

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001.

FACILITY NAME (1) Browns Ferry Nuclear (BFN) Plant Unit 2		DOCKET NUMBER (2) 05000260	PAGE (3) 1 OF 6
--	--	-------------------------------	--------------------

TITLE (4)
Main Steam Safety/Relief Valves Exceeded the Technical Specifications Required Setpoint Limit as a Result of Pilot Valve Disc/Seat Bonding

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
11	04	97	97	008	00	12	3	97	NA	
									NA	

OPERATING MODE (9) N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)									
POWER LEVEL (10) 100	20.2201(b)	20.2203(a)(2)(v)	X	50.73(a)(2)(i)(B)	50.73(a)(2)(viii)					
	20.2203(a)(1)	20.2203(a)(3)(i)		50.73(a)(2)(ii)	50.73(a)(2)(x)					
	20.2203(a)(2)(i)	20.2203(a)(3)(ii)		50.73(a)(2)(iii)	73.71					
	20.2203(a)(2)(ii)	20.2203(a)(4)		50.73(a)(2)(iv)	OTHER					
	20.2203(a)(2)(iii)	50.36(c)(1)		50.73(a)(2)(v)	Specify in Abstract below or in NRC Form 366A					
	20.2203(a)(2)(iv)	50.36(c)(2)		50.73(a)(2)(vii)						

LICENSEE CONTACT FOR THIS LER (12)	
NAME Clare S. Hsieh, Licensing Engineer	TELEPHONE NUMBER (include Area Code) (205) 729-7854

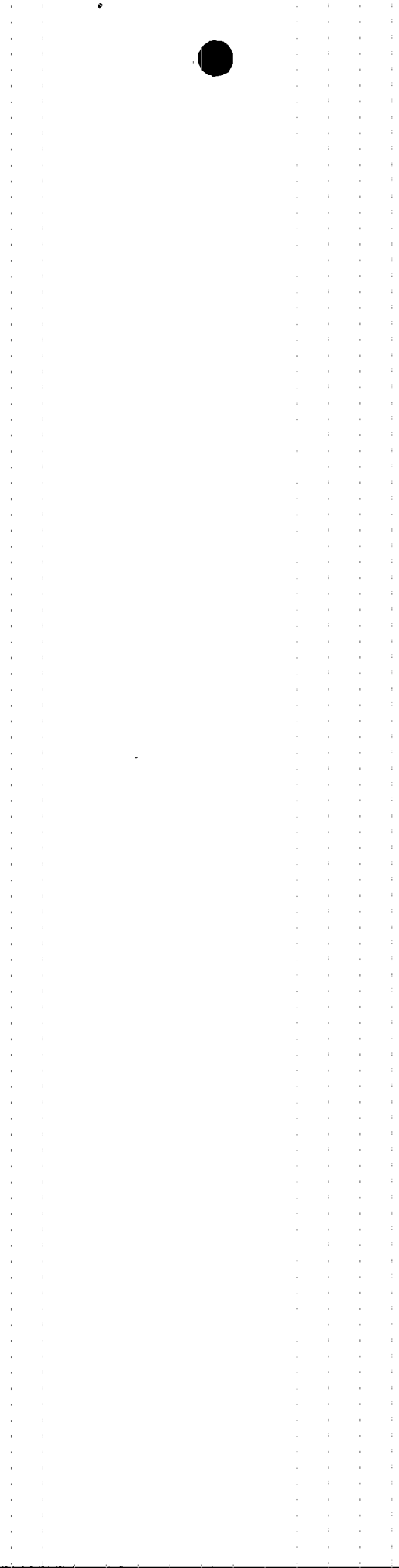
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)										
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
X	SB	RV	T020	Y						

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-spaced typewritten lines) (16)

On November 4, 1997, with Unit 2 at 100 percent power following the Unit 2 cycle 9 refueling outage, Unit 3 operating at 100 percent power, and Unit 1 shutdown and defueled, Wyle Laboratories notified TVA that 5 of the 13 Unit 2 main steam safety/relief valves (SRV) pilot cartridges removed during the Unit 2 cycle 9 refueling outage failed the setpoint tolerance bench tests. Wyle Laboratories' tests discovered that the SRVs' as-found setpoints were outside the TS setpoint tolerance of +/- 11 psi. This condition is reportable in accordance with 10 CFR 50.73(a)(2)(i)(B) as a condition prohibited by the plant's technical specifications (TS). The cause was SRV pilot disc/seat bonding attributed to corrosion at the two-stage SRV pilot disc/seat interface. This resulted in drifting of the SRV setpoints. The Unit 2 SRV pilot cartridges were installed during the Unit 2 forced outage (October 29-November 3, 1996). Setpoint drift is a generic concern experienced by utilities using Target Rock Two-Stage SRVs (Model No. 7567F) in boiling water reactors and is being investigated by the Boiling Water Reactors Owners Group (BWROG) SRV Drift Fix Development Committee and the manufacturer. TVA will continue to participate in the BWROG's evaluation of the long-term solution for the SRV setpoint drift problem. During the Unit 2, cycle 9 outage, SRV pressure switches were installed to minimize the effects of setpoint drift. In addition, TVA will continue to evaluate other possible solutions. Previous LERs for failed SRV testing included: 260/87005, 259/88053, 260/93003, 260/95003, 260/96004, 260/96008, and 296/97003.

9712110186 971203
PDR ADDOCK 05000260
S PDR



LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Browns Ferry Unit 2	05000260	97	-- 008	-- 00	2 of 6

TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

I. PLANT CONDITIONS

At the time of the discovery of this condition, Unit 2 was at 100 percent power following a refueling outage, Unit 3 was operating at 100 percent power, and Unit 1 was shutdown and defueled.

II. DESCRIPTION OF EVENT

A. Event

On November 4, 1997, Wyle Laboratories notified TVA that of the 13 main steam [SB] safety/relief valves (SRV) [RV] pilot cartridges tested at their laboratory in Huntsville, Alabama, five failed the setpoint tolerance bench tests. The SRV pilot cartridges were previously removed from the unit 2 main steam SRVs (Target Rock Two-Stage SRV Model No. 7567F) during the unit 2 cycle 9 refueling outage and shipped to Wyle Laboratories for tests. The pilot cartridges were installed during the unit 2 forced outage (October 30-November 3, 1996).

Altogether, Wyle Laboratories tested five SRV pilot platinum-stellite and eight stellite disc cartridges. One platinum-stellite and four stellite cartridges failed the 'as found' setpoint tolerance bench tests. The setpoints were found outside the technical specifications (TS) tolerance of +/- 11 pounds per square inch (psi) (approximately 1 percent). See Table 1 for specific SRV pilot cartridge test results.

The above condition is reportable in accordance with 10 CFR 50.73(a)(2)(i)(B) as a condition prohibited by the plant's TS.

B. Inoperable Structures, Components, or Systems that Contributed to the Event:

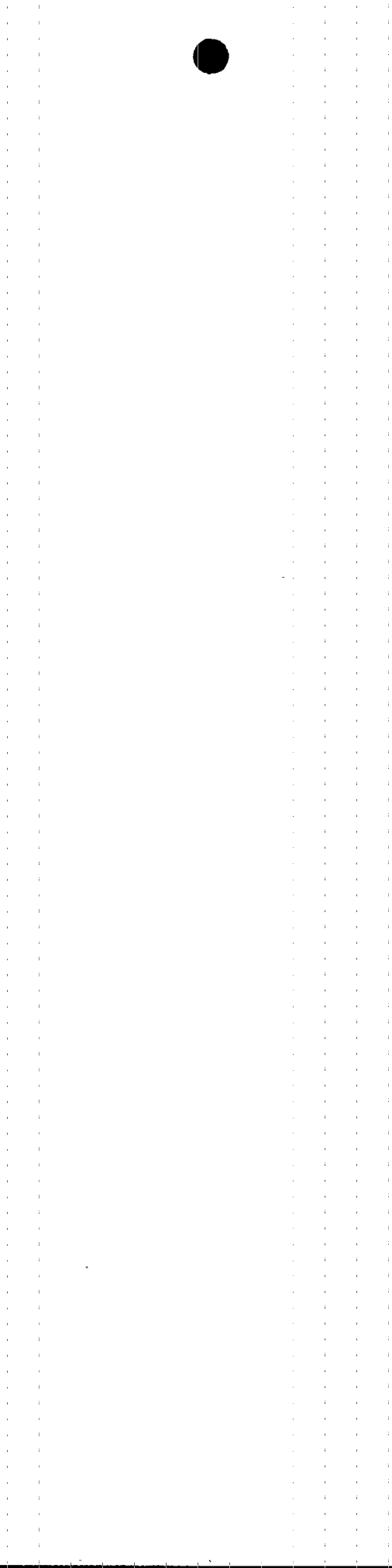
None.

C. Dates and Approximate Times of Major Occurrences:

October 30-November 3, 1996 Unit 2 in forced outage. Pilot cartridges installed in unit 2 main steam SRVs.

September 27, 1997 Unit 2 entered cycle 9 refueling outage.

October 8-15, 1997 Pilot cartridges removed from main steam SRVs and shipped to Wyle Laboratories for tests.



LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Browns Ferry Unit 2	05000260	97	-- 008	-- 00	3 of 6

TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

October 19, 1997 Unit 2 completed cycle 9 refueling outage.

November 4, 1997 Wyle Laboratories notified TVA of the SRV pilot cartridges test results.

D. Other Systems or Secondary Functions Affected:

None.

E. Method of Discovery:

This condition was identified during valve bench testing at Wyle Laboratories in Huntsville, Alabama.

F. Operator Actions:

None.

G. Safety System Responses:

None.

III. CAUSE OF THE EVENT

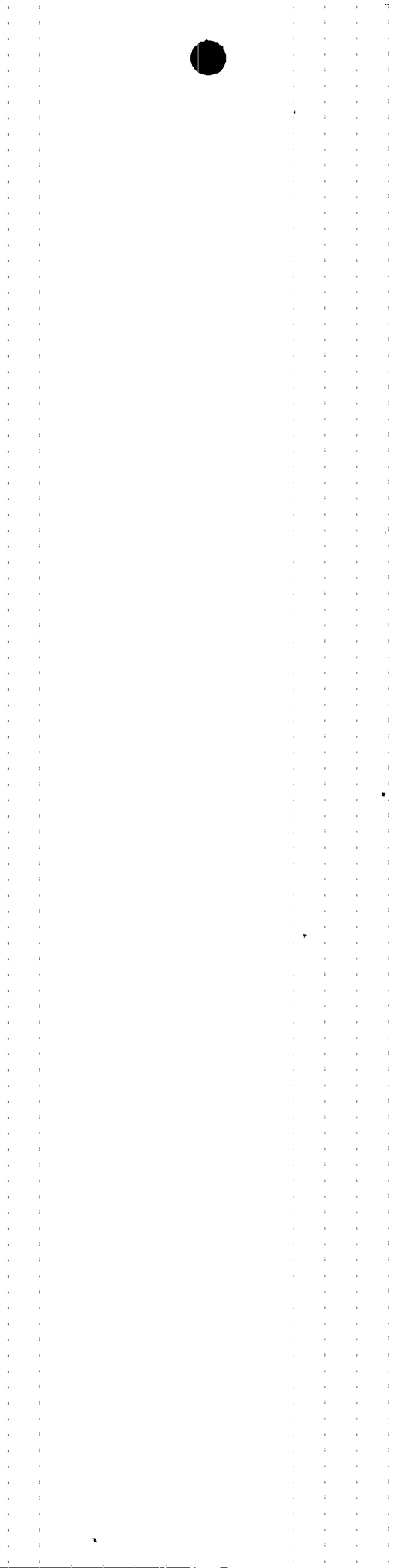
A. Immediate Cause:

The immediate cause was SRV pilot disc/seat bonding resulting in the SRV setpoints deviating outside the TS setpoint tolerance of +/- 11 psi.

B. Root Cause:

Four of the five failed SRV pilot cartridges opened above the TS setpoint tolerance of +11 psi. The cause was SRV pilot disc/seat bonding which was attributed to corrosion at the two-stage SRV pilot disc/seat interface. The corrosion bonding resulted in an increase in the valve opening pressure due to the need for additional opening force above the setpoint value. As a result of this bonding, the SRV setpoints drifted above the TS setpoint limit.

One SRV pilot cartridge opened below the setpoint tolerance of -11 psi (cartridge 1070 opened at -21 psi below its setpoint). TVA believes the low opening pressure was due to 'inservice' valve leakage which may have caused the valve to drift below its



LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Browns Ferry Unit 2	05000260	97	-- 008	-- 00	4 of 6

TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

setpoint tolerance. TVA will examine cartridge 1070 later in more detail after it is disassembled, and any corrective action needed to fix this problem is tracked by the TVA corrective action program.

IV. ANALYSIS OF THE EVENT

There are 13 SRVs on the main steam piping. The valves are designed to perform the safety/relief function for the primary reactor system boundary by opening at a sensed pressure of 1105, 1115 or 1125 psig. The safety/relief function of the SRVs is to limit primary reactor system pressure to less than 1375 psig in the event of a pressurization transient resulting from a turbine trip or a main steam isolation valve closure. The failures of the four SRVs (from approximately +1.17 to +6.31 percent above their setpoint pressure) would not have resulted in exceeding the TS safety limit during any abnormal operational transient. Additionally, in this event one SRV pilot valve cartridge (valve cartridge 1070) opened below its setpoint limit at -21 psi (approximately -1.88 percent). Valve opening before reaching the setpoint tolerance would result in no adverse effects on the TS safety limit of the primary reactor system pressure during analyzed transients.

V. ASSESSMENT OF THE SAFETY CONSEQUENCES

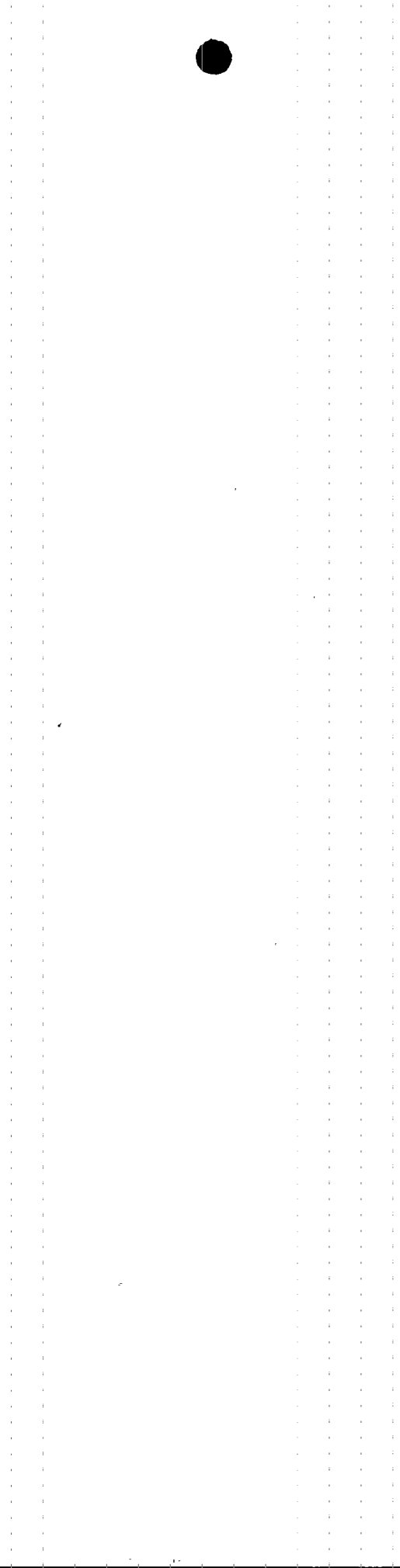
TVA performed a limiting pressurization transient analysis for unit 2 cycle 6 assuming a spectrum of main steam SRV failures and setpoint drifts. The analysis concluded that even if four main steam SRVs completely fail to open and the remainder operate at ten percent above setpoint, the primary reactor system pressure would not exceed the TS safety limit of 1375 psig. Considering the conservative inputs to this analysis and the low sensitivity of the pressurization transient to cycle-by-cycle loading differences, the SRV failures in this unit 2 event would not have resulted in exceeding the TS safety limit during operational transients. Thus, the plant and public safety would not have been adversely affected and safety of plant personnel was not compromised.

VI. CORRECTIVE ACTIONS

A. Immediate Corrective Actions:

Prior to the unit 2 restart, TVA replaced all 13 unit 2 main steam SRV pilot cartridges. The SRV pilot cartridges were replaced with the newly certified cartridges which had previously been removed from other units.

The cartridges removed from unit 2 will later be refurbished, retested and recertified with their setpoint within TS requirements.



LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Browns Ferry Unit 2	05000260	97	-- 008	-- 00	5 of 6

TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

B. Corrective Actions to Prevent Recurrence:

During the Unit 2, cycle 9 refueling outage, a modification was implemented that installed pressure switches to activate SRVs. The pressure switches ensure the initiation of any SRV should it fail to open at its setpoint; thus, minimizing the effects of setpoint drift. In addition, TVA has requested a TS change which raises the setpoint limits from +/- 11 psi (approximately +/- 1 percent) to +/- 3 percent which corresponds to the inputs currently used in the Unit 2 and 3 cycle-specific core reload analyses. This change will provide added margin for SRV tests.

SRV setpoint drift is a generic concern experienced by utilities using this brand of SRVs in boiling water reactors and is being investigated by the BWROG's SRV Drift Fix Development Committee and the manufacturer. TVA will continue to participate in the BWROG's evaluation of the long-term solution for the SRV setpoint drift problem. Long-term corrective actions associated with this problem are being tracked by the TVA corrective action program.

VII. ADDITIONAL INFORMATION

A. Failed Components:

Target Rock, Two-Stage SRVs Model No. 7567F.

B. Previous LERs on Similar Events:

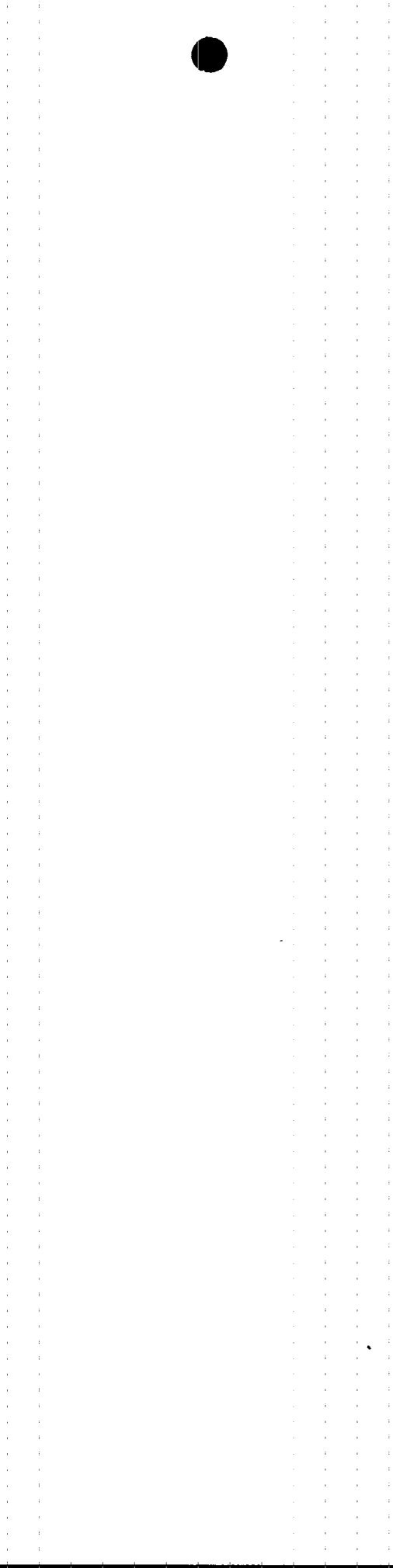
There have been several previous LERs written concerning main steam SRV setpoint drift due to pilot valve disc/seat corrosion bonding (LERs 260/87005, 259/88053, 260/93003, 260/95003, 260/96004, 260/96008, and 296/97003). However, none of the corrective actions in previous LERs would have precluded this event.

TVA had previously implemented the BWROG recommendation of replacing SRV pilot cartridges with cartridges that have a 0.3 percent platinum alloyed stellite pilot disc. The platinum-stellite disc did not correct the SRV setpoint drift problem (see LERs 260/96004 and 260/96008). During the unit 2 cycle 9 refueling outage, TVA installed redundant pressure transmitters/switches to control the opening of the SRVs.

In addition, TVA will continue to evaluate other possible solutions and to participate in the BWROG's evaluation of the long-term solution of the SRV setpoint drift problem.

VIII. COMMITMENTS

None.



LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Browns Ferry Unit 2	05000260	97	-- 008	-- 00	6 of 6

TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

Table 1
SRV AS-FOUND TEST RESULTS

Five (5) of the following thirteen (13) Unit 2 main steam SRVs failed to meet the required TS setpoint tolerance (+/- 11 psi). The information for the failed SRV pilot cartridges is shown in bold type.

Valve Cartridge Serial Number (S/N)	Pilot Disc Composition	Nameplate Setpoint Pressure (psig)	As-Found Actuation Pressure (psig)	Pressure Difference (psig)	Percent Difference (%)
1060	stellite	1105	1101	-4	-0.36
1234	stellite	1105	1139	+34	+3.08
1069	platinum	1105	1095	-10	-0.90
1022	platinum	1105	1105	0	0.00
1079	platinum	1115	1128	+13	+1.17
1021	platinum	1115	1123	+8	+0.72
1240	stellite	1115	1111	-4	-0.36
1070	stellite	1115	1094	-21	-1.88
1071	stellite	1125	1136	+11	+0.98
1026	platinum	1125	1124	-1	-0.09
1078	stellite	1125	1131	+6	+0.53
1233	stellite	1125	1196	+71	+6.31
1064	stellite	1125	1153	+28	+2.49

Energy Industry Identification System (EIIS) system and component codes are identified in the text with brackets (e.g., [XX]).

