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Waterford 3

W3F1-2000-0075  
A4.05  
PR

May 26, 2000

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) 00-005-00 for Waterford Steam Electric Station Unit 3. This report provides details of a failure to comply with Technical Specification Action Statement based on NOED 00-6-006. This condition is being reported pursuant to 10CFR50.73 (a)(2)(i)(B) as an operation or condition prohibited by the plant's Technical Specifications.

There are no commitments contained in this submittal. If you have any questions concerning this LER, please contact Lisa Borel at (504) 739-6403.

Very truly yours,

E.P. Perkins, Jr.  
Director,  
Nuclear Safety Assurance

EPP/LBB/rtk  
Attachment

cc: E.W. Merschoff, (NRC Region IV), N. Kalyanam, (NRC-NRR),  
A.L. Garibaldi, P. Lewis - INPO Records Center,  
J. Smith, N.S. Reynolds, NRC Resident Inspectors Office,  
Louisiana DEQ/Surveillance Division

REN-001

IE22

FACILITY NAME (1) **Waterford Steam Electric Station, Unit 3** DOCKET NUMBER (2) **05000-382** PAGE (3) **1 of 6**

TITLE (4)  
**Operating in a Condition Prohibited by Technical Specification 3.6.2.2 Due to an Inoperable Containment Fan Cooler**

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	27	00	00	005	00	05	26	00	N/A	N/A
									N/A	N/A

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more) (11)								
POWER LEVEL (10)	100	20.2201(b)	20.2203(a)(2)(v)	X	50.73(a)(2)(i)	50.73(a)(2)(viii)				
		20.2203(a)(2)(i)	20.2203(a)(3)(i)		50.73(a)(2)(ii)	50.73(a)(2)(x)				
		20.405(a)(1)(ii)	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	Specify in Abstract below or in NRC Form 366A			
		20.2203(a)(2)(iii)	50.36(c)(1)		50.73(a)(2)(v)					
		20.2203(a)(2)(iv)	50.36(c)(2)		50.73(a)(2)(vii)					

LICENSEE CONTACT FOR THIS LER (12)  
 NAME **Lisa B. Borel, Sr. Licensing Engineer** TELEPHONE NUMBER (Include Area Code) **(504) 739-6403**

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 EPIX	
X	BK	CLR	J127	Y						

SUPPLEMENTAL REPORT EXPECTED (14)  
 YES (If yes, complete EXPECTED SUBMISSION DATE). NO X  
 EXPECTED SUBMISSION DATE (15)  
 MONTH DAY YEAR

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

On 4/24/00, at 22:16 hours, Containment Fan Cooler (CFC) "C" tripped and was declared inoperable. The action statement of Technical Specification (TS) 3.6.2.2 was entered that required CFC "C" to be restored to operable status within 72 hours. A visual inspection of CFC "C" found evidence that the fan blades had rubbed against the shroud and the fan blade edges were damaged. An on-line repair was not feasible within 72 hours. The other three CFCs were inspected and tested to provide assurance that a similar condition did not exist. On 4/26/00 Entergy verbally requested the NRC Staff to exercise discretion not to enforce compliance with TS 3.6.2.2 Limiting Condition for Operation, to remain in effect until Technical Specification Change Request NPF-38-224 (requests approval to allow one operable CFC per train) is approved or an outage of sufficient duration occurs to accommodate repair of the CFC. The NRC orally issued the Notice of Enforcement Discretion (NOED) on 4/27/00 and confirmed NOED 00-6-006 in writing on 5/1/00. On 4/27/00 at 22:16 hours, Waterford 3 exceeded the allowed outage time of TS 3.6.2.2.

There is no safety significance associated with this event. The Containment Cooling System remains capable of performing its design function. This event had no adverse affects on the health and safety of the public and is not considered a Safety System Functional Failure.

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**REPORTABLE OCCURRENCE**

On 4/27/00 at 22:16 hours, Waterford 3 exceeded the allowed outage time of Technical Specification 3.6.2.2 "Containment Cooling System" [BK] while Containment Fan Cooler (CFC) "C" [BK-FAN] was inoperable. This condition is reportable under 10CFR50.73 (a)(2)(i) for any operation or condition prohibited by the plant's Technical Specifications.

**INITIAL CONDITIONS**

At the time of discovery, Waterford 3 was operating in Mode 1 at approximately 100% reactor power. Containment Fan Cooler (CFC) "C" had previously tripped on 4/24/00 at 22:16 hours and the Action Statement of TS 3.6.2.2 was entered. No other structures, systems or components were out of service that contributed to this event.

**EVENT DESCRIPTION**

The Containment Cooling System (CCS) consists of four fan coolers which draw air from containment [NH] and discharge it to a ring header around the top of containment. During normal operation the CCS provides cooling to various areas of the containment. The post-accident safety related design functions of the CCS are as follows:

- Remove heat from the containment atmosphere following a loss of coolant accident (LOCA), secondary system pipe rupture, or main steam line break (MSLB) inside containment.
- Maintain an acceptable containment pressure and temperature.
- Limit off site radiation dose by reducing the pressure differential between containment atmosphere and the external environment.

The CCS coolers [BK-CLR] are divided into two trains – Train A, which contains CFCs "A" and "C", and Train B which contains CFCs "B" and "D". The Limiting Condition for Operation (LCO) for Technical Specification (TS) 3.6.2.2 "Containment Cooling System" requires two independent trains of containment cooling shall be OPERABLE with two fan coolers to each train in Modes 1 through 4. With one train inoperable, the inoperable train must be restored to an operable status within 72 hours or the plant must be in HOT STANDBY within the next six hours. On April 24, 2000, at 22:16 hours, CFC "C" tripped following vibration alarms. CFC "C" was declared inoperable and the Action Statement for TS 3.6.2.2 was entered. Following the trip, electricians meggered the motor and checked phase to phase

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resistances. These checks were all found to be satisfactory. A containment entry was performed at 02:37 hours on April 25, 2000, to visually inspect CFC "C" and the following conditions were noted:

- Hot spots (paint discoloration) were identified at the 2 o'clock and 4 o'clock to 7 o'clock positions where it appeared the fan blades had rubbed against the shroud.
- The edges of the fan blades appeared to be worn or melted.
- Lubricant was noted to have leaked out of the motor outboard bearing.
- The motor/fan base plate bolts could be turned using a wrench.
- The fan could not be turned by hand due to restrictions caused by the blades rubbing on the shroud.

After a second containment entry to perform a more detailed inspection of CFC "C", it was determined that an on-line repair was not feasible within the 72 hour LCO Action Statement Allowed Outage Time. The other three CFCs were inspected and tested to provide added assurance that a similar condition did not exist. Specifically, the motor diagnostic testing and vibration diagnostics, including external inspection, were done on CFCs "A", "B" and "D". In addition, an internal visual inspection was performed on CFC "A". The results of the eccentricity spectrum for each motor showed no signs of eccentricity problems. The vibration readings taken on the housing of the vane axial fan (readings could not be taken from the bearing casing directly, since the bearing casing is inaccessible) lead to the conclusion that the CFCs were operating in the good range with regard to vibration. There were no unusual audible noises nor were abnormalities observed. The results of the internal visual inspection of CFC "A" indicate that the fan is in good condition with no evidence of a bearing problem, the fan rotated freely with adequate clearance between the fan blades and shroud, and all the hardware appeared to be firmly in place with no free play detected in the bearing. On 4/26/00, Entergy discussed this information with the NRC Staff and verbally requested the NRC to exercise discretion not to enforce compliance with TS 3.6.2.2 Limiting Condition for Operation (to allow Waterford 3 to operate with one operable CFC per train versus two operable CFCs per train). This discretion was requested to remain in effect until Waterford 3 Technical Specification Change Request NPF-38-224 is approved or an outage of sufficient duration occurs to accommodate repair of the CFC. The NRC Staff orally issued the Notice of Enforcement Discretion (NOED) on April 27, 2000. On 4/27/00 Entergy followed up with a written request for enforcement discretion. The NRC Staff confirmed NOED No. 00-6-006 in writing on

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May 1, 2000.

**CAUSAL FACTORS**

The cause of operating in a condition prohibited by the Technical Specifications is the Enforcement Discretion granted to allow operation with one operable CFC per train (CFC "C" is inoperable). Entergy had previously submitted Technical Specification Change Request NPF-38-224 that requested TS 3.6.2.2 be changed to allow one operable CFC per train versus two operable CFCs per train. Approval of this Technical Specification Change Request had not yet been obtained at the time it was determined that CFC "C" could not be repaired on line within the 72 hour LCO Action Statement. Entergy requested and was granted enforcement discretion allowing operation with CFC "C" inoperable until such time as the Technical Specification Change Request is approved or an outage of sufficient of duration occurs to repair CFC "C". The root cause of the failure of CFC "C" is being investigated under Waterford 3 Condition Report number CR-WF3-2000-0394. Possible causes that have been identified to date are misalignment of the motor/fan assembly with the housing (failed mounting rods), under- or over-lubrication of the bearing, or end of bearing life.

**CORRECTIVE ACTIONS**

Technical Specification Change Request NPF-38-224 to request approval to allow one operable CFC per train versus two operable CFCs per train has been submitted. CFC "C" will be repaired during the next outage of sufficient duration. Root cause analysis of the failure will be performed and further corrective actions may be assigned as appropriate.

**SAFETY SIGNIFICANCE**

Operating the plant with one operable CFC per train is not safety significant nor does it have any adverse consequences on the plant. A safety evaluation for operating the plant with one CFC per train is based on containment pressure and temperature response analyses performed for the limiting large break Loss-of-Coolant-Accidents (LOCA) and limiting Main-Steam-Line-Break (MSLB) events using the GOTHIC computer code. These analyses have been submitted to the NRC Staff for approval in Technical Specification Change Request NPF-38-224. Several LOCA and MSLB events were analyzed

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using GOTHIC and the Waterford 3 containment model to determine the limiting cases for:

- LOCA containment peak pressure
- Post-LOCA containment pressure at 24 hours
- MSLB peak containment pressure
- MSLB peak containment temperature

Containment pressure and temperature response for LOCA cases were analyzed assuming a loss of offsite power and failure of one train of the containment heat removal system with one CFC per train operable, i.e., only one containment spray (CS) [BE] and one CFC assumed operable, for both minimum and maximum Safety Injection (SI) [BQ] flow cases. The limiting LOCA for containment peak pressure was determined to be the double ended hot leg slot break. The peak pressure for the hot leg break occurs near the end of the blowdown phase, which is prior to the start of safety injection flow; start of CFC operation; and start of containment spray flow into the containment. The calculated peak containment pressure was 35.2 psig which is well below the containment design pressure of 44 psig. The limiting LOCA for containment pressure at 24 hours was determined to be the double ended discharge leg slot break with minimum safety injection flow assumption. The peak containment pressure for this case was calculated to be 33.27 psig. Thus, the containment pressure at 24 hours must be reduced to less than half the containment peak pressure or 16.64 psig. The containment pressure at 24 hours was calculated to be 15.5 psig, which is less than half the associated containment peak pressure. This meets Acceptance Criteria II, Section b in the Standard Review Plan 6.2.1.1.A, "PWR Dry Containments, Including Sub-atmospheric Containments".

The limiting MSLB event for containment peak pressure was determined to be a MSLB from 102 percent power with failure of one containment heat removal train consisting of one containment spray (CS) pump [BE-P] and one CFC operable. The calculated peak containment pressure was 42.68 psig, which is below the containment design pressure of 44 psig. The current UFSAR licensing analysis determined that the limiting MSLB event was a MSLB from 75 percent power with the failure of one train of containment heat removal system consisting of one CS train and two operable CFCs with a peak pressure of 42.9 psig. The limiting event for containment peak temperature (EQ case) was determined

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to be the MSLB from 102 percent power with the failure of one main steam isolation valve [SB-ISV] to close. The calculated peak containment temperature was 397.4 degrees F, which is less than the current maximum allowed temperature of 413.5 degrees F.

**PRA Considerations:**

In the Waterford 3 PRA model, containment fan coolers provide cooling for the containment to prevent a long term overpressurization failure. Analyses were done to show that one fan cooler or one containment spray train was adequate to remove sufficient heat to prevent containment overpressure failure. The impact on containment failure probability due to one CFC being inoperable is negligible. The probability of failure for all containment cooling (both spray trains and all fan coolers) was calculated to be 1.9E-4. This is dominated by failure of common support systems, such as electrical power or component cooling water. These support system failures are not affected by the inoperability of one CFC. Cutsets with individual CFC failures that would be affected are below 1E-9 and therefore have only a negligible impact on containment failure probability. The impact of CFC failures on the core damage frequency during a LOCA (containment overpressurization failure resulting in rapid depressurization of the containment and cavitation of the operating safety injection recirculation) is extremely low, about 1E-11, and is also negligible.

This event is not considered a Safety System Functional Failure (SSFF).

**SIMILAR EVENTS**

No previous similar reportable events involving failure of a CFC or fan was identified.

**ADDITIONAL INFORMATION**

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