



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION IV  
1600 EAST LAMAR BLVD  
ARLINGTON, TEXAS 76011-4511

July 5, 2012

EA-11-142

Donna Jacobs, Vice President, Operations  
Entergy Operations, Inc.  
Waterford Steam Electric Station, Unit 3  
17265 River Road  
Killona, LA 70057-0751

SUBJECT: WATERFORD STEAM ELECTRIC STATION, UNIT 3 – NRC PROCEDURE  
95001 SUPPLEMENTAL INSPECTION REPORT 05000382/2012010

Dear Ms. Jacobs:

On May 23, 2012, the U.S. Nuclear Regulatory Commission (NRC) completed a supplemental inspection pursuant to Inspection Procedure 95001, "Supplemental Inspection for One or Two White Inputs in a Strategic Performance Area," at your Waterford Steam Electric Station, Unit 3. The enclosed inspection report documents the inspection results, which were discussed on, May 23, 2012, with you and other members of your staff.

In accordance with the NRC Reactor Oversight Process Action Matrix, this supplemental inspection was performed to follow-up on a finding with low to moderate safety significance (White) which was identified in the third quarter of 2011. This issue was previously documented and assessed in NRC Inspection Report 05000382/2011009 and the final significance determination dated November 17, 2011. The NRC was informed on March 28, 2012 of your staff's readiness for this inspection.

The objectives of this supplemental inspection were to provide assurance that: (1) the root causes and the contributing causes for the risk-significant issues were understood; (2) the extent of condition and extent of cause of the issues were identified; and (3) corrective actions were or will be sufficient to address and preclude repetition of the root and contributing causes.

The NRC has determined that inspection objectives stated above have been met. Therefore in accordance with IMC 0305, "Operating Reactor Assessment Program," the performance issue shall not be considered in the Action Matrix after the end of the second quarter 2012

The NRC determined that the staff at Waterford Steam Electric Station, Unit 3, performed an acceptable evaluation of the white finding. The evaluation identified the primary root cause to be the untimely response to the known, repetitive leakage as a result of personnel insufficient awareness of the impact of actions on safety and reliability. The licensee addressed the root cause by installing an engineered drain system to route contaminated water leaking from reactor coolant pump seals and by implementing procedural controls that will require the review and evaluation of contaminated leakage control devices for known radiologically significant leakage problems.

No findings were identified during this inspection.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's Agencywide Document Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

**/RA/**

Thomas Blount, Acting Director  
Division of Reactor Safety

Docket Nos: 05000382  
License Nos: NPF-38

Enclosure: Inspection Report 050000382/2012010  
w/ Attachment: Supplemental Information

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U.S. NUCLEAR REGULATORY COMMISSION (NRC)  
REGION IV

Docket No.: 50-382  
License No.: NPF-38  
Report No.: 05000382/2012010  
Licensee: Entergy Operations, Inc  
Facility: Waterford Steam Electric Station, Unit 3  
Location: Killona, LA  
Dates: May 21-23, 2012  
Inspectors: L. Ricketson, P.E., Senior Health Physicist  
Approved by: James Drake, Acting Chief  
Plant Support Branch 2  
Division of Reactor Safety

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## SUMMARY OF FINDINGS

IR 05000382/2012010; 05/21/2012 – 05/23/2012; Waterford Steam Electric Station, Unit 3; Supplemental Inspection - Inspection Procedure (IP) 95001

A regional, senior health physicist performed this inspection. The inspector identified no finding of significance.

### Cornerstone: Occupational Radiation Safety

The NRC staff performed this supplemental inspection in accordance with IP 95001, "Inspection for One or Two White Inputs in a Strategic Performance Area," to assess the licensee's evaluation associated with the failure to use effective engineering controls as part of prejob planning to reduce contamination and subsequent exposure.

The NRC staff previously characterized this issue as having low to moderate safety significance (White), as documented in NRC IR 05000382/2011009. During this supplemental inspection, the inspector determined the licensee performed a comprehensive evaluation of the NRC-identified failure, which occurred during Refueling Outage 16. The licensee identified the primary root cause of the issue was response to the known, repetitive leakage was untimely because personnel exhibited insufficient awareness of the impact of actions on safety and reliability. Contributing causes were also identified. The licensee's review of the extent of cause revealed the root cause was not limited to the use of leakage control devices. Additionally, the licensee's staff members may not have completely understood the level of radiological risk associated with floor drains with poor drainage. The licensee has taken corrective actions to address the root cause by installing an engineered drain system to route contaminated water leaking from reactor coolant pump seals and by implementing procedural controls that will require the review and evaluation of contaminated leakage control devices for known radiologically significant leakage problems.

Given the licensee's acceptable performance in addressing the leaking reactor coolant, the (*white*) finding associated with this issue will only be considered in assessing plant performance for a total of four quarters in accordance with the guidance in IMC 0305, "Operating Reactor Assessment Program." Inspectors will review the licensee's implementation of corrective actions during a future inspection.

### Findings

No findings of significance were identified.

## REPORT DETAILS

### 4. OTHER ACTIVITIES

#### 40A4 Supplemental Inspection (95001)

##### .01 Inspection Scope

The NRC staff performed this supplemental inspection in accordance with IP 95001 to assess the licensee's evaluation of a (White) finding, which affected the occupational radiation safety cornerstone in the radiation safety strategic performance area. The inspection objectives were to:

- provide assurance that the root and contributing causes of risk-significant issues were understood;
- provide assurance that the extent of condition and extent of cause of risk significant issues were identified; and
- provide assurance that the licensee's corrective actions for risk-significant issues were or will be sufficient to address the root and contributing causes and to preclude repetition.

The licensee entered the Regulatory Response Column of the NRC's Action Matrix in the third quarter of 2011 as a result of one inspection finding of low to moderate safety significance (White). The issue that prompted the inspection involved the licensee's failure to use effective engineering controls as part of the pre-job planning to reduce contamination and subsequent exposure during Refueling Outage 16. The licensee failed to keep highly radioactive water from leaking onto the work areas around the reactor coolant pumps, despite having knowledge that this condition could occur. This failure resulted in high levels of radioactive contamination and unexpected and unintended radiation dose to plant workers. The finding was described in Inspection Report 05000382/2011009 (ML112360693). The NRC informed the licensee of the final significance determination of a White finding in a letter dated November 17, 2011 (ML11321A291). Using Inspection Manual Chapter 0609, Appendix C, "Occupational Radiation Safety Significance Determination Process," August 19, 2008, the NRC determined the significance of the finding to be White because (1) this was an ALARA planning issue, (2) the site's three-year average collective dose exceeded 135 person-rem, and (3) one of the work activities accrued more than 25 person-rem, or alternately, because there were more than four other occurrences in which the actual collective dose exceeded 5 person-rem, and the estimated/planned dose by more than 50 percent.

As part of Condition Report CR-WF3-2011-06005, the licensee conducted a root cause evaluation of the issue. On March 28, 2012, the licensee notified the NRC staff members of the licensee's readiness for this supplemental inspection.

The inspector reviewed the licensee's root cause evaluation in addition to other evaluations conducted in support of the root cause evaluation. The inspectors reviewed corrective actions that were taken or planned to address the identified causes. The inspectors also held discussions with licensee personnel to ensure that the root and contributing causes and the contribution of safety culture components were understood and corrective actions taken or planned were appropriate to address the causes and preclude repetition.

.02 Evaluation of the Inspection Requirements

02.01 Problem Identification

- a. IP 95001 requires the inspection staff determine if the licensee's evaluation of the issue documents who identified the issue (i.e., licensee-identified, self-revealing, or NRC-identified) and the conditions under which the issue was identified. The licensee correctly identified the finding as NRC-identified. The root cause evaluation problem statement included "Specifically, the NRC stated that Waterford 3 failed to keep highly radioactive water from leaking onto the work areas around the reactor coolant pump, despite having knowledge this condition could occur." The root cause analysis states (on Page 33), "The NRC identified the following five radiation work permits where Waterford failed to use adequate engineering controls to prevent the spread of radioactive water to work areas which resulted in high dose rates."

- b. IP 95001 requires the inspection staff determine if the licensee's evaluation of the issue documents how long the issue existed and prior opportunities for identification.

The licensee correctly identified how long the issue existed and the prior opportunities for identification. The event narrative discusses (on Page 4) the installation of the N9000 reactor coolant pump vapor stage seal in the fall of 2003 and the first indication of seal leakage, in September 2005. The event narrative also discusses the successive outages and occurrences of reactor coolant pump leakage.

- c. IP 95001 requires the inspection staff determine if the licensee's evaluation documents the plant specific risk consequences, as applicable, and compliance concerns associated with the issue.

The licensee correctly documented the plant-specific risk consequences. The introduction of the root cause evaluation (on Page 3), states that radioactive water leaking onto the work areas around the reactor coolant pumps can cause higher doses.

- d. Findings

No findings of significance were identified.

02.02 Root Cause, Extent of Condition, and Extent of Cause Evaluation

- a. IP 95001 requires the inspection staff determine if the licensee evaluated the issue using a systematic methodology to identify the root and contributing causes.

The licensee correctly used event and causal factor charting and barrier analysis to identify the root and contributing causes.

- b. IP 95001 requires the inspection staff determine if the licensee's root cause evaluation was conducted to a level of detail commensurate with the significance of the issue.

The inspector concluded the root cause evaluation was conducted to a level of detail commensurate with the significance of the problem. The licensee used two different root cause methods to provide different perspectives of the problem. The licensee also used a multi-discipline team. The licensee identified the root cause and four contributing causes, as well as other organizational and programmatic weaknesses. The licensee

identified the primary root cause of the issue was response to the known, repetitive leakage was untimely because personnel exhibited insufficient awareness of the impact of actions on safety and reliability.

- c. IP 95001 requires the inspection staff determine if the licensee's root cause evaluation included a consideration of prior occurrences of the issue and knowledge of OE.

The licensee correctly reviewed prior occurrences of the problem. The licensee reviewed internal and external operating experience and condition reports involving reactor coolant pump seal leakage. The inspector noted the evaluation addressed previous ineffective corrective action associated with re-directing reactor coolant pump controlled bleed-off to the reactor coolant drain.

- d. IP 95001 requires the inspection staff determine if the licensee's root cause evaluation addresses the extent of condition and extent of cause of the issue(s).

The licensee correctly evaluated the extent of condition and extent of cause and identified the floor drains underneath the reactor coolant pumps 2A and 2B on the 11 foot elevation in the reactor containment building show signs of substantial obstruction.

This finding was entered into the corrective action program and closed to a work request.

- e. IP 95001 requires the inspection staff determine if the licensee's root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components as described in IMC 0305.

The licensee appropriately considered the safety culture components, as described in IMC 0305. The licensee's evaluation identified potential weaknesses in decision-making, resources, work control, corrective action program, and operating experience.

- f. Findings

No findings of significance were identified.

#### 02.03 Corrective Actions

- a. IP 95001 requires the inspection staff determine if (1) the licensee specified appropriate corrective actions for each root and/or contributing cause, or (2) an evaluation that states no actions are necessary is adequate.

The licensee identified corrective actions to address each root cause and contributing cause, as well as the organizational and programmatic weaknesses. The licensee addressed the root cause by installing an engineered drain system to route contaminated water leaking from reactor coolant pump seals and by implementing procedural controls which will require the review and evaluation of contaminated leakage control devices for known radiologically significant leakage problems.

- b. IP 95001 requires the inspection staff determine if the licensee prioritized corrective actions with consideration of risk significance and regulatory compliance. The inspector reviewed the licensee's corrective action plan and confirmed the licensee prioritized corrective actions in accordance with procedure EN-LI-102, "Corrective Action Program," Revision 16.
- c. IP 95001 requires the inspection staff determine if the licensee established a schedule for implementing and completing the corrective actions. The inspector reviewed the corrective action plan and corrective action documents and verified the plan and documents established deadlines. All corrective actions have been implemented and an effectiveness review is scheduled.
- d. IP 95001 requires the inspection staff determine if the licensee developed quantitative and/or qualitative measures of success for determining the effectiveness of the corrective actions to preclude repetition. The licensee devised an effectiveness review plan. The plan lists the method and criteria to be met. The effective review is scheduled for completion following Refueling Outage 18. The approximate date of completion is February 27, 2013.
- e. Findings  
  
No findings of significance were identified.

#### **40A6 Meetings**

##### Exit Meeting Summary

On May 23, 2012, the inspector presented the results of the radiation safety inspections to Ms. D. Jacobs, Vice President, Operations, and other members of the licensee staff. The licensee acknowledged the issues presented. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

**SUPPLEMENTAL INFORMATION**

**KEY POINTS OF CONTACT**

Licensee Personnel

J. Brawley, ALARA Supervisor, Radiation Protection  
J. Bourgeios, Acting Manager, Chemistry  
J. Gumnick, Manager, Radiation Protection  
D. Jacobs, Vice President, Operations  
D. Miller, Supervisor, Radiation Protection  
K. Nichols, Director, Engineering  
J. Pollock, Specialist, Licensing

NRC Personnel

M. Davis, Senior Resident Inspector  
D. Overland, Resident Inspector

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Opened and Closed

None

Closed

05000382/2011009-01    FIN    Failure to use effective engineering controls as part of the pre-job planning to reduce contamination and subsequent exposures.

Discussed

None

LIST OF DOCUMENTS REVIEWED

Section 40A4: Supplemental Inspection 95001

PROCEDURES

| <u>NUMBER</u> | <u>TITLE</u>                        | <u>REVISION</u> |
|---------------|-------------------------------------|-----------------|
| EN-LI-102     | Corrective Action Program           | 16              |
| EN-RP-110     | ALARA Program                       | 9               |
| EN-RP-110-05  | ALARA Planning and Controls         | 0               |
| EN-RP-110-06  | Outage Dose Estimating and Tracking | 0               |

AUDITS, SELF-ASSESSMENTS, AND SURVEILLANCES

| <u>NUMBER</u>  | <u>TITLE</u>  | <u>DATE</u>          |
|----------------|---|----------------------|
| WLO-2012-0052  | NRC 95001 Inspection of RCE Report for Condition Report | February 28,<br>2012 |
| WF3-2011-06005 | Preliminary White Finding on ALARA for<br>RF 16         |                      |

CONDITION REPORT

|                   |                   |
|-------------------|-------------------|
| CR-WF3-2011-06005 | CR-WF3-2012-01289 |
|-------------------|-------------------|

MISCELLANEOUS DOCUMENTS

| <u>NUMBER</u> | <u>TITLE</u>   | <u>REVISION</u> |
|---------------|--|-----------------|
|               | Root Cause Evaluation Report – Preliminary White Finding<br>on ALARA | 1               |