



South Texas Project Electric Generating Station P.O. Box 289 Wadsworth, Texas 77483

January 17, 2005  
NOC-AE-05001835  
10CFR50.73  
STI: 31828881

U. S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
One White Flint North  
11555 Rockville Pike  
Rockville, MD 20852

South Texas Project  
Unit 1  
Docket No. STN 50-498  
Licensee Event Report 01-04-006

Unit 1 Pressurizer Power-Operated Relief Valve  
Inoperable for a Time Period Longer Than Allowed by Technical Specifications

Pursuant to 10CFR50.73(a)(2)(i)(B), the South Texas Project submits the attached Licensee Event Report 01-04-006 regarding Pressurizer Power-Operated Relief Valve (PORV) 1-RC-PCV-0656A being inoperable for a time period longer than allowed by Technical Specifications. Specifically, the requirements of Technical Specification 3.4.4 were not met for an inoperable PORV for causes other than excessive seat leakage.

This event did not have an adverse effect on the health and safety of the public.

There are no commitments contained in this event report. Resulting corrective actions will be handled in accordance with the STP Corrective Action Program.

If there are any questions on this submittal, please contact S. M. Head at (361) 972-7136 or me at (361) 972-7800.

A handwritten signature in cursive script, appearing to read "Gary Parkey".

Gary Parkey  
Vice President, Generation  
and Plant General Manager

kjt/

Attachment: LER 01-04-006

IE22

cc:

(paper copy)

Bruce S. Mallett  
Regional Administrator, Region IV  
U. S. Nuclear Regulatory Commission  
611 Ryan Plaza Drive, Suite 400  
Arlington, Texas 76011-8064

Richard A. Ratliff  
Bureau of Radiation Control  
Texas Department of State Health Services  
1100 West 49th Street  
Austin, TX 78756-3189

Jeffrey Cruz  
U. S. Nuclear Regulatory Commission  
P. O. Box 289, Mail Code: MN116  
Wadsworth, TX 77483

C. M. Canady  
City of Austin  
Electric Utility Department  
721 Barton Springs Road  
Austin, TX 78704

(electronic copy)

A. H. Gutterman, Esquire  
Morgan, Lewis & Bockius LLP

David H. Jaffe  
U. S. Nuclear Regulatory Commission

R. L. Balcom  
Texas Genco, LP

C. Kirksey  
City of Austin

C. A. Johnson  
AEP Texas Central Company

Jon C. Wood  
Cox Smith Matthews

J.J. Nesrsta  
R. K. Temple  
E. Alarcon  
City Public Service

## LICENSEE EVENT REPORT (LER)

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

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to [infocollect@nrc.gov](mailto:infocollect@nrc.gov), and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

<b>1. FACILITY NAME</b> South Texas Unit 1	<b>2. DOCKET NUMBER</b> 05000 498	<b>3. PAGE</b> 1 OF 4
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**4. TITLE:**  
Pressurizer Power-Operated Relief Valve being inoperable for a time period longer than allowed by Technical Specifications

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
11	17	2004	2004	- 06 -	00	01	17	2005		05000
									FACILITY NAME	DOCKET NUMBER
										05000

<b>9. OPERATING MODE</b>  I	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: (Check all that apply)</b>															
	<input type="checkbox"/> 20.2201(b)				<input type="checkbox"/> 20.2203(a)(3)(i)				<input type="checkbox"/> 50.73(a)(2)(i)(C)				<input type="checkbox"/> 50.73(a)(2)(vii)			
	<input type="checkbox"/> 20.2201(d)				<input type="checkbox"/> 20.2203(a)(3)(ii)				<input type="checkbox"/> 50.73(a)(2)(ii)(A)				<input type="checkbox"/> 50.73(a)(2)(viii)(A)			
	<input type="checkbox"/> 20.2203(a)(1)				<input type="checkbox"/> 20.2203(a)(4)				<input type="checkbox"/> 50.73(a)(2)(ii)(B)				<input type="checkbox"/> 50.73(a)(2)(viii)(B)			
	<input type="checkbox"/> 20.2203(a)(2)(i)				<input type="checkbox"/> 50.36(c)(1)(i)(A)				<input type="checkbox"/> 50.73(a)(2)(iii)				<input type="checkbox"/> 50.73(a)(2)(ix)(A)			
	<input type="checkbox"/> 20.2203(a)(2)(ii)				<input type="checkbox"/> 50.36(c)(1)(ii)(A)				<input type="checkbox"/> 50.73(a)(2)(iv)(A)				<input type="checkbox"/> 50.73(a)(2)(x)			
<b>10. POWER LEVEL</b>  100%	<input type="checkbox"/> 20.2203(a)(2)(iii)				<input type="checkbox"/> 50.36(c)(2)				<input type="checkbox"/> 50.73(a)(2)(v)(A)				<input type="checkbox"/> 73.71(a)(4)			
	<input type="checkbox"/> 20.2203(a)(2)(iv)				<input type="checkbox"/> 50.46(a)(3)(ii)				<input type="checkbox"/> 50.73(a)(2)(v)(B)				<input type="checkbox"/> 73.71(a)(5)			
	<input type="checkbox"/> 20.2203(a)(2)(v)				<input type="checkbox"/> 50.73(a)(2)(i)(A)				<input type="checkbox"/> 50.73(a)(2)(v)(C)				<input type="checkbox"/> OTHER			
	<input type="checkbox"/> 20.2203(a)(2)(vi)				<input checked="" type="checkbox"/> 50.73(a)(2)(i)(B)				<input type="checkbox"/> 50.73(a)(2)(v)(D)				Specify In Abstract below or in NRC Form 366A			

**12. LICENSEE CONTACT FOR THIS LER**

<b>FACILITY NAME</b> Ken Taplett	<b>TELEPHONE NUMBER (Include Area Code)</b> 361-972-8416
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**13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT**

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
B	AB	RV	Crosby Valve & Gage Co.	Y					

**14. SUPPLEMENTAL REPORT EXPECTED**☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE) ☒ NO**15. EXPECTED SUBMISSION DATE**

MONTH	DAY	YEAR

**ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)**

On November 8, 2004, elevated temperatures were measured on the Unit 1 Pressurizer Power Operated Relief Valve (PORV) 1-RC-PCV-0656A. On November 9, 2004, engineering analysis determined that the thermal Environmental Qualification (EQ) life of the PORV's Limit Switch Cover Gasket had been exceeded. The PORV was declared inoperable. The block valve was closed.

The gasket was replaced within approximately 24 hours of discovery that its thermal EQ life had been exceeded. The PORV remains inoperable due to excessive seat leakage with the associated block valve closed and power maintained to the block valve as required by Technical Specification 3.4.4. Technical Specifications allow continued power operation in this condition.

An engineering evaluation determined that the PORV had been inoperable on October 29, 2004 at the latest, and the inoperable condition was not corrected within 72 hours. This resulted in a condition prohibited by Technical Specifications.

The root cause of exceeding the thermal EQ life of the PORV Limit Switch Cover Gasket is that the design of the PORV portion of the discharge header temperature alarm is inadequate. Corrective actions include evaluation of a modification for installing temperature elements with associated alarms on the Pressurizer PORVs to provide a warning of impending high gasket temperature conditions.

This condition resulted in no personnel injuries, no offsite radiological releases, and no damage to safety-related equipment. There were no challenges to plant safety.

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### I. DESCRIPTION OF REPORTABLE EVENT

#### A. REPORTABLE EVENT CLASSIFICATION

This event is reportable pursuant to 10CFR50.73(a)(2)(i)(B) as an operation or condition prohibited by Technical Specifications.

#### B. PLANT OPERATING CONDITIONS PRIOR TO THE EVENT

South Texas Project Unit 1 was in Mode 1 operating at 100% power.

#### C. STATUS OF STRUCTURES, SYSTEMS, OR COMPONENTS THAT WERE INOPERABLE AT THE START OF THE EVENT AND THAT CONTRIBUTED TO THE EVENT

On November 8, 2004, elevated temperatures were measured on the Unit 1 Pressurizer Power Operated Relief Valve (PORV) 1-RC-PCV-0656A. On November 9, 2004, engineering analysis determined that the thermal Environmental Qualification (EQ) life of the PORV's Limit Switch Cover Gasket had been exceeded. The PORV was declared inoperable. The gasket was replaced within approximately 24 hours of discovery, however the valve was not reworked. Therefore, the PORV remains inoperable due to excessive seat leakage with the associated block valve closed and power maintained to the block valve as required by Technical Specification 3.4.4. Technical Specifications allow continued power operation in this condition.

#### D. NARRATIVE SUMMARY OF THE EVENT, INCLUDING DATES AND APPROXIMATE TIMES

On November 8, 2004, elevated temperatures were measured on the PORV while investigating inleakage into the Pressurizer Relief Tank (PRT). The contact pyrometer reading at the PORV's Limit Switch Cover Gasket was found to be as high as 256°F due to exposure from high temperature reactor coolant via internal valve leakage. On November 9, 2004, an engineering analysis showed that the thermal Environmental Qualification (EQ) life of the Limit Switch Cover Gasket had been exceeded such that the PORV was inoperable. The gasket was replaced. The PORV block valve remained closed to prevent further valve leakage from impacting the replaced gasket.

On November 10, 2004, the PORV was left in a condition where it is inoperable due to excessive seat leakage. Technical Specifications allow continued power operation in this condition with the block valve closed and power maintained to the block valve. Replacement of the main valve and pilot valve seats for the affected PORV with Inconel material is being planned for the Spring 2005 refueling outage.

PRT inleakage had been increasing in Unit 1 since approximately June 9, 2004. On November 17, 2004, an engineering calculation was performed to estimate the rate of increase in gasket temperature since June based on the rate of seat leakage into the PRT. The calculation estimated that the gasket contact temperature of 256°F was reached on approximately October 20, 2004. Arrhenius calculations show that the gasket's end of qualified life was reached approximately nine days later.

The failure mode of the limit switch had the potential to impact the control circuit due to the fact that the indication and the automatic control of the PORV are powered from the same source. One fuse is provided for both the indication and the control to protect the Class 1E power supply from faults within the indication and control circuits. This resulted in a condition where the switch could fail in a manner that would cause the fuse to blow. In this condition, opening of the PORV would not have been possible. Technical Specifications require the PORV block valve to be shut within one hour and a unit shutdown within 72 hours if an inoperable pressurizer PORV, for causes other than excessive seat leakage condition, is not corrected. Since engineering evaluations determined that the PORV had been inoperable on October 29, 2004 at the latest, and the inoperable condition was not corrected within 72

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hours, the unit was operated in a condition prohibited by Technical Specifications.

Therefore, pursuant to 10CFR50.73(a)(2)(i)(B), this event is reportable because the required actions of Technical Specification 3.4.4 were not performed when the pressurizer PORV was inoperable for reasons other than excessive seat leakage.

**E. THE METHOD OF DISCOVERY OF EACH COMPONENT OR SYSTEM FAILURE, OR PROCEDURAL OR PERSONNEL ERROR**

This condition was identified while investigating inleakage into the PRT. Component contact temperature readings and analysis determined when the thermal EQ life of the PORV Limit Switch Cover Gasket had been exceeded.

**II. COMPONENT OR SYSTEM FAILURES**

**A. FAILURE MODE, MECHANISM, AND EFFECTS OF EACH FAILED COMPONENT**

The thermal Environmental Qualification (EQ) life of the PORV Limit Switch Cover Gasket had been exceeded due to exposure from high temperature reactor coolant. The gasket is made of ethylene propylene diene rubber.

**B. CAUSE OF EACH COMPONENT OR SYSTEM FAILURE**

Internal PORV leakage.

**C. SYSTEMS OR SECONDARY FUNCTIONS THAT WERE AFFECTED BY FAILURE OF COMPONENTS WITH MULTIPLE FUNCTIONS**

Operation of Unit 1 Pressurizer Power Operated Relief Valve (PORV) 1-RC-PCV-0656A

**D. FAILED COMPONENT INFORMATION**

Relief Valve (RV); Reactor Coolant System (AB)

**III. ANALYSIS OF THE EVENT**

**A. SAFETY SYSTEM RESPONSES THAT OCCURRED**

N/A

**B. DURATION OF SAFETY SYSTEM TRAIN INOPERABILITY**

Unit 1 Pressurizer Power Operated Relief Valve (PORV) 1-RC-PCV-0656A was inoperable for causes other than excessive seat leakage from approximately October 29, 2004 until November 10, 2004.

**C. SAFETY CONSEQUENCES AND IMPLICATIONS**

With the block valve closed due to the internal leakage through 1-RC-PCV-0656A, the PORV is not available for operation until the block valve is opened. Manual control of PORVs is a safety-related function used to control reactor coolant system pressure.

A calculation was performed to determine the Conditional Core Damage Probability (CCDP) assuming

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the PORV was unavailable from the estimated time that the gasket EQ was exceeded on October 29, 2004 until the gasket was replaced on November 10, 2004. The calculated CCDDP is 4.1E-7. Although the PORV could have been inoperable at an earlier date, this is balanced by the fact that the calculation considered all plant events, many of which do not result in a harsh environment.

The PORV position indication is required for Post Accident Monitoring as shown in Table 7.5-1 of the Updated Final Safety Analysis Report. The Pressurizer PORV status is a preferred backup indication for Reactor Coolant System Integrity (a Type B post accident instrument variable) and is also an important indication for monitoring Pressurizer Level and Pressure Control (a Type D post accident instrument variable). The Limit Switch Cover Gasket had reached its end of life condition so it could not be relied upon to provide the environmental protection for which it was qualified.

This event did not adversely affect the safety of the public or station personnel. There was no release of radiation as a result of this incident.

## IV. CAUSE OF THE EVENT

The root cause of using up the thermal EQ life of the PORV Limit Switch Cover Gasket is that the design of the PORV portion of the discharge header temperature alarm is inadequate. There is only one temperature element (TE) for both PORVs and the TE is located too far away from the PORVs' discharges to effectively evaluate the effect on the gasket due to the increase in temperature from PORV leakage.

## V. CORRECTIVE ACTIONS

1. The Limit Switch Cover Gasket to Pressurizer PORV 1-RC-PCV-0656A was replaced.
2. Evaluation of a modification for installing temperature elements with associated alarms on the Pressurizer PORVs to provide a warning of impending high gasket temperature conditions. In the interim, a demand maintenance item will be created with an appropriate trigger point to take contact pyrometer temperature readings on the PORVs when unexpected increases in PRT level are noted.

## VI. PREVIOUS SIMILAR EVENTS

1. Condition Report (CR) 03-12392: Unit 1 Pressurizer PORV 1-RC-PCV-0656A was determined to be leaking after a Pressurizer Safety Relief Valve High temperature alarm was received. The valve was reseated to stop the leakage. The qualified life of the Limit Switch Cover Gasket was marginally reduced and the PORV remained operable.
2. CR 04-6255: Unit 2 Pressurizer PORV 2-RC-PCV-0655A was determined to be leaking after elevated temperatures were observed on the discharge ring header for the Unit 2 Pressurizer PORVs and Safety Valves following a refueling outage. Reseating the valve resulted in stabilizing the ring header temperatures. Calculations demonstrated that the PORV Limit Switch Cover Gasket would remain thermally qualified throughout the remainder of the fuel cycle. Subsequently, when a discharge ring high temperature alarm was received approximately four months later, the PORV block valve was shut to stop leakage.
3. Between 1990 and 1995, each unit's PORVs experienced leakage and were refurbished. No Pressurizer PORV leaks were identified after 1995 until the leak in Unit 1 in 2003 described in CR 03-12392.