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The Southern Electric System

W. G. Hairston, III  
Senior Vice President  
Nuclear Operations

HL-1417  
000139

February 7, 1991

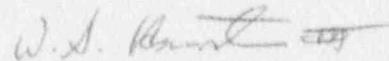
U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, D.C. 20555

PLANT E. I. HATCH - UNIT 2  
NRC DOCKET 50-366  
OPERATING LICENSE NPF-5  
LICENSEE EVENT REPORT  
SAFETY RELIEF VALVES EXPERIENCE SETPOINT DRIFT  
DUE TO CORROSION INDUCED BONDING

Gentlemen:

Georgia Power Company is submitting the enclosed, revised, Licensee Event Report (LER) on a voluntary basis concerning safety relief valve setpoint drift due to corrosion induced bonding. The revision provides updated information regarding the current industry understanding of the root cause of the setpoint drift and summarizes the current Boiling Water Reactor Owners' Group activities to reduce setpoint drift. This event occurred in September of 1989 at Plant Hatch - Unit 2.

Sincerely,



W. G. Hairston, III

CLT/rw

Enclosure: LER 50-366/1989-007 Rev 1

c: (See next page.)

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U.S. Nuclear Regulatory Commission  
February 7, 1991  
Page Two

c: 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.  
Mr. K. Jabbour, Licensing Project Manager - Hatch

U.S. Nuclear Regulatory Commission, Region II  
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) 05000366	PAGE (3) 1 OF 5
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TITLE (4)  
SAFETY RELIEF VALVES EXPERIENCE SETPOINT DRIFT DUE TO CORROSION INDUCED BONDING

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)																																																																																																		
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LICENSEE CONTACT FOR THIS LER (12)

NAME		TELEPHONE NUMBER	
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	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

ABSTRACT (16)

Revision 1 to this LER provides updated information regarding the current industry understanding of the root cause of the setpoint drift exhibited by some of the pressure vessel safety relief valves (SRVs) and summarizes the current Boiling Water Reactor Owners' Group (BWROG) activities to reduce setpoint drift. On 9/26/89, at approximately 1200 EDT, Unit 2 was in the Refuel mode at an approximate power level of 0 MWt (approximately 0% of rated thermal power). At that time plant engineering personnel received written notification of the results of off-site testing of the SRVs. Of the eleven SRVs, four had exhibited drift in the mechanical lift setpoints in excess of the  $\pm 3\%$  tolerance specified by in-service testing (IST) requirements. This voluntary report is being submitted due to the potential industry interest in this event in view of the referenced BWROG activities. The experienced setpoint drift was well within the analytical limits existing for reactor vessel over-pressure protection.

The root cause of the event is corrosion-induced bonding of the surface between the pilot valve disc and seat. The experienced setpoint drift in this event is consistent with current industry data demonstrating that both PH13-8Mo discs and stellite discs can occasionally form corrosion bonds with the stellite seat resulting in setpoint drift.

Corrective actions for this event include refurbishing the valves and participating in the new BWROG corrective action plan to resolve the SRV setpoint drift issue which has been concurred with by the NRC.

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	89	007	01	2	OF 5

TEXT

PLANT AND SYSTEM IDENTIFICATION

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

SUMMARY OF EVENT

Revision 1 to this LER provides updated information regarding the current industry understanding of the root cause of the setpoint drift exhibited by some of the pressure vessel safety relief valves (SRVs EIIIS Code RV) and summarizes the current Boiling Water Reactor Owners' Group (BWROG) activities to reduce setpoint drift. On 9/26/89, at approximately 1200 EDT, Unit 2 was in the Refuel mode at an approximate power level of 0 MWt (approximately 0% of rated thermal power). At that time plant engineering personnel received written notification of the results of off-site testing of the SRVs. Of the eleven SRVs, four had exhibited drift in the mechanical lift setpoints in excess of the  $\pm 3\%$  tolerance specified by in-service testing (IST) requirements. This voluntary report is being submitted due to the potential industry interest in this event in view of the referenced BWROG activities. The experienced setpoint drift was well within the analytical limits existing for reactor vessel over-pressure protection.

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Corrective actions for this event include refurbishing the valves and participating in the new BWROG corrective action plan to resolve the SRV setpoint drift issue which has been concurred with by the NRC.

DESCRIPTION OF EVENT

On 9/09/89, as part of ongoing Unit 2 refueling outage activities, the SRVs were removed from the main steam lines and sent to an off-site contract test laboratory for the purpose of conducting in-service testing (IST) in accordance with the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, IWV-3512. On 9/26/89, by approximately 1200 EDT, plant engineering personnel had been notified of the test results for all the SRVs. Of the eleven SRVs, four had exhibited drift in the mechanical lift setpoints in excess of the  $\pm 3\%$  tolerance specified in Section XI. The following is a tabulation of test results for the eleven SRVs.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

FACILITY NAME (1)  PLANT HATCH, UNIT 2	DOCKET NUMBER (2)  05000366	LER NUMBER (5)			PAGE (3)	
		YEAR	SEQ NUM	REV		
		89	007	01	3	OF 5

TEXT

Plant Hatch MPL	Pilot Cartridge S/N	Nameplate Set Press. (psig)	Initial Lift Press. (psig)	% Nameplate Actuation Pressure
2B21-F013A*	315	1100	1077	- 2.14
2B21-F013B	312	1090	1199	+ 2.66
2B21-F013C*	308	1090	1129	+ 3.58
2B21-F013D	1001	1100	1115	+ 1.36
2B21-F013E	303	1110	1135	+ 2.25
2B21-F013F	310	1090	1103	+ 1.19
2B21-F013G	314	1090	1150	+ 5.50
2B21-F013H*	306	1110	1227	+10.54
2B21-F013K*	302	1100	1201	+ 9.18
2B21-F013L*	307	1110	1137	+ 2.43
2B21-F013M	301	1100	1118	+ 1.64

\*Indicates valve discs were made of PH13-8Mo steel. The remainder were made of Stellite-6.

While the setpoint drift demonstrated by the four valves (2B21-F013C, G, H, K) has been determined to be not reportable under the requirements of 10 CFR 50.73, this event is of potential interest to the industry in view of ongoing efforts by the BWROG to address the issue of SRV setpoint drift by eliminating corrosion-induced bonding as a contributor.

The BWROG had identified PH13-8Mo as a disc material which had the potential to be less susceptible to forming an adherent corrosion (oxide) bond to the Stellite-6 seat. This corrosion at the SRV pilot seat-disc interface is one of the causes of SRV setpoint drift. In cooperation with the BWROG study, several BWRs with Target Rock 2-stage SRVs, including Plant Hatch, had installed PH13-8Mo discs in up to 50% of their SRV pilot valves. This facilitated the gathering of in-service data to compare the performance of the new material with the existing Stellite-6 discs exposed to the same environment.

Early in-service performance of PH13-8Mo appeared to indicate a marked improvement over the stellite discs. However, following a review of the in-service data as of November, 1989, the BWROG reached the conclusion that the PH13-8Mo discs were not providing the improved setpoint drift performance originally expected. The data indicated that the performance of PH13-8Mo is not significantly different than that of stellite; both materials can occasionally form corrosion bonds which result in significant setpoint drift.

The excessive setpoint drift demonstrated by the four valves is consistent with the in-service data reviewed by the BWROG. In this particular case, three of these four valves had PH13-8Mo discs.

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	89	007	01	4	OF 5

TEXT

CAUSE OF THE EVENT

The root cause of the event is corrosion-induced bonding of the pilot valve disc and seat. Georgia Power Company is participating in the new BWROG corrective action plan to resolve the SRV setpoint drift issue which has been concurred with by the NRC.

The new BWROG program to resolve this issue is composed of two parallel options. The primary option involves controlling the local environment in the valve cavity to mitigate corrosion. Some European experience in this area indicates that non-condensibles including free oxygen and hydrogen (derived from radiolysis) accumulate in the valve cavity. A catalyst material has been successfully used to mitigate the potential for explosions in Europe. This also appears to reduce oxygen induced corrosion. Therefore, the primary option consists of designing a suitable catalyst for use in the SRVs and obtaining about two cycles of inservice experience in selected SRVs at various BWRs.

The back-up option, being developed in parallel, is a safety grade system of externally powered pressure switches to assure opening of the SRVs pneumatically when needed. This option would be available for implementation on a plant specific basis should the inservice experience with the catalyst indicate it does not resolve the issue.

REPORTABILITY ANALYSIS AND SAFETY ASSESSMENT

This report is being submitted voluntarily because the event may be of potential interest to the industry in view of the ongoing efforts of the BWROG to address the issue of SRV setpoint drift.

The purpose of the SRVs is to provide over-pressure protection for the reactor pressure vessel and associated reactor coolant system piping. There are a total of eleven SRVs located in the main steam lines between the reactor pressure vessel and the main steam isolation valves (MSIVs FIIS Code ISV). The SRVs are manufactured by Target Rock Company in compliance with the requirements of ASME Section III (1968 with Winter 1968 addenda), Paragraph N911.4(a)(1) for pilot operated valves. There are three sets of valves: four valves are designed to open at 1090 psig, four at 1100 psig, and three are designed to open at 1110 psig. The size of the valves coupled with the designated lift pressures is intended to limit a vessel pressure transient to +110% of the reactor vessel design pressure of 1250 psig, or a maximum of 1375 psig.

In this event, four of the eleven SRVs had setpoint drifts in excess of the +3% tolerance specified in ASME Section XI, with the two maximum setpoint drift magnitudes being +10.54 and +9.18. However, a plant specific analysis has been performed for Georgia Power Company by General Electric which demonstrates that

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	89	007	01	5	OF 5

TEXT

Plant Hatch has sufficient margin for overpressure protection and can tolerate up to a maximum 200 psi drift.

Specifically, the analysis evaluated the peak vessel pressure at various setpoint drifts up to 200 psi for the plant's most limiting pressurization event, the MSIV closure-flux scram event. If it was conservatively assumed that all eleven SRVs opened at a lift pressure +9% above the stated nameplate pressure, the resulting pressure transient would be limited to approximately 1300 psig, which is less than the design limit of 1375 psig. Since the total combined setpoint drift experienced in the event addressed this report was significantly less than the uniform +9% assumed in the referenced analysis, it is concluded that the limiting pressure transient occurring in conjunction with the measured SRV setpoint drift would not have resulted in exceeding the 1375 psig limit.

Based on the above information, it is concluded that this event had no adverse impact on nuclear plant safety. The analysis is conservative in that it assumes worst case initial conditions, and is therefore applicable to all power levels.

CORRECTIVE ACTIONS

Corrective actions for this event include:

1. Refurbishing the SRVs to bring lift pressures within a  $\pm 1\%$  tolerance.
2. Continuing to participate in the new BWROG corrective action plan to resolve the SRV setpoint drift issue which has been concurred with by the NRC.

ADDITIONAL INFORMATION

1. Previous Similar Events:

A similar event was reported in LER 50-321/1990-005 dated 4/24/90, in which SRVs with PH13-8MO pilot valve discs experienced setpoint drift in excess of  $\pm 3\%$ .

2. Affected Components Identification:

Master Parts List Number: 1B21-P013C, G, H, K

Manufacturer: Target Rock Company

Model Number: 7567F

Type: Two Stage Safety Relief Valve

Manufacturer Code: T020

EIIS System Code: JE

Reportable to NPRDS: Yes

Root Cause Code: X

EIIS Component Code: RV

3. Other Affected Equipment:

No systems other than the Unit 2 Safety Relief Valves were affected by this event.