UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
612 EAST LAMAR BLVD, SUITE 400
ARLINGTON, TEXAS 76011-4125

May 18, 2009

Joseph Kowalewski, Vice President, Operations
Entergy Operations, Inc.
Waterford Steam Electric Station, Unit 3
17265 River Road
Killona, LA 70057-3093

Subject: WATERFORD STEAM ELECTRIC STATION, UNIT 3 - NRC INTEGRATED INSPECTION REPORT 05000382/2009002

Dear Mr. Kowalewski:

On April 7, 2009, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Waterford Steam Electric Station, Unit 3. The enclosed integrated inspection report documents the inspection findings, which were discussed on April 8, 2009, with you 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.

This report documents two NRC-identified findings of very low safety significance (Green). One finding involved a violation of NRC requirements. However, because of the very low safety significance and because it was entered into your corrective action program, the NRC is treating this finding as a noncited violation, consistent with Section VI.A.1 of the NRC Enforcement Policy. If you contest the nonviolation or the significance of the noncited violation, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555-0001, with copies to the Regional Administrator, U.S. Nuclear Regulatory Commission, Region IV, 612 E. Lamar Blvd, Suite 400, Arlington, Texas, 76011-4125; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001; and the NRC Resident Inspector at the Waterford Steam Electric Station, Unit 3 facility. In addition, if you disagree with the characterization of any finding 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. The information you provide will be considered in accordance with Inspection Manual Chapter 0305.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, and its enclosure, will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC's document 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 G.Replogle for/

Jeffrey A. Clark, P.E.
Chief, Project Branch E
Division of Reactor Projects

Docket: 50-382
License: NPF-38

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NRC Inspection Report 05000382/2009002
w/Attachment: Supplemental Information

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U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket:	05000382
License:	NFP-38
Report:	05000382/2009002
Licensee:	Entergy Operations, Inc.
Facility:	Waterford Steam Electric Station, Unit 3
Location:	Hwy. 18 Killona, LA
Dates:	January 1 through April 7, 2009
Inspectors:	R. Azua, Senior Resident Inspector D. Overland, Resident Inspector B. Correll, Reactor Inspector
Approved By:	Jeff Clark, Chief, Project Branch E Division of Reactor Projects

SUMMARY OF FINDINGS

IR 05000382/2009002; January 1, 2009 - April 7, 2009 ; Waterford Steam Electric Station, Unit 3; Maintenance Risk Assessments and Emergent Work Control; Plant Modifications.

The report covered a 3-month period of inspection by the resident inspectors. One Green noncited violation and one Green finding 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." 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: Mitigating Systems

- Green. The inspectors identified a finding because the licensee inadvertently deleted procedural steps to recover an emergency diesel generator during a severe accident. The steps were part of a formal commitment to the NRC. The licensee had failed to follow the site commitment management program when making the procedure change and the procedure writer failed to understand the basis for the steps prior to deleting them. The licensee entered this finding in their corrective action program as Condition Reports CR-WF3-2009-0193 and CR-WF3-2009-1616.

  The finding was more than minor because, if left uncorrected, it could result in a more significant safety concern. Specifically, during a severe accident, operators would not have an appropriate mitigation strategy for starting an emergency diesel generator under certain severe accident conditions. Using the Inspection Manual Chapter 0609, "Significance Determination Process," Phase 1 screening worksheet, the finding was of very low risk significance because the finding: (1) could result in a loss of functionality of an emergency diesel generator; (2) did not represent a loss of safety function; (3) did not represent an actual loss of a single train of equipment for more than its technical specification allowed outage time; (4) did not involve non-technical specification equipment; and (5) did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event. The finding had a crosscutting aspect in the area of Human Performance, Decision Making component [H.1(a)], because the licensee failed to use a systematic process when removing the procedural steps (Section 1R13).

- Green. The inspectors identified a noncited violation of 10 CFR 50, Appendix B, Criterion V (Instructions, Procedures and Drawings) because the licensee failed to implement instructions that were intended to help troubleshoot a defective 125 Vdc battery cell. In response to the degraded cell, the licensee had established additional measures to monitor the cell following charging to ensure proper cell operation. However, the licensee did not perform the monitoring. Once identified by the inspectors, the licensee performed more frequent cell tests. The licensee subsequently replaced the faulty cell. The licensee entered this finding into their corrective action program as Condition Reports CR-WF3-2009-1088 and CR-WF3-2009-1099.

  The finding was more than minor because it could have resulted in a more significant safety concern if left uncorrected. Specifically, the normal monitoring

period for the cell was weekly. The cell may not have remained operable between weekly tests. Using the Inspection Manual Chapter 0609, "Significance Determination Process," Phase 1 screening worksheet, the finding was of very low risk significance because it: (1) could have resulted in a loss of operability of the 125 Vdc battery; (2) did not represent a loss of safety function; (3) did not represent an actual loss of a single train of equipment for more than its technical specification allowed outage time; (4) did not involve non-technical specification equipment; and (5) did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event. This finding had a crosscutting aspect in the area of Problem Identification and Resolution, because the licensee failed to implement corrective measures intended to address a condition adverse to quality [P.1(d)] (Section 1R18).

B. Licensee-Identified Violations

None

REPORT DETAILS

Summary of Plant Status

The plant began the inspection period on January 1, 2009, at 100 percent power and remained at approximately 100 percent power for the rest of the inspection period.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity, and Emergency Preparedness

1R01 Adverse Weather Protection (71111.01)

Readiness for Seasonal Extreme Weather Conditions

a. Inspection Scope

The inspectors performed a review of the licensee's adverse weather procedures for seasonal extremes (e.g., extreme high temperatures, extreme low temperatures, or hurricane season preparations). The inspectors: verified that weather-related equipment deficiencies identified during the previous year were corrected prior to the onset of seasonal extremes; and evaluated the implementation of the adverse weather preparation procedures and compensatory measures for the affected conditions before the onset of, and during, the adverse weather conditions

During the inspection, the inspectors focused on plant-specific design features and the licensee's procedures used to mitigate or respond to adverse weather conditions. Additionally, the inspectors reviewed the 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:

- February 24, 2009: The inspectors completed their review of the licensee's actions in preparation for cold weather conditions, and walked down the following systems and components: 1) component cooling water system; 2) dry cooling towers; 3) reactor auxiliary building fire protection system; and 4) main steam isolation valve actuators.

These activities constitute completion of one readiness for seasonal adverse weather sample as defined in Inspection Procedure 71111.01-05.

b. Findings

No findings of significance were identified.

1R04 Equipment Alignments (71111.04)

.1 Partial Walkdown

a. Inspection Scope

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

- January 20, 2009: emergency diesel generator A
- January 26, 2009: high pressure safety injection system train A
- February 3, 2009: auxiliary component cooling water system train A

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, 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 walked down 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 (3) partial system walkdown samples as defined in Inspection Procedure 71111.04-05.

b. Findings

No findings of significance were identified.

.2 Complete Walkdown

a. Inspection Scope

On February 9, 2009, the inspectors performed a complete system alignment inspection of the emergency feedwater system train B to verify the functional capability of the system. The inspectors selected this system because it was considered both safety-significant and risk-significant in the licensee's probabilistic risk assessment. The inspectors walked down the system to review mechanical and electrical equipment line ups, electrical power availability, system pressure and temperature indications, as appropriate, component labeling, component lubrication, component and equipment cooling, hangers and supports, operability of support systems, and to ensure that ancillary equipment or debris did not interfere with equipment operation. The inspectors reviewed a sample of past and outstanding work orders to determine whether any deficiencies significantly affected the system function. In addition, the inspectors reviewed the corrective action program database to ensure that system equipment-

alignment problems were being identified and appropriately resolved. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of one complete system walkdown sample as defined in Inspection Procedure 71111.04-05.

b. Findings

No findings of significance 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:

- February 7, 2009: fire zones RAB 32, 37, 38 and 39
- February 12, 2009: fire zones RAB 1E, 7A, 7B and 7C
- March 23, 2009: fire zones RAB 8A, 8B and 8C
- April 3, 2009: fire zones RAB 1A, 1C, 1D and 3

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 of significance were identified.

1R11 Licensed Operator Requalification Program (71111.11)

a. Inspection Scope

On March 9, 2009, the inspectors observed a crew of licensed operators in the plant's simulator to verify that operator performance was adequate, evaluators were identifying and documenting crew performance problems, and training was being conducted in accordance with licensee procedures. The inspectors evaluated the following areas:

- Licensed operator performance
- Crew's clarity and formality of communications
- Crew's ability to take timely actions in the conservative direction
- Crew's prioritization, interpretation, and verification of annunciator alarms
- Crew's correct use and implementation of abnormal and emergency procedures
- Control board manipulations
- Oversight and direction from supervisors
- Crew's ability to identify and implement appropriate technical specification actions and emergency plan actions and notifications

The inspectors compared the crew's performance in these areas to pre-established operator action expectations and successful critical task completion requirements. Specific documents reviewed during this inspection are listed in the attachment.

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

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness (71111.12Q)

a. Inspection Scope

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

- February 24, 2009: main steam isolation valve No. 1
- March 12, 2009: 125 Vdc train B battery

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

No findings of significance were identified.

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:

- January 22, 2009: emergency diesel generator B maintenance outage
- January 29, 2009: replacement of cell No. 7 of the 125 Vdc train AB battery
- February 3, 2009: component cooling water system train A
- March 26, 2009: replacement of cell No. 38 of the 125 Vdc train B battery

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

Introduction. The inspectors identified a Green finding because the licensee inadvertently deleted procedural steps to recover an emergency diesel generator during a severe accident. The steps were part of a formal commitment to the NRC. The licensee had failed to follow the site commitment management program when making the procedure change and the procedure writer failed to understand the basis for the steps prior to deleting them.

Description. "Supplemental Severe Accident Management Guidelines" (S-SAMG) provide strategies, in part, to restore essential plant equipment using existing or readily available resources under severe accident conditions. Site Procedure S-SAMG-01, "Loss of Large Areas of the Plant Due to Fire/Explosion," Revision 2, contained strategies to allow the emergency diesel generators to start after the associated 125 Vdc battery had been lost. In a letter to the NRC (W3F1-2005-0038), "Response to NRC Guidance Regarding Mitigation Strategies," dated May 31, 2005, the licensee had committed to document the emergency diesel generator recovery guidance in Procedure S-SAMG-01.

On December 27, 2007, the licensee issued S-SAMG-01, Revision 3. As part of this revision, the licensee removed the steps to enable operators to start an emergency diesel generator when the 125 Vdc source was not available.

The inspectors identified that the licensee failed to follow the Commitment Management Program when tracking the NRC commitment. Specifically, Corporate Procedure EN-LI-110, "Commitment Management Program," Revision 0, section 5.8, step [2], specified that the document change should be reviewed against the commitment report, to determine if the proposed changes would change the implementation of any commitments. However, the commitment made in letter W3F1-2005-0038 was not entered into the commitment report. This was contrary to Corporate Procedure LI-110, "Commitment Management Program," Revision 0, Step 5.2.3, which required that commitment information be entered into the Commitment Management System database. The inspectors also determined that the licensee failed to understand the basis for the subject procedure steps prior to making the revision. The licensee entered this finding in their corrective action program as Condition Report CR-WF3-2009-0193.

Analysis. The failure to implement commitment tracking procedures was a performance deficiency. The finding was more than minor because, if left uncorrected, it could result in a more significant safety concern. Specifically, during a severe accident, operators would not have an appropriate mitigation strategy for starting an emergency diesel generator under certain severe accident conditions. Using the Inspection Manual Chapter 0609, "Significance Determination Process," Phase 1 screening worksheet, the finding was of very low risk significance because the finding: (1) could result in a loss of functionality of an emergency diesel generator; (2) did not represent a loss of safety function; (3) did not represent an actual loss of a single train of equipment for more than its technical specification allowed outage time; (4) did not involve non-technical

specification equipment; and (5) did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event. The finding had a crosscutting aspect in the area of Human Performance, Decision Making component [H.1(a)], because the licensee failed to use a systematic process when removing the procedural steps.

Enforcement. The severe accident guidelines address events that are beyond the design basis for the facility. The failure to track the NRC commitment was not a violation of NRC requirements: FIN 05000382/2009002-01, Failure to Follow Commitment Tracking Procedures.

1R15 Operability Evaluations (71111.15)

a. Inspection Scope

The inspectors reviewed the following issues:

- February 5, 2009: nitrogen accumulator pressure out of specification in main steam isolation valve No. 1
- February 17, 2009: failure of static uninterruptible power supply A and the affect on supported components
- March 3, 2009: degraded 125 Vdc battery train B, cell No. 38

The inspectors selected these potential operability issues based on the risk-significance of the associated components and systems. The inspectors evaluated the technical adequacy of the evaluations to ensure that technical specification operability was properly justified and 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 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. The inspectors determined, where appropriate, compliance with bounding limitations associated with the evaluations. Additionally, the inspectors also 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 three operability evaluations inspection samples as defined in Inspection Procedure 71111.15-05

b. Findings

No findings of significance were identified.

1R18 Plant Modifications (71111.18)

a. Inspection Scope

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

- March 2, 2009: individual cell charge on station battery train B, cell 38

The inspectors reviewed the temporary modification and the associated safety evaluation screening against the system design bases documentation, including the 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 one sample for temporary plant modification as defined in Inspection Procedure 71111.18-05

b. Findings

Introduction. The inspectors identified a Green noncited violation of 10 CFR 50, Appendix B, Criterion V (Instructions, Procedures and Drawings) because the licensee failed to implement instructions that were intended to help troubleshoot a defective 125 Vdc battery cell. In response to the degraded cell, the licensee had established additional measures to monitor the cell following charging to ensure proper cell operation. However, the licensee did not perform the monitoring. Once identified by the inspectors, the licensee performed more frequent cell tests. The licensee subsequently replaced the faulty cell.

Description. On November 24, 2008, station battery train B, cell 38 voltage was found to be 2.167 Vdc. Although this voltage was greater than the required technical specification value of 2.13 Vdc, it was lower than the expected value for a new battery cell. The licensee considered the cell degraded but operable. Cell 38 was added to the "Station Battery Monitoring Plan," dated December 17, 2008. The plan specified additional monitoring of certain degraded battery cells to ensure battery operability. For example, the plan specified, in part "Individual cell voltage should be taken on station battery cells after the single cell charger is removed or the cell is replaced, with a minimum frequency of every 15 minutes for the first hour; hourly for the remainder of the first three hours; every three hours for the remaining first 24 hours; once a day for the following week; and then once a week along with the pilot cell weekly." The instruction also specified acceptance criteria for cell performance and delineated corrective measures if the acceptance criteria (trigger points) were not met. The purpose of the plan was to preclude exceeding technical specification limits and to avoid an unnecessary plant shutdown because of an inoperable battery.

The licensee determined that the additional cell monitoring was necessary to ensure continued battery operability. The next monitoring period for cell 38 (absent the frequent monitoring) was once per week. Without the additional monitoring specified by the

battery monitoring plan, the cell could degrade to an inoperable condition between the tests. The plan referenced operating experience where battery cell failures had occurred.

On Monday, February 23, 2009, cell 38 voltage was 2.156 Vdc. This value was below the battery monitoring plan trigger point number 2. The licensee placed the cell on an individual charge until March 2, 2009.

On Tuesday, March 3, 2009, the inspectors identified that the licensee had failed to perform the additional cell 38 monitoring specified by the battery plan. Technicians had taken an initial voltage reading immediately following the charge but had not continued to take the periodic measurements specified by the plan. The licensee initiated the additional cell voltage monitoring on March 4, 2009. In response to the additional monitoring, the licensee decided to replace the degraded cell with a new cell.

Analysis. The failure to follow the instruction for monitoring cell 38 was a performance deficiency. The finding was more than minor because it could have resulted in a more significant safety concern if left uncorrected. Specifically, the normal monitoring period for the cell was weekly. The cell may not have remained operable between weekly tests. Using the Inspection Manual Chapter 0609, "Significance Determination Process," Phase 1 screening worksheet, the finding was of very low risk significance because it: (1) could have resulted in a loss of operability of the 125 Vdc battery; (2) did not represent a loss of safety function; (3) did not represent an actual loss of a single train of equipment for more than its technical specification allowed outage time; (4) did not involve non-technical specification equipment; and (5) did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event. This finding had a crosscutting aspect in the area of Problem Identification and Resolution, Corrective Action Program Component, because the licensee failed to implement corrective measures intended to address a condition adverse to quality [P.1(d)].

Enforcement. 10 CFR 50, Appendix B, Criterion V (Instructions, Procedures and Drawings) requires, in part, that activities affecting quality shall be prescribed by documented instructions and shall be accomplished in accordance with these instructions. The licensee established the "Station Battery Monitoring Plan," dated December 17, 2008. The instruction specified, in part, for Cell 38: "Individual cell voltage should be taken on station battery cells after the single cell charger is removed or the cell is replaced with a minimum frequency of every 15 minutes for the first hour; hourly for the remainder of the first three hours; every three hours for the remaining first 24 hours; once a day for the following week; and then once a week along with the pilot cell weekly." Procedure EN-AD-102, "Procedure Adherence and Level of Use," Revision 4, specified, in part, "Should – Denotes strong recommendation and indicates an action that is expected to be performed as described unless there is a compelling reason not to do so." Contrary to the above, from March 2 to March 3, 2009, the licensee had completed a single cell charge of battery cell 38 but had failed to take the prescribed actions specified in the "Station Battery Monitoring Plan." While the actions were preceded with the word "should," station personnel did not have a compelling reason not to perform the actions. Because this violation was of very low safety significance and was entered in the corrective action program as Condition Reports CR-WF3-2009-1088 and CR-WF3-2009-1099, this violation is being treated as a noncited violation, consistent with Section VI.A of the NRC Enforcement Policy:
NCV 05000382/2009002-02, Failure to Obtain Voltage Readings Following a Single Cell Battery Charge.

1R19 Postmaintenance Testing (71111.19)

a. Inspection Scope

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

- January 24, 2009: emergency diesel generator train B
- January 28, 2009: charging pump B
- January 29, 2009: 125 Vdc train AB battery, cell No. 7
- March 27, 2009: 125 Vdc train B battery, cell No. 38
- April 6, 2009: high pressure safety injection pump AB

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 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 postmaintenance 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 five postmaintenance testing inspection samples as defined in Inspection Procedure 71111.19-05.

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing (71111.22)

a. Inspection Scope

The inspectors reviewed the Final Safety Analysis Report, procedure requirements, and technical specifications to ensure that the four 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
- Annunciator and alarm setpoints

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

- January 27, 2009: shutdown cooling heat exchanger B outlet isolation valve SI-412B and shutdown cooling heat exchanger B inlet valve SI-125B inservice test.
- February 4, 2009: charging pump A
- February 4, 2009: emergency feedwater system train A
- February 19, 2009: reactor trip breakers

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

These activities constitute completion of four surveillance testing inspection sample(s) as defined in Inspection Procedure 71111.22-05.

b. Findings

No findings of significance were identified.

Cornerstone: Emergency Preparedness

1EP6 Drill Evaluation (71114.06)

Training Observations

a. Inspection Scope

The inspectors observed a simulator training evolution for licensed operators on February 18, 2008, 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 of significance were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator Verification (71151)

.1 Data Submission Issue

a. Inspection Scope

The inspectors performed a review of the data submitted by the licensee for the fourth Quarter 2008 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 of significance were identified.

.2 Unplanned Scrams per 7000 Critical Hours

a. Inspection Scope

The inspectors sampled licensee submittals for the Unplanned Scrams per 7000 Critical Hours performance indicator for the period from the fourth quarter of 2007 through the fourth quarter of 2008. To determine the accuracy of the performance indicator data reported during those periods, performance indicator definitions and guidance contained in NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 5, was used. The inspectors reviewed the licensee's operator narrative logs, issue reports, event reports and NRC Inspection reports for the period of January 2008 through February 2009 to validate the accuracy of the submittals. 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 unplanned scrams per 7000 critical hours sample as defined in Inspection Procedure 71151-05.

b. Findings

No findings of significance were identified.

.3 Unplanned Scrams with Complications

a. Inspection Scope

The inspectors sampled licensee submittals for the Unplanned Scrams with Complications performance indicator for the period from the fourth quarter of 2007 through the fourth quarter of 2008. To determine the accuracy of the performance indicator data reported during those periods, performance indicator definitions and guidance contained in NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 5, was used. The inspectors reviewed the licensee's operator narrative logs, issue reports, event reports and NRC integrated inspection reports for the period of January 2008 through February 2009 to validate the accuracy of the submittals. 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 unplanned scrams with complications sample as defined in Inspection Procedure 71151-05.

b. Findings

No findings of significance were identified.

.4 Unplanned Transients per 7000 Critical Hours

a. Inspection Scope

The inspectors sampled licensee submittals for the Unplanned Transients per 7000 Critical Hours performance indicator for the period from the fourth quarter of 2007 through the fourth quarter of 2008. To determine the accuracy of the performance indicator data reported during those periods, performance indicator definitions and guidance contained in NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 5, was used. The inspectors reviewed the licensee's operator narrative logs, issue reports, maintenance rule records, event reports and NRC Integrated Inspection reports for the period of January 2008 through February 2009 to validate the accuracy of the submittals. 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 unplanned transients per 7000 critical hours sample as defined in Inspection Procedure 71151-05.

b. Findings

No findings of significance were identified.

4OA2 Identification and Resolution of Problems (71152)

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

.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. 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 of significance 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 of significance 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 October 2008 through March 2009, 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 semi-annual trend inspection sample as defined in Inspection Procedure 71152-05.

b. Findings

No findings of significance 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 multiple occurrences in 2008 where by the actuator nitrogen dome pressures for the Main Steam Isolation Valves had exceeded the licensee's "Operational Decision Making Input" limits due to changes in ambient temperatures. The inspectors considered the following during the review of the licensee's actions: (1) complete and accurate identification of the problem in a timely manner; (2) evaluation and disposition of operability/reportability issues; (3) consideration of extent of condition, generic implications, common cause, and previous occurrences; (4) classification and prioritization of the resolution of the problem; (5) identification of root and contributing causes of the problem; (6) identification of corrective actions; and (7) completion of corrective actions in a timely manner

These activities constitute completion of one (1) in-depth problem identification and resolution sample as defined in Inspection Procedure 71152-05.

b. Findings

No findings of significance were identified.

4OA5 Other Activities

.1 Quarterly Resident Inspector Observations of Security Personnel and Activities

a. Inspection Scope

During the inspection period, the inspectors performed observations of security force personnel and activities to ensure that the activities were consistent with Waterford Steam Electric Station security procedures and regulatory requirements relating to nuclear plant security. These observations took place during both normal and off-normal plant working hours.

These quarterly resident inspector observations of security force personnel and activities did not constitute any additional inspection samples. Rather, they were considered an integral part of the inspectors' normal plant status review and inspection activities.

b. Findings

No findings of significance were identified.

.2 (Closed) Unresolved Item 05000382/2008005-05: Review results of 'B' train performance testing of component cooling water heat exchanger and auxiliary component cooling water wet cooling tower.

During a triennial heat sink inspection, the inspector noted that the licensee had failed to perform heat exchanger testing of the component cooling water heat exchanger and wet cooling tower within the maximum period specified in the licensee's commitments made in response to Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment." The heat exchanger testing was subsequently performed on December 9, 2008, and the inspector performed an in-office review of documentation of the test results and discussed them with onsite system engineer, heat exchanger engineer, and licensing personnel.

The results indicated that the component cooling water heat exchanger and wet cooling tower were operable. Therefore, the failure to perform heat exchanger testing in accordance with regulatory commitments did not violate NRC requirements, and was determined to have minor significance because the system was capable of performing its safety function.

4OA6 Meetings

Exit Meeting Summary

On March 26, 2009, the result of the review of URI 2008005-05 was discussed with Mr. M. Mason, Licensing. The licensee acknowledged the URI closure as a minor performance deficiency. The inspector confirmed that no proprietary information was reviewed.

On April 8, 2009, the inspectors presented the inspection results to Mr. Joseph Kowalewski, and other members of the licensee 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.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

M. Adams, Supervisor, System Engineering
S. Anders, Manager, Plant Security
B. Briner, Technical Specialist IV, Componet Engineering
K. Christian, Director, Nuclear Safety Assurance
K. Cook, Manager, Operations
C. Fugate, Assistant Manager, Operations
D. Gallodoro, Senior Engineer, Design Engineering
J. Kowalewski, Vice President of Operations
B. Lanka, Manager, Design Engineering
J. Lewis, Manager, Emergency Preparedness
B. Lindsey, Manager, Maintenance
M. Mason, Senior Licensing Specialist, Licensing
P. McKenna, Technical Specialist IV, System Engineering
W. McKinney, Manager, Corrective Action and Assessments
R. Murillo, Manager, Licensing
K. Nicholas, Director, Engineering
O. Pipkins, Senior Licensing Specialist, Licensing
R. Putnam, Manager, Programs and Components
G. Scot, Engineer, Licensing
R. Williams, Senior Licensing Specialist, Licensing

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000382/2009002-01	FIN	Failure to Follow Commitment Tracking Procedures
05000382/2009002-02	NCV	Failure to Obtain Voltage Readings Following a Single Cell Battery Charge

Closed

05000382/2008005-05	URI	Failure to Conduct Performance Testing on the CCW heat exchangers and ACCW wet cooling towers per GL 89-13 (Section 4OA5)

LIST OF DOCUMENTS REVIEWED

Section 1RO1: Adverse Weather Protection

CONDITION REPORTS

CR-WF3-2008-0286	CR-WF3-2008-0288	CR-WF3-2008-0743	CR-WF3-2008-1742
CR-WF3-2008-5461	CR-WF3-2008-5690	CR-WF3-2008-5704	CR-WF3-2008-5873
CR-WF3-2009-0102			

WORK ORDERS

56689	54595

PROCEDURES/DOCUMENTS

NUMBER	TITLE	REVISION
OP-002-007	Freeze Protection and Temperature Maintenance	14

Section 1RO4: Equipment Alignment

WORK ORDERS

51677351-01	00019633-01	51662304-01	51671297-01
51668142-01	51666041-01	00020848-06	51688368-01
51662471-01	51656267-01	51697234-01	51658957-01
51656403-01	51656403-01	51660536-01	

PROCEDURES/DOCUMENTS

NUMBER	TITLE	REVISION
OP-002-001	Auxiliary Component Cooling Water	302
OP-009-003	Emergency Feedwater	300
OP-009-008	Safety Injection	25
OP-009-002	Emergency Diesel Generator	308

Section 1RO5: Fire Protection

PROCEDURES/DOCUMENTS

NUMBER	TITLE	REVISION
UNT-005-013	Fire Protection Program	10
OP-009-004	Fire Protection	305
MM-004-424	Building Fire Hose Station Inspection and Hose Replacement	10
MM-007-010	Fire Extinguisher Inspection and Extinguisher Replacement	302
FP-001-014	Duties of a Fire Watch	14
FP-001-015	Fire Protection Impairments	302
DBD-018	Appendix R/Fire Protection	

Section 1R11: Licensed Operator Requalification Program

PROCEDURES/DOCUMENTS

NUMBER	TITLE	REVISION
E-117	Simulator Exam Scenario	
OP-901-120	Pressurizer Pressure Control Malfunction	301
OP-901-201	Steam Generator Level Control System Malfunction	3
OP-901-511	Instrument Air Malfunction	8
OP-902-000	Standard Post Trip Actions	10
OP-902-002	Loss of Coolant Accident Recovery Procedure	12

Section 1R12: Maintenance Effectiveness

CONDITION REPORTS

CR-WF3-2007-0938	CR-WF3-2007-1220	CR-WF3-2008-5054	CR-WF3-2008-5754
CR-WF3-2007-4399	CR-WF3-2007-4218	CR-WF3-2007-2732	CR-WF3-2007-0456
CR-WF3-2006-3072	CR-WF3-2006-4250	CR-WF3-2008-4179	CR-WF3-2008-5922
CR-WF3-2008-5921	CR-WF3-2008-5885	CR-WF3-2008-5835	CR-WF3-2008-5661
CR-WF3-2008-5486	CR-WF3-2008-5406	CR-WF3-2008-5351	CR-WF3-2008-4636
CR-WF3-2008-1950	CR-WF3-2008-1887	CR-WF3-2008-4231	CR-WF3-2008-2515
CR-WF3-2009-0470	CR-WF3-2009-0463	CR-WF3-2009-0462	CR-WF3-2009-0140
CR-WF3-2008-5768	CR-WF3-2008-5778	CR-WF3-2008-5783	

WORK ORDERS

95811

PROCEDURES/DOCUMENTS

NUMBER	TITLE	REVISION
DC-121	Maintenance Rule	1
NUMARC 93-01	Industry Guideline for Monitoring the Effectiveness of maintenance at Nuclear Power Plants	3
MI-004-643	Maintenance of Main Steam Isolaiton Valve Dome Nitrogen Charge Pressure, MS MVAAA 124 or MS MVAAAA124 B	2

Section 1R13: Maintenance Risk Assessment and Emergent Work Controls

CONDITION REPORTS

CR-WF3-2009-0268	CR-WF3-2009-0269	CR-WF3-2009-0284	CR-WF3-2009-0288
CR-WF3-2009-0193	CR-WF3-2007-1490	CR-WF3-2009-1616	

WORK ORDERS

174326	51689027	51056095

PROCEDURES/DOCUMENTS

NUMBER	TITLE	REVISION / DATE
LI-110	Commitment Management Program	0
EN-LI-110	Commitment Management Program	0
EN-WM-101	On-Line Work Management Process	1
ME-003-200	Station Battery Bank and Charger (Weekly)	301
ME-003-210	Station Battery Bank and Charger (Quarterly)	12
ME-001-012	Temporary Power from Temporary Diesel 3A2 and 3A2 4kV Buses (Mode 1-6)	302
OI-037-000	Operations Risk Assessment Guideline	2
OP-006-003	125 Vdc Electrical Distribution	301
OP-002-003	Component Cooling Water System	305
OP-009-002	Emergency Diesel Generator	308
S-SAMG-01	Loss of Large Areas of the Plant Due to Fire/Explosion	2 and 3
W3F1-2005-0038	Response to NRC Guidance Regarding Mitigation Strategies	5/31/05

Section 1R15: Operability Evaluations

CONDITION REPORTS

CR-WF3-2008-0952 CR-WF3-2008-0955 CR-WF3-2008-2645 CR-WF3-2009-0268

PROCEDURES/DOCUMENTS

NUMBER	TITLE	REVISION
EN-0P-104	Operability Determinations	4
MI-004-643	Maintenance of Main Steam Isolation Valve Dome Nitrogen Charge Pressure MS MVAAA124 A or MS MVAAAA124 B	2
OP-TEM-006	Temporary Emergency Diesel Generator	1
OP-TEM-008	Emergency Diesel Generator (B) Backup Temporary Diesel Generator(s)	3
ME-003-200	Station Battery Bank and Charger (Weekly)	301
ME-003-210	Station Battery Bank and Charger (Quarterly)	12
OP-006-005	Inverters and Distribution	302
OP-006-003	125 Vdc Electrical Distribution	301
OP-006-001	Plant Distribution (7kV, 4kV and SSD) System	305
OP-500-011	Control Room Cabinet M	29
OP-500-012	Control Room Cabinet N	28

Section 1R18: Plant Modifications

CONDITION REPORTS

CR-WF3-2009-0942	CR-WF3-2009-1088	CR-WF3-2009-1099	CR-WF3-2008-5922
CR-WF3-2008-5486	CR-WF3-2009-1091		

WORK ORDERS

175285-02	175285-03	108092	185093-01
163830-01	51693544-01	5169304-01	

PROCEDURES/DOCUMENTS

NUMBER	TITLE	REVISION / DATE
IEEE 450	Recommended Practice for Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Generating Stations and Substations	1980
ME-003-200	Station Battery Bank and Charger (Weekly)	301
OP-006-003	125 Vdc Electrical Distribution	301
ME-003-220	Station Battery Bank and Charger	301
ME-004-231	Station Battery Charging	16
EN-OP-111, Att. 9.2	Station Battery Monitoring Plan ODMI	12/28/2008

Section 1R19: Postmaintenance Testing

CONDITION REPORTS

CR-WF3-2008-0064	CR-WF3-2008-4297	CR-WF3-2008-5358	CR-WF3-2009-0539

WORK ORDERS

51695220	174326

PROCEDURES/DOCUMENTS

NUMBER	TITLE	REVISION / DATE
ME-004-213	Battery Intercell Connections	13
ME-004-807	Battery Cell Jumpering and Replacement	301
OP-903-003	Charging Pump Operability Check	11
OP-903-030	Safety Injection Pump Operability Verification	15
OP-903-068	Emergency Diesel Generator and Subgroup Relay	302

Section 1R22: Surveillance Testing

CONDITION REPORTS

CR-WF3-2008-1143	CR-WF3-2008-4189	CR-WF3-2008-4203	CR-WF3-2008-4765

PROCEDURES/DOCUMENTS

NUMBER	TITLE	REVISION
OP-903-006	Reactor Trip Breaker Test	9
OP-903-121	Safety Systems Quarterly Inservice Valve Tests	9
OP-903-114	Emergency Feedwater Flow Verification	300
OP-904-007	Charging Pump Pulsation Damper Pressure Check	9

Section 1EP6: Drill Evaluation

PROCEDURES/DOCUMENTS

NUMBER	TITLE	REVISION
EP-001-001	Recognition and Classification of Emergency Conditions	22
EP-001-030	Site Area Emergency	300
EP-001-040	General Emergency	300

Section 4OA1: Performance Indicator Verification

PROCEDURES/DOCUMENTS

NUMBER	TITLE	REVISION
NEI 99-02	Regulatory Assessment Performance Indicator Guideline	5

Section 4OA2: Identification and Resolution of Problems

CONDITION REPORTS

CR-WF3-2009-0539	CR-WF3-2009-0197	CR-WF3-2009-0663	CR-WF3-2009-0802
CR-WF3-2008-5852	CR-WF3-2009-0069	CR-WF3-2008-4179	CR-WF3-2009-0697
CR-WF3-2009-0687	CR-WF3-2009-0239	CR-WF3-2009-0262	CR-WF3-2009-0729

PROCEDURES/DOCUMENTS

NUMBER	TITLE	REVISION
EN-LI-118	Root Cause Analysis Process	9

Section 4OA5: Other Activities

CONDITION REPORT

CR-WF3-2009-0599

PROCEDURES/DOCUMENTS

NUMBER	TITLE	DATE
PE-004-021	B Component Cooling Water Heat Exchanger Test 12-9-08 Thermal Performance Analysis	1/19/09