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**William J. Steelman**  
Licensing Manager  
Waterford 3

W3F1-2011-0028

April 16, 2011

U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, DC 20555-0001

Subject: Licensee Event Report 2011-001-00  
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) 2011-001-00 for Waterford Steam Electric Station Unit 3. This report provides the details associated with a failure to meet Technical Specification requirements to reduce oxygen concentration in the Waste Gas Holdup System to within limits within 48 hours.

This report contains no new commitments. Please contact William Steelman, Manager, Licensing at (504) 739-6685 if you have questions regarding this information.

Sincerely,

*Jim Pollack / for WJS*

WJS/MEM

Attachment: Licensee Event Report 2011-001-00

*JE22*  
*NRA*

cc: Mr. Elmo E. Collins, Jr.  
Regional Administrator  
U. S. Nuclear Regulatory Commission  
Region IV  
612 E. Lamar Blvd., Suite 400  
Arlington, TX 76011-4125

NRC Senior Resident Inspector  
Waterford Steam Electric Station Unit 3  
P.O. Box 822  
Killona, LA 70066-0751

U. S. Nuclear Regulatory Commission  
Attn: Mr. N. Kalyanam  
Mail Stop O-07D1  
Washington, DC 20555-0001

R.K. West, [lerevents@inpo.org](mailto:lerevents@inpo.org) - INPO Records Center

**Attachment to**  
**W3F1-2011-0028**  
**Licensee Event Report 2011-001-00**

**LICENSEE EVENT REPORT (LER)**  
(See reverse for required number of  
digits/characters for each block)

Estimated burden per response to comply with this mandatory 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](mailto: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**

Waterford 3 Steam Electric Station

**2. DOCKET NUMBER**

05000 382

**3. PAGE**

1 OF 4

**4. TITLE**

Waste Gas System Oxygen Exceeded Technical Specification Allowed Duration

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
02	16	2011	2011	- 1 -	0	04	16	2011	N/A	05000
<b>9. OPERATING MODE</b>  1			<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §:</b> (Check all that apply)							
<b>10. POWER LEVEL</b>  100%			<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)							
			<input type="checkbox"/> 20.2203(a)(1) <input type="checkbox"/> 20.2203(a)(4) <input 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)							
			<input type="checkbox"/> 20.2203(a)(2)(iii) <input type="checkbox"/> 50.36(c)(2) <input type="checkbox"/> 50.73(a)(2)(v)(A) <input type="checkbox"/> 73.71(a)(4)							
			<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 type="checkbox"/> 50.73(a)(2)(v)(D) <input type="checkbox"/> OTHER							
			Specify in Abstract below or in NRC Form 366A							

**12. LICENSEE CONTACT FOR THIS LER**

FACILITY NAME

Waterford 3 Steam Electric Station William Steelman

TELEPHONE NUMBER (Include Area Code)

(504) 739-6685

**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**☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE) ☒ NO**15. EXPECTED SUBMISSION DATE**

MONTH	DAY	YEAR

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

This LER reports the operation of Waterford 3 in a condition prohibited by Technical Specification 3/4.11.2.5, Radioactive Effluents, Explosive Gas Mixture. Specifically, Technical Specification 3/4.11.2.5 requires that the concentration of oxygen in the waste gas holdup system shall be limited to less than or equal to 2 percent by volume at all times whenever the hydrogen concentration exceeds 4 percent by volume. At 4:10 p.m. on February 14, 2011, it was identified that Gas Decay Tank C oxygen concentration had exceeded the allowed concentration for the existing hydrogen concentration specified in Technical Specification 3.11.2.5. Technical Specification 3/4.11.2.5 Action 'a' states in the event that oxygen concentration is greater than 2 percent by volume, but less than 4 percent by volume, oxygen concentration must be reduced to 2 percent or less within 48 hours. Contrary to this requirement, a review of the condition determined that the 48 hour action limit specified in Technical Specification 3/4.11.2.5 Action 'a' was exceeded and is reportable. The oxygen concentration was returned to within limits at 10:47 p.m. on February 18, 2011, and compliance with Technical Specification 3/4.11.2.5 was restored.

There have been no previous similar licensee events reported in the last three years.

**LICENSEE EVENT REPORT (LER) U.S. NUCLEAR REGULATORY COMMISSION  
CONTINUATION SHEET**

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**NARRATIVE**

**REPORTABLE OCCURRENCE**

This condition meets 10 CFR 50.73(a)(2)(i)(B) reporting criteria because Waterford 3 operated in a condition prohibited by the plant's Technical Specifications (TS). TS 3/4.11.2.5 requires that the concentration of oxygen in the waste gas holdup system [WE] shall be limited to less than or equal to 2 percent by volume at all times whenever the hydrogen concentration exceeds 4 percent by volume. TS 3/4.11.2.5 Action 'a' requires that in the event that oxygen concentration is greater than 2 percent by volume, but less than 4 percent by volume, oxygen concentration must be reduced to 2 percent or less within 48 hours. Contrary to this requirement, Gas Decay Tank (GDT) C oxygen concentration exceeded the allowed concentration for a period exceeding 48 hours.

**INITIAL CONDITIONS/BACKGROUND**

The Gaseous Waste Management System [WE] consists of a Gas Surge Tank (GST), two Waste Gas Compressors (WGC), three Gas Decay Tanks (GDT), and the associated piping and valves required to collect gaseous waste and allow for release through the plant stack.

At the time of the event, the plant was in Mode 1, operating at 100% power. There were no Technical Specifications (TS) LCO Actions in effect impacting the event. The following equipment conditions affected the event. Waste Gas Compressor A was out of service. Gas Decay Tanks A and B pressures were operating equalized due to leakage past each tank's nitrogen inlet valve, NG-230A and NG-230B [LK] respectively; this condition is being addressed in Condition Report CR-WF3-2008-00093.

**EVENT DESCRIPTION**

On 2/14/11, during a trend review of the gas decay tanks, it was discovered that GDTs A, B, and C pressures unexpectedly equalized on 2/6/11. As part of the investigation for the pressure equalization, GDT C was sampled by an automated Waste Gas Analyzer with results of 4.9 percent oxygen and 19.7 percent hydrogen and by the Gas Chromatogram with results of 4.49 percent oxygen and 22.47 percent hydrogen. Both indications were greater than the TS 3/4.11.2.5 requirements and Condition Report CR-WF3-2011-00854 was initiated to address this condition.

On 2/14/11, at 10:50 a.m., TS 3/4.11.2.5 Action 'b' was entered because the oxygen concentration exceeded 4 percent in GDT C. TS 3/4.11.2.5 Action 'b' states "with the concentration of oxygen in the WASTE GAS HOLDUP SYSTEM greater than 4 percent by volume and the hydrogen concentration greater than 4 percent by volume, immediately suspend all additions of waste gases to the system and immediately reduce the concentration of oxygen to less than or equal to 4 percent by volume and then take the ACTION in 'a' above."

To immediately lower GDT C oxygen concentration, the plant aligned nitrogen to the Gas Surge Tank and placed GDT C in service to receive the nitrogen. In a further effort to immediately lower GDT C oxygen concentration, the plant began adding nitrogen gas directly to GDT C using bypass features of the nitrogen system and returned WGC A to service.

On 2/14/11, at 4:10 p.m., GDT C oxygen concentration reached less than 4 percent oxygen, and the plant exited TS 3/4.11.2.5 Action 'b.'



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**NARRATIVE**

**EVENT DESCRIPTION (continued)**

Actions taken to restore compliance per TS 3/4.11.2.5 Action 'a' included adding nitrogen directly to GDT C by bypassing the in-line nitrogen system regulators, aligning nitrogen to the Gas Surge Tank, and placing GDT C in service to receive the nitrogen.

On 2/18/11, at 10:47 p.m., GDT C was confirmed to be <2 percent oxygen concentration with >4 percent hydrogen concentration and TS 3/4.11.2.5 Action 'a' was exited.

**CAUSAL FACTORS**

An apparent cause evaluation determined that the equalization among the GDTs was most likely due to seat leakage past GDT A nitrogen inlet valve NG-230A and inadvertent opening of GDT C nitrogen inlet valve NG-230C. Opening this valve created an equalizing flow path with GDTs A and C. Regarding detection of the event from 2/6/11 through 2/14/11, the Waste Gas Analyzer Panel was not aligned to GDT C because the normal practice is to only monitor the in-service GDT. GDT C was not in service during this time period.

The initiating cause of the event is attributed to seat leakage on NG-230A and seat leakage/opening on NG-230C. This seat leakage is a result of corrosion product deposition on valve seats from high velocity flow through ball valves. The high velocity gases transport corrosion particles to the valve seats resulting in seat damage, both from initial impact at high velocity and subsequent operation of the valve with corrosion particles embedded in the seats. The corrosion particles are the result of moisture in the gaseous waste management system that causes corrosion of carbon steel components such as piping, valves, and tanks.

Exceeding the 48 hours allowed outage time for TS 3/4.11.2.5 Action 'a' was contributed to by various issues. First, maintaining nitrogen gas directly to the GDT C using bypass features of the nitrogen system was pressure constricted to ensure the nitrogen system relief valve did not lift. Second, there were delays in aligning nitrogen gas directly to the GDT C using bypass features of the nitrogen system and in placing GDT C into service to add nitrogen via the GST. Third, GDT C inlet isolation valve GWM-206C [WE] was unable to be opened, which delayed adding nitrogen to GDT C via the GST.

**CORRECTIVE ACTIONS**

**Completed actions include:**

GDT C inlet valve GWM-206C has been rebuilt. A human performance evaluation was completed and determined that ineffective communication contributed to the delay. Applicable department personnel discussed interdepartmental communications and the need to ask for clarity when instruction provided is determined to be lacking or conditions have changed

**Planned actions include:**

GDTs A and C nitrogen inlet valves are scheduled to be reworked. Corrective actions have been assigned to investigate the need for additional changes to address equipment issues contributing to this event.

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**NARRATIVE**

**SAFETY SIGNIFICANCE**

There were no safety consequences as a result of this event. TS 3/4.11.2.5, Radioactive Effluents, Explosive Gas Mixture is provided to ensure that the concentration of potentially explosive gas mixtures contained in the Waste Gas Holdup system is maintained below the flammability limits of hydrogen and oxygen. Hydrogen gas is flammable at a concentration of 4 percent to 75 percent in air. During this event, concentrations of 4.9 percent oxygen and 19.7 percent hydrogen were present in GDT C based upon monitoring performed on 2/14/11. It is suspected that an out of specification mixture of oxygen and hydrogen may have been present when GDT C and GDT A pressures were equalized on 2/6/11, but its value is unknown. GDT C was returned to 2 percent oxygen concentration with greater than 4 percent hydrogen at 10:47 p.m. on 2/18/11. During this event GDT C contained a gas mixture that was potentially hazardous both from an industrial safety and radiological safety perspective. If there had been a catastrophic release of all of the GDT's contents to the environment, the total off site dose would have been ~5.7E-1 curies. This is significantly less than the TS 3/4.11.2.6 LCO limit of 8.5E+4 curies for a single GDT.

**SIMILAR EVENTS**

There have been no previous similar licensee events reported in the last three years.

**ADDITIONAL INFORMATION**

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