NRC FORM 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 04/30/98

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, AND TO THE PAPERWORK REDUCTION PROJECT

LICENSEE EVENT REPORT (LER)

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

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
South Texas, Unit 2	05000 499	1 OF 3

TITLE (4)
Manual reactor trip due to a loss of inventory in Steam Generator 2D.

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
										05000
11	21	97	97	-- 007 --	00	12	18	97	FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
			20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)
POWER LEVEL (10)			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)	X	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	TELEPHONE NUMBER (Include Area Code)
Scott M. Head - Licensing Supervisor	(512) 972-7136

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
B	TG	RPY	W130	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-spaced typewritten lines) (16)

On November 21, 1997, Unit 2 was in Mode 1 at 100 percent power. At 0213 hours, multiple alarms were received in the Unit 2 Control Room. The feedwater regulating valve to Steam Generator 2D was observed indicated closed. Manual operation of the regulating valve electronic controls in the open direction was not effective. When Steam Generator 2D level approached 40 percent and decreasing, the reactor was manually tripped in accordance with plant procedures. All control rods fully inserted. The Engineered Safeguards Features System actuated the Auxiliary Feedwater System and Feedwater Isolation as expected. Inspection of the 7300 system Process Control Cabinet 08, which provides control to the Steam Generator 2D feedwater regulating valve, determined a loss of power to the internal components of the cabinet existed. Troubleshooting determined a failed capacitor on the voltage to pulse converter circuit card had occurred and a capacitor mounting strap in the primary power supply had caused an internal short. It was determined that the fault protection design of the cabinet circuitry permitted a single circuit card capacitor failure to cause a loss of both the primary and secondary power supplies to the cabinet. The cause of the event was two separate failure mechanisms that combined to result in loss of power to the cabinet. Corrective actions include replacing the failed components associated with Process Control Cabinet 08, and initiation of evaluations to identify permanent modifications, as appropriate, to prevent failure recurrence.

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		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
South Texas, Unit 2	05000 499	97	-- 007	-- 00	2 OF 3

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

DESCRIPTION OF EVENT:

On November 21, 1997, Unit 2 was in Mode 1 at 100 percent power. At 0213 hours, multiple alarms were received in the Unit 2 Control Room. A low water level condition in Steam Generator 2D with no indicated feedwater flow and no power indication to the Manual/Auto Control Station for the Steam Generator 2D feedwater regulating valve were identified. The feedwater regulating valve was observed indicated closed. Manual operation of the regulating valve electronic controls in the open direction was not effective. When Steam Generator 2D level approached 40 percent and decreasing, the reactor was manually tripped in accordance with plant procedures. All control rods fully inserted. The Engineered Safeguards Features System actuated the Auxiliary Feedwater System and Feedwater Isolation as expected. All safety equipment operated as designed for a normal reactor trip.

Inspection of the 7300 system Process Control Cabinet 08, which provides control to the Steam Generator 2D feedwater regulating valve, identified a loss of cabinet power. The primary power supply output circuit breaker was in the "TRIPPED" position and the secondary power supply output circuit breaker was in the "OFF" position. The primary power supply breaker was taken to the "OFF" position and the secondary power supply circuit breaker was closed to energize the cabinet. With power restored to Process Control Cabinet 08, the cabinet internals were inspected for damage. Further troubleshooting determined a failed capacitor on a voltage to pulse converter circuit card had caused the shorting of the circuit cards auctioneering diodes. It was also determined during troubleshooting, that a fault in the primary power supply also existed and caused the secondary power supply breaker to reposition to "OFF", which resulted in the as found condition of the secondary power supply circuit breaker.

The primary power supply was removed from service and inspected for the presence of internal faults. A short existed from a capacitor mounting strap to the positive terminal on an adjacent capacitor, one diode was shorted, and there was also a blown AC input fuse.

The cause of the event was two separate failure mechanisms that combined to result in loss of power to the cabinet. One failure mechanism was a capacitor shorting on a voltage to pulse converter circuit card causing an overcurrent condition. The overcurrent condition shorted the circuit card auctioneering diodes rendering them ineffective for both auctioneering the power and providing electrical isolation of the primary and secondary power supplies. The other failure was inadequate space between the mounting strap for a capacitor and other primary power supply internals. The mounting strap made contact with the positive terminal on an adjacent capacitor causing a short circuit resulting in an overcurrent condition. This led to the failure of the primary power supply diode and a blown AC input fuse, and as a result, the primary power supply de-energized. The secondary power supply attempted to support the cabinet load but the failed auctioneered diodes on the circuit card allowed the secondary power supply to backfeed to the primary power supply. The internal fault in the primary power supply caused an overcurrent condition in the secondary power supply. The overcurrent condition tripped the output circuit breakers to both the primary and secondary power supplies and de-energized the cabinet.

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

DESCRIPTION OF EVENT (CONTINUED):
The design of the circuit card permitted a capacitor failure to defeat the circuitry designed to allow the secondary power supply to provide power on a primary power supply failure. The circuit card is individually fuse-protected, but the fuse is downstream of the failed capacitor and could not, therefore, protect the auctioneering diodes from failure.

CAUSE OF EVENT:
The cause of the event was two separate failure mechanisms that combined to result in loss of power to the cabinet.

ANALYSIS OF EVENT:
Reactor trips and Engineered Safeguards Features actuations are reportable pursuant to 10CFR50.73 (a)(2)(iv). The reactor was brought to an orderly shutdown. All Engineered Safeguards Features functioned as designed. There were no adverse safety or radiological consequences from this event.

CORRECTIVE ACTIONS:
1. The failed voltage to pulse converter circuit card and the primary power supply to Process Control Cabinet 08 were replaced.

2. An evaluation will be completed by April 1998, to identify if any permanent modifications are necessary to minimize the probability of recurrence.

ADDITIONAL INFORMATION:
The power supplies to instrument cabinets in both Unit 1 and Unit 2 with similar design as Process Control Cabinet 08 were inspected to verify proper indication of power supply operation. The South Texas Project plans to conduct an inspection of the 7300 system cabinet primary and secondary power supplies in both Unit 1 and Unit 2 to ensure the clearance between capacitor mounting straps and capacitor terminals is adequate. This will be completed by December 31, 1998, in Unit 2 and May 31, 1999, in Unit 1.

A review of industry events identified instances of failed capacitors in 7300 system process control cabinets that resulted in reactor trips or Engineered Safeguards Features actuations. This information will be used as part of the evaluation in corrective action number two (above) to determine if any modifications will be made to improve the design of the South Texas Project process control cabinets. Further evaluations of the secondary power supply circuit breaker, which tripped to the "OFF" position in lieu of the expected "TRIPPED" position, will be performed to determine the cause. The capacitor which failed on the voltage to pulse circuit card is not an electrolytic capacitor, and is not subject to the ten year replacement schedule.

There have been no similar events reported by the South Texas Project to the Nuclear Regulatory Commission within the last three years.