of this event is the equipment failure of a circuit board in the 1A Main Feedwater Pump Turbine control system. This specific board is a Voltage Sensitive Relay circuit board, Part Number 3S7513KF212G17, manufactured by General Electric.

A review of operating history found one similar event in the past two years. Unit 1 underwent an automatic trip from 100% Full Power on February 28, 1996, due to a loss of both operating Main Feedwater pumps. The failure of a multiplier card (circuit board) in the Integrated Control System caused the event. Although that trip was similar in cause to this event, the failures occurred in separate systems and the corrective action from that trip would not have been expected to prevent this event. Therefore, this event is considered to be non-recurring.

There were no radioactive releases, personnel injuries or over exposures, or NPRDS reportable failures associated with this event.

CORRECTIVE ACTIONS

Immediate:

1. Operators attempted to take manual control of feedwater in response to the erratic indications.

2. The Operator at the Controls manually tripped the Reactor Protective System and stabilized the unit.

Subsequent:

1. The operators started the 1B Main Feedwater Pump and secured emergency feedwater.

2. Temporary Modification TM-1356 "REMOVAL OF THE LOSS OF POSITION FEEDBACK DETECTION CIRCUIT" was implemented as a temporary resolution of the problem with 1A Main Feedwater Pump Turbine control circuit.

Planned:

1. The 1A Main Feedwater Pump Turbine control circuit will be repaired and Temporary Modification TM-1356 cleared.

2. Operations will re-evaluate Operations Management Procedure 2-1 guidance to trip the Reactor Protective System on loss of feedwater. This should determine if an exception should be made when the unit is not critical or approaching criticality.

Planned corrective action 1 is considered to be an NRC Commitment Item. It is the only NRC Commitment items contained in this LER.

SAFETY ANALYSIS

Loss of Feedwater (FDW) is an anticipated transient and is discussed in Section 10.4.7 of the UFSAR. The Emergency Feedwater System (EFW) is designed to start automatically. In addition, EFW can be manually initiated. If necessary, EFW can be manually aligned from one of the other two Oconee units. The Stand-by Shutdown Facility includes an Auxiliary Feedwater System as an additional back-up. Therefore, several alternative sources of water are available for decay heat removal following a loss of FDW.

Below 1.75% Full Power (FP), the Reactor Protective System (RPS) loss of FDW automatic trip is not in service. If EFW cannot be established promptly, the Reactor Coolant System (RCS) would heat up, raising RCS pressure, and the RPS would trip on high pressure. If EFW is established, the reactor could stay critical, unless manually tripped.

However, during certain scenarios, especially when decay heat is low, there is a small potential for an overcooling transient which could increase reactivity. If the unit is critical but below 1.75%FP, such a transient could result in an unintentional power increase. If the unit is sub-critical, but control rod withdrawal is in progress at the time of the event, there is a potential for an inadvertent criticality. These scenarios could potentially challenge the 5%FP over-power trip setpoint which is in place at low power (below 2%FP). To protect against these scenarios, guidance has been provided for the operator to manually trip the reactor upon loss of FDW.

Since the reactor was already shutdown with a significant shutdown margin, this manual actuation of the Reactor Protective System (RPS) event had no safety significance. EFW actuated automatically on loss of FDW to provide an assured source of core cooling via the Steam Generators. The unit had been shutdown for 17 days prior to this event and decay heat was relatively low, providing time for additional Operator manual response if it had been necessary.

This event had no impact on the health and safety of the public.