



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

August 8, 2012

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 INTEGRATED  
INSPECTION REPORT 05000382/2012003

Dear Ms. Jacobs:

On June 30, 2012, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Waterford Steam Electric Station, Unit 3 facility. The enclosed inspection report documents the inspection results which were discussed on July 5, 2012, with Mrs. Kimberly Cook, General Manager, Plant Operations, and other members of your staff.

The inspections examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

One NRC-identified and one self-revealing finding of very low safety significance (Green) were identified during this inspection.

One of these findings was determined to involve a violation of NRC requirements. Further, a licensee-identified violation which was determined to be of very low safety significance is listed in this report. The NRC is treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2 of the Enforcement Policy.

If you contest these non-cited violations, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator, Region IV; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at Waterford Steam Electric Station, Unit 3 facility.

If you disagree with a cross-cutting aspect assignment in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region IV; and the NRC Resident Inspector at Waterford Steam Electric Station, Unit 3 facility.

D. Jacobs

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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/**

Donald B. Allen  
Chief, Project Branch E  
Division of Reactor Projects

Docket Nos.: 50-382  
License Nos: NPF-38

Enclosure: NRC Inspection Report 05000382/2012-003

Attachments:

1. Supplemental Information
2. The following items are requested for the Occupational Radiation Safety Inspection at Waterford 3, June 4-8, 2012

cc w/ encl: Electronic Distribution

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**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION IV**

Docket: 05000382

License: NPF-38

Report: 05000382/2012003

Licensee: Entergy Operatons, Inc.

Facility: Waterford Steam Electric Station, Unit 3

Location: 17265 River Road  
Killona, LA 70057

Dates: April 1 through June 30, 2012

Inspectors: M. Davis, Senior Resident Inspector  
D. Overland, Resident Inspector  
R. Azua, Senior Project Engineer  
J. Laughlin, Emergency Preparedness Inspector, NSIR  
L. Ricketson, P.E., Senior Health Physicist  
N. Greene, Ph.D., Health Physicist

Approved By: Don Allen, Chief, Project Branch E  
Division of Reactor Projects

## SUMMARY OF FINDINGS

IR 05000382/2012003; 04/01/2012 – 06/30/2012; Waterford Steam Electric Station, Unit 3, Integrated Resident and Regional Report; Maintenance Effectiveness and Operability Evaluations and Functionality Assessments.

The report covered a 3-month period of inspection by resident inspectors and an announced baseline inspection by region-based inspectors. One Green non-cited violation and one Green finding of significance were identified. The significance of most findings is indicated by their color (Green, White, Yellow, or Red) using Inspection Manual Chapter 0609, "Significance Determination Process." The cross-cutting aspect is determined using Inspection Manual Chapter 0310, "Components Within the Cross Cutting Areas." Findings for which the significance determination process does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

### A. NRC-Identified Findings and Self-Revealing Findings

#### **Cornerstone: Initiating Events**

- Green. A self-revealing finding occurred because the licensee did not establish adequate procedural guidance to control feedwater heater level control valves. Specifically, the procedures used to control the settings for the valves did not contain guidance that properly adjusted the proportional gain and air pressure input to ensure the valves open quickly during a transient. As a result, multiple failures in the feedwater heater drain system resulted in a feedwater pump A trip and a subsequent reactor power cutback. The licensee entered this condition into their corrective action program as CR-WF3-2012-1729 for resolution. The corrective actions included a revision of the procedure and loop calibration settings for the feedwater heater level control valves.

The failure to provide adequate guidance that properly adjusted the proportional gain to ensure the valves open as designed is a performance deficiency. The performance deficiency is more than minor because it is associated with the procedure quality attribute of the Initiating Events cornerstone and affects the cornerstone objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, multiple feedwater heater control valve failures resulted in a reactor power cutback that upset plant stability. The inspectors used the NRC Inspection Manual Chapter 0609, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," to determine the significance. The inspectors determined that the finding is of very low safety significance (Green) because it only contributed to the likelihood of a reactor trip and not the likelihood that mitigation equipment or functions would not be available. This finding has a cross-cutting aspect in the resources component of the human performance area in that the licensee did not ensure that complete, accurate, and up-to-date design

documentation for loop calibration settings was available to assure nuclear safety [H.2(c)] (Section 1R12).

### **Cornerstone: Mitigating Systems**

- Green. The inspectors identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion III because the licensee did not provide adequate design control measures for verifying or checking the adequacy of the ultimate heat sink thermal performance analysis. Specifically, the licensee did not ensure that the design calculation used to determine the required number of wet cooling tower fans needed to operate the plant under normal and design conditions utilized the correct equation. As a result, the incorrect calculation provided reasonable doubt as to the operability of the wet cooling tower fans. The licensee entered this issue into their corrective action program as CR-WF3-2012-1395. The immediate corrective actions taken to restore compliance included a preliminary analysis of the condition and actions to perform a review of the methodology, inputs, and assumptions for the ultimate heat sink thermal performance calculations.

The failure to provide adequate design control measures for verifying or checking the adequacy of the ultimate heat sink thermal performance analysis is a performance deficiency. The performance deficiency is more than minor because it is associated with the design control attribute of the Mitigating System Cornerstone and affects the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the wet cooling tower fans are required to be operable for heat removal following all accidents and anticipated operational occurrences. The inspectors used the NRC Inspection Manual Chapter 0609, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," to determine the significance. The inspectors determined that the finding is of very low safety significance (Green) because it is a design deficiency confirmed not to result in a loss of operability or functionality of the ultimate heat sink. This finding has a cross-cutting aspect in the decision making component of the human performance area in that the licensee did not conduct effectiveness reviews of safety-significant decisions to verify the validity of the underlying assumptions, identify possible unintended consequences, and determine how to improve future decisions [H.1(b)] (Section 1R15).

### **B. Licensee-Identified Violations**

A violation of very low safety significance that was identified by the licensee has been reviewed by the inspectors. Corrective actions taken and planned by the licensee have been entered into the licensee's corrective action program. This violation and associated corrective action tracking number is listed in Section 4OA7 of this report.

## REPORT DETAILS

### Summary of Plant Status

The Waterford Steam Electric Station, Unit 3, began the inspection period at 100 percent power. On April 8, 2012, a reactor power cutback occurred that reduced power to approximately 33 percent because the A steam generator feedwater pump tripped due to multiple failures in the Feedwater Heater Drain system. On April 9, operators commenced to increase power to 100 percent. The unit remained at approximately 100 percent for the remainder of the inspection period.

### 1. REACTOR SAFETY

#### Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

#### 1R01 Adverse Weather Protection (71111.01)

##### Summer Readiness for Offsite and Alternate-ac Power

##### a. Inspection Scope

The inspectors performed a review of preparations for summer weather for selected systems, including conditions that could lead to loss-of-offsite power and conditions that could result from high temperatures. The inspectors reviewed the procedures affecting these areas and the communications protocols between the transmission system operator and the plant to verify that the appropriate information was being exchanged when issues arose that could affect the offsite power system. Examples of aspects considered in the inspectors' review included:

- The coordination between the transmission system operator and the plant's operations personnel during off-normal or emergency events
- The explanations for the events
- The estimates of when the offsite power system would be returned to a normal state
- The notifications from the transmission system operator to the plant when the offsite power system was returned to normal

During the inspection, the inspectors focused on plant-specific design features and the procedures used by plant personnel to mitigate or respond to adverse weather conditions. Additionally, the inspectors reviewed the updated final safety analysis report and performance requirements for systems selected for inspection, and verified that operator actions were appropriate as specified by plant-specific procedures. Specific documents reviewed during this inspection are listed in the attachment. The inspectors also reviewed corrective action program items to verify that the licensee was identifying

adverse weather issues at an appropriate threshold and entering them into their corrective action program in accordance with station corrective action procedures. The inspectors' reviews focused specifically on the following plant systems:

- On June 4 and June 6, 2012, performed partial walkdowns of the switchyard and the startup unit transformers

These activities constitute completion of one readiness for summer weather affect on offsite and alternate-ac power sample as defined in Inspection Procedure 71111.01-05.

b. Findings

No findings were identified.

**1R04 Equipment Alignment (71111.04)**

Partial Walkdown

a. Inspection Scope

The inspectors performed partial system walkdowns of the following risk-significant systems:

- On May 3, 2012, controlled ventilation area system train B due to a loose conduit providing seismic support while train A was inoperable for scheduled maintenance
- On May 29, 2012, low pressure safety injection train B while train A was inoperable for scheduled maintenance
- On May 29, 2012, component cooling water train B while train A was inoperable for scheduled maintenance

The inspectors selected these systems based on their risk significance relative to the reactor safety cornerstones at the time they were inspected. The inspectors attempted to identify any discrepancies that could affect the function of the system, and, therefore, potentially increase risk. The inspectors reviewed applicable operating procedures, system diagrams, updated final safety analysis report, technical specification requirements, administrative technical specifications, outstanding work orders, condition reports, and the impact of ongoing work activities on redundant trains of equipment in order to identify conditions that could have rendered the systems incapable of performing their intended functions. The inspectors also inspected accessible portions of the systems to verify system components and support equipment were aligned correctly and operable. The inspectors examined the material condition of the components and observed operating parameters of equipment to verify that there were no obvious deficiencies. The inspectors also verified that the licensee had properly identified and resolved equipment alignment problems that could cause initiating events



or impact the capability of mitigating systems or barriers and entered them into the corrective action program with the appropriate significance characterization. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of three partial system walkdown samples as defined in Inspection Procedure 71111.04-05.

b. Findings

No findings were identified.

**1R05 Fire Protection (71111.05)**

Quarterly Fire Inspection Tours

a. Inspection Scope

The inspectors conducted fire protection walkdowns that were focused on availability, accessibility, and the condition of firefighting equipment in the following risk-significant plant areas:

- On May 3, 2012, reactor auxiliary building, fire area 2, heating and ventilation mechanical room
- On May 29, 2012, reactor auxiliary building, fire area 35, safety injection pump area B
- On May 29, 2012, reactor auxiliary building, fire area 21, component cooling water pump B
- On May 30, 2012, reactor auxiliary building, fire area 8 (zone 8A), switchgear room A

The inspectors reviewed areas to assess if licensee personnel had implemented a fire protection program that adequately controlled combustibles and ignition sources within the plant; effectively maintained fire detection and suppression capability; maintained passive fire protection features in good material condition; and had implemented adequate compensatory measures for out of service, degraded or inoperable fire protection equipment, systems, or features, in accordance with the licensee's fire plan. The inspectors selected fire areas based on their overall contribution to internal fire risk as documented in the plant's Individual Plant Examination of External Events with later additional insights, their potential to affect equipment that could initiate or mitigate a plant transient, or their impact on the plant's ability to respond to a security event. Using the documents listed in the attachment, the inspectors verified that fire hoses and extinguishers were in their designated locations and available for immediate use; that fire detectors and sprinklers were unobstructed; that transient material loading was within the analyzed limits; and fire doors, dampers, and penetration seals appeared to

be in satisfactory condition. The inspectors also verified that minor issues identified during the inspection were entered into the licensee's corrective action program. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of four quarterly fire-protection inspection samples as defined in Inspection Procedure 71111.05-05.

b. Findings

No findings were identified.

**1R11 Licensed Operator Requalification Program and Licensed Operator Performance (71111.11)**

.1 Quarterly Review of Licensed Operator Requalification Program

a. Inspection Scope

On May 23, 2012, the inspectors observed a crew of licensed operators in the plant's simulator performing scenario P-77, control room evacuation due to a fire during training. The inspectors assessed the following areas:

- Licensed operator performance
- The ability of the licensee to administer the evaluations and the quality of the training provided
- The modeling and performance of the control room simulator
- The quality of post-scenario critiques
- Follow-up actions taken by the licensee for identified discrepancies

These activities constitute completion of one quarterly licensed operator requalification program sample as defined in Inspection Procedure 71111.11.

b. Findings

No findings were identified.

.2 Quarterly Observation of Licensed Operator Performance

a. Inspection Scope

On April 8, 2012, the inspectors observed the performance of on-shift licensed operators in the plant's main control room. At the time of the observations, the plant was in a period of heightened activity due to a reactor power cutback. The inspectors assessed the operators' adherence to plant procedures, including off-normal procedure

OP-901-101, Reactor Power Cutback, and reactivity management policies and procedures.

These activities constitute completion of one quarterly licensed-operator performance sample as defined in Inspection Procedure 71111.11.

b. Findings

No findings were identified.

**1R12 Maintenance Effectiveness (71111.12)**

a. Inspection Scope

The inspectors evaluated degraded performance issues involving the following risk significant systems:

- On April 24, 2012, failed actuator diaphragm in emergency feedwater valve EFW-223B
- On May 2, 2012, number 2 feedwater heater alternate level control valves

The inspectors reviewed events such as where ineffective equipment maintenance has resulted in valid or invalid automatic actuations of engineered safeguards systems and independently verified the licensee's actions to address system performance or condition problems in terms of the following:

- Implementing appropriate work practices
- Identifying and addressing common cause failures
- Scoping of systems in accordance with 10 CFR 50.65(b)
- Characterizing system reliability issues for performance
- Charging unavailability for performance
- Trending key parameters for condition monitoring
- Ensuring proper classification in accordance with 10 CFR 50.65(a)(1) or -(a)(2)
- Verifying appropriate performance criteria for structures, systems, and components classified as having an adequate demonstration of performance through preventive maintenance, as described in 10 CFR 50.65(a)(2), or as requiring the establishment of appropriate and adequate goals and corrective actions for systems classified as not having adequate performance, as described in 10 CFR 50.65(a)(1)

The inspectors assessed performance issues with respect to the reliability, availability, and condition monitoring of the system. In addition, the inspectors verified maintenance effectiveness issues were entered into the corrective action program with the appropriate significance characterization. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of two quarterly maintenance effectiveness samples as defined in Inspection Procedure 71111.12-05.

b. Findings

Introduction. A Green self-revealing finding occurred because the licensee did not establish adequate procedural guidance to control feedwater heater level control valves. Specifically, the procedures used to control settings for the valves did not contain guidance that properly adjusted the proportional gain to ensure the valves open quickly during a transient.

Description. On April 8, 2012, the licensee experienced a feedwater heater equipment failure that caused a reactor power cutback. The initiation of the equipment failure occurred when a solenoid failed on the high pressure feedwater heater 1A normal level control valve FHD-335A, which caused the valve to close. In response, the level in the 1A feedwater heater reached the HI-HI level alarm setpoint that caused the 1A alternate level control valve to open as expected to divert water back to the main condenser. This action secured the flow from the 1A feedwater heater to the 2A feedwater heater. Subsequently, the level in the 2A feedwater heater began to fluctuate because the 2A feedwater heater normal level control valve FHD-455A kept cycling due to rapid oscillations of the controller. The excessive cycling of the valve caused the A heater drain pump flow to fluctuate. The fluctuations in the heater drain pump flow caused operators to reduce power in order to secure the pump. Upon securing the pump, the 2A feedwater heater alternate level control valve FHD-438A did not operate as expected. The valve was sluggish to open and did not control the heater level as intended. As a result, the 2A feedwater heater reached the HI-HI level alarm. This caused the turbine extraction steam isolation valve to close, which lowered the 2 feedwater heater pressures and reduced the suction pressures to heater drain pumps B and C. The low suction pressures caused both B and C heater drain pumps to trip and reduced the suction pressure to the steam generator feedwater pumps. The A steam generator feedwater pump was the only one to trip because of a time delay difference on the B steam generator feedwater pump. The steam generator feedwater pump A trip resulted in a reactor power cutback and a power reduction to 33 percent.

Following the reactor power cutback, the licensee initiated a condition report to evaluate the cause of the secondary transient. The licensee's investigation revealed that maintenance and operational procedures lacked procedural guidance to set the feedwater heater level control valve setpoints. Specifically, the procedure guidance contained in OP-003-034, Feed Heater Vents and Drains, Section 6.1.6, did not contain guidance that properly adjusted the proportional gain and air pressure input such that the valves would open as designed during a transient. This section of the procedure

only provided guidance to raise the setpoint until the valve closes. Therefore, since there was no guidance on the controller setting, the licensee could raise the level setpoint on any alternate level control valve that had difficulty closing. The inspectors noted that this could mask actual controller problems and make the valve slow to react to transient conditions. As a part of the review of the licensee root cause evaluation, the inspectors also noted that the 2A feedwater heater alternate level control valve needed to open quickly since the 2A feedwater heater provided the suction for the heater drain pumps that discharge to the main feedwater pump. The inspectors determined that a slow alternate level control valve response could result in a higher level and closure of the turbine extraction steam isolation valve. This would cause a heater drain system transient and a change in reactivity. A review of other condition reports identified that in 2011 the controllers for the 2A feedwater heater alternate level control valve were slow to respond. However, the corrective actions were to perform additional functional checks with incomplete and inaccurate calibrated loop settings to adjust the closure function. The inspectors concluded that the licensee did not provide up-to-date design documentation to support the loop calibrations for the open function to prevent a transient.

The licensee captured this condition in their corrective action program as CR-WF3-2012-1729 for resolution. The immediate corrective action included the performance of loop calibrations and adjustment of setpoints on the valves. The planned corrective actions included the revision of OP-003-034 to provide instructions for setting the feedwater heater level control valves with input from engineering.

Analysis. The failure to provide adequate guidance that properly adjusted the proportional gain to ensure the valves open as designed is a performance deficiency. The inspectors determined that the licensee had the ability to foresee and prevent this deficiency. The inspectors also determined that the performance deficiency was more than minor because it was associated with the procedure quality attribute of the Initiating Events Cornerstone and affects the cornerstone objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, multiple feedwater heater control valve failures resulted in a reactor power cutback that upset plant stability. The inspectors used the NRC Inspection Manual Chapter 0609, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," to determine the significance. The inspectors determined that the finding was of very low safety significance (Green) because it only contributed to the likelihood of a reactor trip and not the likelihood that mitigation equipment or functions would not be available. This finding has a cross-cutting aspect in the resources component of the human performance area in that the licensee did not ensure that complete, accurate, and up-to-date design documentation to calibrate loop settings was available to assure nuclear safety [H.2(c)].

Enforcement. Enforcement action does not apply because the performance deficiency did not involve a violation of a regulatory requirement. Specifically, procedure OP-003-034, Feed Heater Vents and Drains, is not safety-related. Because this finding does not involve a violation of a regulatory requirement and has very low safety

significance, it is identified as a finding: FIN 05000382/2012003-01, "Failure to establish adequate procedural guidance to control feedwater heater level control valves."

### **1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13)**

#### **a. Inspection Scope**

The inspectors reviewed licensee personnel's evaluation and management of plant risk for the maintenance and emergent work activities affecting risk-significant and safety-related equipment listed below to verify that the appropriate risk assessments were performed prior to removing equipment for work:

- On April 19, 2012, scheduled calibration of steam generator feed pump B low suction pressure switch which posed a pump trip risk with turbine in manual
- On May 22, 2012, component cooling water train B inoperable for scheduled maintenance on component cooling water surge tank make up valve CMU-538B while containment cooling fan B was already inoperable
- On June 1, 2012, emergent maintenance activities on the auxiliary component cooling water heat exchanger outlet temperature control valve ACC-126A
- On June 4, 2012, scheduled maintenance on the train A emergency diesel generator fuel oil transfer pump

The inspectors selected these activities based on potential risk significance relative to the reactor safety cornerstones. As applicable for each activity, the inspectors verified that licensee personnel performed risk assessments as required by 10 CFR 50.65(a)(4) and that the assessments were accurate and complete. When licensee personnel performed emergent work, the inspectors verified that the licensee personnel promptly assessed and managed plant risk. The inspectors reviewed the scope of maintenance work, discussed the results of the assessment with the licensee's probabilistic risk analyst or shift technical advisor, and verified plant conditions were consistent with the risk assessment. The inspectors also reviewed the technical specification requirements and inspected portions of redundant safety systems, when applicable, to verify risk analysis assumptions were valid and applicable requirements were met. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of four maintenance risk assessments and emergent work control inspection samples as defined in Inspection Procedure 71111.13-05.

#### **b. Findings**

No findings were identified.

## **1R15 Operability Evaluations and Functionality Assessments (71111.15)**

### **a. Inspection Scope**

The inspectors reviewed the following assessments:

- On April 5, 2012, steam leak on emergency feedwater pump AB
- On May 7, 2012, auxiliary component cooling water trains A and B following a discovery of a non-conservative technical specification due to incorrect usage of an equation in the design basis calculation for number of wet cooling tower fans
- On May 21, 2012, emergency diesel generator B following a trouble alarm indicating low fuel oil pressure while the diesel was running
- On May 24, 2012, component cooling water trains A and B following a discovery of a non-conservative assumption in the design basis for spring pressure for the component cooling water surge tank make-up valves CMU-538 A and B
- On June 18, 2012, containment spray riser level drop from 186 feet to 173 feet following operability testing on the containment spray pump

The inspectors selected these operability and functionality assessments based on the risk significance of the associated components and systems. The inspectors evaluated the technical adequacy of the evaluations to ensure technical specification operability was properly justified and to verify the subject component or system remained available such that no unrecognized increase in risk occurred. The inspectors compared the operability and design criteria in the appropriate sections of the technical specifications and updated final safety analysis report to the licensee's evaluations to determine whether the components or systems were operable. Where compensatory measures were required to maintain operability, the inspectors determined whether the measures in place would function as intended and were properly controlled. Additionally, the inspectors reviewed a sampling of corrective action documents to verify that the licensee was identifying and correcting any deficiencies associated with operability evaluations. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of five operability evaluations inspection samples as defined in Inspection Procedure 71111.15-05.

### **b. Findings**

Introduction. The inspectors identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion III because the licensee did not provide adequate design control measures for verifying or checking the adequacy of the ultimate heat sink thermal performance analysis. Specifically, the licensee did not ensure that the design calculation used to determine the required number of wet cooling tower fans needed to operate the plant under normal and design conditions utilized the correct equation.

Description. The wet cooling towers (WCT) have eight fans per train, in two banks of four. The number of available fans required for operability varies between four and eight, depending on ambient outdoor wet bulb temperature. When wet bulb temperature is less than 70 degrees, only four WCT fans are required by Technical Specification 3.7.4. This number is based on engineering calculation ECM95-009, "Ultimate Heat Sink Fan Requirements Under Various Conditions," which was derived from MNQ9-52 Amendment 1, "Minimum Ultimate Heat Sink Dry and Wet Cooling Tower Fans – Technical Specification 3/4.7.4 Table 3.7-3."

The methodology used in MNQ9-52 for the WCT calculations is based on Cooling Tower Institute Acceptance Test Code-105. In calculation MNQ9-52, the fan brake horsepower was changed to account for a reduced number of fans in service, and the corresponding adjusted WCT flow was calculated. This adjusted flow was then used to calculate the maximum wet bulb temperature permitted for the WCT to be operable with a reduced number of fans in service. However, the licensee did not recognize that this method was not applicable for calculating adjusted flow rate with large changes of fan brake horsepower. Therefore, the original calculation used an inappropriate methodology to calculate the number of WCT fans required for the tower to remain operable under all conditions.

In 1995, the licensee converted MNQ9-52 to ECM95-009, however the incorrect methodology was not challenged. It was assumed that because the methodology was input into a technical specification, it had previously been reviewed and challenged. The calculation was reviewed again in 2009, but again, the licensee did not question the use of the fan brake horsepower equation. The 2009 review did identify a different non-conservatism in the calculation. To address this deficiency, the licensee completed engineering change EC18928. The calculations performed for this EC once again utilized the incorrect methodology. These missed opportunities to discover the inappropriate use of the equation demonstrate that this violation is indicative of current plant performance.

In July 2010, engineering evaluation EC21824 was completed to change calculation ECM95-009 to reflect EC18928. The results of this calculation were input into drafting a License Amendment Request (LAR) for the proposed change of Technical Specification 3/4.7.4 Table 3.7-3.

The licensee submitted the LAR to the NRC in October 2011. In November 2011, during NRC staff reviews of the proposed LAR, the NRC identified the equation that related wet cooling tower flow rate and fan brake horsepower was inappropriate.

The licensee conducted a preliminary analysis utilizing the correct methodology. This analysis revealed that the equation is only conservative if seven or more WCT fans are operable. Any less than seven fans in service was not conservative. The Technical Specification allowed up to four fans per tower to be out-of-service. A review of the station log determined that at no time in the last three years did the licensee have a WCT fan out of service while the WCT was considered operable. A night order was issued to operators to administratively control the number of WCT fans in service.



Additional actions included a review of the methodology, inputs, and assumptions for the ultimate heat sink calculations.

Analysis. The failure to provide adequate design control measures for verifying or checking the adequacy of the ultimate heat sink thermal performance analysis is a performance deficiency. The inspectors determined that the licensee had the ability to foresee and prevent this deficiency. The performance deficiency is more than minor because it is associated with the design control attribute of the Mitigating System Cornerstone and affects the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the WCT fans are required to be operable for heat removal following all accidents and anticipated operational occurrences. The use of an incorrect calculation caused reasonable doubt as to the operability of the ultimate heat sink. The inspectors used the NRC Inspection Manual Chapter 0609, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," to determine the significance. The inspectors determined that the finding is of very low safety significance (Green) because it is a design deficiency confirmed not to result in a loss of operability or functionality of the ultimate heat sink. This finding has a cross-cutting aspect in the decision making component of the human performance area in that the licensee did not conduct effectiveness reviews of safety-significant decisions to verify the validity of the underlying assumptions, identify possible unintended consequences, and determine how to improve future decisions [H.1(b)].

Enforcement. Title 10 of CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program. Contrary to the above, as of March 20, 2012, the licensee did not provide adequate design control measures for verifying or checking the adequacy of the ultimate heat sink thermal performance analysis. Specifically, the licensee did not ensure that the design calculation used to determine the required number of WCT fans needed to operate the plant under normal and design conditions utilized the correct equation. The licensee entered this condition into their corrective action program as CR-WF3-2012-1395. The immediate corrective actions taken to restore compliance included a preliminary analysis of the condition and actions to perform a review of the methodology, inputs, and assumptions for the ultimate heat sink thermal performance calculations. Because this violation of Appendix B, Criterion III, is of very low safety significance and was entered into the licensee's corrective action program, this violation is being treated as a non-cited violation, consistent with Section 2.3.2 of the Enforcement Policy: NCV 05000382/2012003-02, "Failure to provide adequate design control measures for verifying or checking the adequacy of the ultimate heat sink thermal performance analysis."

## **1R18 Plant Modifications (71111.18)**

### Temporary Modifications

#### a. Inspection Scope

To verify that the safety functions of important safety systems were not degraded, The inspectors reviewed the following temporary modifications:

- On May 7, 2012, temporary jumper installed to test auxiliary component cooling water pump A
- On May 25, 2012, temporary hot leg 2 temperature input to core protection calculator channel D

The inspectors reviewed the temporary modifications and the associated safety-evaluation screening against the system design bases documentation, including the updated final safety analysis report and the technical specifications, and verified that the modification did not adversely affect the system operability/availability. The inspectors also verified that the installation and restoration were consistent with the modification documents and that configuration control was adequate. Additionally, the inspectors verified that the temporary modification was identified on control room drawings, appropriate tags were placed on the affected equipment, and licensee personnel evaluated the combined effects on mitigating systems and the integrity of radiological barriers.

These activities constitute completion of two samples for temporary plant modifications as defined in Inspection Procedure 71111.18-05.

#### b. Findings

No findings were identified.

## **1R19 Post-Maintenance Testing (71111.19)**

#### a. Inspection Scope

The inspectors reviewed the following post-maintenance activities to verify that procedures and test activities were adequate to ensure system operability and functional capability:

- On April 18, 2012, testing following replacement of mechanical seals on component cooling water pump B
- On May 29, 2012, testing following breaker maintenance for low pressure safety injection header to reactor coolant loop 2B flow control valve SI-138A

- On May 30 2012, testing following replacement of K2 relay in essential chiller AB
- On June 1, 2012, testing following maintenance on controlled ventilation area system trains A and B
- On June 4, 2012, testing following emergent maintenance on the auxiliary component cooling water heat exchanger outlet temperature control valve ACC-126A
- On June 12, 2012, testing following maintenance on the containment spray header B riser bypass check valve CS-129B

The inspectors selected these activities based upon the structure, system, or component's ability to affect risk. The inspectors evaluated these activities for the following (as applicable):

- The effect of testing on the plant had been adequately addressed; testing was adequate for the maintenance performed
- Acceptance criteria were clear and demonstrated operational readiness; test instrumentation was appropriate

The inspectors evaluated the activities against the technical specifications, the updated final safety analysis report, 10 CFR Part 50 requirements, licensee procedures, and various NRC generic communications to ensure that the test results adequately ensured that the equipment met the licensing basis and design requirements. In addition, the inspectors reviewed corrective action documents associated with post-maintenance tests to determine whether the licensee was identifying problems and entering them in the corrective action program and that the problems were being corrected commensurate with their importance to safety. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of six post-maintenance testing inspection samples as defined in Inspection Procedure 71111.19-05.

b. Findings

No findings were identified.

**1R22 Surveillance Testing (71111.22)**

a. Inspection Scope

The inspectors reviewed the updated final safety analysis report, procedure requirements, and technical specifications to ensure that the surveillance activities listed below demonstrated that the systems, structures, and/or components tested were capable of performing their intended safety functions. The inspectors either witnessed

or reviewed test data to verify that the significant surveillance test attributes were adequate to address the following:

- Preconditioning
- Evaluation of testing impact on the plant
- Acceptance criteria
- Test equipment
- Procedures
- Jumper/lifted lead controls
- Test data
- Testing frequency and method demonstrated technical specification operability
- Test equipment removal
- Restoration of plant systems
- Fulfillment of ASME Code requirements
- Updating of performance indicator data
- Engineering evaluations, root causes, and bases for returning tested systems, structures, and components not meeting the test acceptance criteria were correct
- Reference setting data
- Annunciators and alarms setpoints

The inspectors also verified that licensee personnel identified and implemented any needed corrective actions associated with the surveillance testing.

- On April 12, 2012, surveillance of steam generator 2 atmospheric dump valve MS-116B (IST)
- On April 17, 2012, surveillance of nitrogen accumulator 8 and 10
- On May 29, 2012, surveillance of shutdown cooling heat exchanger A component cooling water outlet valve CC-963A (IST)
- On May 31, 2012, surveillance of component cooling water pump A (IST)

- On June 12, 2012, surveillance of the containment spray pump B (IST)

Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of five surveillance testing inspection samples as defined in Inspection Procedure 71111.22-05.

b. Findings

No findings were identified.

**Cornerstone: Emergency Preparedness**

**1EP4 Emergency Action Level and Emergency Plan Changes (71114.04)**

a. Inspection Scope

The NSIR headquarters staff performed an in-office review of the latest revisions of Emergency Plan located under ADAMS accession number ML12076A055 as listed in the Attachment.

The licensee determined that in accordance with 10 CFR 50.54(q)(3), the changes made in the revision resulted in no reduction in the effectiveness of the Plan, and that the revised Plan continued to meet the requirements of 10 CFR 50.47(b) and Appendix E to 10 CFR Part 50. The NRC review was not documented in a safety evaluation report and did not constitute approval of licensee-generated changes; therefore, this revision is subject to future inspection. The specific documents reviewed during this inspection are listed in the Attachment

These activities constitute completion of one sample as defined in Inspection Procedure 71114.04 05.

b. Findings

No findings were identified.

**1EP6 Drill Evaluation (71114.06)**

Training Observations

a. Inspection Scope

The inspectors observed a simulator training evolution for licensed operators during an exercise on April 17, 2012, which required emergency plan implementation by a licensee operations crew. This evolution was planned to be evaluated and included in performance indicator data regarding drill and exercise performance. The inspectors observed event classification and notification activities performed by the crew. The

inspectors also attended the postevolution critique for the scenario. The focus of the inspectors' activities was to note any weaknesses and deficiencies in the crew's performance and ensure that the licensee evaluators noted the same issues and entered them into the corrective action program. As part of the inspection, the inspectors reviewed the scenario package and other documents listed in the attachment.

These activities constitute completion of one sample as defined in Inspection Procedure 71114.06-05.

b. Findings

No findings were identified.

**2. RADIATION SAFETY**

**Cornerstone: Occupational and Public Radiation Safety**

**2RS02 Occupational ALARA Planning and Controls (71124.02)**

a. Inspection Scope

This area was inspected to assess performance with respect to maintaining occupational individual and collective radiation exposures as low as is reasonably achievable (ALARA). The inspectors used the requirements in 10 CFR Part 20, the technical specifications, and the licensee's procedures required by technical specifications as criteria for determining compliance. During the inspection, the inspectors interviewed licensee personnel and reviewed the following items:

- Site-specific ALARA procedures and collective exposure history, including the current 3-year rolling average, site-specific trends in collective exposures, and source-term measurements
- ALARA work activity evaluations/post job reviews, exposure estimates, and exposure mitigation requirements
- The methodology for estimating work activity exposures, the intended dose outcome, the accuracy of dose rate and man-hour estimates, and intended versus actual work activity doses and the reasons for any inconsistencies
- Records detailing the historical trends and current status of tracked plant source terms and contingency plans for expected changes in the source term due to changes in plant fuel performance issues or changes in plant primary chemistry
- Radiation worker and radiation protection technician performance during work activities in radiation areas, airborne radioactivity areas, or high radiation areas

- Audits, self-assessments, and corrective action documents related to ALARA planning and controls since the last inspection

Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of the one required sample as defined in Inspection Procedure 71124.02-05.

b. Findings

No findings were identified.

**2RS04 Occupational Dose Assessment (71124.04)**

a. Inspection Scope

This area was inspected to: (1) determine the accuracy and operability of personal monitoring equipment; (2) determine the accuracy and effectiveness of the licensee's methods for determining total effective dose equivalent; and (3) ensure occupational dose is appropriately monitored. The inspectors used the requirements in 10 CFR Part 20, the technical specifications, and the licensee's procedures required by technical specifications as criteria for determining compliance. During the inspection, the inspectors interviewed licensee personnel, performed walkdowns of various portions of the plant, and reviewed the following items:

- External dosimetry accreditation, storage, issue, use, and processing of active and passive dosimeters
- The technical competency and adequacy of the licensee's internal dosimetry program
- Adequacy of the dosimetry program for special dosimetry situations such as declared pregnant workers, multiple dosimetry placement, and neutron dose assessment
- Audits, self-assessments, and corrective action documents related to dose assessment since the last inspection

Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of the one required sample as defined in Inspection Procedure 71124.04-05.

b. Findings

No findings were identified.

#### 4. OTHER ACTIVITIES

**Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity, Emergency Preparedness, Public Radiation Safety, Occupational Radiation Safety, and Physical Protection**

##### 4OA1 Performance Indicator Verification (71151)

###### .1 Data Submission Issue

###### a. Inspection Scope

The inspectors performed a review of the performance indicator data submitted by the licensee for the first quarter 2012 performance indicators for any obvious inconsistencies prior to its public release in accordance with Inspection Manual Chapter 0608, "Performance Indicator Program."

This review was performed as part of the inspectors' normal plant status activities and, as such, did not constitute a separate inspection sample.

###### b. Findings

No findings were identified.

###### .2 Mitigating Systems Performance Index - Emergency ac Power System (MS06)

###### a. Inspection Scope

The inspectors sampled licensee submittals for the mitigating systems performance index - emergency ac power system performance indicator for the period from the second quarter 2011 through the first quarter 2012. To determine the accuracy of the performance indicator data reported during those periods, the inspectors used definitions and guidance contained in NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6. The inspectors reviewed the licensee's operator narrative logs, mitigating systems performance index derivation reports, issue reports, event reports, and NRC integrated inspection reports for the period of April 2011 through the March 2012 to validate the accuracy of the submittals. The inspectors reviewed the mitigating systems performance index component risk coefficient to determine if it had changed by more than 25 percent in value since the previous inspection, and if so, that the change was in accordance with applicable NEI guidance. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the performance indicator data collected or transmitted for this indicator and none were identified. Specific documents reviewed are described in the attachment to this report.

These activities constitute completion of one mitigating systems performance index - emergency ac power system sample as defined in Inspection Procedure 71151-05.



b. Findings

No findings were identified.

.3 Mitigating Systems Performance Index - High Pressure Injection Systems (MS07)

a. Inspection Scope

The inspectors sampled licensee submittals for the mitigating systems performance index - high pressure injection systems performance indicator for the period from the second quarter 2011 through the first quarter 2012. To determine the accuracy of the performance indicator data reported during those periods, the inspectors used definitions and guidance contained in NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6. The inspectors reviewed the licensee's operator narrative logs, issue reports, mitigating systems performance index derivation reports, event reports, and NRC integrated inspection reports for the period of April 2011 through March 2012 to validate the accuracy of the submittals. The inspectors reviewed the mitigating systems performance index component risk coefficient to determine if it had changed by more than 25 percent in value since the previous inspection, and if so, that the change was in accordance with applicable NEI guidance. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the performance indicator data collected or transmitted for this indicator and none were identified. Specific documents reviewed are described in the attachment to this report.

These activities constitute completion of one mitigating systems performance index - high pressure injection system sample as defined in Inspection Procedure 71151-05.

b. Findings

No findings were identified.

.4 Mitigating Systems Performance Index - Heat Removal System (MS08)

a. Inspection Scope

The inspectors sampled licensee submittals for the mitigating systems performance index - heat removal system performance indicator for the period from the third quarter 2011 through the first quarter 2012. To determine the accuracy of the performance indicator data reported during those periods, the inspectors used definitions and guidance contained in NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6. The inspectors reviewed the licensee's operator narrative logs, issue reports, event reports, mitigating systems performance index derivation reports, and NRC integrated inspection reports for the period of July 2011 through March 2012, to validate the accuracy of the submittals. The inspectors reviewed the mitigating systems performance index component risk coefficient to determine if it had changed by more than 25 percent in value since the previous inspection, and if so,

that the change was in accordance with applicable NEI guidance. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the performance indicator data collected or transmitted for this indicator and none were identified. Specific documents reviewed are described in the attachment to this report.

These activities constitute completion of one mitigating systems performance index - heat removal system sample as defined in Inspection Procedure 71151-05.

b. Findings

No findings were identified.

**4OA2 Problem Identification and Resolution (71152)**

.1 Routine Review of Identification and Resolution of Problems

a. Inspection Scope

As part of the various baseline inspection procedures discussed in previous sections of this report, the inspectors routinely reviewed issues during baseline inspection activities and plant status reviews to verify that they were being entered into the licensee's corrective action program at an appropriate threshold, that adequate attention was being given to timely corrective actions, and that adverse trends were identified and addressed. The inspectors reviewed attributes that included the complete and accurate identification of the problem; the timely correction, commensurate with the safety significance; the evaluation and disposition of performance issues, generic implications, common causes, contributing factors, root causes, extent of condition reviews, and previous occurrences reviews; and the classification, prioritization, focus, and timeliness of corrective actions. Minor issues entered into the licensee's corrective action program because of the inspectors' observations are included in the attached list of documents reviewed.

These routine reviews for the identification and resolution of problems did not constitute any additional inspection samples. Instead, by procedure, they were considered an integral part of the inspections performed during the quarter and documented in Section 1 of this report.

b. Findings

No findings were identified.

.2 Daily Corrective Action Program Reviews

a. Inspection Scope

In order to assist with the identification of repetitive equipment failures and specific human performance issues for follow-up, the inspectors performed a daily screening of

items entered into the licensee's corrective action program. The inspectors accomplished this through review of the station's daily corrective action documents.

The inspectors performed these daily reviews as part of their daily plant status monitoring activities and, as such, did not constitute any separate inspection samples.

b. Findings

No findings were identified.

.3 Semi-Annual Trend Review

a. Inspection Scope

The inspectors performed a review of the licensee's corrective action program and associated documents to identify trends that could indicate the existence of a more significant safety issue. The inspectors focused their review on repetitive equipment issues, but also considered the results of daily corrective action item screening discussed in Section 4OA2.2, above, licensee trending efforts, and licensee human performance results. The inspectors nominally considered the 6-month period of December 2011 through June 2012 although some examples expanded beyond those dates where the scope of the trend warranted.

The inspectors also included issues documented outside the normal corrective action program in major equipment problem lists, repetitive and/or rework maintenance lists, departmental problem/challenges lists, system health reports, quality assurance audit/surveillance reports, self-assessment reports, and Maintenance Rule assessments. The inspectors compared and contrasted their results with the results contained in the licensee's corrective action program trending reports. Corrective actions associated with a sample of the issues identified in the licensee's trending reports were reviewed for adequacy.

These activities constitute completion of one single semi-annual trend inspection sample as defined in Inspection Procedure 71152-05.

b. Findings

No findings were identified.

.4 Selected Issue Follow-up Inspection

a. Inspection Scope

During a review of items entered in the licensee's corrective action program, the inspectors recognized a corrective action item documenting actions associated with recent essential chiller relay failures. The inspectors reviewed the appropriateness of the assigned significance, the scope and depth of the causal analysis, and the timeliness of resolution. The inspectors assessed whether the evaluation identified likely causes

for the issues and identified appropriate corrective actions to address the identified causes. The inspectors also conducted a review of the corrective actions to verify that appropriate measures were in place to prevent reoccurrence of the issue. In addition, the inspectors assessed whether the licensee's evaluation considered extent of condition, generic implications, common cause, and previous occurrences. The inspectors reviewed the potential impact on nuclear safety and risk to verify that the licensee had taken corrective actions commensurate with the significance of the issue. The inspectors evaluated these actions against the requirements of the licensee's corrective actions program and performance attributes contained in IP 71152, Section 03.06.

These activities constitute completion of one in-depth problem identification and resolution sample as defined in Inspection Procedure 71152-05.

b. Findings

No findings were identified.

**4OA3 Follow-up of Events and Notices of Enforcement Discretion (71153)**

.1 (Closed) Licensee Event Report (LER) 05000382/2012-001-00, Technical Specification for Containment Fan Cooler Minimum Cooling Flow Not Met

On January 5, 2012, during an NRC triennial heat sink performance inspection, inspectors noted that the component cooling water flows to the B and D containment fan coolers fell below the minimum flow technical specification surveillance requirement from approximately July 8, 2009 through July 19, 2009. As a part of the review of this event, the inspectors identified a non-cited violation. The inspectors documented this violation in NRC Inspection Report 05000382/2011005-01. This licensee event report is closed.

.2 (Closed) Licensee Event Report 05000382/2012-004-00, Essential Chiller Oil Leak Creates Unanalyzed Past Operability Condition

On April 22, 2012, operators discovered a 22 drop per minute oil leak on an instrument tubing low pressure sensing line for essential chiller A. The licensee determined the cause of the oil leak was due to equipment vibrations that created friction from the adjacent tubing, which had been tie-wrapped to the oil pressure sensing line. The licensee did not ensure that adequate tubing support requirements and satisfactory routing precluded wear related problems when the equipment operated. The inspectors documented this violation in Section 4OA7 of this report. This licensee event report is closed.

#### **4OA5 Other Activities**

##### **.1 (Closed) Temporary Instruction 2515/185 "Follow-up on the Industry's Ground Water Protection Initiative"**

###### **a. Inspection Scope**

The ground water protection program was inspected June 4-7, 2012, to determine whether the licensee had implemented the program elements which were found to be incomplete when previously reviewed during NRC Inspection 05000382/2009007. Inspectors interviewed cognizant licensee personnel and performed walk-downs.

###### **b. Findings and Observations**

The following elements had been implemented since the previous review:

- Element 1.1.a - Perform hydrogeologic and geologic studies to determine predominant ground water flow characteristics and gradients.
- Element 1.1.d – Establish the frequency for periodic reviews of site hydrogeologic studies
- Element 1.2.a - Identify each system, structure, or component and work practice that involves or could reasonably be expected to involve licensed material and for which there is a credible mechanism for the licensed material to reach ground water.
- Element 1.2.b - Identify existing leak detection methods for each SSC and work practice that involves or could involve licensed material and for which there is a credible potential for inadvertent releases to ground water.
- Element 1.2.c - Identify potential enhancements to leak detection systems or programs. These may include additional or increased frequency of rounds or walk downs or inspections, or integrity testing.
- Element 1.2.d - Identify potential enhancements to prevent spills or leaks from reaching ground water.
- Element 1.2.f – Establish long term programs to perform preventative maintenance or surveillance activities to minimize the potential for inadvertent releases of licensed materials due to equipment failure.
- Element 1.2.g – Establish the frequency for periodic reviews of systems, structures, or components and work practices.

- Element 1.3.d – Establish a formal, written program for long term ground water monitoring.
- Element 1.3.g – Establish the frequency for periodic review of the ground water monitoring program.
- Element 3.1.c – An independent, knowledgeable individual shall perform a self-assessment which, at a minimum, shall include evaluating implementation of all of the objectives identified NEI 07-07.

The following elements had not been implemented since the previous review and are documented in the corrective action documents listed with the elements:

- Element 1.3.f – Establish a long-term program for preventative maintenance of ground water wells (CR-WF3-2012-02751, CR-WF3-2012-2752, CR-HQN-2012-00673). This element lacked an implementing procedure or process.
- Element 1.4.a – Establish written procedures outlining the decision making process for remediation of leaks and spills or other instances of inadvertent releases (CR-WF3-2012-02757, CR-HQN-2012-00676). This element lacked an implementing procedure or process.

#### **4OA6 Meetings, Including Exit**

##### Exit Meeting Summary

On June 7, 2012, the inspectors presented the results of the radiation safety inspections to Mr. R. Gilmore, Acting Engineering Director, 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.

On July 5, 2012, the inspectors presented the inspection results to Mrs. Kimberly Cook, General Manager, Plant Operations, and other members of the licensee's staff. The licensee acknowledged the issues presented. The inspector asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

#### **4OA7 Licensee-Identified Violations**

The following violation of very low safety significance (Green) was identified by the licensee and is a violation of NRC requirements which meets the criteria of the NRC Enforcement Policy for being dispositioned as a non-cited violation.

### Essential Chiller Oil Leak Creates Unanalyzed Past Operability Condition

Criterion III of Appendix B to the 10 CFR Part 50 requires, in part, that measures shall be established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to safety-related functions of structures, systems, and components. Contrary to the above, prior to April 22, 2012, the licensee did not select and review for the suitability of the application of tubing support and routing that was essential to the safety-related function for essential chiller A. Specifically, the licensee did not assure that adequate tubing support and routing was used to preclude wear related problems due to equipment vibration. As a result, the use of a tie-wrap did not provide adequate support or meet clearance requirements for instrument tubing for essential chiller A. This would have rendered the essential chiller inoperable prior to its 30 day mission time. The inspectors determined that the finding was of very low safety significance because it was a design deficiency confirmed not to result in a loss of operability for the probabilistic risk analysis (PRA) mission time of twenty-four hours. The licensee entered this issue into their corrective action program as CR-WF3-2012-2022.

## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### **Licensee Personnel**

D. Jacobs, Vice President, Operations  
K. Cook, General Manager, Plant Operations  
K. Nichols, Director, Engineering  
D. Hamilton, Director, Nuclear Safety Assurance  
B. Lanka, Manager, System Engineering  
W. McKinney, Manager, Corrective Action Program and Assessments  
M. Mason, Acting Manager, Licensing  
R. Gilmore, Manager, Programs and Components  
C. Fugate, Manager, Operations  
J. Hornsby, Manager, Chemistry  
R. Porter, Manager, Design Engineering  
B. Lindsey, Manager, Maintenance  
R. Perry, Manager, Emergency Planning  
J. Gumnick, Manager, Radiation Protection  
D. Viener, Supervisor, Engineering Programs and Components  
J. Pollack, Senior Licensing Specialist, Licensing  
W. Hardin, Senior Licensing Specialist, Licensing  
J. Bourgeois, Acting Manager, Chemistry  
J. Brawley, ALARA Supervisor, Radiation Protection  
L. Gaubert, Senior HP Technician, Radiation Protection  
D. Miller, Supervisor, Radiation Protection  
M. Vierra, Dosimetry Senior Technician, Radiation Protection  
J. Vollmer, Dosimetry Supervisor, Radiation Protection

#### **NRC Personnel**

M. Davis, Senior Resident Inspector  
D. Overland, Resident Inspector  
R. Azua, Senior Project Engineer

### **LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED**

#### **Opened and Closed**

05000382/2012003-01	FIN	Failure to establish adequate procedural guidance to control feedwater heater level control valves (Section 1R12)
05000382/2012003-02	NCV	Failure to provide adequate design control measures for verifying or checking the adequacy of the ultimate heat sink thermal performance analysis (Section 1R15)



Closed

05000382/2012-001-00	LER	Technical Specification for Containment Fan Cooler Minimum Cooling Flow Not Met (Section 4OA3)
05000382/2012-004-00	LER	Essential Chiller Oil Leak Creates Unanalyzed Past Operability Condition (Section 4OA3)

**LIST OF DOCUMENTS REVIEWED**

**Section 1R01: Adverse Weather Protection**

PROCEDURES\DOCUMENTS

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
OP-006-001	Plant Distribution	311
OP-006-008	Transformer Operation	302
OP-006-009	Electrical Bus Outages	8
OP-901-314	Degraded Grid Conditions	1

**Section 1R04: Equipment Alignment**

PROCEDURES\DOCUMENTS

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
SD-CC	Component Cooling Water and Auxiliary Component Cooling Water System Description	7
OP-002-003	Component Cooling Water	309
OP-003-014	Control Room Heating and Ventilation	301
SD-SI	Safety Injection System Description	6
OP-009-008	Safety Injection System	32

**Section 1R05: Fire Protection**

PROCEDURES\DOCUMENTS

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
UNT-005-013	Fire Protection Program	11
OP-009-004	Fire Protection	307
MM-007-010	Fire Extinguisher Inspection and Replacement	304
FP-001-015	Fire Protection System Impairments	303

**Section 1R05: Fire Protection**PROCEDURES\DOCUMENTS

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
OP-903-060	Fire Hose Station Inspection	8
G-1359	Fire Protection Reactor Auxiliary Building Plan El. +21	2
G-1360	Fire Protection Reactor Auxiliary Building Plan El. +46	1
G-1357	Fire Protection Reactor Auxiliary Building Plan El. -35	1

**Section 1R11: Licensed Operator Requalification**PROCEDURE\DOCUMENTS

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
P-77	Simulator Scenario P-77	2
OP-901-101	Reactor Power Cutback	7
OP-901-212	Rapid Plant Power Reduction	3
OP-901-502	Evacuation of Control Room and Subsequent Plant Shutdown	21

**Section 1R12: Maintenance Effectiveness**PROCEDURE\DOCUMENTS

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
EN-DC-203	Maintenance Rule Program	1
EN-DC-204	Maintenance Rule Scope and Basis	2
EN-DC-206	Maintenance Rule (a)(1) Process	1
OP-003-034	Feed Heater Vents and Drains	8
LER-2012-002-00	Failed Valve Actuator Diaphragm Causes Inoperability Greater Than Allowed by TS LCO Action	0

CONDITION REPORTS

CR- WF3-2012-0860   CR-WF3-2012-1729   CR-WF3-2012-1737   CR-WF3-2012-1742

**Section 1R13: Maintenance Risk Assessment and Emergent Work Controls**PROCEDURES\DOCUMENTS

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
EN-WM-101	On-line Work Management Process	6
OI-037-000	Operations' Risk Assessment Guideline	300
OP-100-010	Equipment Out of Service	303
W2.502	Configuration Risk Management Program Implementation	0

WORK ORDERS

51554216          126082

**Section 1R15: Operability Evaluations**PROCEDURES\DOCUMENTS

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
EN-OP-104	Operability Determination Process	4
OP-903-121	Safety Systems Quarterly IST Valve Test	13
STI-0018	Special Test Instruction for Containment Spray Pump Design Basis Flow Verification Test	0

CONDITION REPORTS

CR-WF3-2012-1669    CR-WF3-2012-2543    CR-WF3-2012-2582    CR-WF3-2012-2830  
CR-WF3-2012-1395

**Section 1R18: Plant Modifications**

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
EC-30055	Core Protection Calculator Channel D Rework Temperature Probe on Hot Leg Number 2 Input	0
OP-903-068	Emergency Diesel Generator Operability and Subgroup Relay Operability Verification	304
OP-002-001	Auxiliary Component Cooling Water	304

## CONDITION REPORTS

CR-WF3-2011-4044    CR-WF3-2012-2285

### **Section 1R19: Post-Maintenance Testing**

#### PROCEDURE\DOCUMENTS

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
MM-006-025	Component Cooling Water Pump Maintenance	4
OP-903-063	Chilled Water Pump Operability Verification	303
ME-007-005	Time Delay Relay Setting Check, Adjustment, and Functional Test	16

## CONDITION REPORTS

CR-WF3-2012-1473

#### WORK ORDERS

310144                  52320357                  306968                  52396129                  197087

### **Section 1R22: Surveillance Testing**

#### PROCEDURES\DOCUMENTS

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
OP-903-120	Containment and Miscellaneous Systems Quarterly IST Valve Tests	13
STA-001-005	Leakage Testing of Air and Nitrogen Accumulators for Safety Related Valves	309
ME-007-005	Time Delay Relay Setting Check, Adjustment, and Functional Test	16
OP-903-050	Component Cooling Water and Auxiliary Component Cooling Water Pump and Valve Operability Test	26
OP-903-035	Containment Spray Pump Operability Check	301
STI-0018	Special Test Instruction for Containment Spray Pump Design Basis Flow Verification Test	0

**Section 1EP4: Emergency Action Level and Emergency Plan Changes**MISCELLANEOUS DOCUMENTS

<u>TITLE</u>	<u>DATE</u>
Waterford Steam Electric Station Unit 3, Emergency Plan	Revision 42

**Section 1EP6: Drill Evaluation**PROCEDURES\DOCUMENTS

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
EP-001-001	Recognition and Classification of Emergencies	25
EP-002-010	Notifications and Communications	304
EP-002-052	Protective Action Guidelines	21

**Section 2RS02: Occupational ALARA Planning and Controls**PROCEDURES\DOCUMENTS

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
EN-RP-110	ALARA Program	9
EN-RP-110-03	Collective Radiation Exposure (CRE) Reduction Guidelines	1
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>REVISION</u>
LO-WLO-2011-00105	Radiation Protection Pre-NRC Inspection Assessment	October 2011
LO-WLO-2011-00105	QA Audit: Combined Radiation Protection and Radwaste	November 16, 2011
QS-2012-W3-001	QA Follow-up Surveillance of Category A Condition Reports initiated during December 201	January 4, 2012

RADIATION WORK PERMIT PACKAGES

<u>NUMBER</u>	<u>TITLE</u>
2011-0632	SI 405 "A" and "B" "Keep Fill Modification Including all Support Activities. No Entry into Posted Locked High Radiation Areas

### RADIATION WORK PERMIT PACKAGES

<u>NUMBER</u>	<u>TITLE</u>
2011-0702	Disassembly of Reactor Head and All Associated Work Activities
2011-0705	Reassembly of Reactor Head and Associated Work Activities Including Staging/Destaging of Equipment

### CONDITION REPORTS

CR-WF3-2011-02025	CR-WF3-2011-02134	CR-WF3-2011-03101	CR-WF3-2011-03113
CR-WF3-2011-03175	CR-WF3-2011-03242	CR-WF3-2011-03822	CR-WF3-2011-07968
CR-WF3-2012-00595	CR-WF3-2012-00713	CR-WF3-2012-00766	

### MISCELLANEOUS DOCUMENTS

<u>TITLE</u>	<u>DATE</u>
RF17 ALARA Report	June 2, 2011
Waterford 3 Nuclear Power Plant Five Year Exposure Reduction Plan 2012-2016	0
2011 Annual Radiation Protection Report	May 8, 2012

### **Section 2RS04: Occupational Dose Assessment**

#### PROCEDURES/DOCUMENTS

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
EN-RP-201	Dosimetry Administration	3
EN-RP-202	Personnel Monitoring	8
EN-RP-203	Dose Assessment	5
EN-RP-204	Special Monitoring Requirements	6
EN-RP-205	Prenatal Monitoring	3
EN-RP-206	Dosimeter of Legal Record Quality Assurance	5
EN-RP-208	Whole Body Counting and In-Vitro Bioassay	4
EN-RP-311-01	Calibration of MGPI Electronic Dosimeters	0

**AUDITS, SELF-ASSESSMENTS, AND SURVEILLANCES**

<u>NUMBER</u>	<u>TITLE</u>	<u>DATE</u>
22873	NUPIC Audit of GEL Laboratories, LLC	December 13, 2011

**CONDITION REPORTS**

CR-HQN-2011-00587	CR-HQN-2011-00851	CR-HQN-2011-01012	CR-WF3-2011-03779
CR-WF3-2011-06270	CR-WF3-2011-06814	CR-WF3-2011-07480	CR-WF3-2012-00057
CR-WF3-2012-00812	CR-WF3-2012-02089		

**MISCELLANEOUS DOCUMENTS**

<u>NUMBER</u>	<u>TITLE</u>	<u>DATE</u>
	Waterford-3 Instrumentation and Whole Body Counter Library Evaluation	2010
	Multipack TLD Assignment Report	2011
100518-0	NVLAP Certificate of Accreditation for Landauer, Inc.	December 31, 2011
	10 CFR Part 61 Waste Stream Sample Screening and Evaluation: BMS Filter	January 23, 2012
	10 CFR Part 61 Waste Stream Sample Screening and Evaluation: SFP 2012 Filter	January 23, 2012
	10 CFR Part 61 Waste Stream Sample Screening and Evaluation: DAW Plant 2012	January 23, 2012
Att. 9.2 to EN-RP-206	Aggregate DLR DDE/EAD Comparison Report 2011	April 18, 2012

**Section 40A1: Performance Indicator Verification****PROCEDURES\DOCUMENTS**

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
NEI 99-02	Regulatory Assessment Performance Indicator Guideline	6
EN-LI-114	Performance Indicator Process	4
EN-EP-201	Performance Indicators	9, 10
EP-001-001	Recognition and Classification of Emergency Conditions	24, 25
EP-002-010	Notifications and Communications	303, 304

EP-002-052	Protective Action Guidelines	20, 21
	Waterford3 Steam Electric Station Emergency Plan	38, 39

#### **Section 4OA2: Identification and Resolution of Problems**

##### PROCEDURES\DOCUMENTS

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
EN-LI-102	Corrective Action Process	15
EN-LI-119	Apparent Cause Evaluation Process	15
LER 2011-005-00	Loss of Essential Chiller B Caused Less Than 100% Emergency Feedwater Supply Capability	0

##### CONDITION REPORTS

CR-WF3-2011-7499	CR-WF3-2011-7166	CR-WF3-2011-6688	CR-WF3-2011-7477
CR-WF3-2012-0222	CR-WF3-2012-0228		

#### **Section 4OA3: Follow-up of Events and Notices of Enforcement Discretion**

##### PROCEDURES\DOCUMENTS

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
LER 2012-001-00	Technical Specification for Containment Fan Cooler Minimum Cooling Flow Not Met	0
LER 2012-004-00	Essential Chiller Oil Leak Creates Unanalyzed Past Operability Condition	0

##### CONDITION REPORTS

CR-WF3-2011-06005	CR-WF3-2012-01289
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#### **Section 4OA5 Temporary Instruction 2515/185**

##### PROCEDURES

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
N-CY-108	Monitoring of Nonradioactive Systems	4
EN-CY-109	Sampling and Analysis of Groundwater Monitoring Wells	2
EN-CY-111	Radiological Ground Water Monitoring Program	2



PROCEDURES  
NUMBER

TITLE

REVISION

EN-DC-153	Preventive Maintenance Component Classification	6
EN-DC-343	Underground Piping and Tanks Inspection and Monitoring Program	5
EN-OP-115-01	Operator Rounds	0
EN-RP-113	Response to Contaminated Spills/Leaks	5

AUDITS, SELF-ASSESSMENTS, AND SURVEILLANCES  
NUMBER

TITLE

DATE

LO-WTHQN-2011-123	Focused Self-Assessment Report – NEI 07-07 Compliance – Waterford-3	November 30, 2011
	NEI Ground Water Protection Initiative NEI Peer Assessment Report	December 9, 2009

MISCELLANEOUS DOCUMENTS  
NUMBER

TITLE

REVISION

	Ground Water Monitoring Plan – Entergy Nuclear Waterford-3 Station	2
	Project Summary Report – Radiological Material Leak Prevention to Groundwater of Above and Under Ground Structures, System, and Components	0
SEP-UIP-WF3	Underground Components Inspection Plan	0
	Entergy Nuclear Engineering Project Report – Guidelines for Management of Reasonable Assurance of Integrity for Above and Underground SSCs Containing Radioactive Material	0

**Section 40A7: Licensee-Identified Violations**

PROCEDURES\DOCUMENTS

NUMBER

TITLE

REVISION

LER 2012-004-00	Essential Chiller Oil Leak Creates Unanalyzed Past Operability Condition	0
		0

CONDITION REPORTS

CR-WF3-2012-2022

**The following items are requested for the Occupational Radiation Safety Inspection at  
Waterford-3  
June 4-8,2012**

**Integrated Report 2012003**

Inspection areas are listed below.

Please provide the requested information on or before May 14, 2012.

Please submit this information using the same lettering system as below. For example, all contacts and phone numbers for Inspection Procedure 71124.01 should be in a file/folder titled "1- A," applicable organization charts in file/folder "1- B," etc.

If information is placed on *ims.certrec.com*, please ensure the inspection exit date entered is at least 30 days later than the onsite inspection dates, so the inspectors will have access to the information while writing the report.

In addition to the corrective action document lists provided for each inspection procedure listed below, please provide updated lists of corrective action documents at the entrance meeting. The dates for these lists should range from the end dates of the original lists to the day of the entrance meeting.

If more than one inspection procedure is to be conducted and the information requests appear to be redundant, there is no need to provide duplicate copies. Enter a note explaining in which file the information can be found.

If you have any questions or comments, please contact Larry Ricketson at (817) 200-1165 or [Larry.Ricketson@nrc.gov](mailto:Larry.Ricketson@nrc.gov) or Natasha Greene at (817) 200-1154 or [Natasha.Greene@nrc.gov](mailto:Natasha.Greene@nrc.gov).

**2. Occupational ALARA Planning and Controls (71124.02)**

Date of Last Inspection: APRIL 25, 2011

- A. List of contacts and telephone numbers for ALARA program personnel
- B. Applicable organization charts
- C. Copies of audits, self-assessments, and LERs, written since date of last inspection, focusing on ALARA
- D. Procedure index for ALARA Program
- E. Please provide specific procedures related to the following areas. Additional Specific Procedures may be requested by number after the inspector reviews the procedure indexes.
  - 1 ALARA Program
  - 2 ALARA Committee
  - 3 Radiation Work Permit Preparation

- F. A summary list of corrective action documents (including corporate and subtiered systems) written since date of last inspection, related to the ALARA program. In addition to ALARA, the summary should also address Radiation Work Permit violations, Electronic Dosimeter Alarms, and RWP Dose Estimates

NOTE; The lists should indicate the significance level of each issue and the search criteria used. Please provide documents which are "searchable."

- G. List of work activities greater than 1 rem, since date of last inspection.  
Include original dose estimate and actual dose.
- H. Site dose totals and 3-year rolling averages for the past 3 years (based on dose of record)
- I. Outline of source term reduction strategy

#### **4. Occupational Dose Assessment (Inspection Procedure 71124.04)**

Date of Last Inspection: APRIL 25, 2011

- A. List of contacts and telephone numbers for the following areas:
- 1 Dose Assessment personnel
- B. Applicable organization charts
- C. Audits, self assessments, vendor or NUPIC audits of contractor support, and LERs written since date of last inspection, related to:
1. Occupational Dose Assessment
- D. Procedure indexes for the following areas
1. Occupational Dose Assessment
- E. Please provide specific procedures related to the following areas. Additional Specific Procedures will be requested by number after the inspector reviews the procedure indexes.
1. Radiation Protection Program
  2. Radiation Protection Conduct of Operations
  3. Personnel Dosimetry Program
  4. Radiological Posting and Warning Devices
  5. Air Sample Analysis
  6. Performance of High Exposure Work
  7. Declared Pregnant Worker
  8. Bioassay Program

F. List of corrective action documents (including corporate and subtiered systems) written since date of last inspection, associated with:

1. NVLAP accreditation
2. Dosimetry (TLD/OSL, etc.) problems
3. Electronic alarming dosimeters
4. Bioassays or internally deposited radionuclides or internal dose
5. Neutron dose

NOTE; The lists should indicate the significance level of each issue and the search criteria used.

G. List of positive whole body counts since date of last inspection, names redacted if desired

H. Part 61 analyses/scaling factors

**Temporary Instruction 2515/185, Revision 1,**

**Follow-Up On The Industry's Ground Water Protection Initiative**

As documented in the integrated Inspection Report 2009007, you had not fully implemented some of the elements of Nuclear Energy Institute 07-07, at the time of the inspection. Please provide the status of each of these elements. If the element has not been fully implemented, please provide a copy of the corrective action document and specific corrective action assignment that ensures implementation of the element.

The elements are: 1.1a, 1.1d, 1.2a, 1.2b, 1.2c, 1.2d, 1.2f, 1.2g, 1.3d, 1.3f, 1.3g, 1.4a, 3.1c

Please provide the latest corporate and NEI audits of these elements.