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Georgia Power
the southern electric system

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Docket No. 50-366

HL-3084
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U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

PLANT HATCH - UNIT 2
LICENSEE EVENT REPORT
MAIN TURBINE TRIP ON HIGH
VIBRATION RESULTS IN A REACTOR SCRAM

Gentlemen:

In accordance with the requirements of 10 CFR 50.73(a)(2)(iv), Georgia Power Company is submitting the enclosed Licensee Event Report (LER) concerning a main turbine high vibration trip which resulted in a reactor scram and a group 2 primary containment isolation signal.

Sincerely,

J. T. Beckham, Jr.

OCV/cr

Enclosure: LER 50-366/1992-026

cc: Georgia Power Company
Mr. H. L. Sumner, General Manager - Nuclear Plant
NORMS

U.S. Nuclear Regulatory Commission, Washington, D.C.
Mr. K. Jabbour, Licensing Project Manager - Hatch

U.S. Nuclear Regulatory Commission, Region II
Mr. S. D. Ebneter, Regional Administrator
Mr. L. D. Wert, Senior Resident Inspector - Hatch

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NRC Form 366 (6-89) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104
EXPIRES: 4/30/92

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
PLANT HATCH, UNIT 2	0 5 0 0 0 3 6 6	1 OF 5

TITLE (4)
MAIN TURBINE TRIP ON HIGH VIBRATION RESULTS IN A REACTOR SCRAM AND GROUP 2 PCIS ISOLATION

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQ NUM	REV	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
										0 5 0 0 0
1 1	2 7	9 2	9 2	0 2 6	0 0	1 2	2 1	9 2		0 5 0 0 0

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR (11)				
POWER LEVEL	0 7 0	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)	
		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	
STEVEN B. TIPPS, MANAGER NUCLEAR SAFETY AND COMPLIANCE, HATCH	912	367-7851

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

CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORT TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORT TO NPRDS	

SUPPLEMENTAL REPORT EXPECTED (14)

		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES(If yes, complete EXPECTED SUBMISSION DATE)	X NO				

ABSTRACT (16)

On 11/27/92 at 0234 CST, Unit 2 was in the Run mode at a power level of 1705 CMWT (70% rated thermal power). At that time, the unit scrammed on Turbine Stop Valve and Turbine Control Valve fast closure due to a Main Turbine trip on high vibration on the #6 bearing. Reactor water level decreased from 37 inches above instrument zero (195 inches above the top of the active fuel) to its minimum of five inches above instrument zero due to void collapse from the rapid reduction in power. This resulted in another scram signal and a Group 2 Primary Containment Isolation System signal on low water level. Level was restored automatically by the Reactor Feedwater Pumps (RFPs). Reactor pressure increased from 968 psig to a peak of about 1030 psig. The Turbine Bypass Valves opened to reduce and maintain pressure below 920 psig. No Safety Relief Valves lifted nor were any required to lift to reduce or control pressure.

The causes of this event were recorder alarm configuration and personnel error. Personnel were not aware of increasing levels of turbine vibration resulting from normal load increases because the vibration annunciator was already lit due to high vibration on an RFP Turbine. Due to the vibration recorder alarm configuration, high RFP Turbine vibration caused the common turbine vibration annunciator to alarm even though each RFP Turbine has its own annunciator. Due to personnel error, compensatory action for the lit annunciator was not taken.

Corrective actions include changing the vibration recorder alarm configuration and counseling personnel.

PLANT AND SYSTEM IDENTIFICATION

General Electric - Boiling Water Reactor
Energy Industry Identification System codes are identified in the text as (EIIS Code XX).

DESCRIPTION OF EVENT

On 11/27/92 at 0234 CST, Unit 2 was in the Run mode at a power level of 1705 CMWT (70% rated thermal power). At that time, the unit scrammed and both Reactor Recirculation pumps (EIIS Code AD) tripped. The scram was caused by a Turbine Stop Valve and Turbine Control Valve fast closure resulting from a trip of the Main Turbine (EIIS Code TA). The Main Turbine tripped due to vibration greater than the trip setpoint of 12 mils (0.012 inches) on the #6 bearing. A Main Turbine trip results in Turbine Stop Valve and Turbine Control Valve fast closure which, in turn, causes a reactor scram and a trip of both Reactor Recirculation pumps.

As expected, reactor vessel water level decreased due to void collapse from the rapid reduction in power. Water level decreased from its normal value of 37 inches above instrument zero (195 inches above the top of the active fuel) to its minimum value of five inches above instrument zero approximately seven seconds after the scram. This level decrease resulted in another scram signal and a Group 2 Primary Containment Isolation System (EIIS Code JM) signal on low (Level 3) water level per design. Water level was restored and maintained by the Reactor Feedwater Pumps (RFPs, EIIS Code SJ) and the Control Rod Drive (EIIS Code AA) system pumps. No Emergency Core Cooling Systems actuated nor were any required to actuate to recover and/or control water level.

Reactor vessel pressure increased from its pre-event value of 968 psig to its peak value of approximately 1030 psig less than five seconds after the scram. The three Main Turbine Bypass Valves (EIIS Code SO) opened to limit the pressure increase, and to reduce and maintain pressure below 920 psig as designed. By 0327 CST, pressure had decreased to 580 psig due to a lack of decay heat (the unit had recently started-up from a two month refueling outage). Operations personnel then closed the Main Steamline Isolation Valves to limit the reactor vessel cooldown rate. No safety relief valves lifted, nor were any required to lift, to reduce or control pressure.

CAUSE OF EVENT

The causes of this event were a less than adequate vibration recorder alarm processor configuration and operations personnel error. The Main Turbine high vibration annunciator was in the alarm condition prior to this event from high vibration on the "B" RFP Turbine. Because of inadequate vibration recorder alarm configuration, high RFP Turbine vibration caused the common turbine vibration annunciator to alarm even though each RFP Turbine has its own annunciator. Additionally, operations personnel failed to monitor the vibration recorder more closely during power increases on 11/27/92. Therefore, they were

not aware of increasing levels of Main Turbine vibration resulting from normal power increases. They continued to increase power instead of holding power and allowing vibration levels to decrease. Consequently, vibration levels continued to increase, resulting in vibration on the #6 bearing exceeding the Main Turbine trip setpoint of 12 mils and causing this event.

Typically, Main Turbine vibration levels, particularly on the #6 bearing, will increase as load on the turbine is increased. As power is increased, more reactor steam is admitted to the Main Turbine resulting in temperature differences within the turbine. These temperature differences cause differential expansion and an increase in vibration levels until the Main Turbine temperatures reach a new equilibrium. A review of five start-ups since January 1990 confirmed this phenomenon routinely exists during power increases. Temporarily halting the power increase allows the turbine temperature to reach equilibrium, decreasing the vibration.

Each of the six Main Turbine bearings has a vibration sensor, the signals from which are transmitted to the Turbine Supervisory Instrumentation Cabinet (EIIS Code IT) and from there to Vibration and Eccentricity Recorder 2N32-R600. This recorder also receives ten other input signals, including "A" and "B" RFP Turbine bearing vibration signals, in addition to the Main Turbine bearing vibration inputs. The recorder's alarm processor is configured such that if any one of the 16 input signals exceeds a predetermined value, a single annunciator ("Shaft Vib/Expansion Alarm") will alarm. The "A" and "B" RFP Turbine bearing vibration signals are also sent to a separate alarm circuit within the Turbine Supervisory Instrumentation Cabinet. Should RFP Turbine bearing vibration levels exceed a predetermined value, annunciators "RFPT 2A Excessive Vibration" or "RFPT 2B Excessive Vibration" will alarm as appropriate. Therefore, high vibration on any one RFP Turbine bearing will result in the alarming of two annunciators. The vibration recorder alarm processor configuration is less than adequate because it causes the unnecessary masking of an alarm condition on the other input signals to recorder 2N32-R600 when RFP Turbine bearing vibration is above its alarm setpoint.

Approximately two hours prior to the Main Turbine trip and reactor scram, vibration levels on Main Turbine bearings #5 and #6 began a fairly steady and linear increase as load on the turbine was increased at a rate of roughly 10% per hour. Shift operations personnel failed to check recorder 2N32-R600 during this time even though they were aware the Main Turbine vibration annunciator was masked because of a known high RFP Turbine bearing vibration. Therefore, they did not note the increasing Main Turbine bearing vibration levels. Since the "Shaft Vib/Expansion Alarm" annunciator was already lit, the shift was not made aware vibration had reached its alarm setpoint of 10 mils. Consequently, they continued to increase load causing vibration levels to continue to increase to the Main Turbine trip setpoint value of 12 mils. The Main Turbine then tripped and the reactor scrammed per design.

REPORTABILITY ANALYSIS AND SAFETY ASSESSMENT

This report is required per 10 CFR 50.73(a)(2)(iv) because unplanned actuations of the Reactor Protection System (RPS, EIIS Code JC) and an Engineered Safety Feature (ESF) system occurred. Specifically, the RPS actuated on Turbine Stop Valve and Turbine Control Valve fast closure resulting from a Main Turbine trip on high vibration. This resulted in the rapid insertion of all control rods per design. Additionally, the RPS actuated again and the Group 2 Primary Containment Isolation System, an ESF system, actuated on low (Level 3) reactor vessel water level per design when level decreased due to void collapse.

The RPS provides timely protection against the onset and consequences of conditions that could threaten the integrity of the fuel and nuclear steam process barriers. Turbine Stop Valve and Turbine Control Valve fast closure result in an increase in reactor vessel pressure. The increase in pressure results in a positive reactivity increase, as moderator density increases, and a corresponding increase in reactor power. In anticipation of this pressure and power increase, the reactor will scram to rapidly reduce power and steam production on Turbine Stop Valves less than 90% full open and Turbine Control Valve fast closure as sensed by Electrohydraulic Control system fluid pressure. This limits the pressure and power increase caused by the closure of these valves.

In this event, the reactor scrammed per design when the Turbine Stop Valves and Turbine Control Valves closed on a Main Turbine trip. Reactor vessel water level initially decreased as expected due to void collapse caused by the rapid reduction in power; however, level did not decrease below 163 inches above the top of the active fuel. Water level was restored and maintained by the RFPs and the Control Rod Drive system pumps. No Emergency Core Cooling Systems actuated nor were any required to actuate to recover and/or control water level. Reactor vessel pressure increased only to 1030 psig, from its pre-event pressure of 968 psig. The Main Turbine Bypass Valves opened to limit the pressure increase, and to reduce pressure and maintain it below 920 psig per design. No Safety Relief Valves lifted nor were any required to lift to reduce or control pressure.

Based on the above discussion, it is concluded that this event had no adverse impact on nuclear safety. This analysis is applicable to all power levels.

CORRECTIVE ACTIONS

Appropriate operations personnel have been counseled regarding their error in not monitoring vibration recorder 2N32-R600 more closely with the "Shaft Vib/Expansion Alarm" annunciator lit during power increases.

TEXT

The configuration of the alarm processor for recorder 2N32-R600 was changed such that RFP Turbine bearing vibration levels will continue to be recorded, but will not cause annunciator "Shaft Vib/Expansion Alarm" to alarm on high vibration. High RFP Turbine bearing vibration still causes annunciators "RFPT 2A Excessive Vibration" and "RFPT 2B Excessive Vibration" to alarm.

The Unit 1 Main and RFP Turbine bearing vibration recorder alarm processor configuration will be reviewed and, if necessary and feasible, changed such that high RFP turbine bearing vibration levels will not cause the "Shaft Vib/Expansion" alarm to annunciate, but will still initiate the individual RFP vibration alarms. This action will be completed by 1/29/93.

ADDITIONAL INFORMATION

No systems other than those mentioned in this report were affected by this event.

No failed components caused or resulted from this event.

There have been no previous similar events reported in the last two years in which the Main Turbine tripped on high vibration because operations personnel were unaware of increasing levels of vibration.