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the southern electric system

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HL-1642
001637

May 21, 1991

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

PLANT HATCH - UNIT 2
NRC DOCKET 50-366
OPERATING LICENSE NPF-5
LICENSEE EVENT REPORT
LESS THAN ADEQUATE PROCEDURE
RESULTS IN ESF ACTUATIONS

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 the unanticipated actuation of some Engineered Safety Features (ESFs). This event occurred at Plant Hatch - Unit 2.

Sincerely,

W. G. Hairston, III
W. G. Hairston, III

JJP/cr

Enclosure: LER 50-366/1991-012

cc: (See next page.)

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U.S. Nuclear Regulatory Commission

May 21, 1991

Page Two

cc: Georgia Power Company

Mr. H. L. Sumner, General Manager - Nuclear Plant

Mr. J. D. Heidt, Manager Engineering and Licensing - Hatch
NORMS

U.S. Nuclear Regulatory Commission, Washington, D.C.

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Mr. S. D. Ebnetter, Regional Administrator

Mr. L. D. Wert, Senior Resident Inspector - Hatch

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) PLANT HATCH, UNIT 2	DOCKET NUMBER (2) 0500366	PAGE (3) 1 of 6
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TITLE (4)
LESS THAN ADEQUATE PROCEDURE RESULTS IN ESF ACTUATIONS

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)
04	22	91	91	012	00	05	21	91		05000

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR (11)

OPERATING MODE (9) 5	20.402(b)	20.405(c)	X	50.73(a)(2)(iv)	73.71(b)
POWER LEVEL 000	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)(iii)		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 STEVEN B. TIPPS, MANAGER NUCLEAR SAFETY AND COMPLIANCE, HATCH	TELEPHONE NUMBER 912 367-7851
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COMPLETE ONE LINE FOR EACH FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORT TO NRPDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORT TO NRPDS

SUPPLEMENTAL REPORT EXPECTED (14)

<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)	<input checked="" type="checkbox"/> NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
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ABSTRACT (16)

On 4/22/91 at 1645 CDT, Unit 2 was in a refueling outage with the core completely unloaded and the reactor vessel flooded. At that time, a false Loss of Coolant Accident (LOCA) signal on low reactor water level was received. Diesel Generators 2R43-S001A, 2R43-S001C, and 1R43-S001B automatically started, the Main Control Room Environmental Control System automatically transferred from the normal mode to the pressurization mode, Turbine Building Plant Service Water isolation valves 2P41-F316A through D automatically closed, and Core Spray system injection valve 2E21-F005A and Residual Heat Removal (RHR) system injection valves 2E11-F015A and 2E11-F017A automatically opened. The Core Spray system and RHR system pumps did not start because they had been removed from service per approved plant procedures as part of refueling outage activities. Similarly, Core Spray system injection valve 2E21-F005B and RHR system injection valves 2E11-F015B and 2E11-F017B did not open because they had been removed from service. The LOCA signal was generated when new Analog Transmitter Trip System (ATTS) trip cards were installed in Main Control Room ATTS panels. Due to incorrect positioning of switches on the ATTS cards, a trip signal was generated when the cards should have been in an untripped condition.

The cause of this event is a less than adequate procedure. The procedure used to set the switches on the new trip cards was incorrect. The procedure's writer and sponsor failed to ensure the procedure provided correct guidance to properly set up the subject cards.

Corrective actions include counseling involved personnel, revising the procedure, and changing the trip card configuration.

**LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION**

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (5)			PAGE (3)		
		YEAR	SEQ NUM	REV			
PLANT HATCH, UNIT 2	05000366	91	012	00	2	OF	6

TEXT

PLANT AND SYSTEM IDENTIFICATION

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

DESCRIPTION OF EVENT

On 4/22/91, Unit 2 was in a refueling outage with the core completely unloaded. Work per Design Change Request (DCR) 2H89-107 was in progress. This DCR was initiated to replace the General Electric Analog Transmitter Trip System (ATTS, EIIIS Code JE) trip cards in the Alternate Rod Insertion (ARI) logic system with equivalent trip cards manufactured by Rosemount in order to introduce manufacturer diversity between the ARI system and the Reactor Protection System (EIIIS Code JC). Trip card manufacturer diversity was necessary to comply with the requirements of 10 CFR 50.62, the ATWS rule. A similar change had been implemented on Unit 1 during its last refueling outage.

The ARI system is initiated on high reactor pressure or low reactor water level signals. The low reactor water level signal comes from slave cards which are provided a water level signal from master trip cards. The master trip cards receive their signal directly from water level transmitters. Consequently, both the master and slave trip cards were being replaced to provide the required diversity.

Each pair of cards, master and slave, are set to generate a downstream logic trip signal at different low water level conditions. The master trip cards, 2B21-N691A through D, are used to generate a Loss of Coolant Accident (LOCA) signal on reactor water level 1, 101 inches below instrument zero. These master trip cards also provide a water level signal to the ARI slave trip cards, 2B21-N692A through D.

ATTS trip cards, when bought, are designed to be used for a variety of applications and must be set up for a particular application prior to installation. The new Rosemount cards were set up and calibrated prior to installation per plant procedure 57CP-CAL-102-2S, "Analog Master/Slave Trip Unit Calibration." Besides adjusting the trip setpoint, card setup also includes positioning the Trip Status and Trip Output switches. The position of these two switches determines when the trip status light is illuminated and whether the card trips on increasing or decreasing input. In setting up the card per procedure both of the Rosemount card's switches were positioned incorrectly so that the card tripped when reactor water level was above the trip setpoint and the trip light extinguished when the card was in the tripped condition.

The switch positions were reversed because the switch designations were not consistent between manufacturers. Both General Electric and Rosemount designate the two switches as S1 and S2; however, the S1 switch on the General Electric card performs the same function as the S2 switch on the Rosemount card and vice versa. Since the two switches perform opposite functions on the two types of

**LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION**

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (5)			PAGE (3)	
		YEAR	SEQ NUM	REV		
PLANT HATCH, UNIT 2	05000366	91	012	00	3	OF 6

TEXT

cards, adjusting the like designated switches to the same positions will result in the cards functioning in opposite manners. Such was the case in this event, as noted above.

Prior to setting up the new cards, procedure 57CP-CAL-102-2S was revised to incorporate changes resulting from the DCR and the use of Rosemount trip cards; however, the switch designation differences were missed and not incorporated into the revision. (The switch designation differences had been properly incorporated into the corresponding Unit 1 procedure prior to set up of the Unit 1 cards.) Consequently, the Rosemount cards were set up using switch positions intended for General Electric cards. This resulted in the Rosemount cards functioning in a manner exactly opposite of that intended. Furthermore, because they functioned in an exactly opposite manner, the problem could not have been detected by the Instrument & Control (I&C) technician performing the bench set up and calibration. As the procedure required, the trip light illuminated when the card's test input signal was decreased to the trip setpoint. This was the expected response as the light is supposed to illuminate when the card is in a tripped condition, but, because the two switches on the card were positioned incorrectly, the card reset when the input signal was decreased to the trip setpoint and the trip light illuminated when the card was reset.

After having been set up on the bench, the Rosemount cards were taken to the Main Control Room and an I&C technician began to insert them in the ATTS panel slots where the General Electric cards had been removed. At 1645 CDT on 4/22/91, the I&C technician inserted trip card 2B21-N691D into its slot in the ATTS panel. This was the seventh of 16 cards to be inserted. When this card was inserted, sufficient logic was satisfied such that a LOCA signal on reactor water level 1 was received. Diesel Generators (EIIIS Code EK) 2R43-S001A, 2R43-S001C, and 1R43-S001B automatically started, the Main Control Room Environmental Control System (EIIIS Code VI) automatically transferred from the normal mode to the pressurization mode, Turbine Building Plant Service Water (EIIIS Code BS) isolation valves 2P41-F316A through D automatically closed, and Core Spray (EIIIS Code BM) system injection valve 2E21-F005A and Residual Heat Removal (RHR, EIIIS Code BO) system injection valves 2E11-F015A and 2E11-F017A automatically opened. The Core Spray system and RHR system pumps did not start because they had been removed from service per approved plant procedures as part of refueling outage activities. Similarly, Core Spray system injection valve 2E21-F005B and RHR system injection valves 2E11-F015B and 2E11-F017B did not open because they had been removed from service.

These actuations occurred because a trip signal was generated as each Rosemount trip card was installed. Each card was incorrectly set up such that it would trip on a reactor water level signal above rather than below its trip setpoint of 101 inches below instrument zero. Actual water level was over 233 inches above instrument zero because the vessel was flooded for refueling activities. Therefore, as each card was installed, it sensed a water level above its trip setpoint and generated a trip signal. When sufficient logic channels were tripped, a full LOCA signal was received and the above actuations resulted. The I&C technician installing the cards could not have known the associated logic

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (5)			PAGE (3)	
		YEAR	SEQ NUM	REV		
PLANT HATCH, UNIT 2	05000366	91	012	00	4	OF 6

TEXT

channels were being placed in a tripped condition. The only indication available to him at the ATTS panel was the trip light on the card and it was not illuminated for reasons explained previously.

Upon receipt of the LOCA signal and the above actuations, Operations personnel confirmed no actual LOCA conditions existed and all actuations occurred as expected. They then shutdown the Diesel Generators, opened valves 2P41-F316A through D, and returned the actuated systems to their normal/standby mode. The Unit 2 Shift Supervisor halted work in the ATTS panels until an investigation into the event could be conducted. The Rosemount cards installed at the time of the event were removed from the ATTS panels.

CAUSE OF THE EVENT

The cause of this event is a less than adequate procedure. Procedure 57CP-CAL-102-2S contained incorrect instructions for setting the switch positions of the Rosemount trip cards because the procedure's writer and sponsor failed to ensure it was correct. The procedure required the Rosemount S1 and S2 switches to be set as if the card were a General Electric card; however, the functions of the switches are reversed on the two cards. The incorrect instructions resulted in the Rosemount cards functioning in a manner exactly opposite to that intended. Thus, a trip signal was generated when the cards should have been in an untripped condition.

The Unit 1 procedure had been revised properly for a similar design change on Unit 1. The writer of the Unit 2 procedure revision used the Unit 1 procedure as a guide, but failed to note and incorporate the switch differences in the Unit 2 procedure. The procedure sponsor, also the technical reviewer of record, knew the switch differences had been incorporated in the Unit 1 procedure, but failed to ensure the Unit 2 procedure was corrected as well.

A contributing factor to this event is less than adequate sequencing of replacement activities. The Work Process Sheet for the DCR work activities required all 16 trip cards to be replaced before the functional test on each card was performed. Had the cards been replaced in master-slave pairs with the functional test performed after each pair, this problem would have been found before the logic necessary for a full LOCA actuation could have been tripped. This is because the card would have failed its functional test as the downstream logic relays and Main Control Room front panel annunciators would have operated opposite to that required by the functional test procedure. The failure of the functional test would have prevented further card replacements until the problem could have been resolved.

REPORTABILITY ANALYSIS AND SAFETY ASSESSMENT

This report is required per 10 CFR 50.73(a)(2)(iv) because unplanned actuations of Engineered Safety Features (ESFs) occurred. Several ESFs actuated on reactor water level 1, a LOCA signal. This signal was generated when incorrectly set up ATTS trip cards were installed in panels in the Main Control Room.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (5)			PAGE (3)	
		YEAR	SEQ NUM	REV		
PLANT HATCH, UNIT 2	05000366	91	012	00	5	OF 6

TEXT

Because switches on the trip cards were incorrectly positioned, a trip signal was generated when the cards should have been in an untripped condition.

A LOCA signal is generated by either reactor water level 1, 101 inches below instrument zero, or high drywell pressure, 1.85 psig. Either one of these signals is indicative of a large pipe break in the primary coolant or main steam systems and a loss of reactor coolant accident. Consequently, these signals result in activation of those ESFs needed to restore and maintain reactor water level to assure adequate cooling of the fuel and to control the release of radioactive material accompanying the pipe break.

In this event, a false LOCA signal, reactor water level 1, was generated when incorrectly set up ATTS trip cards were installed in Main Control Room panels as part of design change activities. Actual water level was well above the reactor water level 1 trip setpoint. In fact, the vessel was flooded to support refueling activities. The LOCA signal was generated because the card switches were positioned to provide a trip signal above the trip setpoint rather than below it as required. Given this error, in conjunction with the actual vessel water level conditions at the time, all logic systems and ESFs functioned as designed for the given plant conditions. No water was actually injected into the reactor vessel because the Core Spray and RHR systems pumps were removed from service as allowed by the Unit 2 Technical Specifications and plant conditions, i.e., no fuel in the reactor vessel.

Based on the above discussion, it is concluded this event had no adverse impact on nuclear safety. This analysis is applicable only to the conditions at the time of the event because the work which precipitated the event would be performed only under those conditions.

CORRECTIVE ACTION

Procedure 57CP-CAL-102-2S was changed temporarily to correct the switch positions for switches S1 and S2 of the Rosemount trip cards. The Rosemount cards were set up and calibrated using the corrected procedure. The temporary changes to procedure 57CP-CAL-102-2S will be made permanent by 5/27/91.

The writer and sponsor of the revision to procedure 57CP-CAL-102-2S have been counseled regarding the need for attention to detail when revising procedures.

The Work Process Sheet for DCR 2H89-107 work activities was changed to require the performance of a functional test after the installation of each master-slave trip card pair. Only after the satisfactory performance of the functional test will the next master-slave trip card pair be installed. In this sequencing of DCR work activities, sufficient logic to actuate ESFs can not be inadvertently placed in a tripped condition.

**LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION**

FACILITY NAME (1) PLANT HATCH, UNIT 2	DOCKET NUMBER (2) 0 5 0 0 0 3 6 6	LER NUMBER (5)			PAGE (3)	
		YEAR	SEQ NUM	REV		
		9 1	0 1 2	0 0	6	OF 6

TEXT

The following long term corrective actions will be implemented:

- revise procedure 42EN-ENG-001-0S by 7/13/91 to limit modification or design change work to one trip system at a time when possible. All work up to and including the functional test of the trip system will be complete and satisfactory before proceeding to the next trip system. If the logic contains only one trip system, the equipment served by the logic will be placed under clearance to prevent unwanted actuation.
- revise procedure 50AC-MNT-001-0S by 7/13/91 to require that Work Process Sheets only specify the sequence of the steps and specifically reference the approved plant procedure or drawing to be used for each step of the work.

Additionally, meetings will be scheduled between offsite and onsite engineering personnel in order to ensure that all responsibilities associated with the design change development and implementation process are clearly delineated and understood by all involved parties. During these meetings it will be determined if any improvements to the process are warranted.

ADDITIONAL INFORMATION

1. Other Systems Affected:

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

2. Failed Components Identification:

No failed components caused or resulted from this event.

2. Previous Similar Events:

Previous similar events in the last two years in which a less than adequate procedure has caused unplanned ESFs actuations were reported in Licensee Event Reports 50-321/1990-022, dated 11/16/90, and 50-366/1990-003, dated 4/23/90. Corrective actions for these events would not have prevented this event because the inadequate procedures for these events were not made so as a result of a revision for a design change. Therefore, corrective actions for these events did not address the process under which procedures are revised as a result of a design change.