

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH
THIS INFORMATION COLLECTION REQUEST: 50.0 HRS.
FORWARD COMMENTS REGARDING BURDEN ESTIMATE
THE INFORMATION AND RECORDS MANAGEMENT BRANCH
(MNNB 7714) U.S. NUCLEAR REGULATORY COMMISSION,
WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK
REDUCTION PROJECT (3150-0104), OFFICE OF
MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
South Texas Unit 2	05000 499	1 OF 9

TITLE (4)	Pressurizer Safety Valve and Main Steam Safety Valve Setpoints Outside Required Tolerance
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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	
04	01	93	93	-- 011 --	01	02	14	95	FACILITY NAME	DOCKET NUMBER 05000	
OPERATING MODE (9)		N/A	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)								
POWER LEVEL (10)		000	20.402(b)			20.405(c)			50.73(a)(2)(iv)		73.71(b)
			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)		X OTHER
			20.405(a)(1)(iii)			50.73(a)(2)(i)			50.73(a)(2)(viii)(A)		(Specify in Abstract below and in Text, NRC Form 366A)
			20.405(a)(1)(iv)			50.73(a)(2)(ii)			50.73(a)(2)(viii)(B)		
			20.405(a)(1)(v)			50.73(a)(2)(iii)			50.73(a)(2)(x)		Voluntary

NAME	Jairo Pinzon - Staff Engineer	TELEPHONE NUMBER (Include Area Code)	(512) 972-8027
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CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

YES (if yes, complete EXPECTED SUBMISSION DATE).	X	NO	EXPECTED SUBMISSION DATE (15)			
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ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On April 1, 1993, Unit 2 was defueled during a refueling outage. After being reset at the second refueling outage for Unit 2 (2RE02) to the specified value of 2485 psig \pm 1.0%, the setpoint for the Unit 2 Pressurizer Safety Valves were found to range from 3.8% below to 2.1% above the required setpoint during the third refueling outage (2RE03). This is a deviation from the \pm 1.0% Technical Specification requirement. The Unit 2 Pressurizer Safety Valves (PSV-3450, 3451 & 3452) had been sent to Wyle Laboratories for setpoint verification testing. Pressurizer Safety Valve setpoint drift is an industry-wide problem which has been known for some time. The Westinghouse Owners Group has addressed this generic issue in WCAP-12910, which makes specific recommendations relative to Pressurizer Safety Valve setpoint verification testing. Corrective actions include modifying the test procedure to test the Pressurizer Safety Valve lift setpoint on saturated steam as recommended by WCAP-12910.

In addition to the above, additional Pressurizer Safety Valve out of tolerance conditions were discovered which were not previously identified. Several Main Steam Safety Valve setpoints were also found to be outside the required tolerances.

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

DESCRIPTION OF EVENT:

On April 1, 1993, Unit 2 was defueled during its third refueling outage. The three Unit 2 Pressurizer Safety Valves (PSV-3450, 3451 & 3452) were sent to Wyle Laboratories for setpoint verification testing. After being reset at the second refueling outage for Unit 2 (2RE02), the setpoints were determined during the third refueling outage (2RE03) to be in the range of 2390 psig to 2536 psig or from 3.8% below to 2.1% above the required setpoint. This is a deviation from the $\pm 1.0\%$ Technical Specification requirement. Table 1 presents the setpoint data for Unit 2.

Pressurizer Safety Valves are required to provide American Society of Mechanical Engineers (ASME) Code over-pressure protection for the Reactor Coolant System during plant transients. The valves are designed and tested to open at a nominal set pressure of 2500 psia. During normal plant operating conditions, the Pressurizer Safety Valves must maintain their leak tightness as part of the reactor coolant pressure boundary. At the South Texas Project, the valves are installed on water-filled loop seals to provide maximum seat tightness which keeps hydrogen from the valve seats and keeps the valve cool.

The South Texas Project utilizes Crosby HB-BP-86 6N8 Pressurizer Safety Valves which are spring-loaded with an adjusting bolt which increases or decreases the spring pressure to achieve the relief valve opening. Once a safety valve is set and the adjusting bolt is torqued, the lift set pressure should change only if the valve experiences leakage or if the valve is actuated. Neither of these conditions had occurred with the South Texas Project valves.

WCAP-12910 summarizes industry data (EPRI Report NP-2770-LD) and the results of the Westinghouse Owners Group Program which evaluates the Pressurizer Safety Valve set pressure shift phenomena. The WCAP primarily addresses the pressure shift noted between the setting conditions and the operating conditions. Our set pressure differences or deviations are between consecutive set pressure verification tests with the same test configuration. WCAP-12910 does, however, present a significant number of data points which can provide an understanding of the set pressure test repeatability.

After being set on steam and then re-tested on water loop seal, WCAP-12910 statistically evaluates the data and concludes that (for the specific valves tested), the set pressure shift did not exceed $\pm 1.0\%$. This is based on a very accurate measurement (0.1 to 0.5 mil) of spindle movement and a pressure curve slope change. For the South Texas Project Pressurizer Safety Valves, there is fair agreement between "pops" in the test stand on a water loop seal for a series of tests. However, a significant difference is seen when the data are taken about 18 months apart. The South Texas Project 6N8 type PSV is not included in the WCAP summary but the 6M6 type safety valve is included, and it would be expected to respond in a similar manner.

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DESCRIPTION OF EVENT: (Continued)

WCAP-12910 recommends that Pressurizer Safety Valve set points should be established on a saturated steam environment, regardless of the medium used during operation. With a steam setting, the spindle movement is sharper, more visible and more reproducible.

Earlier Pressurizer Safety Valve set pressure testing for the South Texas Project (up to and including 1RE03 and 2RE02) and the WCAP-12910 set pressure testing was conducted at the Westinghouse Western Service Center while the 2RE03 testing was conducted at the Wyle Laboratories. The same test procedure was used and no data bias can be seen in favor of either test facility.

On January 16, 1995, an issue was raised by a Nuclear Regulatory Commission Inspector regarding the safety analysis of operation of the Unit with the Pressurizer Safety Valves in the out of tolerance condition. The issue related to the fact that this Voluntary Licensee Event Report did not document the impact of the Pressurizer Safety Valve out of tolerance condition in the "Analysis of Event" section. In addition, it was discovered that there have been instances where a number of the Main Steam Safety Valves have been found to be out of tolerance during the past refueling outage surveillances. Table 2 documents the as found condition for the tested valves during each Unit 2 outage.

A reportability review was immediately initiated to evaluate the as found condition of the Pressurizer Safety Valves and the Main Steam Safety Valves. Discussions with the Nuclear Regulatory Commission, Region IV, Engineering Management, indicated that the reportability of these past events should hinge on whether or not the condition resulted in the plant being outside the design basis. The reportability review concluded that although these valves were found to be out of tolerance, these conditions were bounded by the design basis of the plant.

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CAUSE OF EVENT:

The observed setpoint drift on the South Texas Project Pressurizer Safety Valves is apparently the result of the inherent valve characteristics (i.e. the massive spring assembly) and the limited capability to accurately determine the first point of valve spindle movement. Inherent valve characteristics include the differences between the test conditions and especially the effect of temperature in the valve seat, plug area and on the spring.

The cause of the Main Steam Safety Valve out of tolerance conditions is an industry known problem regarding setpoint drift on the large pressure release devices.

ANALYSIS OF EVENT:

Houston Lighting & Power recognizes the guidance provided by letter from Mr. S. J. Collins, Nuclear Regulatory Commission Division Director of Reactor Safety, to Mr. W. T. Cottle, Nuclear Group Vice President, Houston Lighting & Power, dated December 8, 1993. This guidance clarified interpretation of reporting requirements of out of tolerance conditions of primary or secondary safety relief valves. Prior to the issuance of this guidance, Houston Lighting & Power had a different interpretation of the application of this reporting requirement. After analysis of the out of tolerance data, it was determined that the out of tolerance conditions experienced as a result of the Pressurizer Safety and the Main Steam Safety Valves did not result in a condition that was unanalyzed or outside the design basis of the plant.

Pressurizer Safety Valves

The Pressurizer Safety Valves protect the integrity of the Reactor Coolant Systems from overpressurization. The integrity of the Reactor Coolant System is required to prevent the release of radionuclides contained in the reactor coolant from reaching the containment atmosphere. The reactor vessel, pressurizer, and the Reactor Coolant System piping, valves, and fittings are designed to Section III of the American Society of Mechanical Engineers (ASME) Code for Nuclear Power Plants. The ASME Code permits a maximum transient pressure of 110% (2735 psig) of design pressure. Technical Specification Bases 2.1.2 and 3/4.4.2 identify 2735 psig as the safety limit for the Reactor Coolant System.

An assessment of the safety consequences and implication of the Pressurizer Safety Valves out of tolerance conditions was performed. Table 1 shows the as found values and the percentage of out of tolerance of the Pressurizer Safety Valves for each loop. These measurements were taken at each of the Unit 2 refueling outages.

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ANALYSIS OF EVENT: (Continued)

Table 1 identifies that for Unit 2 all the Pressurizer Safety Valves were out of tolerance during the second and third refueling outages. Of the four out of tolerance conditions, one was high (or positive) and the remaining three were low (or negative). Positive out of tolerance conditions may result in increasing the calculated peak Reactor Coolant System pressure results for accidents that take credit for the Pressurizer Safety Valve actuation. Negative out of tolerance conditions may result in decreasing the calculated minimum Departure From Nucleate Boiling Ratio for accidents that take credit for Pressurizer Power Operated Relief Valve actuation.

The accidents that positive out of tolerance conditions may impact are:

- 1) Uncontrolled Rod Cluster Control Assembly withdrawal from a subcritical condition and at power (Condition II event) (FSAR section 15.4.1)
- 2) Loss of external electrical load (Condition II event) (FSAR section 15.2.2)
- 3) Turbine trip (Condition II event) (FSAR section 15.2.3)
- 4) Locked rotor (Condition IV event) (FSAR section 15.3.3)
- 5) Rod Cluster Control Assembly ejection (Condition IV event) (FSAR section 15.4.8)

The only positive out of tolerance condition was 2.05% or 2536 psig, which was identified during the third Unit 2 refueling outage. The other two Pressurizer Safety Valves were shown to be -3.82 % and -1.49%, which offsets the effect of the one being high by 2.05%. Past safety analyses included a 3% accumulation in the setpoint. An evaluation was made that showed the past safety analyses bounded the as measured Pressurizer Safety Valve setpoint cases. Therefore, the past safety analysis bounds the most severe positive out of tolerance condition.

The accidents that the negative out of tolerance conditions may impact are:

- 1) Uncontrolled Rod Cluster Control Assembly withdrawal from a subcritical condition and at power (Condition II event) (FSAR section 15.4.1)
- 2) Complete loss of flow (Condition III event) (FSAR section 15.3.2)
- 3) Rod out of position (Condition II event) (FSAR 15.4.3)
- 4) Hypothetical steamline break (Condition IV event) (FSAR section 15.1.5)
- 5) Locked rotor (Condition IV event) (FSAR section 15.3.3)
- 6) Dropped Rod Cluster Control Assembly (Condition II event) (FSAR section 15.4.3)

All of the Pressurizer Safety Valve negative out of tolerance conditions are bounded by the Pressurizer Power Operated Relief Valve setpoint of 2235 psig. Therefore, the past safety analyses bounds the most severe negative out of tolerance condition.

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ANALYSIS OF EVENT: (Continued)**Main Steam Safety Valves**

The safety function of the Main Steam Safety Valves is to protect the Steam Generator and the piping upstream of the Main Steam Isolation Valves from overpressurization under all modes of operation. During a loss of load/turbine trip event, operability of the Main Steam Safety Valves ensure that the secondary system pressure will be limited to within 110% (1413.5 psig) of its design pressure of 1285 psig.

An assessment of the safety consequences and implication of the Main Steam Safety Valves out of tolerance conditions was performed. Table 2 shows the as found values and the percentage of out of tolerance of the Main Steam Safety Valves for each loop. These measurements were taken at each of the past refueling outages.

The primary concern addressed in this safety analysis is Main Steam System overpressurization. First, the single most positive out of tolerance condition of the Main Steam Safety Valves occurred during the third Unit 2 refueling outage which was declared inoperable at the time of discovery. The high flux setpoint was adjusted per the Technical Specification. Only one other Main Steam Safety Valve was measured to be out of tolerance high at the time. Prior to this discovery, the past safety analyses still bounded the Main Steam Safety Valves because only five of the 20 Main Steam Safety Valves are actually required to provide peak steam relief following the secondary side pressure limiting transient.

All of the Main Steam Safety Valve measurements are within the $\pm 3\%$ of the setpoint, with the exception of the one in Unit 2 mentioned in the previous paragraph. The single most positive out of tolerance condition discovered in Unit 2 was 1.52% during the third Unit 2 refueling outage. Similar to that of the Pressurizer Safety Valves, past safety analysis assumed a 3% accumulation added to the setpoint. This condition is also bounded by the 3% accumulation assumption. Therefore, the past safety analysis bounded the Main Steam Safety Valves.

The Main Steam Safety Valves setpoints measured during past Unit 2 refueling outages all measured within the 3%. Although the Main Steam Safety Valves were discovered to be outside the allowable 1% according to Technical Specifications, the plant was operating within its safety analysis limits.

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CORRECTIVE ACTIONS:

1. The three Unit 2 Pressurizer Safety Valves have been recently setpoint tested in accordance with the best technology available.
2. Houston Lighting & Power has modified the test procedure to test the Pressurizer Safety Valve lift setpoint on saturated steam as recommended by WCAP-12910.
3. Houston Lighting and Power has been following industry attempts to resolve the Main Steam Safety Valve drift issue.

ADDITIONAL INFORMATION:

The Pressurizer Safety Valves are model number HB-BP-86 6N8 manufactured by Crosby. The Pressurizer Safety Valves are spring-loaded with an adjusting bolt which increases or decreases the spring force to achieve the relief valve opening.

The Main Steam Safety Valves are model 6-3707RAX-RT-25-XNC1012 manufactured by Consolidated/Dresser. The Main Steam Safety Valves are spring-loaded with an adjusting bolt which increases or decreases the spring force to achieve the relief valve opening.

The South Texas Project is pursuing a Technical Specification change to relax the lift setting tolerance of the Pressurizer Safety Valves from $\pm 1\%$ to $\pm 2\%$ and the Main Steam Safety Valves from $\pm 1\%$ to $\pm 3\%$. The proposed setpoint tolerance of $\pm 2\%$ for the Pressurizer Safety Valves and $\pm 3\%$ for the Main Steam Safety Valves "as found" conditions was previously evaluated as part of the transition to VANTAGE 5H fuel.

Unit 1 Voluntary Licensee Event Report 92-018 was previously submitted documenting Pressurizer Safety Valve setpoints outside the required tolerance. This Licensee Event Report documented both Unit 1 Pressurizer Safety Valve setpoints outside required tolerances discovered during previous outages.

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Table 1

Unit 2 Pressurizer Safety Valves

Setpoint- 2485.00

2RE01

2RE02

2RE03

08/05/89

03/29/91

09/19/92

AS FOUND/% ERR

AS FOUND/% ERR

AS FOUND/% ERR

PSV-3450 2488.00/+0.12

*

2390.00/-3.82

PSV-3451 *

2392.00/-3.74

2536.00/+2.05

PSV-3452 *

2478.00/-0.28

2448.00/-1.49

* - NOT REQUIRED TO BE TESTED PER TECHNICAL SPECIFICATIONS

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Table 2

Unit 2 Main Steam Safety Valves

TRAIN A	7410	7410A	7410B	7410C	7410D
TRAIN B	7420	7420A	7420B	7420C	7420D
TRAIN C	7430	7430A	7430B	7430C	7430D
TRAIN D	7440	7440A	7440B	7440C	7440D

SETPOINT	1285.00	1295.00	1305.00	1315.00	1325.00
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2RE01 - 10/11/90

	AS FOUND/% ERR	AS FOUND/% ERR	AS FOUND/% ERR	AS FOUND/% ERR	AS FOUND/% ERR
TRAIN A	1255.10/-2.33	1296.90/+0.15	1298.30/-0.51	1309.10/-0.45	1293.30/-2.39
TRAIN B	1277.60/-0.58	1282.20/-0.99	1283.80/-1.62	1304.70/-0.78	1295.10/-2.26
TRAIN C	1289.40/+0.34	1284.30/-0.83	1281.20/-1.82	1289.50/-1.94	1310.70/-1.08
TRAIN D	1294.70/+0.75	1258.60/-2.81	1306.80/+0.14	1326.30/+0.86	1315.60/-0.71

2RE02 - 09/14/91

	AS FOUND/% ERR	AS FOUND/% ERR	AS FOUND/% ERR	AS FOUND/% ERR	AS FOUND/% ERR
TRAIN A	*	*	*	*	*
TRAIN B	*	*	*	*	*
TRAIN C	*	*	*	1321.30/+0.48	1320.40/-0.35
TRAIN D	1295.40/+0.81	1274.00/-1.62	*	*	*

* - NOT REQUIRED TO BE TESTED PER TECHNICAL SPECIFICATIONS

2RE03 - 02/28/93

	AS FOUND/% ERR	AS FOUND/% ERR	AS FOUND/% ERR	AS FOUND/% ERR	AS FOUND/% ERR
TRAIN A	1271.50/-1.05	1283.70/-0.87	1303.60/-0.11	1301.60/-1.02	1334.50/+0.72
TRAIN B	1284.80/-0.02	1295.90/+0.07	1304.00/-0.08	1307.60/-0.56	1345.20/+1.52
TRAIN C	**1357.00/+5.60	1294.40/-0.05	1307.50/+0.19	1315.70/+0.05	1295.40/-2.23
TRAIN D	1281.20/-0.30	1287.30/-0.59	1297.40/-0.58	1302.50/-0.95	1321.80/-0.24

** - VALVE 7430 DID NOT ACTUATE ON 2/28/93, AND WAS DECLARED INOPERABLE AND HI-FLUX
SETPOINT ADJUSTED IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS.