



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION II  
245 PEACHTREE CENTER AVENUE NE, SUITE 1200  
ATLANTA, GEORGIA 30303-1257

July 22, 2010

Mr. Christopher L. Burton  
Vice President  
Carolina Power and Light Company  
Shearon Harris Nuclear Power Plant  
P. O. Box 165, Mail Code: Zone 1  
New Hill, North Carolina 27562-0165

**SUBJECT: SHEARON HARRIS NUCLEAR POWER PLANT - NRC INTEGRATED  
INSPECTION REPORT 05000400/2010003**

Dear Mr. Burton:

On June 30, 2010, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Shearon Harris reactor facility. The enclosed integrated inspection report documents the inspection results, which were discussed on July 22, 2010, with Mr. Kelvin Henderson 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 self-revealing findings of very low safety significance (Green). One of these findings was determined to involve a violation of NRC requirements. However, because of the very low safety significance and because the finding was entered into your corrective action program (CAP), the NRC is treating this finding as a non-cited violation (NCV) consistent with Section VI.A.1 of the NRC Enforcement Policy. If you contest any NCV or finding, 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 Shearon Harris facility. In addition, if you disagree with the cross-cutting aspect assigned to 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 II, and the NRC Senior Resident Inspector at the Shearon Harris facility.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's 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 Nos.: 50-400  
License No.: NPF-63

Enclosure: NRC Inspection Report 05000400/2010003  
w/Attachment: Supplemental Information

cc w/encl: (See page 3)

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/RA/

Randall A. Musser, Chief  
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cc w/encl. (continued)

Kelvin Henderson

Plant General Manager

Carolina Power and Light Company

Shearon Harris Nuclear Power Plant

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Senior Resident Inspector

U.S. Nuclear Regulatory Commission

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U.S. NRC

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Letter to Christopher L. Burton from Randall A. Musser dated July 22, 2010

SUBJECT: SHEARON HARRIS NUCLEAR POWER PLANT - NRC INTEGRATED  
INSPECTION REPORT 05000400/2010003

Distribution w/encl:

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U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.: 50-400

License No.: NPF-63

Report No.: 05000400/2010003

Licensee: Carolina Power and Light Company

Facility: Shearon Harris Nuclear Power Plant, Unit 1

Location: 5413 Shearon Harris Road  
New Hill, NC 27562

Dates: April 1, 2010 through June 30, 2010

Inspectors: J. Austin, Senior Resident Inspector  
P. Lessard, Resident Inspector  
R. Hamilton, Senior Health Physicist (4OA5)  
C. Fletcher, Senior Reactor Inspector (1R07)

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

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## SUMMARY OF FINDINGS

IR 05000400/2010003, Carolina Power and Light Company; April 1, 2010 – June 30, 2010; Shearon Harris Nuclear Power Plant, Unit 1; Post Maintenance Testing, and Event Follow-up.

The report covers a three month period of inspection by resident inspectors and announced baseline inspection by regional inspectors. Two self-revealing findings of very low safety significance (Green) were identified. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). The cross cutting aspects were determined using IMC 0310, "Components within the Cross Cutting Areas". Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review.

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

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

- Green. A self-revealing Green finding was identified for the licensee's failure to follow Work Control Management procedure WCM-006, Graded Approach to Planning and Scheduling, which has requirements that would have ensured the proper rebuild of the oil filter assembly in the hydrogen seal oil (HSO) system. Specifically, this resulted in inadequate maintenance on the filter assembly which caused the handle of the assembly to eject during power operations, causing an oil spill which necessitated a manual reactor trip. The licensee entered this issue into the CAP as Action Request (AR) #366174. The licensee took corrective action to replace the oil filter assembly, as well as clean and replace the spilled oil. Additionally, the licensee reviewed both completed and upcoming work orders to verify they were properly classified based upon potential impact on plant operations.

The licensee's failure to follow WCM-006 requirements which resulted in the improper rebuild of the oil filter assembly in the HSO system was identified as a performance deficiency. The finding was determined to be more than minor because it was associated with the procedure quality attribute of the initiating events cornerstone and affected the cornerstone objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions. Specifically, the performance deficiency resulted in an initiating event causing a manual reactor trip and the possibility of an oil fire in the vicinity of the offsite power electrical supply ducts. Using IMC 0609, "Significance Determination Process," Phase 1 Worksheet, the inspectors concluded that a Phase 2 evaluation was required since the finding contributed to both the likelihood of a reactor trip and the likelihood that mitigating systems would not have been available. This conclusion was based upon the potential for the spilled oil to ignite in a location that could have challenged the offsite electrical power supply bus ducts following the reactor trip. A regional Senior Reactor Analyst completed a Phase 3 evaluation under the Significance Determination Process. The performance deficiency was characterized as of very low safety significance (Green) based upon the results of

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this evaluation. The dominant accident sequence involved the postulation of oil igniting in the spill zone. Once ignited, suppression efforts were unsuccessful, causing the loss of the turbine building and a loss of offsite power. Given this damage state, recovery of offsite power was not considered credible. Subsequently, it was postulated that the emergency diesel generators failed which ultimately led to a loss of core cooling and core damage. The finding has a cross cutting aspect of Work Planning, as described in the Work Control component of the Human Performance cross-cutting area because the failure to correctly classify the work package as "Quality Critical" resulted in not correctly mitigating the risk associated with working on this equipment by including additional guidance to assist the technicians in completing the work successfully (H.3(a)) (Section 4OA3).

#### Cornerstone: Mitigating Systems

- Green. A self-revealing Green NCV of TS 6.8.1, Procedures, was identified for the licensee's failure to follow procedure PIC-E069, Sequencer Electromechanical Timing Relays; D.C. Pick-Up, D.C. Drop-Out, A.C. Pick-Up, and A.C. Drop-Out. Specifically, the licensee failed to properly reinstall the Load Block 5 Auxiliary Relay, resulting in the automatic start of "B" Motor Driven Auxiliary Feedwater (MDAFW) pump and water flowing to all three steam generators. Operators immediately secured the "B" MDAFW pump. The licensee entered this issue into their corrective action program (CAP) as action request (AR) #381672. As corrective action, the licensee removed and correctly installed the relay followed by a successful post maintenance test. Additionally, the licensee plans to revise ADM-NGGC-0104, Work Management Process, to require the work implementer to specify which mitigating actions and/or human performance barriers will be used for critical steps.

The failure to follow procedure PIC-E069 section 7.6 for the restoration of the load block 5 auxiliary relay was a performance deficiency. The violation was more than minor because it is associated with the procedure quality attribute of the Mitigating Systems cornerstone, and it affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, it resulted in the automatic start of the "B" MDAFW pump and water flowing to all three steam generators. Using IMC 0609, "Significance Determination Process," Phase 1 screening worksheet of the SDP this finding was determined to be of very low safety significance because it was not a design or qualification deficiency confirmed to result in a loss of operability or functionality, did not represent a loss of system safety function, did not result in a loss of safety system function for a single train for greater than TS allowed outage time, did not result in a loss of safety function of one or more non-TS trains of equipment designated as risk-significant for greater than 24 hours, and did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event. The finding has a cross-cutting aspect of Human error prevention, as described in the Work Practices component of the Human Performance cross-cutting area because the licensee did not

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apply sufficient human error prevention tools to ensure the correct installation of the relay (H.4(a)) (Section 1R19).

B. Licensee-Identified Violations

None.

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## REPORT DETAILS

### Summary of Plant Status

Unit 1 operated at or near Rated Thermal Power (RTP) for the entire inspection period.

#### 1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

#### 1R01 Adverse Weather Protection

##### .1 Offsite and Alternate AC Power Readiness

###### a. Inspection Scope

The inspectors performed a review of the licensee's offsite and alternate AC power readiness for selected systems. 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 Updated Final Safety Analysis Report (UFSAR) 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:

- Offsite AC Power (Switchyard)
- Emergency Diesel Generators

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

- AR #401978, Switchyard Breaker 52-13 Low Gas Pressure
- AR #401800, Degraded Operation of Unit Auxiliary Transformer 1A Cooling Fan #3 Degraded Operation
- AR #391586, Grid Disturbance on Apex/Regency Line

###### b. Findings

No findings were identified.

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## 1R04 Equipment Alignment

### .1 Quarterly Partial System Walkdowns

#### a. Inspection Scope

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

- “A” and “B” Emergency Service Water (ESW) system while they were protected to support elevated risk activities in the switchyard on April 10, 2010;
- Primary Makeup Water System following scheduled maintenance on April 16, 2010; and
- “A” Emergency Switchgear during the “B” Emergency Diesel Generator and “B” ESW planned maintenance outage on June 9, 2010.

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 impact the function of the system and, therefore, potentially increase risk. The inspectors reviewed applicable operating procedures, system diagrams, applicable portions of the UFSAR, TS requirements, 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. Documents reviewed are listed in the attachment.

#### b. Findings

No findings were identified.

### .2 Semi-Annual Complete System Walkdown

#### a. Inspection Scope

On May 5, 2010, the inspectors performed a complete system alignment inspection of the “A” Essential Services Chilled Water System (ESCWS) to verify the functional capability of the system. This system was selected because it was considered risk significant in the licensee’s probabilistic risk assessment. The inspectors walked down

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the system to review mechanical and electrical equipment line-ups, electrical power availability, system pressure and temperature indications, component labeling, component lubrication, component and equipment cooling, hangers and supports, operability of support systems, and to ensure that auxiliary equipment or debris did not interfere with equipment operation. A review of a sample of past and outstanding work orders (WOs) was performed to determine whether any deficiencies significantly affected the system function. In addition, the inspectors reviewed the corrective action program (CAP) database to ensure that system equipment alignment problems were being identified and appropriately resolved. The documents used for the walkdown and issue review are listed in the attachment.

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

- AR #280015, "B" Chiller Inoperable due to High Oil Level
- AR #316594, Jerky Operation of ESCW Temperature Control Valves (TCV's) During OST-1041
- AR #319422, "B" ESCW Chilled Water Pump Inboard Motor Bearing Abnormal Noise and Elevated Vibration

b. Findings

No findings were identified.

1R05 Fire Protection

.1 Quarterly Resident Inspector Tours

a. Inspection Scope

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

- "B" Diesel, 261' Elevation
- "B" Diesel, 280' and 292' Elevation
- "A" Switchgear Ventilation Room
- "B" Switchgear Ventilation Room
- "A" Train ESW Pump Room
- "B" Train ESW Pump Room

The inspectors reviewed areas to assess if the licensee 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

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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 fire risk as documented in the plant's Individual Plant Examination of External Events with later additional insights, their potential to impact equipment which 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.

b. Findings

No findings were identified.

1R06 Flood Protection Measures

.1 Review of Areas Susceptible to Internal Flooding

a. Inspection Scope

The inspectors reviewed selected risk important plant design features and licensee procedures intended to protect the plant and its safety related equipment from internal flooding events. The inspectors reviewed flood analyses and design documents, including the UFSAR, engineering calculations, and abnormal operating procedures (AOPs), for licensee commitments. The specific documents reviewed are listed in the attachment. In addition, the inspectors reviewed licensee drawings to identify areas and equipment that may be affected by internal flooding caused by the failure or misalignment of nearby sources of water, such as the fire suppression, service water or the circulating water systems. The inspectors also reviewed the licensee's corrective action documents with respect to past flood-related items identified in the corrective action program to verify the adequacy of the corrective actions. The inspectors performed a walkdown of the following plant area to assess the adequacy of watertight doors and verify drains and sumps were clear of debris and were operable, and that the licensee complied with its commitments:

- Flood Area F-216-4, Reactor Auxiliary Building 261' Essential Services Chiller Area

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

- AR #380182, Safety Related Conduit Subject to Flooding

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b. Findings

No findings were identified.

.2 Annual Review of Cables Located in Underground Bunkers/Manholes

a. Inspection Scope

The inspectors conducted an inspection of four underground bunkers/manholes subject to flooding that contain cables whose failure could disable risk-significant equipment. The inspectors performed walkdowns of risk-significant areas, including bunkers MH-70C SB, MH-70D SB, MH-73B SB-C and MH-86B SB to verify that the cables were not submerged in water, that cables and/or splices appear intact and to observe the condition of cable support structures. The cables located within these bunkers provided electrical power to safety related components such as the "B" Emergency Service Water Intake Structure components and the "B" Diesel Fuel Oil Transfer Pump. Where dewatering devices were not installed; the inspectors ensured that drainage was provided and was functioning properly.

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

- AR #405479, Manhole Pipe Clogged with Concrete
- AR #405366, Damage Manhole Anchor Bolt for Hold-down Plate

b. Findings

No findings were identified.

1R07 Heat Sink Performance

.1 Triennial Review of Heat Sink Performance

a. Inspection Scope

The inspectors reviewed operability determinations, completed surveillances, vendor manual information, associated calculations, performance test results and cooler inspection results associated with the Unit 1 Component Cooling Water heat exchangers (CCW HX) and the Residual Heat Removal heat exchangers (RHR HX). These heat exchangers were chosen based on their risk significance in the licensee's probabilistic safety analysis, their important safety-related mitigating system support functions and their relatively low margin.

For the CCW heat exchangers, the inspectors determined whether testing, inspection, maintenance, and monitoring of biotic fouling and macrofouling programs were adequate

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to ensure proper heat transfer. This was accomplished by determining whether the test method used was consistent with accepted industry practices, or equivalent, the test conditions were consistent with the selected methodology, the test acceptance criteria were consistent with the design basis values, and reviewing results of heat exchanger performance testing. The inspectors also determined whether the test results appropriately considered differences between testing conditions and design conditions, the frequency of testing based on trending of test results was sufficient to detect degradation prior to loss of heat removal capabilities below design basis values and test results considered test instrument inaccuracies and differences.

For the CCW and RHR heat exchangers, the inspectors reviewed the methods and results of heat exchanger performance inspections. The inspectors determined whether the methods used to inspect and clean heat exchangers were consistent with as-found conditions identified and expected degradation trends and industry standards, the licensee's inspection and cleaning activities had established acceptance criteria consistent with industry standards, and the as-found results were recorded, evaluated, and appropriately dispositioned such that the as-left condition was acceptable.

In addition, the inspectors determined whether the condition and operation of the CCW and RHR heat exchangers were consistent with design assumptions in heat transfer calculations and as described in the final safety analysis report. This included determining whether the number of plugged tubes was within pre-established limits based on capacity and heat transfer assumptions. The inspectors determined whether the licensee evaluated the potential for water hammer and established adequate controls and operational limits to prevent heat exchanger degradation due to excessive flow induced vibration during operation. In addition, eddy current test reports and visual inspection records were reviewed to determine the structural integrity of the heat exchanger.

The inspectors determined whether the performance of ultimate heat sinks (UHS) and their subcomponents such as piping, intake screens, pumps, valves, etc. was appropriately evaluated by tests or other equivalent methods to ensure availability and accessibility to the in-plant cooling water systems.

The inspectors reviewed the licensee's operation of the Emergency Service Water System and UHS. This included a review of licensee's procedures for a loss of the emergency service water system or UHS and the verification that instrumentation, which is relied upon for decision making, was available and functional. In addition, the inspectors determined whether macrofouling was adequately monitored, trended, and controlled by the licensee to prevent clogging. The inspectors determined whether the licensee's biocide treatments for biotic control were adequately conducted and whether the results were adequately monitored, trended, and evaluated. The inspectors also reviewed strong pump-weak pump interaction and design changes to the Emergency Service Water System and the UHS.

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The inspectors performed a system walkdown of the Emergency Service Water intake structure to determine whether the licensee's assessment on structural integrity and component functionality was adequate and that the licensee ensured proper functioning of traveling screens and strainers, and structural integrity of component mounts. In addition, the inspectors determined whether Emergency Service Water pump bay silt accumulation was monitored, trended, and maintained at an acceptable level by the licensee, and that water level instruments were functional and routinely monitored. The inspectors also determined whether the licensee's ability to ensure functionality during adverse weather conditions was adequate.

In addition, the inspectors reviewed condition reports related to the heat exchangers/coolers and heat sink performance issues to determine whether the licensee had an appropriate threshold for identifying issues and to evaluate the effectiveness of the corrective actions. The documents that were reviewed are included in the Attachment to this report.

The inspectors reviewed the Shearon Harris Nuclear Power Plant, Unit 1 Dam Safety and Operation Inspection Report performed on June 25, 2009 by the Federal Energy Regulatory Commission (FERC), which satisfies the requirement defined in IP 71111.07-02.02d.1.

These inspection activities constituted four heat sink inspection samples as defined in IP 71111.07-05.

b. Findings

No findings were identified.

1R11 Licensed Operator Requalification Program

.1 Quarterly Review

a. Inspection Scope

On April 20, 2010, the inspectors observed a crew of licensed operators in the plant's simulator during a licensed operator simulator scenario 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 scenario tested the operators' ability to respond to a complete loss of Component Cooling Water and a reactor trip complicated by two stuck rods. The inspectors evaluated the following areas:

- Licensed operator performance
- Crew's clarity and formality of communications
- Ability to take timely actions in the conservative direction
- Prioritization, interpretation, and verification of annunciator alarms

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- Correct use and implementation of abnormal and emergency procedures
- Control board manipulations
- Oversight and direction from supervisors
- Ability to identify and implement appropriate TS actions and Emergency Plan actions and notifications

The crew's performance in these areas was compared to pre-established operator action expectations and successful critical task completion requirements.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness

a. Inspection Scope

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. Documents reviewed are listed in the attachment. The inspectors evaluated degraded performance issues involving the following two risk significant components:

- AR #391219, "B" EDG Fuel Oil Day Tank Level Indicating Higher than Expected;
- AR #383822, Reactor Auxiliary Building Emergency Exhaust System Damper (AV-21) Needed Slight Assistance at Open Limit

The inspectors focused on the following attributes:

- Implementing appropriate work practices;
- Identifying and addressing common cause failures;
- Scoping of systems in accordance with 10 CFR 50.65(b) of the maintenance rule;
- Characterizing system reliability issues for performance;
- Charging unavailability for performance;
- Trending key parameters for condition monitoring;
- Ensuring 10 CFR 50.65(a)(1) or (a)(2) classification or re-classification; and
- Verifying appropriate performance criteria for structures, systems, and components (SSCs)/functions classified as (a)(2) or appropriate and adequate goals and corrective actions for systems classified as (a)(1).

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

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- AR #390674, Investigation Completed Before Maintenance Rule Evaluation Determined Maintenance Rule Functional Failure
- AR #400303, Grounding Strap to 1A-SA EDG Starting Air Compressor is Disconnected
- AR #396160, Normal Service Water (NSW) Pump Discharge Strainer High Differential Pressure Reviewed during Testing

b. Findings

No findings were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control

a. Inspection Scope

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

- Yellow risk condition for a planned level loop calibration on the Reactor Makeup Water Storage Tank on April 15, 2010;
- Elevated green risk condition during switchyard work while replacing breaker 52-15 (Wake County supply breaker) during the week of April 19, 2010;
- Unplanned yellow risk condition due operators being unable to manually open DW-6, the demineralized water isolation valve for the Reactor Makeup Water Storage Tank on April 28, 2010;
- Planned yellow risk condition while the "B" Startup Transformer was inoperable due to switchyard work on May 2, 2010; and
- Emergent work risk assessment due to failure of the "B" NSW seal booster pump on June 24, 2010.

These activities were selected based on their potential risk significance relative to the reactor safety cornerstones. As applicable for each activity, the inspectors verified that risk assessments were performed as required by 10 CFR 50.65(a)(4) and were accurate and complete. When emergent work was performed, the inspectors verified that the plant risk was promptly reassessed and managed. 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 TS requirements and walked down portions of redundant safety systems, when applicable, to verify risk analysis assumptions were valid and applicable requirements were met.

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b. Findings

No findings were identified.

1R15 Operability Evaluationsa. Inspection Scope

The inspectors selected the following five 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 TS 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 Updated Safety Final Analysis Report (UFSAR) 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. Documents reviewed are listed in the attachment.

- AR #393590, Turbine Driven Auxiliary Feedwater (TDAFW) Pump Governor Valve Steam Leak;
- AR #391538, "B" RHR Pump Seal Cooler Flow Recorded out of Specification;
- AR #386969, "A" Chiller Oil Thermostat Failure;
- AR #400371, Unexpected Alarm During 'A' EDG OST-1013 Run; and
- AR #392192, Operability Determination for Failed "A" Containment Vacuum Breaker Signal Comparator (PDS-O1CB-768OA2SD).

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

- AR #250450, Vendor Supplied Thermometer for B Chiller does not Match Engineering Database

b. Findings

No findings were identified.

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1R18 Plant Modificationsa. Inspection Scope

The following engineering design package was reviewed and selected aspects were discussed with engineering personnel:

- Permanent Modification Engineering Change (EC) Number 69756 Redesign Ground Fault Relay Scheme for 6.9 kV Safety Motor Cubicle

This document and related documentation were reviewed for adequacy of the associated 10 CFR 50.59 safety evaluation screening, consideration of design parameters, implementation of the modification, post-modification testing, and relevant procedures, design, and licensing documents were properly updated. The inspectors observed ongoing and completed work activities to verify that installation was consistent with the design control documents. The modification EC 69756 was used to install a new time delay relay in the output contact circuit of the ground fault relay for safety related 6.9 kV motors to minimize nuisance alarms.

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

- AR #84814, "A" Component Cooling Water Pump Ground Relay Activation;
- AR #210970, 6.9kV Motors Generate Found Fault Alarms when Started; and
- AR #404687, Unidentified Decrease in Nitrogen Pressure from the Gas Yard.

b. Findings

No findings were identified.

1R19 Post Maintenance Testinga. Inspection Scope

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

<u>Test Procedure</u>	<u>Title</u>	<u>Related Maintenance Activity</u>	<u>Date Inspected</u>
OST-1056	Containment Ventilation Isolation Valve ISI Test Quarterly Interval Modes 1 - 6	Work Order # (WO)1739463, Troubleshoot and Repair A Containment Vacuum Breaker	April 8, 2010
OST-1824	1B-SB Emergency Diesel Generator Operability Test 18 Month Interval Modes 1 Through 6 and Defueled	WO# 1672858, Recalibrate Load Block 5 Auxiliary Relay	April 14, 2010
OPT-1512	Essential Chilled Water Turbopak Units Quarterly Inspection/Checks, Modes 1-6	WO #1735596, Replace B Chiller Lube Oil Heater Thermostat	May 5, 2010
OST-1040	Essential Services Chilled Water Systems Operability Quarterly Interval, Modes 1-6	WO #1162630, Replace Solenoids on 1CH-125 (Non-Essential Header Isolation Valve)	June 4, 2010
OST-1074 and OST-1215	Motor Operated Valves Thermal Overload And Torque Switch Protection Bypass Test 18 Month Interval Modes 1 – 6  Emergency Service Water System Operability Train B Quarterly Interval Modes 1-2-3-4-5-6-Defueled	WO #1711303, Engineering Change 71147, Modify Motor Control Centers to Prevent Spurious Operation During Fire, 1SW-271 (B ESW Return Isolation Valve to Auxiliary Reservoir)	June 9, 2010

These activities were selected based upon the structure, system, or component's ability to impact risk. The inspectors evaluated these activities for the following: 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; tests were performed as written in accordance with properly reviewed and approved procedures; equipment was returned to its operational status following testing, and test documentation was properly evaluated. The inspectors evaluated the activities against TS and the UFSAR to ensure that the test results adequately ensured that the equipment met the licensing basis and design requirements. In addition, the inspectors reviewed corrective action documents associated with post-maintenance tests to determine whether the licensee was identifying problems and entering them in the corrective action program and that the problems were being corrected commensurate with their importance to safety.

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Documents reviewed are listed in the attachment.

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

- AR #397975, Replaced “B” Chiller Thermostat Out of Calibration; and
- AR #392042, Spurious Opening of “A” Containment Vacuum Breaker.

b. Findings

Introduction: A self-revealing Green NCV of TS 6.8.1, Procedures, was identified for the licensee’s failure to follow procedure PIC-E069, Sequencer Electromechanical Timing Relays; D.C. Pick-Up, D.C. Drop-Out, A.C. Pick-Up, and A.C. Drop-Out. Specifically, the licensee failed to properly reinstall the Load Block 5 Auxiliary Relay, resulting in the automatic start of “B” Motor Driven Auxiliary Feedwater (MDAFW) pump and water flowing to all three steam generators while at rated thermal power.

Description: On February 16, 2010, the licensee removed the Load Block 5 Auxiliary Relay from the “B” Emergency Safeguards Sequencer for calibration. PIC-E069 section 7.1 (relay inspection/lead removal) was utilized to remove the relay. PIC-E069 section 7.6 (restoration) was utilized for relay installation after calibration. The technicians accidentally reinstalled the relay one row down on the relay block from where it was initially removed. The independent verifier observed the position of the relay and failed to recognize it was reinstalled incorrectly. The maintenance was completed and the clearance was returned to operations for system restoration.

While removing the clearance, the incorrectly installed relay caused an automatic start of the “B” MDAFW pump. This caused water to flow to all three steam generators, resulting in an increase of reactor power by approximately 0.1%. Operators secured the “B” MDAFW pump and entered the issue into their corrective action program. Additionally, the licensee plans to revise ADM-NGGC-0104, Work Management Process, to require the work implementer to specify which mitigating actions and/or human performance barriers will be used for critical steps.

Analysis: The failure to follow PIC-E069 section 7.6 (restoration) was identified as a performance deficiency. The performance deficiency was more than minor because it is associated with the procedure quality attribute of the Mitigating Systems cornerstone, and it affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, it resulted in the automatic start of the “B” MDAFW pump and water flowing to all three steam generators. Using IMC 0609, “Significance Determination Process,” Phase 1 screening worksheet of the SDP, this finding was determined to be of very low safety significance because it was not a design or qualification deficiency confirmed to result in a loss of operability or functionality, did not represent a loss of system safety function, did not result in a loss of safety system function for a single train for greater than TS allowed outage time, did not result in a loss

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of safety function of one or more non-TS trains of equipment designated as risk-significant for greater than 24 hours, and did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event.

The finding has a cross-cutting aspect of Human Error Prevention, as described in the Work Practices component of the Human Performance cross-cutting area because the licensee did not apply sufficient human error prevention tools to ensure the correct installation of the relay (H.4(a)).

Enforcement: TS 6.8.1, Procedures, requires that written procedures shall be established, implemented, and maintained, covering applicable procedures recommended in Appendix A of Regulatory Guide 1.33, Revision 2, February 1978. Section 9 of Appendix A of Regulatory Guide 1.33, Revision 2, February 1978 states that there will be procedures for performing maintenance that can affect the performance of safety related equipment. The plant procedure governing the maintenance on the Load Block 5 Auxiliary Relay (PIC-E069, section 7.6) described a method for reinstallation followed by independent verification by a second technician. Contrary to this requirement, the Load Block 5 Auxiliary Relay was reinstalled incorrectly which resulted in an invalid actuation of "B" MDAFW pump. As corrective action, the licensee removed and correctly installed the relay followed by a successful post maintenance test. Additionally, the licensee plans to revise ADM-NGGC-0104, Work Management Process, to require the work implementer to specify which mitigating actions and/or human performance barriers will be used for critical steps. Because the finding is of very low safety significance and has been entered into the CAP (AR #381672), and consistent with the NRC Enforcement Policy, this violation is being treated as a non-cited violation, and is designated as NCV 05000400/2010003-01, "Failure to Follow Procedure to Install the Load Block 5 Auxiliary Relay."

## 1R22 Surveillance Testing

### .1 Routine Surveillance Testing

#### a. Inspection Scope

For the four surveillance tests below, the inspectors observed the surveillance tests and/or reviewed the test results for the following activities to verify the tests met TS surveillance requirements, UFSAR commitments, inservice testing requirements, and licensee procedural requirements. The inspectors assessed the effectiveness of the tests in demonstrating that the SSCs were operationally capable of performing their intended safety functions.

- OST-1216, Component Cooling Water System Operability Quarterly Interval, Modes 1-4, on April 6, 2010;
- OST-1035, Fuel Handling Building Emergency Exhaust Train "A" Operability Test Monthly Interval Whenever Irradiated Fuel is in the Storage Pool on May 23, 2010;

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- OST-1023, Offsite Power Availability Verification Weekly Interval Modes 1, 2, 3 on June 1, 2010; and
- OST-1007, Chemical Volume Control System/Safety Injection (CVCS/SI) System Operability Train "A" Quarterly Interval, Mode 1-4 on June 21, 2010.

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

- AR #400836, Failure of Fuel Handling Building Dampers 11 & 21 to Close as Expected

b. Findings

No findings were identified.

.2 In service Testing (IST) Surveillance

a. Inspection Scope

The inspectors reviewed the performance of OST-1411, Turbine Driven Auxiliary Feedwater Pump Operability Test Quarterly Interval Mode 1, 2, 3 on April 14, 2010, to evaluate the effectiveness of the licensee's American Society of Mechanical Engineers (ASME) Section XI testing program for determining equipment availability and reliability. This test performs the following as required for IST testing:

- Performance Test of the turbine driven auxiliary feedwater (TDAFW) Pump
- Stroke open testing of:
  - 1CE-56, Condensate Storage Tank (CST) Suction Check Valve to TDAFW Pump
  - 1MS-71, Main Steam (MS) Line "B" to TDAFW Pump Check Valve
  - 1MS-73, MS Line "C" to TDAFW Pump Check Valve
  - 1AF-110, TDAFW Recirculation to CST Check Valve
- Stroke close testing of:
  - 1AF-204 and 1AF-136, TDAFW Check Valves to Steam generator (SG) "A"
  - 1AF-205 and 1AF-142, TDAFW Check Valves to SG "B"
  - 1AF-206 and 1AF-148, TDAFW Check Valves to SG "C"
  - 1AF-68, TDAFW Supply Check Valve to SG "A"
  - 1AF-87, TDAFW Supply Check Valve to SG "B"
  - 1AF-106, TDAFW Supply Check Valve to SG "C"
- Proper operation of the TDAFW Governor valve and T&T valve

The inspectors evaluated selected portions of the following areas:

- Testing procedures and methods;
- Acceptance criteria;

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- Compliance with the licensee's IST program, TS, selected licensee commitments, and code requirements;
- Range and accuracy of test instruments; and
- Required corrective actions.

b. Findings

No findings were identified.

.3 Reactor Coolant System Leak Detection Inspection Surveillance

a. Inspection Scope

The inspectors observed and reviewed the test results for OST-1026, Reactor Coolant System Leak Detection Computer Calculation, Modes 1-4, on May 3, 2010. The inspectors observed in plant activities and reviewed procedures and associated records to determine whether: effects of the testing were adequately addressed by control room personnel or engineers prior to the commencement of the testing; acceptance criteria were clearly stated, demonstrated operational readiness, and were consistent with the system design basis; plant equipment calibration was correct, accurate, and properly documented; and the calibration frequency were in accordance with TSs, the USAR, procedures, and applicable commitments; applicable prerequisites described in the test procedures were satisfied; test frequencies met TS requirements to demonstrate operability and reliability; tests were performed in accordance with the test procedures and other applicable procedures; test data and results were accurate, complete, within limits, and valid; equipment was returned to a position or status required to support the performance of its safety functions; and all problems identified during the testing were appropriately documented and dispositioned in the corrective action program. Documents reviewed are listed in the attachment.

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

- AR #397043, OST-1026 Reactor Coolant System Leak Calculation was Higher due to Temperature Change

b. Findings

No findings were identified.

1EP6 Emergency Planning Drill Evaluation

a. Inspection Scope

The inspectors observed two emergency preparedness drills this quarter to verify

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licensee self-assessment of classification, notification, and protective action recommendation development in accordance with 10 CFR 50, Appendix E. The first was conducted on April 29, 2010, and consisted of a loss of coolant accident leading to a breach of all three fission product barriers. The second drill was performed on June 10, 2010, and tested the licensee's ability to respond to a fire at the main generator which caused the reactor to trip. During the reactor trip, two rods were simulated as stuck out of the core, resulting in fuel failure, steam generator tube rupture and ultimately a radiological release through a stuck open steam generator safety valve.

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

- AR #404620, Emergency Operation Computer System Improvements Identified During Drill;
- AR #404631, Joint Information Center Communication Issues during Drill;
- AR #404644, Joint Information Center and Customer Service Center Improvement Item; and
- AR #404735, Emergency Operations Facility Improvement Items.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator (PI) Verification

a. Inspection Scope

To verify the accuracy of the PI data reported to the NRC, the inspectors compared the licensee's basis in reporting each data element to the PI definitions and guidance contained in Nuclear Energy Institute (NEI) Document 99-02, Regulatory Assessment Performance Indicator Guideline.

Mitigating Systems Cornerstone

- Safety System Functional Failures

The inspectors reviewed licensee submittals for the Safety System Functional Failures performance indicator for the period from the first quarter 2009 through the first quarter 2010. The inspectors reviewed the licensee's operator narrative logs, operability assessments, maintenance rule records, maintenance work orders, issue reports, event reports and NRC Integrated Inspection reports for the period to validate the accuracy of the submittals. Specific documents reviewed are described in the attachment to this report.

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### Barrier Integrity Cornerstone

- Reactor Coolant System (RCS) Specific Activity

The inspectors reviewed licensee submittals for the Reactor Coolant System Specific Activity performance indicator for the period from the first quarter 2009 through the first quarter 2010. The inspectors reviewed the licensee's RCS chemistry samples, TS requirements, issue reports, and event reports for the period to validate the accuracy of the submittals. In addition to record reviews, the inspectors observed a chemistry technician obtain and analyze a reactor coolant system sample. Specific documents reviewed are described in the attachment to this report.

- Reactor Coolant System Leakage

The inspectors sampled licensee submittals for the Reactor Coolant System (RCS) Leakage performance indicator for the period from the first quarter 2009 through the first quarter 2010. The inspectors reviewed the licensee's operator logs, RCS leakage tracking data, issue reports, and event reports for the period to validate the accuracy of the submittals. Specific documents reviewed are described in the attachment to this report.

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

- AR #407707, Inconsistency in Data Reporting for RCS Identified Leakage

b. Findings

No findings were identified.

## 4OA2 Identification and Resolution of Problems

### .1 Routine Review of items Entered Into the Corrective Action Program

a. Inspection Scope

To aid in the identification of repetitive equipment failures or specific human performance issues for follow-up, the inspectors performed frequent screenings of items entered into the licensee's corrective action program. The review was accomplished by reviewing daily action request reports.

b. Findings

No findings were identified.

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## .2 Semi-Annual Trend Review

### a. Inspection Scope

The inspectors performed a review of the licensee's CAP and associated documents to identify trends that could indicate the existence of a more significant safety issue. The inspectors' review was focused on repetitive equipment issues, but also considered the results of daily inspector CAP item screening discussed in Section 4OA2.1 above, licensee trending efforts, and licensee human performance results. The inspectors' review nominally considered the six month period of January 1 through June 30, 2010, although some examples could have expanded beyond those dates where the scope of the trend warranted.

The review also included issues documented outside the normal CAP; in major equipment problem lists, 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 CAP trending reports. Corrective actions associated with a sample of the issues identified in the licensee's trending reports were reviewed for adequacy.

### b. Findings

There were no findings identified. The inspectors observed that the licensee performed adequate trending reviews. The licensee routinely reviewed cause codes, involved organizations, key words, and system links to identify potential trends in the 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.

The inspectors identified that the adverse trend in the area of evaluation of identified problems previously identified in NRC Integrated Inspection Report 05000400/2009005 continues. Specifically, the evaluations do not always accurately identify or address the underlying causes, thus allowing the issue(s) to recur in a similar manner. The following issues illustrate the continued presence of this trend:

- AR #376709, Outdoor Electrical Cable Water Submergence Evaluation;
- AR #389937, Corrective Action Program Improvement Opportunities; and
- AR #368166, Failure of the Plant Computer to Update, Unplanned Limiting Condition for Operation Entry.

This issue was entered into the licensee's CAP as AR #395582 to address the need for increased management attention.

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4OA3 Follow-up of Events.1 (Closed) Licensee Event Report (LER) 05000400/2010-002-00, Manual Actuation of the Reactor Protection System due to a Hydrogen Seal Oil Leaka. Inspection Scope

The inspectors reviewed the licensee's actions associated with the reactor trip that occurred on November 15, 2009. The inspectors observed plant parameters for mitigating systems and fission product barriers, evaluated performance of systems and operators, and confirmed proper classification and reporting of the event. Documents reviewed are listed in the attachment. This LER is closed.

b. Findings

Introduction: A self-revealing Green finding was identified for the licensee's failure to follow Work Control Management procedure WCM-006, Graded Approach to Planning and Scheduling, which has requirements that would have ensured the proper rebuild of the oil filter assembly in the hydrogen seal oil (HSO) system. Specifically, this resulted in inadequate maintenance on the filter assembly which caused the handle of the assembly to eject during full power operations, causing a significant oil spill which necessitated a manual reactor trip.

Description: On November 15, 2009, with the unit at 100 percent power, the licensee experienced a significant oil leak from the HSO system. The function of the HSO system is to contain hydrogen in the generator while preventing air from entering the generator for proper cooling. As a design feature, the main turbine lube oil (MTLO) system automatically provides makeup oil to the HSO system as needed. For both of these reasons, the loss of HSO required the operators to trip the reactor and the main turbine.

During the investigation of this issue, it was determined that the oil leak had occurred due to the ejection of the handle on an HSO filter assembly. Operators rotate this handle twice daily to clean the internals of the filter. On the night of November 15, 2009, the operator was rotating the handle when the handle ejected from the filter assembly. As oil sprayed from the assembly, the MTLO system provided makeup oil until the operators were able to trip the reactor and stop the rotation of the main turbine. It is estimated that approximately 10,000 gallons of oil spilled out of the assembly. Further investigation revealed that this component had been rebuilt on April 25, 2009, during refueling outage 15. During this work, maintenance personnel identified a groove on the shaft of the filter assembly handle. Without consulting vendor specific technical information or supervision, maintenance personnel decided the groove did not perform a purpose and reassembled the filter without the required split collars. The purpose of this groove is to allow a split collar to be attached to the shaft, thereby retaining the handle in the filter assembly.

The licensee's Work Control Management procedure WCM-006, Graded Approach to Planning and Scheduling, provides instructions for determining "Quality Critical" work

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packages. Per WCM-006, work on equipment that could cause a plant transient or shutdown should be classified as a "Quality Critical" (Level A) package. A "Quality Critical" work package contains additional details, drawings and vendor specific information to assist the technicians in completing the work successfully. It was determined that the HSO filter assembly rebuild work package should have been classified as a "Quality Critical" package because failure of this component would cause a plant transient or shutdown. Contrary to this procedure, the HSO filter repack work package was incorrectly classified as "Not Quality Critical" (Level B). The lack of detail in the Level B work package resulted in the maintenance personnel failing to properly reassemble the HSO filter assembly.

Analysis: The licensee's failure to follow WCM-006 requirements that would have ensured the proper rebuild of the oil filter assembly in the HSO system was identified as a performance deficiency. Specifically, this resulted in the handle of the filter ejecting during full power operations, causing an oil spill which necessitated a manual reactor trip on November 15, 2009. The performance deficiency was more than minor because it was associated with the human performance attribute of the initiating events cornerstone and affected the cornerstone objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions. Specifically, the performance deficiency resulted in an initiating event causing a manual reactor trip and the possibility of an oil fire in the vicinity of the offsite power electrical supply ducts. Using IMC 0609, "Significance Determination Process," Phase 1 Worksheet, the inspectors concluded that a Phase 2 evaluation was required since the finding contributed to both the likelihood of a reactor trip and the likelihood that mitigating systems will not be available. This conclusion was based upon the potential for the spilled oil to ignite in a location that could have challenged the offsite electrical power supply bus ducts following the reactor trip. A regional Senior Reactor Analyst completed a Phase 3 evaluation under the Significance Determination Process. The performance deficiency was characterized as of very low safety significance (Green) based upon the results of this evaluation. The dominant accident sequence involved the postulation of oil igniting in the oil spill zone. Once ignited, suppression efforts were unsuccessful, causing the loss of the turbine building and a loss of offsite power. Given this damage state, recovery of offsite power was not considered credible. Subsequently, it was postulated that the emergency diesel generators failed which ultimately led to a loss of core cooling and core damage.

The finding has a cross-cutting aspect of Work Planning, as described in the Work Control component of the Human Performance cross-cutting area because the failure to correctly classify the work package as "Quality Critical" resulted in not correctly mitigating the risk associated with working on this equipment by including additional guidance to assist the technicians in completing the work successfully. (H.3(a))

Enforcement: Enforcement action does not apply because the performance deficiency did not involve a violation of regulatory requirements. No violation of NRC requirements was identified because none of the components affected by this finding were considered safety-related. The licensee took corrective action to replace the oil filter assembly, as well as clean and replace the spilled oil. Additionally, the licensee reviewed both

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completed and upcoming work orders to verify they were appropriately classified and prepared as either "Quality Critical" or "Not Quality Critical." The licensee entered this finding into their CAP as AR #366174. This finding is identified as FIN 05000400/2010003-02, "Reactor Trip due to Failing to Properly Assemble an Oil Filter in the Hydrogen Seal Oil System."

#### 4OA5 Other Activities

##### .1 Quarterly Resident Inspector Observations of Security Personnel and Activities

###### a. Inspection Scope

During the inspection period the inspectors conducted observations of security force personnel and activities to ensure that the activities were consistent with licensee 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 reviews and inspection activities.

###### b. Findings

No findings were identified.

##### .2 (Closed) TI 2515/173 Review of the Implementation of the Industry Ground Water Protection Voluntary Initiative

###### a. Inspection Scope

The inspectors reviewed elements of the licensee's environmental monitoring program to evaluate compliance with the voluntary Groundwater Protection Initiative (GPI) as described in Nuclear Energy Institute (NEI) 07-07, Industry Ground Water Protection Initiative – Final Guidance Document, August 2007 (ADAMS Accession Number ML072610036). Inspectors interviewed personnel, performed walk-downs of selected areas, and reviewed the following items:

- Site characterization of geology and hydrology as described in the licensee's groundwater flow study report;
- Evaluations of systems, structures, or components (SSCs) that contain or could contain licensed material and evaluations of work practices that involved licensed material for which there is a credible mechanism for the licensed material to reach the groundwater;
- Implementation of the onsite groundwater monitoring program to monitor for potential licensed radioactive leakage into groundwater;
- Locations of groundwater monitoring wells installed as a result of implementation of the Groundwater Protection Initiative;

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- Procedures for the decision making process for potential remediation of leaks and spills, including consideration of the long term decommissioning impacts;
- Records of leaks and spills recorded in the licensee's decommissioning files in accordance with 10 CFR 50.75(g);
- Licensee briefings of local and state officials on the licensee's groundwater protection initiative;
- Procedures for notification to the local and state officials and to the NRC regarding detection of leaks and spills;
- Procedures for external notifications and reports if an onsite groundwater sample exceeds the criteria in the radiological environmental monitoring program;
- Groundwater monitoring results as reported in the annual radiological environmental operating report; and
- Licensee and industry assessments of implementation of the groundwater protection initiative.

b. Findings

No findings were identified with the licensee's Implementation of NEI 07-07. This completes the Region II inspection requirements.

4OA6 Management Meetings

.1 Exit Meeting Summary

On April 22, 2010, the inspectors presented the inspection results of the "Review of the Implementation of the Industry Ground Water Protection Voluntary Initiative" to Mr. Kelvin Henderson, Shearon Harris Plant Manager, and other cognizant licensee representatives. The inspectors noted that proprietary information was reviewed during the course of the inspection but would not be included in the documented report.

On June 16, 2010, the inspectors presented the inspection results of the Triennial Review of Heat Sink Performance to Mr. Chris Burton and other members of the licensee staff. The inspectors confirmed that none of the potential report input discussed was considered proprietary.

On July 22, 2010, the inspector presented the inspection results to Mr. Kelvin Henderson and other members of the licensee staff. The inspectors confirmed that proprietary information was not provided or examined during the inspection period.

ATTACHMENT: SUPPLEMENTAL INFORMATION

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## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### **Licensee personnel**

B. Bernard, Superintendent, Security  
C. Burton, Vice President Harris Plant  
D. Corlett, Supervisor, Licensing/Regulatory Programs  
H. Curry, Manager, Nuclear Oversight  
M. Denny, BOP System Supervisor  
J. Dills, Manager, Operations  
J. Dufner, Manager, Engineering  
K. Harshaw, Manager, Outage and Scheduling  
K. Henderson, Plant General Manager  
G. Kilpatrick, Training Manager  
P. Louka, GL 89-13 Program Owner  
M. Parker, Superintendent, Radiation Protection  
J. Robinson, Superintendent, Environmental and Chemistry  
M. Wallace, Licensing Senior Specialist  
J. Warner, Manager, Support Services

#### **NRC personnel**

R. Musser, Chief, Reactor Projects Branch 4, Division of Reactor Projects, Region II

## LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

### Opened and Closed

05000400/2010003-01	NCV	Failure to Follow Procedure to Install the Load Block 5 Auxiliary Relay (Section 1R19)
05000400/2010003-02	FIN	Reactor Trip due to Failing to Properly Assemble an Oil Filter in the Hydrogen Seal Oil System (Section 4OA3)

### Closed

05000400/2010-002-00	LER	Manual Actuation of the Reactor Protection System due to a Hydrogen Seal Oil Leak (Section 4OA3)
2515/173	TI	Review of the Implementation of the Industry Ground Water Protection Voluntary Initiative (Section 4OA5.2)

## **LIST OF DOCUMENTS REVIEWED**

### **Section 1R01: Adverse Weather Protection**

For Offsite and Alternate AC Power Readiness:

#### Procedures

- NGGM-IA-0003 Rev. 8 Transmission Interface Agreement for Operation, Maintenance and Engineering Activities at Nuclear Plants
- AOP-028, Grid Instability
- OST-1023, Offsite Power Availability Verification Weekly Interval

### **Section 1R04: Equipment Alignment**

#### Partial System Walkdown

Primary Makeup Water system:

- Procedure OP-112, Primary Makeup Water System,
- Drawing 2165-S-0799, Simplified Flow Diagram Primary Makeup and Demineralized Water Systems
- Primary Makeup Water System Student Text

Emergency Service Water system:

- Procedure OP-139, Service Water System,
- Drawing 2165-S-0547, Simplified Flow Diagram Circulating and Service Water Systems

Emergency Switchgear system:

- Procedure OP-156.02 AC Electrical Distribution System,
- Drawing 5165-B-C-0001, Simplified Flow Diagram AC Electrical Distribution System
- FSAR Section 3/4.8.3, On-Site Power Distribution

#### Complete System Walkdown

- Procedure OP-148 Essential Services Chill Water System
- Design Basis Document-132, Essential & Nonessential Services Chilled Water Systems
- Drawing 2165-S-0998, Simplified Flow Diagram Essential Services Chill Water System, Sheets 1 and 2
- FSAR Section 9.2.8, Essential Services Chill Water System
- List of Installed Temporary Modifications (To verify no temporary modifications on this system)
- Essential Services Chilled Water System Student Text
- WO 1542758, "A" Chiller Oil Pump Breaker will not Close

### **Section 1R05: Fire Protection**

- FPP-001 Fire Protection Program Manual
- FPP-004, Transient Combustible Control
- FPP-013, Fire Protection – Minimum Requirements, Mitigating Actions and Surveillance Requirements
- FPP-012-04-DBG, Diesel Generator Building Fire Pre-Plan, D06, Diesel Generator Room B, Elevation 261', Exhaust Silencer Room, Elevation 292'
- FPP-012-04-DBG, Diesel Generator Building Fire Pre-Plan, D09, Diesel Generator B HVAC Duct Area, Elevation 280'
- FPP-012-04-DBG, Diesel Generator Building Fire Pre-Plan, D10, Diesel Generator B HVAC Area, Elevation 292'
- FPP-012-04-DBG, Diesel Generator Building Fire Pre-Plan, D07, Diesel Generator B Fuel oil Day Tank Enclosure
- FPP-012-04-DBG, Diesel Generator Building Fire Pre-Plan, D08, Diesel Generator Room B Air Starting Units, Electrical Room and Unit 2 B Electrical Room, Elevation 261'
- FPP-012-02-RAB286, Reactor Auxiliary Building Elevation 286 Fire Pre-Plan, A32, "A" Switchgear Ventilation Room
- FPP-012-02-RAB286, Reactor Auxiliary Building Elevation 286 Fire Pre-Plan, A33, "B" Switchgear Ventilation Room

### **Section 1R06: Flood Protection Measures**

#### **UFSAR Sections**

- 2.4.10, Flooding Protection Requirements
- 3.6A.6, Flooding Analysis

#### **Procedures**

- AOP-022, Loss of Service Water
- OP-139, Service Water System

### **Section 1R07: Heat Sink Performance**

#### **Procedures**

- EPT-163, Harris Nuclear Plant, Plant Operating Manual, GL 89-13 Inspections for "A" CCW HX
- EPT-163, Harris Nuclear Plant, Plant Operating Manual, GL 89-13 Inspections for "B" CCW HX
- EPT-250, Harris Nuclear Plant, Plant Operating Manual, Vol 6, Part 9, "A" Train ESW Flow verification/Balance, Rev 18
- OST-1214, Harris Nuclear Plant, Plant Operating Manual, Vol 3, Part 9, Operations Surveillance

- Test, Emergency Service water System Operability, Train "A", Quarterly Interval Modes 1-2-3-4-5-6-Defueled, Rev 60
- CAP-NGGC-0200, Rev 32, Harris Corrective Action Program Procedure

#### Corrective Action Documents

- AR #239738, B CSIP Pump Oil Cooler Plugging Requirements
- AR #240598-01, Cooling Water Reliability Program, Procedure Quality Improvements, 02/07/2008
- AR #249643, Wrong Tubes Plugged on "B" CCW HX
- AR #391538, Residual Heat Removal Pump "B" Seal cooler Outlet CCW flow low out of band, 4/6/2010
- AR #404966, Missed Opportunity to Identify Cause During Investigation for Misplaced Tube Plug, 6/15/2010 (Generated in response to inspector's observations)

#### Other

- Formal Self Assessment #217192: Harris Nuclear Plant Cooling Water Reliability Program (GL-89-13), dated 7/16/2007 through 7/19/2007
- Serial # NLS-90-005, Carolina Power and Light Company Response to USNRC GL 89-13, Dated January 26, 1990
- TAC No. MD8676, Shearon Harris Nuclear Power Plant, Unit 1-Issuance of Amendment Regarding Lowering the Minimum Allowed Level of the UHS Main Reservoir, Dated 10/14/2009
- Shearon Harris Nuclear Power Plant, Unit 1 DAM Safety and Operation Inspection Report, June 25, 2009
- EPT-250, A Train ESW Flow Verification/Balance results, 5/24/2007
- Harris Nuclear Power Plant Emergency Service Health Report, Dated 3/24/2010
- NGG Program Health Report for Cooling Water Reliability (GL 89-13), Dated 1/29/2010
- NGG Calculation HNP-C/STRS-1085, HX and Chiller Tube Minimum Wall Criteria
- Work Order 641778, EPT-163, GL 89-13 Inspections, Dated 10/7/2007
- Work Order 858114, EPT-163, GLL 89-13 Inspection for A CCW HX Inspection Results

### **Section 1R11: Licensed Operator Regualification**

#### Procedures

- AOP-014, Loss of Component Cooling Water
- AOP-002, Emergency Boration

### **Section 1R12: Maintenance Effectiveness**

- NUMARC 93-01, Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants
- ADM-NGGC-0101, Maintenance Rule Program

### **Section 1R13: Maintenance Risk Assessments and Emergent Work Evaluation**

- OMP-003, Outage Shutdown Risk Management
- WCM-001, On-line Maintenance
- ADM-NGGC-0006, Online Equipment Out of Service (EOOS) Models for Risk Assessment
- LP-L-8901B, Reactor Make-Up Water Storage Tank Level Loop Calibration
- High Risk Activity Plan, Replace Switchyard Breaker
- OP-156.02, AC Electrical Distribution

### **Section 1R15: Operability Evaluations**

- OPS-NGGC-1305, Operability Determinations
- DBD-114, Auxiliary Feedwater System
- PM-M0086, TDAFW Governor Valve Inspection
- VM-MDY, Vendor Manual TDAFW Pump
- Drawing 2165-S-1321, Simplified Flow Diagram Component Cooling Water System, Sheet 3
- VM-BJH, Vendor Manual RHR Pump
- Drawing C-8x20WDF321X3B, RHR Pump Seal Piping
- Essential Services Chilled Water Student Text
- VM-OAJ-V01, Vendor Manual Chiller, Water
- WO 1432946, Replace A Chiller Lube Oil Thermostat
- Design Basis Document DBD-201, Emergency Diesel Generator
- Control Wiring Diagram 2166-B-401 Sheet 1993A, "A" EDG Protection and Instrumentation
- Control Wiring Diagram 2166-B-401 Sheet 1993, "A" EDG Protection and Instrumentation
- Control Wiring Diagram 2166-B-401 Sheet 1995, "A" EDG 86 DG Relay
- Control Wiring Diagram 2166-B-401 Sheet 1994, "A" EDG Protection and Instrumentation
- Control Wiring Diagram 2166-B-401 Sheet 1989 "A" EDG Engine Control Sheet 2
- Control Wiring Diagram 2166-B-401 Sheet 1992, "A" EDG Differential and Ground Fault Relaying
- Control Wiring Diagram 2166-B-401 Sheet 1991A, "A" EDG Excitation Control
- Annunciator Panel Procedure (APP)-DGP-001, Diesel Generator Panels
- VM-MBO, Vendor Manual Emergency Diesel Generator
- WO 1621012, EDG Potential Circuit Loss of Fuse (H-5) on EDG Control Panel Came in and Cleared
- Troubleshooting Control Form Associated with WO 1621012
- WO 1623787, Replace "A" EDG Synchronization Selector Switch

### **Section 1R18: Plant Modifications**

- Design Basis Document DBD-202, Plant Electrical System
- Final Safety Analysis Report Section 7.4.2 and 8.3.1, Plant Electrical System

**Section 1R19: Post Maintenance Testing**

- Drawing 2165-S-1305, Simplified Flow Diagram Essential Services Chilled Water System
- OP-148 Essential Services Chill Water System
- FSAR 9.2.8 Essential Services Chill Water System
- OP-139 Service Water System
- Drawing 2165-S-0547, Simplified Flow Diagram Emergency Service Water System
- Drawing 2165-S-0548, Simplified Flow Diagram Emergency Service Water System
- Drawing 2165-S-0548, Sheet 2, Simplified Flow Diagram Emergency Service Water System

**Section 1R20: Refueling and Outage Activities**

- FHP-020, Refueling Operations
- FHP-014, Fuel and Insert Shuffle Sequence

**Generic Letter 88-17 Documents**

- AOP-020, Loss of Reactor Coolant System Inventory or Residual Heat Removal While Shutdown
- AP-013, Plant Nuclear Safety Committee
- ESR 9500808, Removable Equipment Hatch Cover Bolting Requirements
- ESR 9800297, Containment Closure Procedure
- GP-008, Draining the Reactor Coolant System
- HNP-C/CONT-1009, Containment Building Removable Equipment Hatch
- OMP-003, Outage Shutdown Risk Management
- OMP-004, Control of Plant Activities During Reduced Inventory Conditions
- OST-1034, Containment Penetrations Test Weekly Interval During Core Alterations and Movement of Irradiated Fuel Inside Containment, and
- OST-1091, Containment Closure Test Weekly Interval During Core Alterations and Movement of Irradiated Fuel Inside Containment

**Section 1R22: Surveillance Testing**

- Drawing 2165-S-0544, Simplified Flow Diagram Feedwater System
- Current and Historical Plant Computer Plots of Service Water, Component Cooling Water, Containment and Volume Control Tank Temperatures
- Drawing 2165-S-1305, Simplified Flow Diagram Chemical and Volume Control System
- DBD-131, Component Cooling Water System
- Drawing 2166-B-401 Sheets 759, 2865, 2880 and 2913 Fuel Handling Building Operating Floor Isolation Dampers 11 & 21



**Section 40A1: Performance Indicator Verification**

- NEI 99-02, Regulatory Assessment Performance Indicator Guideline
- Calculation HNP-F/PSA-0068, NRC Mitigating System Performance Index Basis Document for Harris Nuclear Plant

**Section 40A2: Identification and Resolution of Problems**

- CAP-NGGC-0200, Corrective Action Program

**Section 40A3: Event Follow-up**

- Construction Drawing 2165-G-005, Turbine Building Ground Floor Plan
- Construction Drawing 2166-G-179, Turbine Building Ground Floor Conduit Arrangement Plan

**Section 40A5: Other Activities****Procedures, Manuals, and Guidance Documents**

- AP-556, Effluent Management Program, Rev. 6
- CHE-NGGC-0057, Groundwater Protection Program, Rev. 0
- EGR-NGGC-0513, License Renewal Buried Piping and Tanks Inspection Program, Rev. 1
- EMP-012, Groundwater Monitoring Program, Rev. 1
- CAP-NGGC-0200, Corrective Action Program, Rev. 32
- CAP-NGGC-0201, Self-Assessment/Benchmark Programs, Rev. 13
- Shearon Harris Nuclear Power Plant Off-Site Dose Calculation Manual, Rev. 20, Sections 4 and 5 only

**Records and Data Reviewed**

- ERC -08-005, Evaluation of Systems, Structures, Components or Work Practices for the Groundwater Protection Program, Rev. 1
- Shearon Harris Nuclear Power Plant Units 2 and 3 COL Application, Part 3, Environmental Description, Section 2.3 only
- NEI 07-07 NEI Groundwater Protection Initiative, NEI Peer Assessment Report, 11/10/2009
- CTBD Groundwater Well Results.pdf
- Shearon Harris Nuclear Power Plant FSAR Section 2.4.13, Hydrologic Engineering-Groundwater
- Diagram: ODCMWells.pdf
- Consultant Assessment: Review of Current Radiological Monitoring Program, 8/17/2006
- Consultant Assessment: Characteristics of Monitoring Well MWA-12, 10/16/2006
- Consultant Assessment: Cooling Tower Blowdown Line Assessment Report, April 2009

- Consultant Assessment: Cooling Tower Blowdown Line Supplemental Ground Water Assessment Report, December 2009
- State Communication 4-24-08.pdf, 4/24/2008
- State Communication 2009.pdf, Communications with the State of North Carolina, 4/1/09, 5/14/09, 5/22/09 and 6/17/09
- Listing of HNP Mandatory Periodic Self-Assessments

Corrective Action Program Documents

- Self Assessment 264516, Ground Water Protection Initiative NEI 07-07, July 22-24, 2008