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10 CFR 50.73

W3F1-2012-0047

June 21, 2012

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
11555 Rockville Pike
Rockville, MD 20852

Subject: Licensee Event Report 2012-004-00
Waterford Steam Electric Station, Unit 3 (Waterford 3)
Docket No. 50-382
License No. NPF-38

Dear Sir or Madam:

Entergy is hereby submitting Licensee Event Report (LER) 2012-004-00 for Waterford Steam Electric Station Unit 3 (Waterford 3). This report provides details associated with an inoperable Essential Chiller.

This report contains no new commitments. Please contact Michael E. Mason, acting Licensing Manager, at (504) 739-6673 if you have questions regarding this information.

Sincerely,

A handwritten signature in black ink, appearing to read "DJWH", is positioned below the "Sincerely," text.

DJ/WH

Attachment: Licensee Event Report 2012-004-00

cc: Regional Administrator, U.S. NRC Region IV
RidsRgn4MailCenter@nrc.gov

U. S. NRC Project Manager, Waterford 3
Kaly.Kalyanam@nrc.gov

NRC Senior Resident Inspector, Waterford 3
Marlone.Davis@nrc.gov

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lerevents@inpo.org

Attachment to

W3F1-2012-0047

Licensee Event Report 2012-004-00

NRC FORM 366 U.S. NUCLEAR REGULATORY COMMISSION (10-2010)				APPROVED BY OMB NO. 3150-0104				EXPIRES 10/31/2013											
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: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA/Privacy Section (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.									
1. FACILITY NAME						2. DOCKET NUMBER				3. PAGE									
Waterford 3 Steam Electric Station						05000 382				1 OF 5									
4. TITLE																			
Essential Chiller Oil Leak Creates Unanalyzed Past Operability Condition																			
5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED										
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MONTH	DAY	YEAR	FACILITY NAME		DOCKET NUMBER								
04	22	2012	2012	- 004	- 00	06	21	2012	FACILITY NAME		DOCKET NUMBER								
										05000									
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9. OPERATING MODE			11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)																
1			<input type="checkbox"/> 20.2201(b)			<input type="checkbox"/> 20.2203(a)(3)(i)			<input type="checkbox"/> 50.73(a)(2)(i)(C)			<input type="checkbox"/> 50.73(a)(2)(vii)							
			<input type="checkbox"/> 20.2201(d)			<input type="checkbox"/> 20.2203(a)(3)(ii)			<input type="checkbox"/> 50.73(a)(2)(ii)(A)			<input type="checkbox"/> 50.73(a)(2)(viii)(A)							
100			<input type="checkbox"/> 20.2203(a)(1)			<input type="checkbox"/> 20.2203(a)(4)			<input checked="" type="checkbox"/> 50.73(a)(2)(ii)(B)			<input type="checkbox"/> 50.73(a)(2)(viii)(B)							
			<input type="checkbox"/> 20.2203(a)(2)(i)			<input type="checkbox"/> 50.36(c)(1)(i)(A)			<input type="checkbox"/> 50.73(a)(2)(iii)			<input type="checkbox"/> 50.73(a)(2)(ix)(A)							
			<input type="checkbox"/> 20.2203(a)(2)(ii)			<input type="checkbox"/> 50.36(c)(1)(ii)(A)			<input type="checkbox"/> 50.73(a)(2)(iv)(A)			<input type="checkbox"/> 50.73(a)(2)(x)							
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			<input type="checkbox"/> 20.2203(a)(2)(iv)			<input type="checkbox"/> 50.46(a)(3)(ii)			<input type="checkbox"/> 50.73(a)(2)(v)(B)			<input type="checkbox"/> 73.71(a)(5)							
			<input type="checkbox"/> 20.2203(a)(2)(v)			<input type="checkbox"/> 50.73(a)(2)(i)(A)			<input type="checkbox"/> 50.73(a)(2)(v)(C)			<input type="checkbox"/> OTHER							
			<input type="checkbox"/> 20.2203(a)(2)(vi)			<input checked="" type="checkbox"/> 50.73(a)(2)(i)(B)			<input checked="" type="checkbox"/> 50.73(a)(2)(v)(D)			Specify in Abstract below or in NRC Form 366A							
12. LICENSEE CONTACT FOR THIS LER																			
FACILITY NAME								TELEPHONE NUMBER (Include Area Code)											
Waterford 3 Steam Electric Station Michael Mason								(504) 739-6673											
13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT																			
CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX										
14. SUPPLEMENTAL REPORT EXPECTED										15. EXPECTED SUBMISSION DATE		MONTH	DAY	YEAR					
<input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO																			
ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)																			
<p>At 14:43 CDT on 04/22/2012, a 22 drop per minute oil leak was discovered on instrument tubing for Essential Chiller A Compressor Low Oil Pressure Switch. Due to the noted oil leakage and loss of compressor oil inventory, the Essential Chiller Technical Specification (TS) 72 hour shutdown action was entered. Plant personnel aligned Essential Chiller AB (swing chiller) to replace A. Essential Chiller Train A was declared operable at 00:44 on 4/23/2012.</p> <p>Examination of the leak revealed that the tubing had been tie-wrapped to adjacent piping. Friction from normal system vibration had worn through the tubing. The instrument tubing was subsequently replaced.</p> <p>In evaluating the past operability of the Essential Chillers within the 30 day mission time, several occasions were discovered where opposite train equipment had been declared inoperable. This created a condition where both trains of Essential Chillers were inoperable, which is not covered by actions in the Essential Chiller TS. As none of the individual periods where both trains were inoperable exceeded 24 hours, consistent with the mission time assumed in quantitative risk analysis, the safety significance of the condition is negligible.</p> <p>This condition is being reported pursuant to the requirements of 10 CFR 50.73(a)(2)(i)(B), 10 CFR 50.73(a)(2)(ii)(B), and 10 CFR 50.73(a)(2)(v)(D).</p>																			

LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Waterford 3 Steam Electric Station	05000382	YEAR	SEQUENTIAL NUMBER	REV NO.	2 OF 5
		2012	- 004	- 00	

NARRATIVE

REPORTABLE OCCURRENCE

At 14:43 CDT on 04/22/2012, a 22 drop per minute (DPM) oil leak was discovered on instrument tubing for Essential Chiller A [CHU] Compressor [CMP] Low Oil Pressure Switch. Due to the noted oil leakage and loss of compressor oil inventory, the Essential Chiller Technical Specification (TS) 72 hour shutdown action was entered. Plant personnel aligned Essential Chiller AB (swing chiller) to replace A. Essential Chiller Train A was declared operable at 00:44 on 4/23/2012.

Examination of the leak revealed that the tubing had been tie-wrapped to adjacent piping. Friction from normal system vibration had worn through the tubing. The instrument tubing was subsequently replaced.

In evaluating the past operability of the Essential Chillers within the 30 day mission time, several occasions were discovered where opposite train equipment had been declared inoperable. This created a condition where both trains of Essential Chillers were inoperable, which is not covered by actions in the Essential Chiller TS. As none of the individual periods where both trains were inoperable exceeded 24 hours, consistent with the mission time assumed in quantitative risk analysis, the safety significance of the condition is negligible.

This condition is being reported pursuant to the requirements of 10 CFR 50.73(a)(2)(i)(B) (Operation Prohibited by Technical Specification), 10 CFR 50.73(a)(2)(ii)(B) (Unanalyzed Condition), and 10 CFR 50.73(a)(2)(v)(D) (Condition That Could Have Prevented Fulfillment of a Safety Function).

INITIAL CONDITIONS

During this time period, Waterford Steam Electric Station Unit 3 (Waterford 3) was operating in Mode 1, stable at or near 100% power. The Essential Chilled Water (CHW) system was aligned for normal operations with no plant protection system actuation signals present.

EVENT DESCRIPTION

An apparent cause evaluation was performed and is documented in the corrective action program. The causal factors were found to have occurred during previous system modifications. A timeline of relevant actions follows:

In May 2000, an Engineering Request package was generated requesting the installation of isolation valves for Essential Chiller Low Oil Pressure switches on all three chillers to allow calibration of the pressure switches without offloading the refrigerant. This would minimize Freon losses during maintenance.

In July 2001, an Engineering Request package was issued to address the transition from stainless tubing to brass fittings for the Chiller dehydrators. The package did not address vibration induced fatigue.

In July 2001, an Engineering Request package was issued to address multiple chiller failures, to facilitate Maintenance Rule (a)(1) recovery actions, and to address the previous request for tubing isolation valves. A change to the package addressed the tubing isolation valves for the Essential Chiller pressure switches and field routing of new tubing. The package did not address tubing supports.

In August 2001, a work package to implement the Engineering Request was performed to field route tubing for Essential Chiller A. The work package did not address tubing supports.

In November 2001, a condition report identified a 15 DPM oil leak on Essential Chiller A 1/4" oil pressure sensing line. The condition report identified the leak was due to the 1/4" tubing rubbing on an adjacent structural support. The other chillers were inspected for similar conditions. No mention was made of the presence of tie-wraps. This was a missed opportunity to identify the 1/4" tubing which was routed adjacent to the larger oil return line and the presence of tie-wraps.

In October 2004, a condition report and work order documents correcting a 40 DPM oil leak in the 1/4" oil

LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Waterford 3 Steam Electric Station	05000382	YEAR	SEQUENTIAL NUMBER	REV NO.	3 OF 5
		2012	- 004	- 00	

NARRATIVE

pressure sensing line between the low oil pressure gage and the filters for Essential Chiller A. No work order step existed to replace or install tubing clamps.

On 04/22/2012, CR-WF3-2012-2022 documents finding a 22 DPM oil leak on Essential Chiller A Compressor Low Oil Pressure Switch tubing. Examination of the leak revealed that the tubing had been tie-wrapped to adjacent piping. Friction from normal system vibration had worn through the tubing. Due to noted leakage and loss of compressor oil inventory, Essential Chiller A was declared inoperable. The 22 DPM oil leak was determined to be sufficient to prevent the Chiller from completing its 30 day mission objective to provide room and area cooling for safety related equipment. The decision was made to swap the 3AB3 (swing) electrical bus from alignment to the 3B3 electrical bus to the 3A3 electrical bus in order to allow Essential Chiller AB to be operable when aligned to Chilled Water Train A.

On 04/22/2012, CR-WF3-2012-2024 was initiated as a result of an engineering walkdown to identify that Essential Chiller AB also has a tie-wrap installed where the leak had occurred on Chiller A. The tie-wrap was removed and tubing inspected. No wear was noted.

On 4/23/2012, Essential Chiller AB was aligned to replace Essential Chiller A for CHW Train A service.

On 4/23/2012, work was completed replacing the Essential Chiller A leaking 1/4" oil pressure sensing line tubing with a union fitting.

This reported condition was entered into the site corrective action program as CR-WF3-2012-2022.

SYSTEM DESIGN

The Essential Chillers cool the CHW system fluid, which exits the chillers at less than or equal to 42 degrees F. The cooled Chilled Water is supplied to air handling unit cooling coils in order to cool spaces containing safety related equipment during normal and accident conditions. There are three Essential Chillers (A, B, and AB) which service two trains of CHW (Trains A and B). The AB (or swing) Essential Chiller may be aligned to replace either the A or B Essential Chiller, both hydraulically and electrically. Each Essential Chiller consists of a skid mounted centrifugal compressor, evaporator, condenser, a local control panel, and a separate chilled water pump [P].

CAUSAL FACTORS

The cause of the Essential Chiller A instrument tubing failure and subsequent oil leak was the previous installation of the field routed tubing which allowed differential motion from vibration to wear through the tubing wall.

Three missed barriers, which occurred in years 2000 and 2001, led to the identified latent condition:

1. The design input worksheet of the Engineering Request incorrectly dispositioned a design input step as not applicable. As a result, there were no tubing support requirements specified, no clearance requirements to adjacent components or supports specified, and no post-installation verifications for either of these considerations were specified.
2. The Tubing Installation procedure checklist steps for tubing supports were marked "NA" in the work package, indicating no support requirements. The work package preparation was inadequate as it did not specify any tubing support or clearance requirements.
3. A lack of a questioning attitude during work package field walkdown and installation: The field routing of the pressure sensing lines involved long lengths of unsupported 1/4" diameter tubing. Although the actual time when the tie-wraps were installed to provide tubing support is indeterminate, it may be concluded they were installed as part of the original installation, since the 1/4" tubing span could not have supported its own weight. The installing

LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Waterford 3 Steam Electric Station	05000382	YEAR	SEQUENTIAL NUMBER	REV NO.	4 OF 5
		2012	- 004	- 00	

NARRATIVE

craft should have rejected the work package as insufficient at the time of work package walkdown or installation and requested tubing support information. The installation of the tie-wraps was apparently performed to provide tubing support.

EXTENT OF CONDITION

Other safety related skid mounted equipment configurations have been reviewed and, with the exception of the Emergency Diesel Generators [DG], do not include long runs of skid mounted instrument tubing. The corrective action plan will require Engineering walkdown of the Emergency Diesel Generators. The Emergency Diesel Generator walkdowns will complete the extent of condition review for this condition. The site operating experience (OE) review indicated the Emergency Feedwater [BA] Turbine Driven pump (EFW Pump AB) has experienced problematic oil leaks. However, the EFW pump oil leaks were not the result of instrument tubing leaks and the pump-driver does not have long runs of skid mounted instrument tubing. The extent of condition will therefore be limited to the Essential Chillers and the Emergency Diesel Generators.

CORRECTIVE ACTIONS

Correct the tubing leak. (completed)

Perform a walkdown of the Essential Chillers to inspect the instrument tubing at the point where it crosses the oil return line to assure that the tubing wall thickness is not experiencing any significant wear and that the oil pressure sensing lines do not have point contact at the subject location. (completed)

Evaluate the Essential Chillers tubing to ensure adequate tube routing and supports to preclude tubing failures due to vibration. (in progress in corrective action program)

Issue a site Engineering "Lessons Learned" summarizing the condition description and causes. (in progress in corrective action program)

Perform a walkdown of the Emergency Diesel Generators' instrument tubing. Ensure that the tubing is not supported using unauthorized tie-wraps and ensure adequate clearance exists to allow for equipment vibration. (Extent of Condition)(in progress in corrective action program)

SAFETY SIGNIFICANCE

To qualitatively evaluate the Safety Significance, the capability of the Essential Chilled Water system to provide cooling to the plant during the Essential Chiller thirty day mission time was reviewed for the period of thirty days prior to the time of failure to ensure that there were no conditions where the loss of Essential Chilled Water cooling would have resulted in the loss of both trains' safety function. Therefore, the review time for the possible effect on Safety Significance will begin on 3/23/2012.

A review of the Station Logs from 3/23/2012 through 4/22/2012 indicates two occasions where the Train B of Essential Chilled Water (CHW) was declared inoperable, once on 3/28/2012 and a second time on 3/29/2012. Both occasions were noted as planned entries into TS 3.7.12. On 3/28/2012, Essential Chiller B was being replaced with Essential Chiller AB and on 3/30/2012, Essential Chiller "AB" was replaced with B. On both occasions the swap was executed promptly without any indicated delays, with log entries indicating a start of the CHW Train B aligned Chiller occurring within one hour of the TS 3.7.12 entry. Since these evolutions were procedurally controlled with assigned cognizant operators performing the manual realignments during the entire time, and the swap evolutions were each completed within an hour, these evolutions were virtually certain to be successful (a success probability of unity), and the Essential Chiller B function was not compromised such that both trains of Essential Chilled Water could have been compromised as a result of the Essential Chiller A oil leak, even if the worst case design basis accident had occurred during the thirty day period enveloping these events.

LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Waterford 3 Steam Electric Station	05000382	YEAR	SEQUENTIAL NUMBER	REV NO.	5 OF 5
		2012	- 004	- 00	

NARRATIVE

Since the Essential Chillers provide a support function, and the impact of a loss of CHW cooling would have cascaded into other safety systems, a review of Station Log entries was conducted for possible affected safety systems during the period 3/23/2012 through 4/22/2012.

There were several TS entries made during this period. On several occasions the Component Cooling Water System (CCW) [BS] Train B was declared inoperable (TS 3.7.3 entry) to fill the Spent Fuel Pool [DA] from the Condensate Storage Pool (CSP) [KA] using the CCW makeup pump. In addition, TS 3.7.3 was entered to realign CCW Pump B to replace the AB Pump on 4/20/2012 and then conduct operability testing of CCW Pump B. CCW Train B was declared inoperable for valve testing. The CCW pumps are cooled by CHW system air handling units, although the CCW Makeup pumps, which are used for the subject fill evolutions, are located in the common area on the RAB -35 ft. el. and are not cooled by CHW. The CCW Makeup system is required for CCW operability to provide makeup to the CCW system, during and following a design basis event or accident. During each of these planned TS entries, the associated evolution was conducted per established procedures with operators in attendance. The evolutions were conducted promptly and without evident delay, and the evolutions were virtually certain of successful completion.

Other observed TS entries during the period included TS 3.8.2.1 and TS 3.8.3.1, to support the realignment of the 4KV 3AB3 Bus from 3A3 to 3B3. The 3AB3 Bus swap affected the plant electrical distribution system, which includes cable routings through areas cooled by the CHW system. The 4KV Bus swap was conducted promptly, per established procedures, with operator(s) in control during the entire evolution, and the evolution was virtually certain to be completed successfully.

Other Train B or common system/area TS entries observed during the subject period were not impacted by the inoperability of CHW cooling.

Per the review of the Station Logs for the period, there were no failures or degraded conditions of any Train B or common equipment noted that, when combined with the inoperability of the Essential Chiller A, would have resulted in a complete loss of a specified safety function.

The Safety Significance of the identified condition is low, since the CHW Train B cooling function remained available during the subject period from 3/23/2012 through 4/22/2012, and since no interim actions were required during the planned evolutions to reduce the effect on Nuclear Safety.

The apparent cause evaluation found that there were no adverse personnel or radiological safety implications as a result of the identified condition.

A quantitative analysis of Safety Significance was performed by the Safety Analysis group and documented in the site corrective action program. The mission time for the site Probabilistic Risk Analysis (PRA) model, consistent with current industry practice, is set at 24 hours. This 24 hour mission time inherently assumes that, given an initiating event, the plant response is a trip and a safe condition will be reached within 24 hours of the trip (otherwise, core damage occurs). Based on the site PRA model, a failure of the essential chiller beyond the 24 hour mission time is insignificant and there is no change in core damage frequency (CDF) or large early release frequency (LERF).

SIMILAR EVENTS

Corrective action program data for the past three years was searched for similar failures. None were found.

ADDITIONAL INFORMATION

Energy industry identification system (EIS) codes are identified in the text within brackets [].