Duke Power
A Duke Energy Company

W. R. McCollum, Jr.
Vice President

Duke Power
Oconee Nuclear Site
7800 Rochester Highway
Seneca, SC 29672
(864) 885-3107 OFFICE
(864) 885-3564 FAX

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

Subject: Oconee Nuclear Station
Docket Nos. 50-287
Licensee Event Report 50-287/00-01, Revision 0
Problem Investigation Process No.: 0-O-00-0010

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report 50-287/00-01, concerning a Reactor Trip that resulted when the Main Turbine was manually tripped due to equipment failure.

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. McCollum, Jr.

Attachment

IE22

cc: Mr. Luis A. Reyes
Administrator, Region II
U.S. Nuclear Regulatory Commission
61 Forsyth Street, S. W., Suite 23T85
Atlanta, GA 30303

Mr. D. E. LaBarge
U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, D.C. 20555

INPO Records Center
700 Galleria Parkway, NW
Atlanta, GA 30339-5957

Mr. M. C. Shannon
NRC Senior Resident Inspector
Oconee Nuclear Station

NRC FORM 366 (6-1998) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMD NO. 3150-0104 EXPIRES: 06/30/2001
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LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Oconee Nuclear Station, Unit 3	050-287	1 of 6

TITLE (4)
Reactor Trip After Manual Main Turbine Trip Due To Instrument 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 NAME	DOCKET NUMBER(S)
										050-
01	03	00	2000	01	00	02	02	2000	FACILITY NAME	050-

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)	100		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
			20.405(a)(1)(iii)		50.73(a)(2)(i)		50.73(a)(2)(viii)(A)		(Specify in Abstract below and in Text, NRC Form 366A)
			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 (Include Area Code)
L.E. Nicholson, Regulatory Compliance Manager	(864) 885-3292

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
B	TJ	TC	F120	N					

SUPPLEMENTAL REPORT EXPECTED (14)				EXPECTED SUBMISSION	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)

At approximately 1254 on January 3, 2000, with Unit 3 at approximately 100 percent power, a Stator Cooling runback occurred. Operations verified that plant equipment was responding appropriately. It was observed that Generator MWatts had run back to 0 with Generator MVARs indicating 260 and that the Generator breakers were closed. At approximately 1257, these conditions along with HiHi Generator Stator winding temperatures led Control Room personnel to manually trip the Main Turbine, which resulted in an anticipatory Reactor trip. Reactor Power was approximately 56 percent at the time of the Main Turbine trip. This event involved equipment failures on the secondary side only. Primary and secondary equipment and parameters responded as expected. There were no major problems encountered in placing the plant in Mode 3.

Investigations revealed the Stator Cooling runback resulted from high Stator Cooling temperature. This condition was caused by the failure of the temperature controller for the Stator Cooling System proportioning valve. The cause of the reactor trip was inadequate installation of the temperature controller tubing. Corrective actions to prevent recurrence include replacement and analysis of the failed temperature controller. This event is considered of no significance with respect to the health and safety of the public.

EVALUATION:

BACKGROUND

The Stator Cooling (SC) [EIIS:TJ] Water System is a closed-loop system used to cool the generator's stationary armature windings and the excitor rectifying diodes. The major system components are the Stator Cooling Panel, a storage tank, two cooling pumps, two coolers, a proportioning valve, a de-ionizer and a differential pressure-regulating valve. The SC Panel contains the various instrumentation and controls used for monitoring and controlling SC system operation and an alarm panel consisting of 12 alarm windows. An alarm on this panel causes an alarm on 3SA3/A5, SC Panel Trouble, in the Control Room. The proportioning valve (3SC-5) [EIIS:FCV] is a temperature-controlled three-way valve on the discharge of the SC coolers that proportions part of the pump discharge around the coolers to control the temperature of the SC System going to the generator windings and rectifiers. Valve 3SC-5 is normally set to maintain the stator winding inlet temperature at about 46 C (115 F).

The Integrated Control System (ICS) [EIIS:JA] is designed to match reactor thermal power with core thermal power demand.

The Electro-Hydraulic Control System (EHC) [EIIS:TG] is divided into three major functional control areas: speed control, load control, and flow control. Monitoring circuits are provided to annunciate conditions of the system. Protection circuitry is imbedded in each control section to protect the turbine generator from mechanical and electronic failures in the system. Loss of the ability to adequately cool the stator windings causes the EHC to reduce MW load in order to decrease heat load on the stator windings.

The Reactor Protective System (RPS) [EIIS:JC] monitors several important system parameters and initiates a reactor trip when any trip setpoint is reached using two-of-four channel logic. One reactor trip parameter is a Main Turbine (MT) [EIIS:MT] trip which will initiate a reactor trip when power is greater than 30 percent full power by actuating RPS turbine anticipatory trip channels. The purpose of this trip is to limit Reactor Coolant System (RCS) [EIIS:AB] pressure and to minimize challenges to the Power Operated Relief Valve.

EVENT DESCRIPTION

On January 3, 2000, Unit 3 was in Mode 1 (Power Operation) at 100 percent power. Maintenance personnel were working on a failed SC system conductivity probe that had previously initiated a "Stator Cooling Panel Trouble" alarm at 0047 hours.

At approximately 1253, the Unit 3 Control Room received Statalarms for Stator Cooling Panel Trouble, Turbine Panel Trouble, and shortly afterwards, the GEN Loss of Stator Coolant alarm. An Operator was dispatched to the SC panel to investigate.

Control Room personnel continued to monitor SC graphics on the Operator Aid Computer. SC system temperatures were increasing as indicated by numerous Control Room alarms.

Control Room personnel monitored plant parameters and confirmed that the ICS was responding properly to reduce Reactor power and balance RCS heat input verses output. At approximately 1255, Control Room personnel observed that Generator MVARS were at approximately 260, Generator MWe had run back to 0, Stator winding temperature was still high and the Generator breakers were closed. This was not an expected indication for the turbine. Control Room personnel were concerned about the Generator being damaged under these conditions. At approximately 1257, a decision was made to trip the Turbine. When the Turbine tripped, the Reactor tripped, as expected, due to the anticipatory reactor trip.

Control Room personnel confirmed that the Reactor and Turbine had tripped and monitored the unit for proper operation in accordance with the Emergency Operating Procedures. As normally required after a Reactor trip, Operators started High Pressure Injection (HPI) [EIIS:BG] pump 3A and throttled 3HP-26 (3A High Pressure Injection Valve) to restore RCS Pressurizer level. The 3A Essential Siphon Vacuum (ESV) Pump tripped and was restarted per procedure. The Unit 2 ESV Headers were fully operable and available to supply Unit 3 while the 3A ESV pump was off.

Except as previously mentioned, all primary and secondary equipment and parameters responded as expected. There were no Engineered Safety Features actuations and Main Feedwater was maintained following the Reactor trip.

Following the Reactor trip, the Failure Investigation Process was initiated and a root cause investigation team was formed with representatives from Operations and Engineering. The team determined that the initiating transient for the event was caused by the failure of the temperature controller for 3SC-5 (SC Proportioning Valve). The temperature controller temperature indication for valve 3SC-5 was found to be off-scale low. This caused valve 3SC-5 to reposition to the full cooler bypass position, thus removing the ability of the SC system to adequately cool the Generator. This condition was caused by a failure of the controller capillary tube. A new controller, capillary tube and sensing bulb were installed. A tubing tray to provide support/protection for the new capillary tube was installed using Specification # OSS-0060.00-00-0001. After the unit reached 100 percent full power, the controller and tubing were inspected for vibration/fretting interaction. The inspection for the controller and tubing revealed no vibration/fretting interaction. Signs were installed on the capillary tubing for all 3 units SC skids warning of a Unit Trip potential. The failed controller was sent to the Duke Power Metallurgical laboratory for a detailed failure analysis.

The Unit 3 Reactor was returned to critical on January 5, 2000 at 0141.

CAUSAL FACTORS

The cause of the Reactor Trip is equipment failure. The initiating transient was caused by the failure of the temperature controller for valve 3SC-5. The temperature controller failed low, causing valve 3SC-5 to reposition to the full cooler bypass position, thus removing the ability of the SC system to adequately cool the Generator. The root cause of the failed controller is attributed to an Installation deficiency. The capillary tube for the controller was not properly installed nor supported when the control panel was originally manufactured by the equipment vendor for construction of the plant. Maintenance personnel working in the area at the time of the Reactor trip stated that they did contact or move the capillary tube while performing their work; however, the physical layout of the unsupported capillary tube made it impossible to work in the area without coming in contact with the capillary tube. The required capillary

tube bend radius of 3 inches minimum was not maintained. Certain sections of the capillary tube had bends that were close to ½ inch. The failed temperature controller has been sent to the Duke Power Metallurgical laboratory for a detailed analysis.

CORRECTIVE ACTIONS

Immediate:

Control Room personnel took appropriate actions to bring the unit to stable conditions per the Emergency Operating procedures.

Subsequent:

1. A new controller, capillary tube and sensing bulb were installed. A tubing tray was installed using Specification # OSS-0060.00-00-0001.

2. Inspected the Units 1 and 2 temperature controllers and capillary tubes and work requests were written for minor deficiencies on Unit 2 that will be repaired during a unit outage.

3. Signs were installed on the capillary tubing for all 3 units SC skids warning of a Unit Trip potential.

4. A vibration inspection was performed at 100% power and the inspection revealed no vibration/fretting interaction.

Planned:

The temperature controller has been sent to the Duke Power Metallurgical laboratory for a failure analysis. Depending upon the results of the analysis, more corrective actions may be recommended.

There are no NRC commitments contained in this LER.

SAFETY ANALYSIS

This event is not considered to be significant. At no time were the health or safety of the public or plant personnel compromised.

The Unit 3 Reactor automatically tripped due to a manual trip of the Main Turbine. The Main Turbine was manually tripped to protect the Generator which was experiencing increasing Stator winding temperatures.

Stator winding temperature exceeded 176 F, which initiated the Loss of SC runback circuit. The high temperature condition did not clear and the SC runback occurred as expected. The EHC system reduced MW load; consequently, the heat load was removed from the Generator, thus decreasing the need for Stator Winding cooling.

The unit post-trip response was normal. No Engineered Safety Features or Emergency Feedwater actuations were either required or received after the trip. All safety systems required for maintaining Reactor Core and Containment protection remained fully available.

The core damage significance of this event has been evaluated to be very low. No significant systems were unavailable at the time of the trip. The conditional core damage probability for a Reactor trip for this condition is expected to be less than 1E-07.

ADDITIONAL INFORMATION

A review of LERs and Operating Experience within the past two years indicates that there have not been any Reactor trips associated with equipment failures of this type.

The failed component is not EPIX reportable.

This event did not result in personnel injuries, radiation overexposures, or releases of radioactive materials.