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Early C. Ewing, III
Director
Nuclear Safety & Regulatory Affairs
Waterford 3

W3F1-99-0008
A4.05
PR

February 4, 1999

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) 99-001-00 for Waterford Steam Electric Station Unit 3. This report provides details of the entry into Technical Specification 3.0.3 due to a period of inoperability of both Essential Chilled Water Loops.

This condition is being reported pursuant to 10 CFR 50.73(a)(2)(i)(B).

Very truly yours,

Edward P. Perkins (for E.C. Ewing)

E.C. Ewing
Director
Nuclear Safety & Regulatory Affairs

ECE/DAY/ssf
Attachment

080016

cc: E.W. Merschoff (NRC Region IV), C.P. Patel (NRC-NRR),
A.L. Garibaldi, P. Lewis - 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-6 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)

Waterford Steam Electric Station Unit 3

DOCKET NUMBER (2)

05000 382

PAGE (3)

1 OF 7

TITLE (4)

Technical Specification 3.0.3 Entry Due to Less Than Adequate Chiller Thermostat Control

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
01	05	99	99	001	00	02	04	99	N/A	05000
									N/A	05000

OPERATING MODE (9)	POWER LEVEL (10)	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)				
1	100	20.2201(b)	20.2203(a)(2)(v)	<input checked="" type="checkbox"/>	50.73(a)(2)(i)	50.73(a)(2)(vii)
		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

David A. Young, Licensing Engineer

TELEPHONE NUMBER (include Area Code)

(504) 739-6363

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)

YES (If yes, complete EXPECTED SUBMISSION DATE).

NO

EXPECTED SUBMISSION DATE (15)

MONTH DAY YEAR

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

The Essential Chilled Water Chiller A tripped and the A Loop was declared Inoperable while in a 72-hour Action that was previously entered when Chiller B was tagged out for maintenance rendering the B Loop Inoperable. Technical Specification 3.0.3 was entered due to the inoperable status of both the A and B Loops of the Essential Chilled Water System. The A Loop was restored to Operable status using the A/B Chiller and Technical Specification 3.0.3 was exited. The cause of the Chiller A trip was less than adequate control of the chiller thermostat setting, which was found out of adjustment low. To improve thermostat setting control, Entergy will place a "tamper" seal on the chiller thermostats and install a label near each of the chiller thermostat control knobs to prohibit unauthorized thermostat adjustment. The event did not impact the safety and health of the public or plant personnel. The event is being reported pursuant to 10 CFR 50.73(a)(2)(i)(B).

**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

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

REPORTABLE OCCURRENCE

The concurrent inoperability of Essential Chilled Water [KM] (CHW) loops A and B constituted a condition prohibited by the Technical Specifications. Technical Specification (TS) 3.7.12 states that "Two independent essential services chilled water loops shall be OPERABLE." Since the Technical Specifications do not provide explicit action when both Loops of Essential Chilled Water are inoperable, the plant entered Technical Specification (TS) 3.0.3.

Pursuant to 10CFR50.73(a)(2)(i)(B) and 10CFR50.36(c)(2) any operation or condition prohibited by the plant's Technical Specifications is reportable as a Licensee Event Report (LER).

INITIAL CONDITIONS

The Unit was operating in Mode 1 at 100% power. The unit was in Technical Specification Action Statement 3.7.12 (72-hour Action) with Chiller B tagged out of service for maintenance. Chiller A/B was aligned to replace the availability of Chiller B, and Chiller A was operable. There were no other systems, components, or structures which contributed to the event.

EVENT DESCRIPTION

On 1/5/99, Essential Chilled Water (CHW) Chiller A tripped multiple times on Low Refrigerant Pressure while in a 72-hour Action Statement that was previously entered when Chiller B was tagged out for maintenance. At the time of the Chiller A trip, Chiller

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A/B was mechanically aligned to replace Chiller B availability with the A/B electrical bus aligned to the A side. Chiller A/B was supplying chilled water to the B Loop, though the B Loop was not declared operable.

Following the final Chiller A trip, the refrigerant level in Chiller A was checked and found to be normal. The cause of the Chiller A trip was indeterminate and Chiller A was declared Inoperable. TS 3.0.3 was entered at 0500 due to the inoperable status of both the A and B Loops of CHW.

Immediate Action was taken to align Chiller A/B to replace Chiller A and restore operability of A Loop. Once aligned mechanically and electrically to the A Loop, Chiller A/B was started but then tripped on Low Refrigerant Pressure due to starting the Chiller under abnormal operating conditions of low load coincident with low CCW temperature (outside ambient temperature was below freezing). Starting the Chiller under these conditions caused an increased rate of condensation, which resulted in liquid refrigerant level increase in the condenser (stacking condition). The stacking condition in the condenser resulted in a low suction pressure in the compressor suction. Chiller A/B was then restarted and loaded manually to avoid the "stacking" condition. This condition should not occur during accident conditions due to increased loads on the Chiller during an accident. At 0621 hours Essential Chilled Water A Loop was declared Operable with Chiller A/B supplying the loop, and TS 3.0.3 was exited.

A plant shutdown was not commenced due to the imminent restoration of Chilled Water A Loop using Chiller A/B.

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CAUSAL FACTORS

A Root Cause Determination was conducted. It was determined that the cause of the Essential Chiller A trip was less than adequate control of the thermostat setting on Chiller A. The Human-Machine Interface Controls were less than adequate. The thermostat on Essential Chiller A was found to be out of adjustment low (the knob was physically in a position lower than required to maintain the specified temperature). A review of control room logs indicated that the thermostat setting had been lowered three times between September 1997 and March 1998 in order to lower chilled water temperature to ensure compliance with the TS chilled water temperature limit. In April of 1998, Chiller A was observed to be maintaining chilled water temperature above the specified upper limit, and the A Loop of Essential Chilled Water was declared Inoperable. During the subsequent trouble shooting, a chiller control circuitry-wiring problem was identified and corrected. Control room logs contained no record of the thermostat setting being adjusted back to a higher level once the wiring problem was corrected. No documentation was found which indicated that any thermostat adjustments to Essential Chiller A occurred since March 1998.

While no individual instance of an improper adjustment to the chiller A thermostat has been identified, it is evident that a series of lowering adjustments (or drift) resulted in a thermostat setting that made the chiller susceptible to low suction pressure trips during cold weather conditions. The low outside ambient temperature contributed to a low chiller load and lower than normal condensing water temperature.

Past experience indicates that all of the chillers (A, B, and A/B) are susceptible to tripping on low suction pressure before tripping on load recycle (low chilled water

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temperature). There was a lack of control of thermostat setting on Essential Chillers A, B, and AB.

The first trip of Essential Chiller A occurred several minutes after removing the largest heat load from the A Loop of Chilled Water. During that time, CCW temperature, which is typically about 90 degrees, was approximately 73 degrees. The low load coupled with low condensing water temperature is expected to cause chilled water temperature to drift towards the low end of its control band, and in the limiting case to the load recycle trip setpoint. In this scenario, the refrigerant operating point is also expected to drift toward the low suction pressure trip setpoint. The proximity of each of these parameters to its setpoint is partly driven by the approach value at which the chiller operates for a given load. Approach refers to the difference between the chilled water temperature and the temperature at which the refrigerant is boiling. In some cases, the chiller may trip on low refrigerant suction pressure before it trips on low chilled water temperature for load recycle. Additionally, low load coupled with low CCW temperatures is known to cause "stacking" of refrigerant in the condenser, which results in reduced refrigerant inventory at the compressor suction. This will cause the refrigerant operating point to drop much faster than the chilled water temperature, and result in a low suction pressure trip.

CORRECTIVE MEASURES

Immediate Corrective Action

The thermostat setting on Essential Chiller A was found out of adjustment low. The setting was adjusted and it was subsequently verified that the chiller operated correctly.

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Action to Prevent Recurrence

Entergy will place "tamper" seals on thermostat control knobs of Chillers A, B, and A/B. The seals will serve as a deterrent to human inadvertent or uncontrolled adjustment of the thermostat control knobs, and as an indicator of other uncontrolled adjustment out of the set position for any reason (such as drift due to vibration).

Entergy will install a label near each of the chiller thermostat control knobs to prohibit unauthorized thermostat adjustment.

SAFETY SIGNIFICANCE

At the time of entry into TS 3.0.3, the B loop of Essential Chilled Water was in operation with Essential Chiller AB supplying the loop. The B loop was not independent of the A loop because the AB Chiller was electrically aligned to the A safety bus.

Following the trip on low suction pressure, and two unsuccessful attempts to restart Essential Chiller A, the A loop of chilled water was declared inoperable. It is expected that the A chiller would have started upon receipt of an SIAS and would likely not have tripped on low suction pressure due to rapidly increasing condensing water temperature and rapidly increasing real load under accident conditions. Accident conditions would rapidly increase CCW temperatures and load on the chillers, which would prevent a rapid lowering of chilled water temperature making a trip on low suction pressure unlikely.

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The chillers would not restart automatically in the event of a trip on low suction pressure following a SIAS. Control room annunciators would prompt manual chiller restart either from the control room or locally.

During the approximately 81 minutes in the TS 3.0.3 Action, Operations shift personnel were stationed at the chillers and chiller control panels, and actively engaged in startup of an essential chiller to recover an operable loop of the Essential Chilled Water system. A plant shutdown was not commenced due to the imminent restoration of the Chilled Water A Loop using Chiller A/B. The event did not impact the health and safety of the public.

SIMILAR EVENTS

There have been no similar LER's at Waterford 3 in the past two years.