



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

REGION II  
SAM NUNN ATLANTA FEDERAL CENTER  
61 FORSYTH STREET, SW, SUITE 23T85  
ATLANTA, GEORGIA 30303-8931

January 25, 2008

Carolina Power and Light Company  
ATTN: Mr. Tom Walt  
Vice President - Robinson Plant  
H. B. Robinson Steam Electric Plant  
Unit 2  
3851 West Entrance Road  
Hartsville, SC 29550

SUBJECT: H.B. ROBINSON STEAM ELECTRIC PLANT - NRC INTEGRATED  
INSPECTION REPORT 05000261/2007005

Dear Mr. Walt:

On December 31, 2007, the US Nuclear Regulatory Commission (NRC) completed an inspection at your H.B. Robinson reactor facility. The enclosed integrated inspection report documents the inspection findings, which were discussed on January 3, 2008, with you and other members of your staff.

The inspection 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.

Based on the results of this inspection, the inspectors identified one issue of very low safety significance (Green). This issue was determined to involve a violation of NRC requirements. Additionally two licensee-identified violations which were determined to be of very low safety significance are listed in Section 40A7 of this report. However, because of their very low safety significance and because they have been entered into your corrective action program (CAP), the NRC is treating these issues as non-cited violations (NCV), in accordance with Section VI.A.1 of the NRC's Enforcement Policy. If you contest these NCVs, 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 II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the H.B. Robinson facility.

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 (PARS) 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/***

Randall A. Musser, Chief  
Reactor Projects Branch 4  
Division of Reactor Projects

Docket No.: 50-261  
License No.: DPR-23

Enclosure: Inspection Report 05000261/2007005  
w/Attachment: Supplemental Information

cc w/encls: See page 3

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Report to Tom Walt from Randall A. Musser dated January 25, 2008.

SUBJECT: H.B. ROBINSON STEAM ELECTRIC PLANT - NRC INTEGRATED  
INSPECTION REPORT 05000261/2007005

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U.S. Nuclear Regulatory Commission

2112 Old Camden Rd

Hartsville, SC 29550

U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No: 50-261

License No: DPR-23

Report No: 005000261/2007005

Facility: H. B. Robinson Steam Electric Plant, Unit 2

Location: 3581 West Entrance Road  
Hartsville, SC 29550

Dates: October 1, 2007, through December 31, 2007

Inspectors: R. Hagar, Senior Resident Inspector  
E. Morris, Resident Inspector

Approved by: R. Musser, Chief  
Reactor Projects Branch 4  
Division of Reactor Projects

Enclosure

## SUMMARY OF FINDINGS

IR 05000261/2007-005, Carolina Power and Light Company; 10/1/07-12/31/07; H.B. Robinson Steam Electric Plant, Unit 2; Maintenance Effectiveness.

The report covered a three-month period of inspection by resident inspectors. One NRC identified non-cited violation (NCV) was identified. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using IMC 0609, "Significance Determination Process" (SDP). Findings for which the SDP 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 July 2006.

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

#### **Cornerstone: Mitigating Systems**

- Green. The inspectors identified a non-cited violation of 10 CFR 50, Appendix B, Criterion XVI for the licensee's failure in 2005 to determine the cause of a failure of the steam-driven auxiliary feedwater pump to start, thereby allowing a subsequent similar failure in 2007.

The performance deficiency was more than minor because it affected the equipment performance attribute of the Mitigating Systems cornerstone. Specifically, the performance deficiency decreased the reliability of the SDAFW pump by increasing the probability that the pump's governor air supply solenoid valve would fail to open on demand. This finding was determined to have very low safety significance because it was not a design or qualification deficiency and did not represent the loss of a system safety function. This finding has a cross-cutting aspect in the area of Human Performance because the licensee did not ensure that personnel, equipment, procedures, and other resources were available and adequate to assure nuclear safety (H.2.c), in that the licensee did not ensure that resources were available and adequate to produce a complete investigation for a significant condition adverse to quality. (Section 1R12)

### B. Licensee-Identified Violations

Two violations of very low safety significance which were identified by the licensee were reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the Corrective Action Program. These violations and corrective action tracking numbers are listed in Section 40A7 of this report.

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## REPORT DETAILS

Summary of Plant Status The unit began the inspection period at rated thermal power, and operated at full power for the entire inspection period.

### 1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity

#### 1R01 Adverse Weather Protection

##### a. Inspection Scope

After the licensee completed preparations for low temperatures, the inspectors walked down the service water pumps, auxiliary feedwater system, and safety injection system. These systems were selected because their safety related functions could be affected by adverse weather. The inspectors reviewed documents listed in the Attachment, observed plant conditions, and evaluated those conditions using criteria documented in Procedure AP-008, Cold Weather Preparations. Documents reviewed are listed in the Attachment.

The inspectors reviewed the following action request (AR) associated with this area to verify that the licensee identified and implemented appropriate corrective actions:

- AR 227883, Freeze protection for Service Water Pump components under clearance greater than 30 days.

##### b. Findings

No findings of significance were identified.

#### 1R04 Equipment Alignment

##### a. Inspection Scope

##### Partial System Walkdowns

The inspectors performed the following three partial system walkdowns, while the indicated structures, systems, and/or components (SSCs) were out-of-service for maintenance and testing:

<u>System Walked Down</u>	<u>SSC Out of Service</u>	<u>Date Inspected</u>
Steam Driven Auxiliary Feedwater train	A Motor Driven Auxiliary Feedwater pump	October 4
B Service Water Booster Pump train	A Service Water Booster Pump	October 22

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B Instrument Air Compressor  
Train

A Instrument Air  
Compressor

October 29

To evaluate the operability of the selected trains under these conditions, the inspectors compared observed positions of valves, switches, and electrical power breakers to the procedures and drawings listed in the Attachment. The inspectors also walked down the trains. During the walkdowns, the inspectors reviewed the following:

- Valves were correctly positioned and did not exhibit leakage that would impact the functions of any given valve.
- Electrical power was available as required.
- Major system components were correctly labeled, lubricated, cooled, ventilated, etc.
- Hangers and supports were correctly installed and functional.
- Essential support systems were operational.
- Ancillary equipment or debris did not interfere with system performance.
- Tagging clearances were appropriate.
- Valves were locked as required by the locked valve program.

The inspectors reviewed the documents listed in the Attachment to verify that the ability of the system to perform its functions could not be affected by outstanding design issues, temporary modifications, operator workarounds, adverse conditions, and other system-related issues tracked by the engineering department.

The inspectors reviewed the following AR associated with this area to verify that the licensee identified and implemented appropriate corrective actions:

- AR 228308, Low cooling water flow to circulating water pumps

b. Findings

No findings of significance were identified.

1R05 Fire Protection

a. Inspection Scope

For the six areas identified below, the inspectors reviewed the control of transient combustible material and ignition sources, fire detection and suppression capabilities, fire barriers, and any related compensatory measures to verify that those items were consistent with Updated Final Safety Analysis Report (UFSAR) Section 9.5.1, Fire Protection System, and UFSAR Appendix 9.5.A, Fire Hazards Analysis. The inspectors walked down accessible portions of each area and reviewed results from related surveillance tests to verify that conditions in these areas were consistent with descriptions of the areas in the UFSAR. Documents reviewed are listed in the Attachment.

The following areas were inspected:

<u>Fire Zone</u>	<u>Description</u>
20	Emergency Switchgear Room and Electrical Equipment Area
26	Yard Transformers
7	Auxiliary Building Hallway (Ground Floor)
1	Diesel Generator "B" Room
25F	Turbine Building East & West Mezzanine
25G	Turbine Building Operating Deck

The inspectors reviewed the following AR associated with this area to verify that the licensee identified and implemented appropriate corrective actions:

- AR 211614, Emergency Diesel Generator CO2 system flex hose kinked

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification

a. Inspection Scope

On December 11, the inspectors observed licensed-operator performance during requalification simulator training for crew one to verify that actual operator performance was consistent with expected operator performance, as described in Exercise Guide LOCT 04-5. This training tested the operators' ability to operate components from the control room, direct auxiliary operator actions, and determine the appropriate emergency action level classifications while responding to a pressurizer level transmitter failure, high vibrations on the main turbine, a steam line break inside containment, and the failure of the safety injection pumps. The inspectors focused on clarity and formality of communication, the use of procedures, alarm response, control board manipulations, group dynamics, and supervisory oversight.

The inspectors observed the post-exercise critique to verify that the licensee identified deficiencies and discrepancies that occurred during the simulator training.

Documents reviewed are listed in the Attachment.

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectivenessa. Inspection Scope

The inspectors reviewed the two degraded SSC/function performance problems or conditions listed below to verify the appropriate handling of these performance problems or conditions in accordance with 10 CFR 50, Appendix B, Criterion XVI, Corrective Action, and 10 CFR 50.65, Maintenance Rule. Documents reviewed are listed in the Attachment.

The problems/conditions and their corresponding ARs were:

<u>Performance Problem/Condition</u>	<u>AR(s)</u>
Surveillance test failure of RMS-2 after air solenoid replacement	222904 223595
Unplanned unavailability of the [steam driven auxiliary feedwater] pump	242583

During the reviews, the inspectors focused on the following:

- Appropriate work practices,
- Identifying and addressing common cause failures,
- Scoping in accordance with 10 CFR 50.65(b),
- Characterizing reliability issues (performance),
- Charging unavailability (performance),
- Trending key parameters (condition monitoring),
- 10 CFR 50.65(a)(1) or (a)(2) classification and reclassification, and
- Appropriateness of performance criteria for SSCs/functions classified (a)(2) and/or appropriateness and adequacy of goals and corrective actions for SSCs/functions classified (a)(1).

b. Findings

Introduction: On August 8, 2005, the steam-driven auxiliary feedwater (SDAFW) pump failed to start during a routine surveillance test. At the time, the frequency at which the licensee had been testing the pump (once per quarter) was not consistent with monthly testing that had been recommended by the vendor of the pump governor's air supply solenoid valve. The licensee determined the failure to be a significant condition adverse to quality, and initiated AR 165893 to investigate it. The investigation team identified two "most likely" causes of the failure, but did not review the testing frequency and did not identify a root cause. The licensee implemented corrective actions to address the most-likely causes. No corrective action changed the frequency at which the SDAFW pump was tested.

On August 12, 2007, the SDAFW pump again failed to start during a routine surveillance test. The licensee addressed that failure in AR 242583. The investigation report for AR 242583 stated that the August 12, 2007, failure had been a repeat of the August 8, 2005, failure, and

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that the cause of both failures had been sticking of the pump's governor air supply solenoid valve. The report also stated that the cause of the valve sticking was that the licensee had not been cycling that valve as frequently as the valve vendor had recommended. Corrective actions described in the report included revising the monthly surveillance procedure to require starting the SDAFW pump every month. The August 12, 2007, event was therefore a result of the licensee's failure to determine the cause of the August 8, 2005 event and their consequential failure to take effective action to preclude repetition.

Description: The performance deficiency in these circumstances is the licensee's failure to identify the cause of the August 8, 2005, event. The licensee determined that event to be a significant condition adverse to quality, and for a significant condition adverse to quality, 10 CFR 50, Appendix B, Criterion XVI requires, in part, that the licensee determine the cause of the condition and take corrective action to preclude repetition. The licensee's failure to identify the cause of the August 8, 2005, event and their consequential failure to take corrective action to preclude repetition allowed a similar failure to occur on August 12, 2007.

Analysis: The performance deficiency was more than minor because it is associated with the equipment performance attribute of the Mitigating Systems cornerstone. Specifically, the performance deficiency allowed a continuation of the licensee's failure to cycle the governor air supply solenoid valve in accordance with the vendor's recommendation, which increased the probability that the valve would fail to open on demand, and thereby decreased the reliability of the SDAFW pump. Using the Phase 1 worksheet in Manual Chapter 0609, Appendix A, this performance deficiency was determined to have very low safety significance because it was not a design or qualification deficiency and did not represent the loss of a system safety function. This finding has a cross-cutting aspect in the area of Human Performance, because the licensee did not ensure that personnel, equipment, procedures, and other resources were available and adequate to assure nuclear safety (H.2.c), in that the licensee did not ensure that resources were available and adequate to produce a complete investigation for a significant condition adverse to quality.

Enforcement: 10 CFR 50, Appendix B, Criterion XVI requires, in part, that the measures established for identifying and correcting conditions adverse to quality shall, for significant conditions adverse to quality, assure that the cause of the condition is determined and corrective action taken to preclude repetition. Contrary to the above, following a failure of the SDAFW pump to start on August 8, 2005, an event determined by the licensee to be a significant condition adverse to quality and documented in AR 165893, the licensee failed to identify the cause of the condition, and therefore failed to take corrective action to preclude repetition. Specifically, the licensee failed to discover that the frequency at which they were testing the SDAFW pump (at that time, once every 3 months) was longer than the frequency at which the vendor of the SDAFW pump governor air supply solenoid valve recommended that the valve be cycled to prevent sticking (once every 31 days). Consequently, the licensee failed to change the frequency of cycling the SDAFW pump governor air supply solenoid valve to a frequency that would prevent sticking of that valve, and on August 12, 2007, the SDAFW pump failed to start in circumstances that were essentially identical to those in 2005.

Because this finding was of very low safety significance and has been entered into the licensee's corrective action program as AR 258487, consistent with Section VI.A of the NRC

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Enforcement Policy, this violation is being treated as a non-cited violation, and is designated as NCV 05000261/2007005-01, "Failure to determine the cause of a failure of the steam-driven auxiliary feedwater pump to start".

#### 1R13 Maintenance Risk Assessments and Emergent Work Evaluation

##### a. Inspection Scope

For the four time periods listed below, the inspectors reviewed risk assessments and related activities to verify that the licensee performed adequate risk assessments and implemented appropriate risk-management actions when required by 10 CFR 50.65(a)(4). For emergent work, the inspectors also verified that any increase in risk was promptly assessed, and that appropriate risk-management actions were promptly implemented. Documents reviewed are listed in the Attachment. Those periods included the following:

- November 2 - 11, including scheduled maintenance on the B motor driven auxiliary pump.
- December 3 - 7, including emergent work on the A coolant charging pump.
- December 10 - 14, including scheduled maintenance on the C service water pump and emergent work on the C component cooling water pump.
- December 17 - 21, including scheduled maintenance on the B coolant charging pump, A service water booster pump, and calibration of pressurizer protection channels.

##### b. Findings

No findings of significance were identified.

#### 1R15 Operability Evaluations

##### a. Inspection Scope

The inspectors reviewed the two operability determinations associated with the ARs listed below. The inspectors assessed the accuracy of the evaluations, the use and control of any necessary compensatory measures, and compliance with the Technical Specification (TS). The inspectors verified that the operability determinations were made as specified by Procedure OPS-NGGC-1305, Operability Determinations. The inspectors compared the justifications provided in the determinations to the requirements from the TS, the UFSAR, and associated design-basis documents to verify that operability was properly justified and the subject components or systems remained available, such that no unrecognized increase in risk occurred:

- AR 252880, [Dedicated Shutdown Diesel Generator] ventilation fan "A" pulley and belt fell off shaft.

- AR 251953, Potential impact on meteorological tower wind measurements due to proximity of Unit 1 Fly Ash Silo.

Documents reviewed are listed in the Attachment.

b. Findings

No findings of significance were identified.

1R19 Post Maintenance Testing

a. Inspection Scope

For the five post-maintenance tests listed below, the inspectors witnessed the test and/or reviewed the test data to verify that test results adequately demonstrated restoration of the affected safety functions described in the UFSAR and TS. Documents reviewed are listed in the Attachment.

The following tests were witnessed/reviewed:

<u>Test Procedure</u>	<u>Title</u>	<u>Related Maintenance Activity</u>	<u>Date Inspected</u>
OST-201-1	[Motor Driven Auxiliary Feedwater] Component Test - Train A	Complete preventive maintenance on the A motor driven auxiliary feedwater pump oil cooler	October 4
OST-910	Dedicated Shutdown Diesel Generator (Monthly)	Complete preventive maintenance on the dedicated shutdown diesel	October 18
MST-023	Safeguard Relay Rack Train "B"	Replace test switch for PC-951B(X2T) containment hi-hi pressure bistable	November 19
OST-908	Component Cooling System Component Test	Replace a seal on the C component cooling system pump	December 11
OST-303-1	Service Water Booster Pump A Test	Repair a seal leak on the A service water booster pump	December 20

The inspectors reviewed the following AR associated with this area to verify that the licensee

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identified and implemented appropriate corrective actions:

- AR 222882, post maintenance test leak check not documented for containment spray pump B

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing

a. Inspection Scope

For the five surveillance tests listed below, the inspectors witnessed testing and/or reviewed the test data to verify that the systems, structures, and components involved in these tests satisfied the requirements described in the TS, the UFSAR, and applicable licensee procedures, and that the tests demonstrated that the SSCs were capable of performing their intended safety functions. Documents reviewed are listed in the Attachment.

<u>Test Procedure</u>	<u>Title</u>	<u>Date Inspected</u>
OST-352-2	Containment Spray Component Test-Train B	October 11
OST-251-1*	[Residual Heat Removal] Pump A and Components Test - Train A	November 1
OST-051**	Reactor Coolant System Leakage Evaluation (Every 72 Hours During Steady State Operation and Within 12 Hours of Reaching Steady State Operation)	November 8
OST-014	[LLRT] of Personnel Air Lock Door Seals (Within Three Days of Entry When CV Integrity is Required)	November 15
OST-409-2	[Emergency Diesel Generator] "B" Fast Speed Start	December 5

\*This procedure included inservice testing requirements.

\*\* This procedure was a Reactor Coolant System leakage detection surveillance.

b. Findings

No findings of significance were identified.

## Cornerstone: Emergency Preparedness

### 1EP6 Drill Evaluation

#### a. Inspection Scope

On October 9, the inspectors observed an emergency preparedness drill to verify licensee self-assessment of classification, notification, and protective action recommendation development in accordance with 10 CFR 50, Appendix E. The inspectors also attended the post-drill critique to verify that the licensee properly identified failures in classification, notification and protective action recommendation development activities. Documents reviewed are listed in the Attachment.

#### b. Findings

No findings of significance were identified.

### 4. OTHER ACTIVITIES

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

#### a. Inspection Scope

The inspectors verified the PIs identified below. For each PI, the inspectors verified the accuracy of the PI data that had been previously reported to the NRC by comparing those data to the actual data, as described below. The inspectors also compared the licensee's basis in reporting each data element to the PI definitions and guidance contained in NEI 99-02, "Regulatory Assessment Indicator Guideline," Rev. 4. In addition, the inspectors interviewed licensee personnel associated with collecting, evaluating, and distributing these data.

#### Initiating Events Cornerstone

- Unplanned Scrams
- Scrams with Loss of Heat Removal
- Unplanned Power Changes

For the period from the third quarter of 2006 through the second quarter of 2007, the inspectors reviewed a selection of licensee event reports, operator log entries, daily reports (including the daily CR descriptions), monthly operating reports, and PI data sheets to verify that the licensee had accurately identified the number of scrams and unplanned power changes greater than 20 percent that occurred during the subject period. The inspectors compared those numbers to the numbers reported by the licensee for the PI. The inspectors also reviewed the accuracy of the number of critical hours reported, and the licensee's basis for crediting normal heat removal capability for each of the reported reactor scrams.

### Mitigating Systems Cornerstone

- Emergency AC Power
- High Pressure Safety Injection
- Cooling Water Systems
- Safety System Functional Failures

For the Emergency AC Power, High Pressure Safety Injection, and Cooling Water Systems, the inspectors reviewed the mitigating systems performance indicators for the first time during this quarter, and therefore extended the review period from the second quarter of 2006 through the second quarter of 2007. The Safety System Functional Failures PI had been reviewed last year, so its review period extended only from the third quarter of 2006 through the second quarter of 2007. For these PIs and during these periods, the inspectors reviewed Licensee Event Reports (LERs), records of inoperable equipment, and Maintenance Rule records to verify that the licensee had accurately accounted for unavailability hours that the subject systems had experienced during the subject period. The inspectors also reviewed the number of hours those systems were required to be available and the licensee's basis for identifying unavailability hours.

#### b. Findings

No findings of significance were identified.

### 4OA2 Identification and Resolution of Problems

#### .1 Routine Review of ARs

To aid in the identification of repetitive equipment failures or specific human performance issues for followup, the inspectors performed frequent screenings of items entered into the CAP. The review was accomplished by reviewing daily AR reports.

#### .2 Annual Sample Review

##### a. Inspection Scope

The inspectors selected AR 234632 ([Leading Edge Flow Monitor] uncertainty analysis change) for detailed review. The inspectors selected this AR because it relates specifically to operator workaround 07-02, which required control room operators to continuously monitor two computer data points to verify proper operation of the higher accuracy primary heat balance calculation instrumentation. The inspectors reviewed this report to verify:

- complete and accurate identification of the problem in a timely manner;
- evaluation and disposition of performance issues;
- evaluation and disposition of operability and reportability issues;
- consideration of extent of condition, generic implications, common cause, and previous occurrences;
- appropriate classification and prioritization of the problem;

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- identification of root and contributing causes of the problem;
- identification of corrective actions which were appropriately focused to correct the problem; and
- completion of corrective actions in a timely manner.

The inspectors also reviewed this AR to verify compliance with the requirements of the CAP as delineated in Procedure CAP-NGGC-0200, Corrective Action Program, and 10 CFR 50, Appendix B. Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings of significance were identified.

3. Semi-Annual Trend Review

a. Inspection Scope

The inspectors performed a review of the CAP and associated documents to identify trends that could indicate the existence of a more significant safety issue. The inspector's review focused on repetitive equipment issues, but also considered the results of daily inspector CAP item screening discussed in Section 40A2.1, licensee trending efforts, and licensee human performance results. The inspector's review nominally considered the six month period of June, 2007, through December, 2007, although some examples expanded beyond those dates when the scope of the trend warranted. The review included issues documented outside the normal CAP 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 latest monthly and quarterly trend reports. Corrective actions associated with a sample of the issues identified in the trend reports were reviewed for adequacy. The specific documents reviewed are listed in the Attachment.

The inspectors also evaluated the trend reports against the requirements of the CAP as specified in 10 CFR 50, Appendix B, Criterion XVI, and in Procedures CAP-NGGC-0200, Corrective Action Program, CAP-NGGC-0206, Corrective Action Program Trending and Analysis.

b. Assessment and Observations

No findings of significance were identified. The inspectors evaluated trending methodology and observed that the licensee had performed a detailed review. The licensee routinely reviewed cause codes, involved organizations, key words, and system links to identify potential trends in their CAP data. The inspectors compared the licensee process results with the results of the inspectors' daily screening, and did not identify any discrepancies or potential trends in the CAP data that the licensee had failed to identify.

#### 4OA5 Other Activities

##### .1 Operation of an Independent Spent Fuel Storage Installation (ISFSI) (IP 60855.1)

###### a. Inspection Scope

The inspectors performed a walkdown of the two ISFSIs on site (reference docket 72-3 and 72-60). The inspectors also reviewed changes made to programs and procedures and their associated 10 CFR 72.48 screens and/or evaluations to verify that changes made were consistent with the license or Certificate of Compliance; reviewed records to verify that the licensee has recorded and maintained the location of each fuel assembly placed in the ISFSIs; and reviewed surveillance records to verify that daily surveillance requirements were performed as required by technical specifications. Documents reviewed are listed in the attachment.

###### b. Findings

No findings of significance were identified.

##### .2 (Closed) URI 05000261/2007003-01, Work Affecting Emergency Core Cooling Sump Piping in the Absence of Foreign Material Exclusion Controls

In inspection report 2007003, this issue had been identified for a failure to follow procedures, which resulted in the introduction of foreign material into piping between the emergency core cooling system (ECCS) reactor building sump and residual heat removal pumps A and B. This issue had been designated as an unresolved item pending further investigation to determine whether and to what extent the subject debris could affect safety functions during a postulated event that includes recirculation flow from the ECCS sump.

During the current inspection period, the licensee conducted full-scale tests to address this issue, and documented results from those tests in Engineering Change 68283, Testing and Analysis of [Robinson Nuclear Plant] Residual Heat Removal Pump Debris Tolerance. The inspectors observed those tests to verify that the tests replicated the system components and system configuration that existed in the plant, that debris used in the tests was similar to that found in the ECCS piping, and that test flow rates were similar to those that would have occurred during accident sequences that required water to flow through the piping where the debris was found. The inspectors also reviewed results from those tests and associated analyses to verify that test results were accurately recorded, and that the analyses were consistent with test details. In addition, the inspectors evaluated test and analysis results to determine whether and how the debris could have affected either an RHR pump or a downstream ECCS component. The inspectors concluded that although the debris could have been entrained in the flow, it would not have credibly produced any effect that would have prevented either the RHR pumps or a downstream ECCS component from performing their safety functions. This URI is therefore closed. However, these circumstances include a licensee-identified violation. That violation is described below in section 4OA7.2.

#### 4OA6 Meetings, Including Exit

On January 3, 2008, the resident inspectors presented the inspection results to Mr. Tom Walt and other members of his staff. The inspectors confirmed that proprietary information had not been provided or examined during the inspection.

#### 4OA7 Licensee-Identified Violations

The following violations of very low safety significance (Green) were identified by the licensee and are violations of NRC requirements which meet the criteria of Section VI of the NRC Enforcement Policy, NUREG-1600, for being dispositioned as a Non-Cited Violations (NCV).

##### .1 Unplanned Equipment Out of Service Orange Risk

On October 17, the licensee discovered that an inadequate risk evaluation had been performed on October 4 for maintenance that affected the A motor-driven auxiliary feedwater pump and its flow control valve. The licensee had initially determined that the plant configuration required for that maintenance would constitute a Yellow risk condition, based on recognizing that they expected to remove from service both the pump and its flowpath to the A steam generator. However, to establish the required clearance boundaries, the licensee actually removed from service not only the pump and its flowpath to the A steam generator, but also the flowpath from the pump to the B steam generator. The licensee subsequently determined that the resulting plant configuration (with a motor-driven auxiliary feedwater pump and two injection paths out of service) had constituted an Orange Risk condition, and that they had not recognized that at the time.

10 CFR 50.65 (a)(4) requires, in part, that before performing maintenance activities, the licensee shall assess and manage the increase in risk that may result from the proposed maintenance activities. The inspectors determined that the circumstances described above constituted a violation of 10 CFR 50.65 (a)(4) because in those circumstances, the licensee failed to assess and manage the increase in risk that resulted from the maintenance activities. In accordance with Manual Chapter 0612, Appendix B, this violation was more than minor because the licensee risk assessment failed to consider components of the auxiliary feedwater system that were unavailable during maintenance. Because this finding related to managing and assessing maintenance risk, the inspectors assessed its significance as described in NRC Manual Chapter 0609, Appendix K, Maintenance Risk Assessment and Risk Management Significance Determination Process. The incremental core damage probability deficit for this condition was determined not to exceed 1.0E-6 and therefore screened as a "Green Finding" utilizing Flowchart 1 of Appendix K. This violation is in the CAP as AR 251128.

##### .2 Work Affecting Emergency Core Cooling Sump Piping in the Absence of Foreign Material Exclusion Controls

On April 2, 2007, in response to NRC Information Notice 2006-20, "Foreign Material Found in the Emergency Core Cooling System," and in conjunction with licensee actions to resolve Generic Safety Issue 191, "Assessment of Debris Accumulation on PWR Sump Performance," the licensee used a remote video camera to visually inspect the two suction lines between the

emergency core cooling system (ECCS) sump and residual heat removal (RHR) pumps A and B. Inspection of the first line revealed a piece of wire approximately 30 inches long, and inspection of the second line revealed a stainless steel insulation band and other smaller items of metallic debris. The licensee's investigation of this event is documented in the significant adverse condition investigation report associated with AR 230613. That report states that the sump piping had previously been opened during refueling outage 18 (in 1998), when work was performed under Work Request/Job Order (WR/JO) 97-AEUV4, an instruction that, in part, directed workers to establish a foreign material exclusion area (FMEA) prior to removing the screens which separated the ECCS sump from its associated piping. The report further states that contrary to the instruction in that WR/JO, workers had performed work in the ECCS sump on March 8, 1998, before they established foreign-material exclusion controls on March 9, 1998.

The circumstances described above constitute a violation of 10 CFR 50, Appendix B, Criterion V, which requires, in part, that activities affecting quality be conducted in accordance with documented instructions of a type appropriate to the circumstances. Work conducted on the ECCS sumps during refueling outage 18 was an activity affecting quality and Work Request/Job Order (WR/JO) 97-AEUV4 was an instruction of a type appropriate to the circumstances of completing that work. Contrary to the above and during refueling outage 18, workers performed work in the ECCS sump before they established foreign-material exclusion controls. This finding is more than minor because it affected the Equipment Performance attribute of the Mitigating Systems cornerstone, in that foreign material in the ECCS sump suction lines degraded the performance of systems that respond to initiating events to prevent core damage. Using the Phase 1 worksheet in Manual Chapter 0609, Appendix A, this finding was determined to have very low safety significance because it was not a design or qualification deficiency and did not represent the actual loss of a safety function. This issue is in the licensee's CAP as AR 230613.

Attachment: Supplemental Information

Enclosure

## SUPPLEMENTAL INFORMATION

### KEY POINTS OF CONTACT

#### Licensee personnel

- C. Baucom, Manager, Support Services - Nuclear
- B. Clark, Training Manager
- W. Farmer, Engineering Manager
- J. Huegel, Maintenance Manager
- E. Kapopoulos, Plant General Manager
- J. Lucas, Nuclear Assurance Manager
- J. Rhodes, Radiation Protection Superintendent
- T. Tovar, Operations Manager
- T. Walt, Vice President
- S. Wheeler, Supervisor, Regulatory Support

#### NRC personnel

- R. Musser, Chief, Reactor Projects Branch 4

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

Opened

None

Closed

05000261/2007003-01	URI	Work Affecting Emergency Core Cooling Sump Piping in the Absence of Foreign Material Exclusion Controls
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Opened & Closed

05000261/2007005-01	NCV	Failure to Determine the Cause of a Failure of the Steam-Driven Auxiliary Feedwater Pump to Start
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Previous Items Closed

None

Discussed

None

**LIST OF DOCUMENTS REVIEWED**

1R01 Adverse Weather Protection

Procedures

AP-008, Cold Weather Preparations, Rev. 15  
AP-015, Portable Heaters/Heating Devices, Rev. 13  
PM-076, Electric Unit Heaters and Steam Unit Heaters, Rev. 7  
EDP-009, Freeze Protection Panels, Rev. 30  
OP-925, Cold Weather Operation, Rev. 38

1R04 Equipment Alignment

Steam Driven Auxiliary Feedwater train

OWP-001, Auxiliary Feedwater, Rev. 43  
Drawing G-190197, Feedwater Condensate and Air Evacuation System Flow Diagram, Sheet 1 of 4,  
Rev. 77  
Drawing G-190197, Feedwater Condensate and Air Evacuation System Flow Diagram, Sheet 4 of 4,  
Rev. 55

B Service Water Booster Pump train

OWP-017, Service Water, Rev. 52  
Drawing G-190199, Service & Cooling Water System Flow Diagram, Sheet 7 of 15, Rev. 38

B Instrument Air Compressor train

OP-905, Instrument and Station Air System, Rev. 97  
Drawing G-190200, Instrument and Station Air System Flow Diagram, Sheet 2 of 10, Rev. 33

1R05 Fire Protection

Sections of UFSAR Appendix 9.5.1A

3.1.5.5, Fire Zone 20 - Emergency Switchgear Room and Electrical Equipment Area  
3.7.8, Fire Zone 26 - Yard Transformers  
3.1.3.1 - Fire Zone 7 - Auxiliary Building Hallway (Ground Floor)  
3.1.1 - Fire Zone 1 - Diesel Generator "B" Room  
3.10.7 - Fire Zone 31 - Refueling Water Storage Tank  
3.10.8 - Fire Zone 32 - Primary Water Storage Tank  
3.8.1 - Fire Zone 30 - Diesel Oil Storage Tank  
3.7.6 - Fire Zone 25F - Turbine Building West Mezzanine  
3.7.7 - Fire Zone 25G - Turbine Building Operating Deck

Procedures; results from the following completed tests

OST-602, Unit 2 Fire Water System Flowpath Verification (Monthly) and Valve Cycling (Annually), Rev.  
43, 9/30/07  
OST-610, Unit 2 Portable Fire Extinguishers, Fire Hose Stations and Houses (Monthly), Rev. 47,  
10/13/07

OST-611-1, Low Voltage Fire Detection and Actuation System Zone 1& 2 (Semi-Annual), Rev. 6, dated 8/28/07  
OST-611-11, Low Voltage Fire Detection and Actuation System Zones 19 & 20 (Semi-Annual), Rev. 5, dated 6/10/07  
OST-611-6, Low Voltage Fire Detection and Actuation System Zone 11 & 13 (Semi-Annual), Rev. 5, dated 6/30/07  
OST-611-7, Low Voltage Fire Detection and Actuation System Zone 12 (Semi-Annual), Rev. 3, dated 6/9/07  
OST-620, Carbon Dioxide Suppression System Weight Test (Semi-Annual), Rev. 24, dated 7/25/07  
OST-621, Diesel Generator CO2 System Cylinder Weight Test (Semi-Annual), Rev. 23, dated 9/15/07  
OST-624, Fire Damper Inspection (18-Month), Rev. 21, dated 6/3/07  
OST-627, Function Test of the Emergency Diesel Generator CO2 Cardox Suppression System (Annual), Rev. 29, dated 1/29/07  
OST-628, Function Test of the Halon 1301 System (Annual), Rev 21, dated 9/5/06  
OST-630, Halon 1301 Suppression System Weight Test (Semi-Annual), Rev. 28, dated 7/24/07 and 7/25/07  
OST-642, Main Transformer Deluge System Flow Test (Annually), Rev 16, dated 4/18/07 and 4/22/07  
OST-643, Startup/Auxiliary Transformer Deluge System Flow Test (Annually), Rev. 19, dated 6/5/07  
OST-645, Turbine Lube Oil Deluge System Flow Test, Rev. 17, 6/4/07

Other documents

Work Order 1052259, Water motor gong did not sound during OST-642  
Work Order 1075883, Water motor gong did not sound during OST-643

1R11 Licensed Operator Requalification

TAP-409, Conduct of Simulator Training and Evaluation, Rev. 19  
LOCT 04-5, Full Scope Scenario, Rev. 1

1R12 Maintenance Effectiveness

Action Requests

165893, Steam-driven [auxiliary feedwater] pump trip  
222904, Extended [limiting condition for operation] time for R-11/12 due to RMS-2 failure  
223595, Potential rework of RMS-2 solenoid EV-1726  
242583, Unplanned unavailability of the [steam driven auxiliary feedwater] pump

Procedures

Results from OST-701-11, Radiation Monitoring Inservice Valve Test, Rev. 8, dated 2/19/07

Maintenance Rule Documents

For system 7005 Radiation Monitoring:

- Event list for previous 18 months
- Scoping and Performance Criteria

For system 3065, auxiliary feedwater system

- Event list for previous 18 months
- Scoping and Performance Criteria

- Performance Summary

Other Documents

[Engineering Disposition] 67723, [steam driven auxiliary feedwater] pump trip on low discharge pressure

Shift operating logs, 8/10/2007- 8/13/2007

[Engineering Change] 61907, [steam driven auxiliary feedwater pump] maintenance documentation

1R13     Maintenance Risk Assessments and Emergent Work Evaluation

Procedures

OMM-048, Work Coordination and Risk Assessment, Rev. 30

ADM-NGGC-0006, Online [Equipment out of Service] Models For Risk Assessment, Rev. 5

OMM-001-2, Shift Routines and Operating Practices, Rev. 51

1R15     Operability Evaluations

AR 252880, [Dedicated Shutdown Diesel Generator] ventilation fan "A" pulley and belt fell off shaft  
Procedure OP-602, Dedicated Shutdown System, Rev. 45

Control-room operator logs, 10/31/2007 - 11/01/2007

Engineering Service Request 9800435, [Dedicated Shutdown Diesel Generator] Intake Damper Failure  
Mode Evaluation, Rev. 0

Engineering Service Request 9400556, [Dedicated Shutdown Diesel Generator] [Heating, Ventilation,  
and Air Conditioning], Rev. 0

Condition Report 98-01115, Damper actuators on the Dedicated Shutdown Diesel Generator were not  
functioning on demand by the control circuit

AR 251953, Potential impact on meteorological tower wind measurements due to proximity of Unit 1  
Fly Ash Silo

UFSAR section 2.3.2 - Local Meteorology

UFSAR section 1.8 - Conformance to NRC Regulatory Guides

1R19     Post Maintenance Testing

MST-023, Safeguard Relay Rack Train "B", Rev. 18

OST-201-1, [Motor Driven Auxiliary Feedwater] Component Test - Train A, Rev. 26

OST-303-1, Service Water Booster Pump A Test, Rev. 5

OST-908, Component Cooling System Component Test, Rev. 64

OST-910, Dedicated Shutdown Diesel Generator (Monthly), Rev. 42

OWP-015, Reactor Protection and Safeguards RPS, Rev. 22

PLP-033, Post-Maintenance Testing Program, Rev. 39

Work Order 1123464-04, PC-951B(X2T) test switch #9 train B; check voltage and replace

1R22     Surveillance Testing

Procedures

OST-051, Reactor Coolant System Leakage Evaluation (Every 72 Hours During Steady State  
Operations and Within 12 Hours of Reaching Steady State Operation), Rev. 38

OST-251-1, [Residual Heat Removal] Pump A and Components Test - Train A, Rev. 19  
OST-352-2, Containment Spray Component Test- Train B, Rev. 29  
OST-014, [Local Leak Rate Test] of Personnel Air Lock Door Seals (Within Three Days of Entry When [Containment Vessel] Integrity is Required), Rev. 13  
OST-409-2, [Emergency Diesel Generator] "B" Fast Speed Start, Rev. 34

1EP6 Drill Evaluation

Emergency Response Organization Exercise, October 9, 2007  
Emergency Operating Procedure logic diagram PATH-1, Rev. 18  
Emergency Action Level diagram EAL-1, Rev. 15  
Emergency Action Level diagram EAL-2, Rev. 20  
NEI-99-02, Regulatory Assessment Performance Indicator Guideline, Rev. 5

4OA1 Performance Indicator Verification

Calculation RNP-F-PSA-0057, NRC Mitigating System Performance Index (MSPI) Basis Document, Rev. 4  
Procedure REG-NGGC-0009, NRC Performance Indicators and Monthly Operating Report Data, Rev. 7  
Procedure ADM-NGGC-0101, Maintenance Rule Program, Rev. 20  
Licensee Event Report 2007-001-00, Reactor Trip Due to a Loose Wire in the Main Transformer Monitoring Circuitry  
Maintenance Rule event reports that cover the previous 18 months, for the following systems:  
1000 (Containment Isolation Valve)  
1080 (Reactor Protection)  
2005 (Reactor Coolant)  
2045 (Residual Heat Removal)  
2060 (Chemical and Volume Control)  
2080 (Safety Injection)  
2116 (Post Accident Monitoring)  
4060 (Service Water System)  
4080 (Component Cooling Water)  
5095 (Emergency Diesel Generator)  
5235 (Electrical - [Direct Current] System)  
6135 (Instrument Air)  
6140 (Station Air)  
7105 (Spent Fuel)  
8220 ([Heating, Ventilation, and Air Conditioning] - Control Room Area)

4OA2 Identification and Resolution of Problems

Action Requests

AR 234632 [Leading Edge Flow Monitor] uncertainty analysis change

Procedures

CAP-NGGC-0200, Corrective Action Program, Rev. 19

CAP-NGGC-0206, Corrective Action Program Trending and Analysis, Rev. 2  
OMM-001-8, Control of Equipment and System Status, Rev. 37

Corrective Action Program Trend Reports

Site-Wide Analysis of Condition Reports for Performance Trends, July 1 – September 30, 2007  
[Environmental & Chemistry] and [Radiation Control] CAP Rollup & Trend Analysis September 2007  
Maintenance CAP Rollup & Trend Analysis, September 2007  
Operations CAP Rollup & Trend Analysis, September 2007  
Outage & Scheduling CAP Rollup & Trend Analysis, September 2007  
Plant Support Group CAP Rollup & Trend Analysis, May, June, July, August, and September 2007

40A5 Other Activities

.1 Independent Spent Fuel Storage Installation

Procedures

OST-021, Daily Surveillance, Rev. 20  
FMP-004, Special Nuclear Material (SNM) Inventory, Rev. 22  
REG-NGGC-0010, 10 CFR 50.59 and Selected Regulatory Reviews, Rev. 10  
NGGM-PM-0028, Transnuclear NUHOMS Dry Fuel Storage Program Manual, Rev. 0  
OM-NUH24PTH-118, NUHOMS System Operations Manual, Rev. 0  
AOP-028, [Independent Spent Fuel Storage Installation] Abnormal Events, Rev. 6

Other Documents

Certificate of Compliance No. 1004, Standardized NUHOMS Horizontal Modular Storage System

.2 Work Affecting Emergency Core Cooling Sump Piping in the Absence of Foreign Material Exclusion Controls

Sections of Engineering Change 68283, ECCS Recirculation Debris Impact Assessment, R.0

Attachment A, Testing and Analysis of RNP Residual Heat Removal Pump Debris Tolerance  
Appendix A, Flowserve Analytical Report  
Appendix B, Test Specification  
Appendix C, Test Loop Description  
Appendix D, Wyle Labs Test Plan  
Appendix E-1, Initial and Final Test Article Inspection Results  
Appendix E-2, Initial Test Article Hydraulic Performance Test  
Appendix E-3, Debris Test Documentation and Results  
Appendix E-4, Motor Monitoring During Debris Testing  
Appendix E-5, Vibration Measurements during Debris Testing  
Appendix E-6, Final Test Article Hydraulic Performance Test  
Appendix E-7, RNP Analytical Evaluation of RHR Debris Transport Velocity  
Appendix E-8, RHR Pump Test Statistical Analysis Results  
Appendix E-9, Description of Debris used during Debris Testing  
Appendix E-10, IST Hydraulic Performance Evaluation of RHR Pump Performance and Correlation of Wyle Laboratory Results to RNP Test Data

Other Documents

AR 230613, Assignment 16, ECCS Emergency Sump Debris Past Operability Determination  
DBD/R87038/SD0, Design Basis Document - Safety Injection System

4OA7 Licensee-identified Violations

AR 251128, Unplanned Equipment Out of Service Orange Risk  
AR 230613, Foreign material found in Emergency Core Cooling System