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Georgia Power
the southern electric system

September 28, 1995

Docket No. 50-366 HL-5038

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

Edwin I. Hatch Nuclear Plant - Unit 2
Licensee Event Report
Reduction in Main Condenser
Vacuum Prompts a Manual Reactor Shutdown

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 reduction in main condenser vacuum which prompted an unplanned manual reactor shutdown.

Sincerely,

J. T. Beckham, Jr.

OCV/eb

Enclosure: LER 50-366/1995-003

cc: *Georgia Power Company*
Mr. H. L. Sumner, Jr., Nuclear Plant General Manager
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. B. L. Holbrook, Senior Resident Inspector - Hatch

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NRC FORM 366 (5-92) U.S.NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104
EXPIRES: 5/31/95
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 (MNBB7714), 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)
Edwin I. Hatch Nuclear Plant - Unit 2	0 5 0 0 0 3 6 6	1 OF 5

TITLE (4)
Reduction in Main Condenser Vacuum Prompts Manual Reactor Shutdown

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)
0 9	0 2	9 5	9 5	0 0 3	0 0	1 0	0 2	9 5		0 5 0 0 0
									FACILITY NAME	0 5 0 0 0

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)	2 8	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 (include area code)
Steven B. Tipps , Nuclear Safety & Compliance Manager	AREA CODE 9 1 2 3 6 7 - 7 8 5 1

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
C	K E	C T W	E 0 8 0	N						

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 15 single-space typewritten lines) (16)

On 9/2/95, at 1512 EDT, Unit 2 was in the Run mode at 682 CMWT (28 percent of rated thermal power). At that time, the Reactor Protection System (RPS) was manually actuated in anticipation of an automatic actuation of a Main Turbine trip due to Main Condenser low vacuum. Prior to the reactor shutdown, on 9/1/95, at approximately 2008 EDT, one cell of a cooling tower collapsed, blocking the flow of Circulating Water System (CWS) water from the cooling tower to the flume. Flume level subsequently decreased to the point that the CWS pumps experienced vortexing and pumped air along with water into the system. The air collected in the "D" waterbox of the Main Condenser. Licensed personnel proceeded to reduce reactor power due to decreasing Main Condenser vacuum. By approximately 2230 EDT, vacuum had stabilized and the flume level had been restored. On the following day, 9/2/95, at 1220 EDT, licensed personnel noticed that the Main Condenser vacuum was decreasing and began reducing reactor power in an attempt to restore vacuum. An apparently unsuccessful attempt was made to vent the "D" waterbox and, since vacuum could not be restored, at 1512 EDT, conservative actions were taken to manually shut down the reactor. The lowest reactor water level reached during the ensuing transient was 166 inches above the top of the active fuel. The "B" Reactor Feedwater Pump restored water level to normal. Reactor pressure following the reactor shutdown did not exceed the pre-event level of 975 psig. The cause of the event was air-binding of the "D" waterbox. Corrective actions include venting the waterbox, returning the cooling tower to service, and briefing Operations shift personnel on the event.

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 9/2/95, at 1512 EDT, Unit 2 was in the Run mode at 682 CMWT (28 percent of rated thermal power). At that time, the Reactor Protection System (RPS, EIIS Code JE) was manually actuated in anticipation of an automatic actuation on a Main Turbine (EIIS Code TA) trip on Main Condenser (EIIS Code SG) low vacuum. Prior to the reactor shutdown, on 9/1/95, at approximately 2008 EDT, with the reactor at 2168 CMWT (89 percent of rated thermal power), one cell in one of the three cooling towers (EIIS Code KE) collapsed blocking the flow of Circulating Water System (CWS, EIIS Code NN) water from the cooling tower to the CWS flume. As a result, the cooling tower basin overflowed into the yard drains, resulting in a loss of CWS inventory and, thus, a decrease in flume water level. Licensed personnel were notified of the event by a nonlicensed individual in the cooling tower yard. Licensed personnel proceeded to decrease reactor power to approximately 1289 CMWT (53 percent rated thermal power) due to decreasing Main Condenser vacuum.

By approximately 2230 EDT, Main Condenser vacuum had stabilized and the flume level had been restored. Cooling tower 5 had been removed from service for cleanup of the collapsed cell fill material. On the following day, 9/2/95, at 1220 EDT, licensed personnel had noticed that the Main Condenser vacuum was decreasing. Licensed personnel began to reduce reactor power in an attempt to restore vacuum. However, the Main Condenser vacuum continued to decrease. It was suspected that air had been introduced into the Main Condenser waterboxes during the flume water level transient on 9/1/95. Air in the waterboxes would affect Main Condenser efficiency and under certain load conditions would result in a decrease in vacuum. Thus, nonlicensed personnel were dispatched to vent the condenser waterboxes. After the venting was completed, vacuum in the Main Condenser continued to decrease. Reactor power reduction continued in an attempt to stabilize and restore vacuum.

At 1510 EDT, with the Main Condenser vacuum at 21.5 inches Hg, Control Room personnel were notified that the condensate temperature was 153°F. The normal condensate temperature is approximately 130°F. Such a high condensate temperature does not pose any operational problems but is indicative of a reduction in the cooling capability of the CWS. Approximately one minute later, the "Turbine Bellows Failure" annunciator alarmed which indicated that a Main Turbine trip on Main

Condenser low vacuum was imminent. Consequently, at 1512 EDT, the reactor was shut down by manual actuation of RPS.

The RPS actuation resulted in a rapid insertion of all control rods. As expected, following a reactor scram, void collapse occurred in the reactor core region resulting in a reduction of reactor water level. The lowest level reached during the transient was eight inches above instrument zero (166 inches above the top of the active fuel). The "B" Reactor Feedwater Pump (RFP, EIIS Code SJ) restored water level to normal. Additionally, the reactor pressure did not exceed the pre-event level of 975 psig.

Since the reactor water level did not exceed any system actuation setpoints, no engineered safety features automatically initiated during the event.

CAUSE OF EVENT

The cause of the event was air binding of the "D" Main Condenser waterbox. Specifically, on 9/1/95 when the Cooling Tower cell collapsed, the flume level decreased low enough to cause vortexing in the pump suction pits. Consequently, air was pumped into the Circulating Water System. The first high point on the Main Condenser waterboxes is the "D" waterbox. Thus, the entrained air collected in the "D" waterbox resulting in an air-bound condition. In this condition, the efficiency of the waterbox and, thus, the Main Condenser is reduced. Due to the atmospheric conditions on the night of 9/1/95, the Main Condenser with the air-bound "D" waterbox was capable of condensing the steam from the Main Turbine. However, the following day, as outside ambient temperature began increasing, Circulating Water System water temperature began increasing as well. Given the steam load on the Main Condenser and the "D" waterbox being air-bound, the increase in CWS water temperature decreased the condensing rate in the Main Condenser causing vacuum to begin decreasing. Reactor power was reduced in order to decrease the steam load to the Main Condenser and restore vacuum. However, the decrease in power could not be accomplished fast enough to reverse the vacuum trend.

Prior to the vacuum decreasing on 9/2/95, it was noted that the "D" waterbox might contain air. This was based on the fact that the "D" waterbox differential pressure indication was downscale. On 9/2/95 at approximately 1400 EDT, after shift personnel noticed condenser vacuum decreasing and after the reactor power level reductions had been initiated, non-licensed personnel were dispatched to vent the waterboxes. Subsequent to the venting, the differential pressure indication for the "D" waterbox remained downscale. At that point, personnel believed that the instrumentation was malfunctioning because of past problems experienced with this instrumentation. However, after the

event, the "D" waterbox was again vented and this time was found to have contained a substantial amount of air. Furthermore, after this second venting activity, the differential pressure indication was restored. It was concluded that during the first venting activity the vent valve was not opened long enough to empty the forty-foot vent line of the water contained in the line. The four-inch line taps off of the top of the waterbox and is routed down below the waterbox to a floor drain. Therefore, with air captured in the top of the waterbox, the vent line would still be filled with water. When venting the waterbox the first time, the individual observed water in the vent line sight glass for approximately 30 seconds after opening the vent valve and incorrectly concluded that the water box was filled with water.

REPORTABILITY AND SAFETY ASSESSMENT

This report is required pursuant to 10 CFR 50.73(a)(2)(iv) because a condition occurred which required a manual actuation of an engineered safety feature. Specifically, the Reactor Protection System was manually actuated in anticipation of an automatic actuation on Main Turbine trip due to low Main Condenser vacuum.

The Reactor Protection System is designed to automatically shutdown the reactor by rapidly inserting the control rods into the reactor core when sensed parameters exceed predetermined setpoints. One of the parameters sensed is a Main Turbine trip or Turbine Stop Valve (TSV) closure at greater than a nominal 30 percent rated thermal power. A trip of the Main Turbine (i.e., closure of the TSVs) with the reactor at power results in a reactor pressure transient and a reactivity transient. The reactor pressure vessel and the reactor core are designed with ample margin to withstand these transients; however, when a turbine trip is anticipated, as in this event, conservative actions should be taken to manually shut down the reactor to avoid or lessen the transient.

An automatic trip of the Main Turbine occurs on Main Condenser low vacuum to preclude damage to the Main Turbine and the Main Condenser due to an over-pressure condition.

In this event, Main Condenser vacuum was approaching the Main Turbine trip setpoint and the RPS trip logic for Main Turbine trip at greater than 30 percent power was still active, even though indicated power was 28 percent. (This is attributed to setpoint conservatism and instrument dead band.) RPS was subsequently manually actuated resulting in full insertion of the control rods. The reactor pressure remained at the pre-event level of 975 psig. As expected following the scram, void collapse occurred in the reactor core region resulting in a reactor water level transient. The lowest level reached during the transient was eight inches above instrument zero (166 inches above the top of the active fuel) before level was restored by the "B" RFP. Therefore, the reactor pressure vessel

was not subjected to any abnormal pressure transients and the fuel was adequately covered during the event.

Based on this analysis, it is concluded that this event did not adversely impact nuclear safety.

CORRECTIVE ACTIONS

On 9/3/95, the "D" Main Condenser waterbox was completely vented.

The cell fill material was cleaned out of Cooling Tower 5 and the tower was returned to service on 9/3/95.

Operations shift personnel will be briefed during Beginning of Shift Training (BOST) sessions on the event and the need to allow for emptying of water in the vent line before checking for air in the vessel being vented. Shift personnel will be briefed by October 15, 1995.

ADDITIONAL INFORMATION

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

No events have occurred in the past two years in which the reactor was shut down because of a failed Cooling Tower cell or an air-bound waterbox.

Failed Components Information:

Master Parts List Number: 2W24-B001B
Type: Forced Convection Cooling Tower
Manufacturer: Ecodyne, Cooling Products Division
Model Number: 1078-6811
Manufacturer Code: E080
EIIS System Code: KE
EIIS Component Code: CTW
Root Cause Code: C
Reportable to NPRDS: No