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T.R. "Ted" Leonard  
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Waterford 3

W3F1-97-0166  
A4.05  
PR

July 18, 1997

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 (LER) Number 97-022-00 for Waterford Steam Electric Station Unit 3. This report provides details of a positive reactivity addition to the Reactor Coolant System in violation of Technical Specification 3.7.6.2b. This condition is being reported pursuant to 10CFR50.73(a)(2)(i)(B).

Very truly yours,

T.R. Leonard  
General Manager  
Plant Operations

TRL/WDM/tjs  
Attachment

cc: E.W. Merschoff (NRC Region IV), C.P. Patel (NRC-NRR),  
A.L. Garibaldi, J.T. Wheelock - INPO Records Center,  
J. Smith, N.S. Reynolds, NRC Resident Inspectors Office,  
Administrator - LRPD

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**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-8 F33), 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)

WATERFORD STEAM ELECTRIC STATION UNIT 3

05000 382

1 OF 6

TITLE (4)

POSITIVE REACTIVITY ADDITION IN VIOLATION OF TS 3.7.6.2.b

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	
06	14	97	97	022	00	07	18	97	N/A	05000	
									FACILITY NAME	DOCKET NUMBER	
									N/A	05000	
OPERATING MODE (9)		5	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)								
POWER LEVEL (10)		000	20.2201(b)			20.2203(a)(2)(v)	<input checked="" type="checkbox"/>		50.73(a)(2)(i)	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

TELEPHONE NUMBER (include Area Code)

T.J. GAUDET, LICENSING MANAGER

(504) 739-6666

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

SUPPLEMENTAL REPORT EXPECTED (14)

EXPECTED SUBMISSION DATE (15)

MONTH DAY YEAR

YES

(If yes, complete EXPECTED SUBMISSION DATE).

NO

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

On June 10, 1997, at 2112 hours, Control Room Emergency Filtration Units A and B were declared inoperable to install gravity dampers per Design Change DCP-3536. Technical Specification (TS) 3.7.6.2b requires the suspension of all operations involving positive reactivity changes. On June 12, 1997, at 0132 hours, OP-903-115, "Train A Integrated Emergency Diesel Generator/Engineering Safety Features Test," was performed. As a result of this surveillance, approximately 9% of the volume of Boric Acid Makeup Tank B was pumped into the Reactor Coolant System (RCS). This resulted in RCS boron concentration being greater than Refueling Water Storage Pool (RWSP) concentration. On June 14, 1997, Operations performed a makeup to the RCS using the operable boration flow path from the RWSP. Because the RWSP boron concentration was lower than the RCS, this condition is reportable per 10 CFR 50.73(a)(2)(i)(B) as a violation of TS 3.6.7.2b. All operations involving possible positive reactivity additions were stopped until the TS action statements were exited. TS 3.7.6.2b will be revised to remove the reference to positive reactivity addition. This event did not compromise the health and safety of the public.

**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	VARIABLES	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

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
WATERFORD STEAM ELECTRIC STATION UNIT 3	05000	97	022	00	2 OF 6
	382				

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

REPORTABLE OCCURRENCE

Technical Specification (TS) 3/4.6.7.2, "Control Room Emergency Air Filtration System," Action b, states with both Control Room Emergency Filtration Units (CREFU) inoperable, suspend all operations involving core alterations or positive reactivity changes. On June 14, 1997, Operations performed a makeup to the Reactor Coolant System (RCS) [AB] using the operable boration flow path from the Refueling Water Storage Pool (RWSP). At the time of this operation, RCS boron concentration was 2290 parts per million (ppm) and the RWSP concentration was 2266 ppm. Therefore, this action constituted a positive reactivity addition and is being reported in accordance with 10CFR50.73(a)(2)(i)(B) as an operation or condition prohibited by TS.

INITIAL CONDITIONS

At the time this condition was discovered, Waterford 3 was in Operational Mode 5 (Cold Shutdown) while conducting Refueling Outage eight (RF08). The RCS was at approximately 105 degrees Fahrenheit (F) and 35 pounds per square inch atmospheric (psia) pressure. Both CREFU trains were inoperable due to installation of a design change. Valve BAM-141, Boric Acid Makeup Header Flow Control Valve, was removed from service to troubleshoot the valve controller. TS Action Statements 3.7.6.2b was in effect.

EVENT DESCRIPTION

On June 10, 1997, at 2112 hours, the Operations' shift crew (the crew) declared CREFU trains A and B inoperable to install gravity dampers [UD-MP] in accordance with Design Change Package (DCP) 3536. TS 3.7.6.2b, which directs suspension of all operations involving core alterations or positive reactivity changes, was entered. At that time, RCS boron concentration was 2272 ppm and RWSP boron concentration was 2274 ppm.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
WATERFORD STEAM ELECTRIC STATION UNIT 3	05000 382	97	022	00	3 OF 6

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

On June 12, 1997, at 0132 hours, the crew commenced Operations Surveillance Procedure OP-903-115, "Train A Integrated Emergency Diesel Generator/Engineering Safety Features Test." By 0150 hours, RCS pressure had slowly risen from 28 psig to 38 psig. Boric Acid Makeup (BAM) [CB] Pumps A and B, which were started as part of the OP-903-115 surveillance, pumped approximately 9% of BAM Tank A volume into the RCS. Sample results revealed that RCS boron concentration rose to 2300 ppm which was above the RWSP boron concentration of 2274 ppm.

On June 14, 1997, the Chemistry department requested a purge of the Volume Control Tank (VCT) to reduce RCS ammonia levels. Realizing the evolution would require making up to the RCS from the RWSP, which was at a lower boron concentration, the crew performed several Shutdown Margin (SDM) calculations with different boron concentrations to ensure SDM would be maintained. The calculations demonstrated the net change in reactivity from when the plant entered TS 3.7.6.2b to when the RCS makeup occurred would be negative. In addition, since the makeup source was the operable boration flowpath, the crew concluded the makeup would not violate the intent of TS 3.7.6.2b. These points were discussed with the Operations' Manager who concurred with the conclusions. At that point, the crew performed the VCT purge evolution that included making up to the RCS from the RWSP.

CAUSAL FACTORS

The apparent root cause of this event was incorrect assumptions by Operations department staff and management.

- The crew assumed that since the net change in reactivity from the RCS makeup was negative, the intent of TS 3.7.6.2b was met.
- The crew assumed if the makeup source was the operable boration flowpath, it would not constitute a violation of TS 3.7.6.2b. Even though the flowpath could be used to satisfy SDM requirements in an emergency, normal makeup constituted a positive reactivity change.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
WATERFORD STEAM ELECTRIC STATION UNIT 3	05000	97	022	00	4 OF 6
	382				

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

The following contributing cause was identified:

- The action statements of TS 3.7.6.2b, which require suspension of positive reactivity changes, are overly conservative and unnecessary. In NUREG 1432, "Standard TS for Combustion Engineering Plants," the bases for this TS states the system is designed to maintain the Control Room [NA] environment for 30 days of continuous occupancy after a Design Basis Accident without exceeding a 5 rem whole body dose or its equivalent to any part of the body. This does not involve the suspension of activities that would cause a positive reactivity change.

CORRECTIVE MEASURES

- Waterford 3 will submit a TS change for TS 3.7.6 to be more in line with NUREG 1432, "Standard TS for Combustion Engineering Plants," which reads:

With two Control Room Emergency Air Cleanup Systems inoperable [in modes 5 and 6, or] during movement of irradiated fuel assemblies [or during core alterations], immediately suspend core alterations and suspend movement of irradiated fuel assemblies.

- Until the TS change takes place, Operations management has provided the following direction to Control Room personnel:

We need to be exceedingly sensitive to any positive reactivity changes that we may cause whenever we are in an Action Statement that reads, "...suspend all operations involving core alterations or positive reactivity changes." Therefore, we cannot use the RWSP as a source of makeup to the RCS if it has a lower boron concentration, even if it is well within any shutdown margin consideration and a proper boration flowpath. We cannot place a purification ion exchanger in service if it is not saturated with the same concentration of boron as the RCS. We cannot heatup the plant with a positive moderator temperature coefficient (or cool it down if the moderator temperature coefficient is negative). Any

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
WATERFORD STEAM ELECTRIC STATION UNIT 3	05000 382	97	022	00	5 OF 6

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

operations involving positive reactivity changes are of concern and should be screened accordingly.

SAFETY SIGNIFICANCE

Following the receipt of a Safety Injection Actuation Signal or the detection of a high radiation at the outside air intake, the CREFU system is designed to attain a positive pressure of 1/8 inch water gauge with less than or equal to 200 cfm of outside air. The operability of this system and Control Room design provisions are based on limiting radiation exposure to five rem or less whole body, or its equivalent.

The bases for TS 3/4.1.2, "Boration Systems," states, "With the RCS temperature below 200 degrees F, one injection system is acceptable without single failure consideration on the basis of the stable reactivity condition of the reactor and the additional restrictions prohibiting CORE ALTERATIONS and positive reactivity changes in the event the single injection system becomes inoperable."

TS 3.1.2.1, 3.1.2.3, and 3.1.2.7 were reviewed to verify that the RWSP satisfied all requirements as the boration water source. In Mode 5, the requirement is a minimum boron concentration of 1720 ppm and a minimum level of 12%. Operations Procedure OP-100-014, "Technical Specification and Technical Requirements Compliance," requires a minimum boron concentration of 2050 ppm. The boron concentration of the RWSP at the time of the RCS makeup (2266 ppm) exceeded both of these requirements. The TS bases for SDM states below 200°F, the specified SDM ensures that sufficient time for operator actions exists between the initial indication of the deboration and the total loss of SDM. RCS temperature at the time of this event was 105 degrees F.

Calculations were performed at various RCS boron concentrations to determine the amount of SDM available. The calculations illustrate the small change in RCS boron concentration as a result of this event had a minimal effect on SDM:

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

FACILITY NAME (1)  WATERFORD STEAM ELECTRIC STATION UNIT 3	DOCKET  05000 382	LER NUMBER (6)			PAGE (3)  6 OF 6
		YEAR 97	SEQUENTIAL NUMBER 022	REV. NU. 00	

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

<u>RCS Boron</u>	<u>Keff</u>	<u>SDM</u>	<u>Comments</u>
2300 ppm	0.921	8.6%	Maximum RWSP Modes 1-4
2297 ppm	0.921	8.5%	
2290 ppm	0.922	8.5%	
2200 ppm	0.930	7.6%	
2050 ppm	0.943	6.0%	Minimum RWSP by OP-100-014
1720 ppm	0.974	2.7%	Minimum RWSP by TS

Core Operating Limits Report (COLR) 3.1.1.1 states that SDM shall be greater than or equal to that shown in Figure 1, "Shutdown Margin as a Function of Cold Leg Temperature." COLR Figure 1 indicates that with RCS temperature at approximately 105 degrees F when this event occurred, SDM is required to be greater than or equal to 1.0%. With the minor change in Keff and SDM that occurred as a result of the makeup, it can be seen that SDM was never in danger of being jeopardized. This event did not compromise the health and safety of the public.

SIMILAR EVENTS

LER 96-002-00 was submitted due to Waterford 3's interpretation of TS 3.7.1.2a. Waterford 3 did not consider the steam driven Emergency Feedwater Pump inoperable when one of the steam supply valves was taken out of service. One occasion was discovered in which one valve was out of service for greater than the 72-hour action statement allowed.

ADDITIONAL INFORMATION

Energy Industry Identification System (EIIS) codes are identified in the text within brackets [ ].