Entergy Operations

Entergy Operations, Inc.
P.O. Box B
Killona, LA 70066
Tel 504-464-3120

D. F. Packer
General Manager
Plant Operations
Waterford 3

W3F1-94-0008
A4.05
PR

January 18, 1994

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

Subject: Waterford 3 SES
Docket No. 50-382
License No. NPF-38
Reporting of Licensee Event Report

Gentlemen:

Attached is Licensee Event Report Number LER-93-009-00 for Waterford Steam Electric Station Unit 3. This Licensee Event Report is submitted in accordance with the requirements of 10CFR50.73(a)(2)(vii).

Very truly yours,

D.F. Packer
General Manager
Plant Operations

DFP/TWG/ssf
Attachment

cc: J.L. Milhoan, NRC Region IV
G.L. Florreich
J.T. Wheelock - INPO Records Center
R.B. McGehee
N.S. Reynolds
NRC Resident Inspectors Office
Administrator - LRPD

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NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 5/31/95

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 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.

LICENSEE EVENT REPORT (LER)

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

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Waterford Steam Electric Station Unit 3	05000 382	1 OF 10

TITLE (4)
PSV Setpoints Found Out of Tolerance Due to Errors Introduced When Establishing Setpoints

EVENT DATE (5)			LER NUMBER (6)			REPORT NUMBER (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
									N/A	05000
11	15	93	93	-- 009 --	00	01	18	94	FACILITY NAME: N/A	DOCKET NUMBER: 05000

OPERATING MODE (9)	1
POWER LEVEL (10)	100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

	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)	X	50.73(a)(2)(vii)		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)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
J.G. Hoffpauir, Maintenance Superintendent	(504) 464-3138

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	AB	RV	C568	Y						

SUPPLEMENTAL REPORT EXPECTED (14)

	YES (If yes, complete EXPECTED SUBMISSION DATE)	X	NO

EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On November 15 and 16, 1993, Waterford 3 was informed that off-site testing had revealed that the as-found setpoints of the two valves which had been installed as pressurizer safety valves during the fifth operating cycle were outside of the allowable tolerance (±1%).

Waterford 3 believes that this condition may have resulted from an inability to adequately control some of the many variables present in the pre-installation "jack-and-lap" process. Waterford 3 has revised the safety valve testing procedure to require steam set pressure verification when the jack-and-lap process is used.

Action to prevent recurrence of this event includes an evaluation of a change to the Waterford 3 Technical Specifications to increase the as-found setpoint tolerance to ±3%. This event did not compromise the health and safety of the public or plant personnel. Previous occurrences of this condition are discussed in this report. There have been no similar LER's.

REQUIRED NUMBER OF DIGITS/CHARACTERS
FOR EACH BLOCK

BLOCK NUMBER	NUMBER OF DIGITS/CHARACTERS	TITLE
1	UP TO 46	FACILITY NAME
2	8 TOTAL 3 IN ADDITION TO 05000	DOCKET NUMBER
3	VARIES	PAGE NUMBER
4	UP TO 76	TITLE
5	6 TOTAL 2 PER BLOCK	EVENT DATE
6	7 TOTAL 2 FOR YEAR 3 FOR SEQUENTIAL NUMBER 2 FOR REVISION NUMBER	LER NUMBER
7	6 TOTAL 2 PER BLOCK	REPORT DATE
8	UP TO 18 – FACILITY NAME 8 TOTAL – DOCKET NUMBER 3 IN ADDITION TO 05000	OTHER FACILITIES INVOLVED
9	1	OPERATING MODE
10	3	POWER LEVEL
11	1 CHECK BOX THAT APPLIES	REQUIREMENTS OF 10 CFR
12	UP TO 50 FOR NAME 14 FOR TELEPHONE	LICENSEE CONTACT
13	CAUSE VARIES 2 FOR SYSTEM 4 FOR COMPONENT 4 FOR MANUFACTURER NPRDS VARIES	EACH COMPONENT FAILURE
14	1 CHECK BOX THAT APPLIES	SUPPLEMENTAL REPORT EXPECTED
15	6 TOTAL 2 PER BLOCK	EXPECTED SUBMISSION DATE

REQUIRED NUMBER OF DIGITS/CHARACTERS
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9	1	OPERATING MODE
10	3	POWER LEVEL
11	1 CHECK BOX THAT APPLIES	REQUIREMENTS OF 10 CFR
12	UP TO 50 FOR NAME 14 FOR TELEPHONE	LICENSEE CONTACT
13	CAUSE VARIES 2 FOR SYSTEM 4 FOR COMPONENT 4 FOR MANUFACTURER NPRDS VARIES	EACH COMPONENT FAILURE
14	1 CHECK BOX THAT APPLIES	SUPPLEMENTAL REPORT EXPECTED
15	6 TOTAL 2 PER BLOCK	EXPECTED SUBMISSION DATE

REPORTABLE OCCURRENCE

On November 15, 1993, the Waterford 3 plant staff was informed that off-site testing had revealed that the as-found setpoint of the valve which had been installed as pressurizer safety valve RC-317A (EIIS Identifier AB-RV) during the fifth operating cycle was outside of the allowable ± 1% tolerance specified in Technical Specification 3.4.2.2. A similar notification was made on November 16th regarding the valve that had been installed as pressurizer safety valve RC-317B during the fifth operating cycle.

Based on an NRC interpretation of reporting requirements dated December 8, 1993 (received December 17, 1993), this event appears to represent a single cause or condition that resulted in the inoperability of two components that are assumed by the safety analysis to be independent. As such, a Licensee Event Report is being submitted in accordance with 10CFR50.73(a)(2)(vii).

It should be noted that Waterford 3 has experienced several past instances of pressurizer safety valve as-found setpoints outside of the Technical Specification allowable tolerance. In NRC Inspection Report 50-382/93-14, the NRC questioned whether these previous instances constituted reportable events in accordance with 10CFR50.73. After initially indicating that Waterford 3's pressurizer safety valve testing history would be communicated to the NRC by means of a voluntary LER, Entergy Operations committed to submitting a LER in accordance with the guidance provided by the Division of Reactor Projects III/IV/V, Office of Nuclear Reactor Regulation, in their letter dated November 2, 1993. This LER specifically discusses

the most recent finding of a pressurizer safety valve as-found setpoint outside of the Technical Specification tolerance. Information concerning previous pressurizer safety valve as-found test results is included in the "Similar Events" section of this report.

EVENT SEQUENCE

During Waterford 3's fifth operating cycle, which extended from May 27, 1991 through September 19, 1992, Dresser Industries safety valve model 31709NA, serial number (S/N) BS-08031, was installed in the plant as pressurizer safety valve RC-317A. Similarly, Dresser safety valve S/N BS-08030 was installed as RC-317B. During the fifth refueling outage, these two pressurizer safety valves were removed and replaced with spare valves that had been prepared for installation during the course of the operating cycle.

In November 1993, safety valves BS-08031 and BS-08030 were sent to the Westinghouse Western Service Center's Safety Valve Test Facility in order to prepare the valves for installation in the plant during the sixth refueling outage, which is scheduled to begin on March 4, 1994.

The Waterford 3 safety valve test procedure is conducted on a steam test block. Before the "as-found" set pressure is checked, the valves are subjected to a general inspection and then heated to a stabilized thermal profile representative of actual in-service conditions. Next, steam inlet pressure is raised to 90% of lift pressure for the conduct of a pre-test leakage check and then the valve is actuated to determine the as-found set pressure.

On November 15, 1993, the Waterford 3 plant staff was informed that the as-found setpoint of safety valve BS-08031 was outside of the allowable ± 1% tolerance specified in Technical Specification 3.4.2.2. The first lift, representing the as-found setpoint, occurred at 2572 psig which is 87 psig (3.50%) above the required setpoint. A total of three lifts were performed before any valve adjustments were made; the average setpoint for these lifts was 2557 psig which is 72 psig (2.90%) above the required 2485 psig setpoint. (BS-08031 was installed as pressurizer safety valve RC-317A during the fifth operating cycle.)

On November 16, 1993, Waterford 3 was informed that the as-found setpoint of safety valve BS-08030 was outside of the Technical Specification allowable tolerance. The first lift, representing the as-found setpoint, occurred at 2566 psig which is 81 psig (3.25%) above the required setpoint. A total of three lifts were performed before any valve adjustments were made; the average setpoint for these lifts was 2555 psig which is 70 psig (2.82%) above the required 2485 psig setpoint. (BS-08030 was installed as pressurizer safety valve RC-317B during the fifth operating cycle.)

CAUSAL FACTORS

Based on in-house experience and judging from the efforts of other plants, Waterford 3 believes that the use of a pre-installation "jack-and-lap" procedure following setpoint testing without steam set pressure reverification contributes more significantly to setpoint changes than was previously thought. NRC Information Notice 91-74, "Changes in Pressurizer Safety Valve Setpoints Before Installation," identified inadequate control of the jack-and-lap process as a possible contributor to setpoint changes and, in general, pointed out the need for closer controls on certain operations performed before the valve is installed.

The jack-and-lap procedure involves partial disassembly of the safety valve, maintaining its spring in compression, and polishing the valve seat surfaces to remove minor irregularities. However, as pointed out in IN 91-74, jack-and-lap procedures used to correct leakage before installation may cause setpoint changes. Typically, setpoints are not verified after performing the jack-and-lap because the setpoint test itself appears to often lead to subsequent leakage, resulting in a repeating cycle that may be difficult to end. Leakage itself cannot be tolerated because even small pre-installation leaks may lead to steam cutting and increasing leakage during operation, which, in turn, could cause the setpoint to change.

Waterford 3 has imposed strict controls on the jack-and-lap process based on the material presented in IN 91-74 and the experiences of other plants. Nevertheless, because of the number of variables involved, Waterford 3 is of the opinion that it may not be possible to control the jack-and-lap process to the extent necessary to ensure that the safety valve setpoint does not shift during the procedure. This position appears to be supported by industry experience: utilities which have revised their test procedures to require steam set pressure verification after the jack-and-lap appear to have experienced fewer cases of significant setpoint drift.

IMMEDIATE CORRECTIVE ACTIONS

The failure of the as-found setpoint tests was entered into the Waterford 3 Corrective Action Program as Condition Report CR-93-259.

ACTIONS TO PREVENT RECURRENCE

Despite extensive efforts to adequately control the process, Waterford 3 has opted to revise the safety valve testing procedure to require steam set pressure verification when the jack-and-lap procedure is used. In conjuction with this change, Waterford 3 will perform a seat leakage test with steam at 94% of set pressure instead of the hot nitrogen seat leakage test that was performed previously. Waterford 3 believes that this change will result in more reliable valve set pressure performance in the long run.

Entergy Operations is in the process of evaluating a change to the pressurizer safety valve setpoint tolerance specified in the Waterford 3 Technical Specifications. Preliminary indications are that a limit of ±3% for the safety valve setpoint tolerance will ultimately prove to be acceptable. If this is the case, Entergy Operations will request a change to Waterford 3 Technical Specification 3.4.2.2.

Finally, the results of the pressurizer as-found setpoint testing will be entered into the NPRDS database.

Entergy Operations expects to complete the evaluation of the possible change to the Technical Specifications by July 27, 1994.

SAFETY SIGNIFICANCE

An engineering evaluation was performed to examine the possible effect of these pressurizer safety valve as-found test results on the Waterford 3 FSAR safety analyses. The evaluation concluded that, based on the single worst observed safety valve lift for this most recent occurrence (3.5% above the nominal setpoint), peak reactor coolant system (RCS) pressure for the most limiting RCS pressurization event

loss of condenser vacuum) would have been considerably below the safety limit of 2750 psia for RCS peak pressure. It should be noted that a lift pressure of 3.5% above the nominal setpoint represents the highest as-found pressurizer safety valve setpoint for all of Waterford 3's operating history. As such, this analysis bounds the effects of pressurizer safety-valve as-found test results that were out of tolerance high for the entire Waterford 3 operating history.

Additionally, Waterford 3 has performed a bounding analysis for as-found test results that were below the nominal setpoint. As shown in the table which follows, the July, 1992 test of pressurizer safety valve BS-01593, which resulted in valve lift at 4.6% below the nominal setpoint, represents the lowest as-found pressurizer safety valve setpoint in Waterford 3's operating history. Nevertheless, an analysis utilizing the EPRI RETRAN transient analysis code concluded that a reactor trip would take place before an unacceptable overpressurization of the reactor coolant system occurred. These results were presented to the NRC in a meeting on June 30, 1993. (These test results are discussed further in item 3 of "Notes To The Data On Pressurizer Safety Valve Testing.")

These analyses indicate that the pressurizer safety valve out-of-tolerance conditions experienced at Waterford 3 did not compromise the health and safety of the public or plant personnel.

SIMILAR OCCURRENCES

Pressurizer safety valve test results for the Waterford 3 operating history are discussed in the following pages.

AS-FOUND TEST RESULTS

Waterford 3 Pressurizer Code Safety Valves

Valve Type: Dresser Industries Model 31709NA

Setpoint: 2485 psig

PSV S/N	Cycle 1 PSV's	Cycle 2 PSV's	Cycle 3 PSV's	Cycle 4A PSV's	Cycle 4B PSV's	Cycle 5 PSV's
BS-08030	RC-317A FAIL -73 psig (-2.94%)	RC-317B FAIL +64 psig (+2.57%)	RC-317B PASS	RC-317B FAIL +79 psig (+3.18%)		RC-317B FAIL +81 psig (+3.25%)
BS-08031	RC-317B FAIL -78 psig (-3.14%)		RC-317A PASS	RC-317A FAIL -38 psig (-1.53%)		RC-317A FAIL +87 psig (+3.50%)
BW-09724		RC-317A FAIL +31 psig (+1.2%)			RC-317A PASS	
CJ-01593					RC-317B FAIL -115 psig (-4.6%)	

NOTES TO THE DATA ON PRESSURIZER SAFETY VALVE TESTING:

1. The table shows the results of as-found tests conducted after the the valve had been in-service for an operating cycle. For example, BS-08030 and BS-08031 were installed as RC-317B and -317A, respectively, during operating Cycle 3. After the valves had been installed for the entire operating cycle, they were removed and tested at an off-site facility. In this case, the testing revealed that the as-found setpoint for each valve was within the required tolerance. Note that the single worst test for each test cycle is shown.

2. Operating Cycle 4 included a forced outage (October 6-15, 1990) which was caused by PSV leakage. During the outage, BS-08030 and -08031 were removed. Cycle 4 was completed with BW-09724 installed as RC-317A and BS-01593 installed as RC-317B. Cycle 4A represents operation before the forced outage; Cycle 4B represents operation after the forced outage.

3. During the Cycle 4 forced outage, the PSV's were instrumented to obtain actual in-service valve temperature profiles. Prior to installation in the plant for Cycle 5, valves BS-08030 and BS-08031 were tested using both the original and new temperature profiles. Using the original temperature profile, as-found testing of BS-08030 resulted in valve lift at an average of 67 psig (2.7%) above the nominal setpoint. Valve actuation using the new profile occurred at an average of 24 psig (0.9%) above setpoint.

Similar results were obtained for BS-08031: Using the original temperature profile, the valve lifted at an average of 35 psig (1.4%) below the nominal setpoint. Valve actuation using the new profile occurred at an average of 93 psig (3.7%) below setpoint.

The July 1992 test of BS-01593, which was identified in the "Safety Significance" section of this report as the lowest as-found test result, is of interest with regard to the effect of ambient temperature on valve setpoints. BS-01593 was purchased in September, 1990 and set for Waterford 3 using the original temperature profile. It was installed in the plant during the cycle 4 forced outage and instrumented to obtain the correct temperature profile. The July 1992 testing (performed to prepare the valve for installation during the fifth refueling outage for use during the sixth operating cycle) was performed using the new (hotter) temperature profile. Therefore, the apparent downward setpoint shift, while significant, was not unexpected. Since no as-found testing was performed using the original temperature profile, it may not be appropriate to characterize the observed change in the setpoint as setpoint "drift."

Temperature Profiles are as follows:

Temp. Profile	Inlet Temp	Discharge Temp	Lower Bonnet Temp	Upper Bonnet Temp
'Original' Profile	454-486°F	N/A	200-225°F	173-185°F
RC-317A 'New'	500-501°F	260-277°F	347-377°F	230-258°F
RC-317B 'New'	454-486°F	258-265°F	321-327°F	207-210°F

The Waterford 3 experience regarding the effect of ambient temperature on safety valve setpoints mirrors material presented in Supplement 1 to NRC Information Notice 89-90, "Pressurizer Safety Valve Lift Setpoint Shift."