



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION II  
SAM NUNN ATLANTA FEDERAL CENTER  
61 FORSYTH STREET, SW, SUITE 23T85  
ATLANTA, GEORGIA 30303-8931

January 28, 2010

Mr. David A. Heacock  
President and Chief Nuclear Officer  
Virginia Electric and Power Company  
Innsbrook Technical Center  
5000 Dominion Boulevard  
Glen Allen, VA 23060-6711

**SUBJECT: SURRY POWER STATION – NRC INTEGRATED INSPECTION REPORT  
05000280/2009005 and 05000281/2009005**

Dear Mr. Heacock:

On December 31, 2009, the United States Nuclear Regulatory Commission (NRC) completed an inspection at your Surry Power Station, Units 1 and 2. The enclosed inspection report documents the inspection results, which were discussed on January 21, 2010, with Mr. K. Sloane and other members of your staff.

The inspection examined activities conducted under your licenses as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your licenses. 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 the findings was determined to involve a violation of NRC requirements. Additionally, three licensee-identified violations, which were determined to be of very low safety significance, are listed in this report. However, because of the very low safety significance and because they are entered into your corrective action program, the NRC is treating these findings as non-cited violations (NCVs) consistent with Section VI.A.1 of the NRC Enforcement Policy. If you contest any NCV, 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 Surry Power Station.

In addition, if you disagree with the characterization of any finding in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region II; and the NRC Resident Inspector at the Surry Power Station. The information you provide will be considered in accordance with Inspection Manual Chapter 0305.

VEPCO

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

Sincerely,

**/RA/**

Gerald J. McCoy, Chief  
Reactor Projects Branch 5  
Division of Reactor Projects

Docket Nos.: 50-280, 50-281  
License Nos.: DPR-32, DPR-37

Enclosure: Inspection Report 05000280/2009005 and 05000281/2009005  
w/Attachment: Supplemental Information

cc w/encl. (See page 3)

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of the 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).

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Gerald J. McCoy, Chief  
 Reactor Projects Branch 5  
 Division of Reactor Projects

Docket Nos.: 50-280, 50-281  
 License Nos.: DPR-32, DPR-37

Enclosure: Inspection Report 05000281/2009005 and 05000281/2009005  
 w/Attachment: Supplemental Information

cc w/encl. (See page 3)

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cc w/encl:

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Letter to David A. Heacock from Gerald J. McCoy dated January 28, 2010.

SUBJECT: SURRY POWER STATION – NRC INTEGRATED INSPECTION REPORT  
05000280/2009005 and 05000281/2009005.

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**U.S. NUCLEAR REGULATORY COMMISSION**

REGION II

Docket Nos.: 50-280, 50-281

License Nos.: DPR-32, DPR-37

Report No: 05000280/2009005 and 05000281/2009005

Licensee: Virginia Electric and Power Company (VEPCO)

Facility: Surry Power Station, Units 1 and 2

Location: 5850 Hog Island Road  
Surry, VA 23883

Dates: October 1, 2009 through December 31, 2009

Inspectors: C. Welch, Senior Resident Inspector  
J. Nadel, Resident Inspector  
C. Fletcher, Reactor Inspector  
R. Hamilton, Senior Health Physicist (2OS1, 2PS2, 4OA5)  
W. Loo, Senior Health Physicist (2OS2)  
A. Vargas-Mendez, Reactor Inspector (1R08)  
R. Williams, Reactor Inspector (1R08)

Approved by: Gerald J. McCoy, Chief  
Reactor Projects Branch 5  
Division of Reactor Projects

Enclosure

## SUMMARY OF FINDINGS

IR 05000280/2009-005 and 05000281/2009-005; 10/01/2009 – 12/31/2009; Surry Power Station, Units 1 and 2; Maintenance Effectiveness and Operability Determinations.

The report covered a 3- month period of inspection by resident inspectors and announced inspections by regional health physicists and engineering inspectors. Two Green findings, one of which was a non-cited violation (NCV), 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 aspect was determined using IMC 0305, "Operating Reactor Assessment Program." 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 December 2006.

### Cornerstone: Barrier Integrity

- Green. A self-revealing Green NCV of 10 CFR 50 Appendix B, Criterion XVI, was identified for the failure to correct a condition adverse to quality which led to main control room isolation damper 1-VS-MOD-103D being inoperable for approximately 19 hours on September 21-22, 2009 (CR 349075). The actuator was repaired and is scheduled for replacement in 2010.

The finding, associated with the performance attribute of the barrier integrity cornerstone, is more than minor because it adversely affected the cornerstone objective, as it relates to control room integrity, to provide reasonable assurance physical design barriers protect public health and safety. The finding, evaluated per MC-0609, Attachment 4, "Phase 1 – Initial Screening and Characterization of Findings," was determined to be of very low safety significance (Green) because it did not result in a loss of safety function or loss of a single train of the control room isolation boundary for more than its allowed outage time. This finding has a cross-cutting aspect in the area of human performance, resources, in that equipment and other resources were not made available to assure nuclear safety by minimizing preventative maintenance deferrals (H.2.a). (Section 1R12)

- Green. A self-revealing Green Finding was identified for the incorrect operability determination of main control room isolation damper 1-VS-MOD-103D. The damper, declared operable and left in-service following loss of power to its hydraulic pump on September 21, 2009 (CR 349003), failed to close on demand, on September 22, 2009. The damper was inoperable for approximately 19 hours (CR 349075) before power was restored to the pump, the damper closed, and the actuator repaired.

The finding, associated with the performance attribute of the barrier integrity cornerstone, is more than minor because it adversely affected the cornerstone objective as it relates to control room integrity, to provide reasonable assurance physical design barriers protect public health and safety. The finding, evaluated per MC-0609, Attachment 4, "Phase 1 – Initial Screening and Characterization of

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Findings,” was determined to be of very low safety significance (Green) because it did not result in a loss of safety function or the loss of a single train of the control room isolation boundary for more than its allowed outage time. This finding has a cross-cutting aspect in the area of problem identification, corrective action program, in that an adequate operability assessment that thoroughly evaluated the degraded condition of 1-VS-MOD-103D was not performed (P.1.c). (Section 1R15)

### **Licensee Identified Violations**

Violations of very low safety significance, which were identified by the licensee, have been reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee’s corrective action program. These violations and corrective actions are listed in Section 4OA7 of this report.

## REPORT DETAILS

### Summary of Plant Status

Unit 1 operated at or near full rated thermal power (RTP) throughout the inspection period.

Unit 2 began coast down operations for refueling outage (RFO) 23 on October 7, 2009. The Unit was taken off-line and the reactor shutdown at 12:19 a.m. on November 1. Startup from RFO 23 commenced on November 29. The reactor was brought critical at 5:27 a.m. but was subsequently tripped on November 29 at 10:45 a.m. due to a failed group step counter. The reactor was again brought critical on November 29 at 9:50 p.m. and the Unit was connected to the electrical grid, following physics testing, at 10:33 p.m. on November 30th. RTP was reached at 4:25 a.m. on December 4, 2009. Unit 2 was removed from the grid on December 12 to allow balance moves to be made to improve main turbine vibrations after which the Unit was reconnected to the grid and subsequently reached RTP at approximately 2:30 a.m. on December 13, 2009. The Unit operated at RTP for the remainder of the period.

### 1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

#### 1R01 Adverse Weather Protection

##### .1 External Flooding

###### a. Inspection Scope

The inspectors reviewed the Updated Final Safety Analysis Report and station procedures associated with severe weather involving external flooding to evaluate the station's readiness to cope with external flooding at the intake structure. The inspectors reviewed the elevation drawings for the emergency service water (ESW) pump house and walked down the intake structure with focus on the ESW pump house and the sealing of equipment below the flood line as well as the condition and availability of the buildings' temporary removable flood barriers. The inspectors verified the licensee was identifying weather related problems and entering the issues into the corrective action program. The inspectors reviewed condition report (CR) 349378 and the associated corrective actions for unsealed penetrations in the ESW pump house floor.

###### b. Findings

A licensee identified violation was reviewed by the inspectors. This licensee-identified finding involved a violation of TS 6.4, Procedures. The enforcement aspects of the violation are discussed in Section 4OA7. No other findings of significance were identified.

Enclosure

## 1R04 Equipment Alignment

### .1 Partial Walkdown

#### a. Inspection Scope

The inspectors performed a partial walkdown of the risk-significant systems identified below to verify the redundant or diverse train for equipment removed from service was operable and/or that the system was properly aligned to perform its' designated safety function following an extended outage. During the walkdown, the inspectors verified the positions of critical valves, breakers, and control switches by in-field observation and/or review of the main control board. To determine the correct configuration to support system operation, the inspectors reviewed applicable operating procedures, station drawings, the Updated Final Safety Analysis Report, and the Technical Specifications. The inspectors attempted to identify any discrepancies that could impact the function of the system, and, therefore, potentially increase risk.

- Unit 2 Auxiliary Feedwater System
- Unit 2 Low Head Safety Injection System
- Unit 2 Containment Spray System
- Unit 2 MDAFW Cold Shutdown Alignment and Supply to U1 AFW cross-tie

#### b. Findings

No findings of significance were identified.

### .2 Complete System Walkdown

#### a. Inspection Scope

The inspectors performed a complete system walkdown of the Unit 2 recirculation spray system (RS) to verify the system was properly aligned and capable of performing its safety function, and to assess its' material condition. During the walkdown, the inspectors verified valve and breaker positions were in the proper alignment, component labeling was accurate, hangers and supports were functional, local indications were accurate, and valves were locked as required. The plant health report, system drawings, condition reports, the UFSAR, and Technical Specifications were reviewed. Outstanding deficiencies were verified to be properly classified and not affect system operability and capability to perform its safety function. This inspection included both the inside recirculation spray (ISRS) and outside recirculation spray (OSRS) sub-systems. The inspectors reviewed the corrective action program to verify equipment alignment issues were being identified and resolved.

#### b. Findings

No findings of significance were identified.

## 1R05 Fire Protection

### .1 Quarterly Fire Protection Reviews

#### a. Inspection Scope

The inspectors conducted a defense-in-depth (DID) review for the six fire areas listed below by walkdown and review of licensee documents. The reviews were performed to evaluate the fire protection program operational status and material condition and the adequacy of: (1) control of transient combustibles and ignition sources; (2) fire detection and suppression capability; (3) passive fire protection features; (4) compensatory measures established for out-of-service, degraded or inoperable fire protection equipment, systems, or features; and (5) procedures, equipment, fire barriers, and systems so that post-fire capability to safely shutdown the plant is ensured. The inspectors reviewed the corrective action program to verify fire protection deficiencies were being identified and properly resolved.

- Fire zone 16, Unit 2 Containment
- Fire zone 10, Battery Room 1A
- Fire zone 11, Battery Room 1B
- Fire zone 32, Fire pump house
- Fire zone 41, Unit 1 Main and Station Service Transformers
- Fire zone 42, Unit 2 Main and Station Service Transformers

#### b. Findings

No findings of significance were identified.

## 1R06 Flood Protection Measures

### .1 Internal Flooding

#### a. Inspection Scope

The inspectors reviewed the Updated Final Safety Analysis Report and Individual Plant Examination of Non-Seismic External Events and Fires to identify those areas that can be affected by external and internal flooding. Based on the reviews, the inspectors walked down the Unit 1 and 2 turbine building basements, the emergency switchgear rooms, mechanical equipment rooms 3, 4, and 5, and the auxiliary building basement. The inspectors observed and assessed the condition and availability of temporary or removable flooding barriers, flooding dikes, floor drain backflow preventers, the sealing of holes and penetrations between flood areas, the adequacy of water tight doors, and the operability of flooding alarms and installed sump pumps.

#### b. Findings

No findings of significance were identified.

## .2 Underground Electrical Cable Bunker/Manhole inspections

### a. Inspection Scope

The inspectors performed the annual review of electrical cables run underground via bunkers/manholes and buried conduit. The purpose of the inspection was to determine if the cables and cable splices appear intact and whether they were submerged or subject to periodic wetting, if the cable supports were in good condition, and if the manhole was outfitted with a means of dewatering (i.e. sump pump) and if it was operational. To accomplish this inspection, the inspectors reviewed Surry's life cycle management plan for medium voltage cables, Technical Report EE-0064, "Evaluation of Electrical Cable for Installation in Wet Locations," and the licensee's 2009 inspection results from the first, second, third, and fourth quarter manhole inspections, accomplished in accordance with 0-MCM-1207-01, "Pumping of Security and Electrical Cable Vaults." The inspectors observed the licensee's inspection of two non-safety related manholes and reviewed relevant condition reports.

### b. Findings

No findings of significance were identified.

## 1R07 Heat Sink Performance

### a. Inspection Scope

The inspectors reviewed the licensee's heat exchanger program document, the 3<sup>rd</sup> quarter heat exchanger health report, trending data maintained by the system engineer, maintenance rule information, and the records and as found photographs for the heat exchanger cleanings performed in November 2009 for heat exchangers 1-CC-E-1A, 1B, 1C, and 1D. The inspectors verified significant heat exchanger performance issues were being entered into the licensee's corrective action program and appropriately addressed.

### b. Findings

No findings of significance were identified.

## 1R08 Inservice Inspection Activities

From November 9, 2009 through November 13, 2009, the inspectors conducted a review of the implementation of the licensee's Inservice Inspection (ISI) Program for monitoring degradation of the reactor coolant system, steam generator tubes, emergency feedwater systems, risk significant piping and components and containment systems.

The inspections described in Sections 1R08.1, 1R08.2, R08.3, 1R08.4 and 1R08.5 below constituted one inservice inspection sample as defined in Inspection Procedure 71111.08-05.

.1 Piping Systems ISI

a. Inspection Scope

The inspectors observed and reviewed records of the following non-destructive examinations mandated by the ASME Section XI Code to evaluate compliance with the ASME Code Section XI and Section V requirements and if any indications and defects detected were detected, to determine if these were dispositioned in accordance with the ASME Code or an NRC approved alternative requirement.

- Observed ultrasonic (UT) examination on RHR elbow to pipe weld S2, Class II
- Reviewed liquid penetrant (PT) examination on pipe to valve, Class II
- Reviewed PT examination on pipe to valve, Class II
- Reviewed UT examination on elbow to pipe, Class II
- Reviewed PT examination on pipe to valve 2-RH-33, Class II

The inspectors reviewed the following surface examination records with recordable indications accepted for continued service to determine if acceptance was in accordance with the ASME Code Section XI or an NRC approved alternative.

- CEM-0004, Rev 0, "Structural Integrity Evaluation for Surry Unit 2 RHR Heat Exchanger 2-RH-E-1A with As-Left Thinned Areas in the Hub of the Main Flange"

The inspectors reviewed and observed the following pressure boundary welds completed for risk significant systems during the outage to determine if the licensee applied the preservice non-destructive examinations and acceptance criteria required by the construction Code and the ASME Code Section XI. Additionally, the inspectors reviewed the welding procedure specification and supporting weld procedure qualification records to determine if the weld procedures were qualified in accordance with the requirements of Construction Code and the ASME Code Section IX.

- Reviewed WO 38102653983, Replace valve 2-RH-33, Class II
- Observed WO 38077498902, Replace flux thimbles on locations D3, D5, D12, N7, B5, B6, C12, G9, L4, L6, M3, H13, and N12, Class I

The inspectors reviewed portions of the video footage of the VE examinations for the bottom-mounted instrument penetrations to ensure examinations were being performed in accordance with the requirements of ASME Code Case N-722-1 and 10 CFR 50.55a(g)(6)(ii)(E).

b. Findings

No findings of significance were identified.

## .2 Reactor Pressure Vessel Upper Head Penetration Inspection Activities

### c. Inspection Scope

For the Unit 2 vessel head, no examination was required pursuant to 10 CFR 50.55a(g)(6)(ii)(D) for the current refueling outage. Therefore, no NRC review was completed for this inspection procedure attribute.

The licensee did not perform any welded repairs to vessel head penetrations since the beginning of the preceding outage for Unit 2. Therefore, no NRC review was completed for this inspection procedure attribute.

### d. Findings

No findings of significance were identified.

## .3 Boric Acid Corrosion Control (BACC)

### a. Inspection Scope

The inspectors performed an independent walkdown of portions of boric acid containing system which had received a recent licensee boric acid walkdown and determined whether the licensee's BACC visual examinations emphasized locations where boric acid leaks can cause degradation of safety significant components.

The inspectors reviewed the following licensee evaluations of reactor coolant system components with boric acid deposits to determine if degraded components were documented in the corrective action system. The inspectors also evaluated corrective actions for any degraded reactor coolant system components to determine if they met the component Construction Code, ASME Section XI Code, and/or NRC approved alternative.

- CR329793 "Residue observed on the outer edges of the flanges for 1-CS-32"
- CR341327 "Valve body leakage from 01-SS-TV-101B"
- CR338607 "Leakage from valve 01-CH-115"

The inspectors reviewed the following corrective actions related to evidence of boric acid leakage to determine if the corrective actions completed were consistent with the requirements of the ASME Code Section XI and 10 CFR Part 50, Appendix B, Criterion XVI.

- CR355874 "During the performance of 1-NPT-RC-002 boric acid residue was observed in the packing area of 2-CH-361"
- CR355901 "During 2-OPT-RC-10.1, observed an inactive leak on a threaded connection vent plug for 2-RC-FC-2481A"
- CR355919 "During 2-OPT-RC-10.1, an ICV for 2-RC-FT-2416 was observed to have an inactive fitting leak"

b. Findings

No findings of significance were identified.

.2 Steam Generator (SG) Tube Inspection Activities

a. Inspection Scope

The NRC inspectors observed the following activities and/or reviewed the following documentation and evaluated them against the licensee's technical specifications, commitments made to the NRC, ASME Section XI, and Nuclear Energy Institute (NEI) 97-06 (Steam Generator Program Guidelines):

- Interviewed Eddy Current Testing (ET) data analysts and reviewed samples of ET data.
- Compared the numbers and sizes of SG tube flaws/degradation identified, against the licensee's previous outage Operational Assessment predictions
- Reviewed the SG tube ET examination scope and expansion criteria.
- Evaluated if the licensee's SG tube ET examination scope included potential areas of tube degradation identified in prior outage SG tube inspections and/or as identified in NRC generic industry operating experience applicable to the licensee's SG tubes.
- No new degradation mechanisms were identified during the EC examinations.
- Reviewed the licensee's repair criteria and processes.
- Primary-to-secondary leakage (e.g., SG tube leakage) was below three gallons per day, or the detection threshold, during the previous operating cycle.
- Evaluated if the ET equipment and techniques used by the licensee to acquire data from the SG tubes were qualified or validated to detect the known/expected types of SG tube degradation in accordance with Appendix H, Performance Demonstration for Eddy Current Examination, of EPRI Pressurized Water Reactor Steam Generator Examination Guidelines, Revision 7.
- Reviewed the licensee's secondary side SG Foreign Object Search and Removal (FOSAR) activities.
- Reviewed the licensee's evaluations and repairs for SG tubes damaged by foreign material or tubes surrounding inaccessible foreign objects left within the secondary side of the steam generators.
- Reviewed ET personnel qualifications.

b. Findings

No findings of significance were identified.

## .2 Identification and Resolution of Problems

### a. Inspection Scope

The inspectors performed a review of ISI/SG related problems entered into the licensee's corrective action program and conducted interviews with licensee staff to determine if:

- the licensee had established an appropriate threshold for identifying ISI/SG related problems;
- the licensee had performed a root cause (if applicable) and taken appropriate corrective actions; and
- the licensee had evaluated operating experience and industry generic issues related to ISI and pressure boundary integrity.

The inspectors performed these reviews to evaluate compliance with 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requirements. The corrective action documents reviewed by the inspectors are listed in the Attachment to this report.

### b. Findings

No findings of significance were identified.

## 1R11 Licensed Operator Requalification Program

### .1 Resident Inspector Quarterly Review

#### a. Inspection Scope

On October 14, 2009, the inspectors observed a licensed operator simulator training session. The training was administered using scenario RQ-09.6 and involved operational transients associated with a loss of Residual Heat Removal capability. The inspector observed the crew's performance to determine whether the crew met the scenario objectives; accomplished the critical tasks; demonstrated the ability to take timely action in a safe direction and to prioritize, interpret, and verify alarms; demonstrated proper use of alarm response, abnormal, and emergency operating procedures; demonstrated proper command and control; communicated effectively; and appropriately classified events per the emergency plan. The inspectors confirmed items for improvement were identified and discussed with the operators to further improve performance. The inspector verified the simulator conditions were consistent with the scenario and reflected the actual plant configuration (i.e. simulator fidelity).

#### b. Findings

No findings of significance were identified.

## 1R12 Maintenance Effectiveness

### a. Inspection Scope

For the equipment issues described in the three condition reports listed below, the inspectors evaluated the effectiveness of the corresponding licensee's preventive and corrective maintenance. The inspectors performed a detailed review of the problem history and associated circumstances, evaluated the extent of condition reviews, as required, and reviewed the generic implications of the equipment and/or work practice problem. Inspectors performed walkdowns of the accessible portions of the system, performed in-office reviews of procedures and evaluations, and held discussions with system engineers. The inspectors compared the licensee's actions with the requirements of the Maintenance Rule (10 CFR 50.65), VPAP 0815, "Maintenance Rule Program," and the Surry Maintenance Rule Scoping and Performance Matrix.

- CR 349075, 1-VS-MOD-103D failed to close as expected
- CR 353772, 1-RM-RI-159 Flow Fault Lit/Filter Tear
- CR 350124, 1-RM-RI-159 Flow Fault Lit

### b. Findings

Introduction: A self-revealing Green NCV of 10 CFR 50 Appendix B, Criterion XVI, was identified for the failure to correct a condition adverse to quality which led to main control room isolation damper 1-VS-MOD-103D being inoperable for approximately 19 hours on September 21-22, 2009 (CR 349075). The actuator was repaired and is scheduled for replacement in 2010.

Description: Condition report (CR) 321840, issued on January 29, 2009, documented that the hydraulic pump for main control room (MCR) damper 1-VS-MOD-103D was cycling on every 10 to 15 minutes for 1 to 2 seconds. Review of the CR response identified that engineering contacted the vendor and verified the motor for the hydraulic pump was rated for continuous duty and would not be damaged by repeated cycling, the damper was successfully cycled with and without electrical power, that no external leakage was identified, and that after several cycles of the damper the motor discontinued cycling on and off and therefore no additional actions were required.

The vendor technical manual states in item 2 of the monthly maintenance checks that "the equipment should be checked to ensure that pressure is being maintained without excessive use of the motor and pump. Excessive pump use (more than once in two hours) would indicate hydraulic leakage in the system. Leaks should be identified and repaired." Section VI – Troubleshooting of the vendor technical manual identifies a leaking relief valve as a probable cause for hydraulic pump operation for greater than 2 minutes.

A second condition report, CR 344278, was issued on August 10 to document 1-VS-MOD-103D was cycling on every 19 minutes for 1 to 2 seconds. The CR was closed to an existing work order scheduled for October 12, 2009.

During surveillance testing of the MCR emergency ventilation system on September 20, 2009; operations identified that the pump for 1-VS-MOD-103D continued to operate, cycling on for 1 to 2 seconds every 10 minutes. A log entry referenced the prior CR generated against 1-VS-MOD-103D on August 10, 2009 (CR 344278). Having aborted the surveillance, it was re-performed the morning of September 21 and the motor for 1-VS-MOD-03D's pump did not stop cycling on at approximately 2 minute intervals. That afternoon, at 1:54 p.m., operations noted the indicating lights for the hydraulic pump's motor to 1-VS-MOD-103D were de energized. Investigation determined the breaker's thermal overloads had tripped, opening the power circuit to the motor, due to the excessive operation / cycling of the motor. On September 22, at 8:28 a.m., operations attempted to close 1-VS-MOD-103D, the damper failed to close. Operations reset the thermal overloads and breaker for 1-VS-MOD-103D at 9:29 a.m. and shut MOD 103D to restore operability of the MCR pressure boundary. An investigation determined that the damper had failed to operate because the hydraulic accumulator had lost pressure due to internal leakage, and the loss of electrical power to the hydraulic pump prevented recharging the accumulator.

The vendor technical manual specifies that maintenance be performed on a monthly, yearly, and five year frequency. During the fifth year the vendor instructs that the actuator be completely dismantled and overhauled, stating the basis of the overhaul is to replace, the elastomer seals, any worn parts or parts which contain elastomers that cannot be replaced (throw away items). Review identified 1-VS-MOD-103D had never been fully overhauled as recommended by the vendor. The internal relief valve was last replaced in June 2004 following a similar incident where the hydraulic pump ran continuously due to the relief valve leaking due to a degraded o-ring seal. The event was captured in plant issue document S-2004-1863, issued on May 18, 2004. Corrective action included replacing the relief valve and changing the normal inspection frequency from 72 weeks to yearly. The CR also recommended replacing the actuators on a five year basis; however, replacement was deferred on two occasions, first in September 2006 and again in October 2008.

Analysis: The failure to correct excessive internal hydraulic leakage, a condition adverse to quality is a performance deficiency which was within the licensee's ability to foresee and correct, that led to inoperability of MCR damper 1-VS-MOD-103D on September 21-22, for approximately 19 hours.

The finding, associated with the barrier performance attribute of the barrier integrity cornerstone, is more than minor because it adversely affected the cornerstone objective, as it relates to the main control room barrier integrity, to provide reasonable assurance physical design barriers protect public health and safety. The finding, evaluated per MC-0609, Attachment 4, "Phase 1 – Initial Screening and Characterization of Findings," was determined to be of very low safety significance (Green) because it did not result in a loss of safety function or loss of a single train of the control room isolation boundary for more than its allowed outage time.

This finding has a cross-cutting aspect in the area of human performance, resources, in that equipment and other resources were not made available to assure nuclear safety by minimizing preventative maintenance deferrals for 1-VS-MOD-103D (H.2.a).

Enclosure

Enforcement: 10 CFR 50, Appendix B, Criterion XVI, requires in part that conditions adverse to quality be promptly identified and corrected. Contrary to the above, a condition adverse to quality; leakage internal to the hydraulic actuator for MCR isolation damper 1-VS-MOD-103D, first apparent in January, 2009 and again in August and September; was not corrected until after the damper failed to operate on September 22, 2009. Because this finding is of very low safety significance, has been entered into your corrective action program as CR 349075, and has been corrected; this violation is being treated as a NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy, NCV 05000280, 281/2009005-01; Inoperability of MCR isolation Damper 1-VS-MOD-103D due to failure to promptly identify and correct internal hydraulic leakage.

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

#### a. Inspection Scope

The inspectors evaluated, as appropriate, for the four work activities listed below: (1) the effectiveness of the risk assessments performed before maintenance activities were conducted; (2) the management of risk; (3) that, upon identification of an unforeseen situation, necessary steps were taken to plan and control the resulting emergent work activities; and, (4) that maintenance risk assessments and emergent work problems were adequately identified and resolved. The inspectors verified that the licensee was complying with the requirements of 10 CFR 50.65(a)(4) and the data output from the licensee's safety monitor associated with the risk profile of Units 1 and 2. The inspectors reviewed the corrective action program to verify deficiencies in risk assessments were being identified and properly resolved.

- The increased (yellow) on-line risk condition for Unit 2 during initial chemical treatment of the service water system in MER 4 on October 1 and 2, 2009.
- On-line risk (Green) condition during the 18-month overhaul of EDG #2 on October 6, 2009.
- On-line risk (Green) during the concurrent inoperability of the AMSAC circuit and a tornado watch on December 3, 2009.
- An unanticipated elevated (orange) shutdown risk on Unit 2 and increased (yellow) on-line risk on Unit 1 that resulted from an unanalyzed change in the work schedule sequence on November 12-13, 2009.

#### b. Findings

A licensee identified violation was reviewed by the inspectors. This licensee-identified finding involved a violation of 10 CFR 50.65(a)(4). The enforcement aspects of the violation are discussed in Section 4OA7. No other findings of significance were identified.

## 1R15 Operability Evaluations

### a. Inspection Scope

The inspectors reviewed the six operability evaluations, listed below, affecting risk-significant mitigating systems, to assess, as appropriate: (1) the technical adequacy of the evaluations; (2) whether continued system operability was warranted; (3) whether other existing degraded conditions were considered; (4) if compensatory measures were involved, whether the compensatory measures were in place, would work as intended, and were appropriately controlled; and (5) where continued operability was considered unjustified, the impact on TS Limiting Conditions for Operation and the risk significance. The inspectors' review included verification that determinations of operability followed procedural requirements of OP-AA-102, Revision 3, "Operability Determination." The inspectors reviewed the corrective action program to verify deficiencies in operability determinations were being identified and corrected.

- Operability Determination 345; Unit 2 RHR Heat Exchanger 1A indication below minimum wall thickness.
- Operability Determination 336; ASME Code Class 2 piping weld has through wall leak (near valve 2-RH-33).
- Immediate Operability Determination for unsealed penetrations found on all three emergency service water pumps at the pump house floor boundary.
- Immediate operability determination for CR 349003 regarding loss of power to damper 1-VS-MOD-103D's hydraulic pump motor.
- Operability Determination 334 1-VS-MOD-103B cycled about 20 times during return to service of 1-VS-MOD-103B
- Operability Determination 333 1-VS-MOD-103B/103C/103D have exhibited degraded reliability due to multiple repeated failures.

### b. Findings:

Introduction: A self-revealing Green Finding was identified for the incorrect operability determination of main control room isolation damper 1-VS-MOD-103D. The damper, declared operable and left in-service following loss of power to its hydraulic pump on September 21, 2009 (CR 349003), failed to close on demand, on September 22, 2009. The damper was inoperable for approximately 19 hours (CR 349075) before power was restored to the pump, the damper closed, and the actuator repaired.

Description: The MCR isolation dampers 1-VS-MOD-103A, B, C, and D operate by hydraulically pressure supplied from an accumulator internal to the actuator assembly. The accumulator, charged with nitrogen, is maintained at operating pressure by a motor driven hydraulic pump also internal to the actuator assembly. The pump is controlled by an internal pressure switch which actuates the motor to recharge the accumulator at 1920 psig and de energizes the motor at 2200 psig. Minimum pressure required to operate the dampers is 1920 psig.

Hydraulic leakage, internal to the actuator for 1-VS-MOD-103D, was initially identified on January 29, 2009 (CR 321840). The leakage abated after several cycles of the damper and did not re occur until August 10 (CR 344278) when it was again abated by cycling the damper several times. Evidence of internal leakage was next noted following routine testing on September 20 when the hydraulic pump continued to cycle every 10 minutes following testing. Indication internal leakage had increased was identified the morning of September 21, when it was noted the frequency of the hydraulic pump cycling changed from approximately every 10 minutes to 2 minute intervals.

The impact of the internal hydraulic leakage on the operability of 1-VS-MOD-103D was first evaluated in January 2009, in response to CR 320793. The response indicated the damper was operable and fully qualified. Immediate operability was based on successful closure of the damper with and without power to the hydraulic pump and having stopped the pump's repeated cycling. A prompt OD, request by operations in CR 321959 to determine long term damper health as a result of the hydraulic motor cycling, was cancelled based on having stopped the pump's cycling. Additional information to support the prior immediate OD was captured in the CR response and identified that engineering had no operability concern with the damper actuator based on the continuous duty rating of the pump's motor and fact that the stored accumulator pressure was sufficient to close the damper on a loss of power. CR 34427, which documented the August 10 internal leakage, identified the damper was operable and fully qualified. Operability was based on the prior OD response from January 2009. A condition report was not generated for the leakage identified on September 20 and 21 nor was the degraded condition formally reassessed via the OD process. Instead, the leakage was documented in the operator logs with reference to the outstanding CR.

On September 21, at 1:54 p.m., operations noted the indicating lights for MOD-103D hydraulic pump were de-energized. Investigation identified the breaker's thermal overloads had dropped out opening the power circuit to the motor operated damper. An immediate operability evaluation was performed for the loss of electrical power to MOD-103D and concluded the damper remained operable (CR 349003) but not fully qualified. Operability was based on the presumed capability to close the damper using the stored hydraulic accumulator pressure. The assessment failed to evaluate the affect of the existing internal hydraulic leak on the ability of the accumulator to continue to maintain operability of the damper. Based on the determination MOD-103D remained operable, the damper was left in the open position and a decision was made to not reset the breaker's thermal overloads to prevent continuous operation of the pump's motor.

On September 22, at 8:28 a.m., operations attempted to close 1-VS-MOD-103D, the damper failed to close. Operations reset the thermal overloads and breaker for 1-VS-MOD-103D at 9:29 a.m. and shut MOD-103D to restore operability of the MCR pressure boundary.

Analysis: The failure to properly evaluate the operability of main control room isolation damper, 1-VS-MOD-103D, per OP-AA-102, Rev. 5; "Operability Determination," and consider all of the degraded conditions and their impact individually and in sum is a performance deficiency which was within the licensee's ability to foresee and correct,

that led to an inoperable component being left in service, for approximately 19 hours before being isolated and control room integrity restored.

The finding, associated with the performance attribute of the barrier integrity cornerstone, is more than minor because it adversely affected the cornerstone objective, as it relates to control room integrity, to provide reasonable assurance physical design barriers protect public health and safety. The finding, evaluated per MC-0609, Attachment 4, "Phase 1 – Initial Screening and Characterization of Findings," was determined to be of very low safety significance (Green) because it did not result in a loss of safety function or loss of a single train of the control room isolation boundary for more than its allowed outage time.

This finding has a cross-cutting aspect in the area of problem identification and resolution, corrective action program, in that an adequate operability assessment that thoroughly evaluated the degraded condition of 1-VS-MOD-103D was not performed (P.1.c).

Enforcement: Enforcement action does not apply because the performance deficiency did not involve a violation of a regulatory requirement. The issue was entered into the licensee's corrective action program as CR 349075. Because the Finding does not involve a violation of regulatory requirements and has very low safety significance, it is identified as: FIN 05000280, 281/2009005-02; Failure to perform an adequate operability determination for main control room isolation damper 1-VS-MOD-103D.

## R18 Plant Modifications

### .1 Permanent Modifications

#### a. Inspection Scope

The inspectors reviewed the identified plant modifications to verify: (1) that the design and licensing bases, and performance capability of risk-significant systems, structures, and components (SSCs) were not degraded through modification; (2) that modifications performed during increased risk-significant configurations do not place the plant in an unsafe condition; and, (3) that the modification did not affect system operability or availability as described by the TS and UFSAR. The inspectors reviewed applicable procedures, engineering calculations, the modification design and implementation package, work orders, drawings, corrective action documents, the UFSAR and TS, supporting analyses, and design basis information. Inspectors witnessed aspects of the modification implementation and observed/reviewed aspects of the post-modification testing.

- Temporary Mod SI-09-140, Alternate Power To 1-FC-P-1B
- Temporary Mod SU-09-00078, Startup on AFW & Carbohydrazide

#### b. Findings:

No findings of significance were identified.

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1R19 Post Maintenance Testinga. Inspection Scope

For the six risk-significant maintenance activities listed below, the inspectors reviewed the associated post maintenance testing (PMT) procedures and either witnessed the testing and/or reviewed completed records to assess whether: (1) the effect of testing on the plant had been adequately addressed by control room and/or engineering personnel; (2) testing was adequate for the maintenance performed; (3) test acceptance criteria were clear and adequately demonstrated operational readiness consistent with design and licensing basis documents; (4) test instrumentation had current calibrations, range, and accuracy consistent with the application; (5) test were performed as written with applicable prerequisites satisfied; (6) jumpers installed or leads lifted were properly controlled; (7) test equipment was removed following testing; and (8) equipment was returned to the status required to perform its safety function. The inspectors reviewed the corrective action program to verify PMT deficiencies were being identified and corrected. Documents reviewed are listed in the Attachment to this report.

- #2 Emergency Diesel Generator 18 Month Overhaul, WO. 38102292513
- Replace Unit 2 Source and Intermediate Range detectors NI-32/NI-36, WOs: 38102204021, 38102336513, and 38102661147.
- Post refueling RCCA testing 2-NPT-RX-014, Rev. 16, "Hot Rod Drops by Bank;" WO.38102345648.
- Post refueling startup testing 2-NPT-RX-008, Rev 21, "Startup Physics Testing," WO 38102356269.
- Repair and replacement of hot leg sample valve 02-SS-TV-206A after failed Type "C" Containment Penetration Leakage Testing, WOs: 38102663178, 38102664443, 38102691534, 38102691563, and 38102696053.
- Repair of hot leg sample valve 02-SS-TV-206B after failed Type "C" Containment Penetration Leakage Testing, WOs: 38102663180, 38102663531.

b. Findings

No findings of significance were identified.

1R20 Refueling and Other Outage Activitiesa. Inspection Scope

In accordance with NRC Inspection Procedure 71111.20, "Refuelling and Outage Activities," the inspectors monitored licensee controls over the outage activities listed below for the Unit 2 Refueling Outage (RFO) that began on November 1 and ended December 4, 2009.

#### Review of Outage Plan:

Prior to the outage, the inspectors reviewed the "Surry Unit 2 2009 RFO Shutdown Risk Review Report" to verify the licensee had appropriately considered risk, industry operating experience, and previous site specific problems.

The inspectors verified the outage impact on defense-in-depth for the five shutdown critical safety functions; electrical power availability, inventory control, decay heat removal, reactivity control, and containment; had been appropriately considered and that the Licensee had planned to provide adequate defense-in-depth for each safety function or had established contingencies to minimize the overall risk where redundancy was limited or not available.

On a routine basis, the inspectors reviewed the refueling outage work plan and daily shutdown risk assessments. Periodic updates to the Surry Unit 2 2009 RFO Shutdown Risk Review Report, accounting for schedule changes and unplanned activities, were also reviewed. Detailed risk reviews for specific high risk periods/activities are documented in section 1R13 of this report.

#### Monitoring of Shutdown Activities:

The inspectors observed portions of the reactor shutdown and plant cooldown to assess operator performance with respect to communications, command and control, procedure adherence, and compliance with Technical Specification cooldown limits. Upon shutdown, the inspectors conducted a thorough containment walkdown to identify structures, piping, and supports in containment with stains or deposited material that could indicate previously unidentified leakage from components containing reactor coolant and/or signs of physical damage.

#### Licensee control of Outage Activities:

The inspectors on a sampling basis monitored the outage activities listed below.

- Licensee configuration management, including daily outage reports, to evaluate defense-in-depth commensurate with the outage safety plan and compliance with the applicable TS when taking equipment out of service.
- Controls over the status and configuration of electrical systems and switchyard to ensure that TS and outage safety plan requirements were met.
- Licensee implementation of clearance activities to ensure equipment was appropriately configured to safely support the work or testing.
- Decay heat removal processes to verify proper operation and that steam generators, when relied upon, were a viable means of backup cooling.
- Controls to ensure that outage work was not impacting the ability to operate the spent fuel pool cooling system during and after core offload.
- Reactor water inventory controls including flow paths, configurations, and alternative means for inventory addition, and controls to prevent inventory loss.

- Reactivity controls to verify compliance with TS and those activities which could affect reactivity were reviewed for proper control within the outage risk plan.
- Refueling activities for compliance with TS, to verify proper tracking of fuel assemblies from the spent fuel pool to the core, and to verify foreign material exclusion was maintained.
- Containment closure activities, including a detailed containment walkdown prior to startup, to verify that evidence of leakage did not exist and that debris

#### Control of Heavy Loads

The inspectors verified station procedures for heavy load lifts were consistent with station analysis and Appendix 9B of the UFSAR to ensure that heavy load lifts were conducted safely. The inspectors reviewed actions to manage the increased risk during these activities and observed the heavy load lift for the Unit 2 reactor vessel head installation.

#### Refueling Activities:

The inspectors, on a sampling basis, verified the requirements of TS 3.10, "Refueling," were met, and that refueling activities were conducted in accordance with station procedures. Activities were monitored from the control room, spent fuel pool, and refueling bridge at various times while fuel handling activities were in progress to observe the communications and coordination between personnel and to verify core reactivity was controlled and fuel movement was accomplished and tracked in accordance with the fuel movement schedule. The inspectors reviewed the video recording of the core verification to independently verify the as-loaded core configuration matched the designed core reload configuration for Unit 2 cycle 23.

#### Monitoring of Heat-up and Startup Activities:

Prior to startup, the inspectors examined the spaces inside the containment building to verify that debris had not been left which could affect performance of the containment sumps. On a sampling basis the inspectors verified that technical specification, license conditions, and other requirements, commitments, and administrative procedure prerequisites were met for changes in plant configurations/modes. The inspectors performed control room observations, plant walkdowns, reviewed main control board indicators, operator logs, plant computer information, and station procedures to monitor the startup evolution. Control room observations included the approach to criticality, critical operations, low power physics testing, and the synchronization of the main turbine generator to the electrical grid.

#### b. Findings

No findings of significance were identified.

1R22 Surveillance Testinga. Inspection Scope

The inspectors witnessed and/or reviewed test records for the risk-significant surveillance tests listed below, to determine whether the SSCs selected meet Technical Specifications (TS), the Updated Final Safety Analysis Report (UFSAR), and licensee's procedure requirements and demonstrate that the SSCs are capable of performing their intended safety functions (under conditions as close as practical to accident conditions or as required by TS) and their operational readiness.

In-Service Testing:

- 2-OPT-RS-003, Rev. 26, "Flow Test of Inside Recirculation Spray Pumps 2-RS-P-1A and 2-RS-P-1B."
- 2-OPT-RH-003, Rev. 12, "RHR System Operability Test."
- 2-OPT-RS-001, Rev. 22, "Containment Outside Recirculation Spray Pumps Flow and Leak Test."

Surveillance Testing:

- 2-OP-RX-002, Rev. 24, "Shutdown Margin (Calculated at Zero Power)."
- 2-OPT-ZZ-002, Rev 23 OTO1, "ESF Actuation with Undervoltage and Degraded Voltage – 2J Bus."

Appendix J Leakage Tests:

- 2-OPT-CT-201, Rev. 18, "Containment Isolation Valve Local leak Rate Testing (Type C Containment Testing)," for Containment Penetration 91, 2-VS-MOV-200A
- 2-OPT-CT-201, Rev. 18, "Containment Isolation Valve Local leak Rate Testing (Type C Containment Testing)," for Containment Penetration 90, 2-VS-MOV-200D
- 2-OPT-CT-201, Rev. 18, "Containment Isolation Valve Local leak Rate Testing (Type C Containment Testing)," for Containment Penetration 70, 2-RS-MOV-256B

b. Findings

No findings of significance were identified.

## 2. RADIATION SAFETY

Occupational Radiation Safety Cornerstone

2OS1 Access Controls To Radiologically Significant Areasa. Inspection Scope

Access Controls: The inspectors reviewed and evaluated licensee guidance and its implementation for controlling and monitoring worker access to radiologically significant areas and tasks associated with the 2009 Unit 2 (U2) Refueling Outage (RFO). The inspectors evaluated changes to, and adequacy of, procedural guidance; directly

observed implementation of established administrative and physical radiological controls; appraised radiation worker and technician knowledge of, and proficiency in implementing, Radiation Protection (RP) activities; and assessed radiation worker exposures to radiation and radioactive material.

The inspectors directly observed the administrative and engineered controls for radiologically significant areas. The inspectors discussed and reviewed the controls and their implementation for Locked High Radiation (LHRA) and Very High Radiation Area (VHRA) keys and for storage of irradiated material within the spent fuel pool in detail. Additionally the inspectors discussed and reviewed the licensee's controls for areas where dose rates could change significantly because of plant shutdown and refueling operations. The inspectors discussed the expected response to unexpected radiological conditions on backshift with two responsible RP Supervisors.

For selected tasks, the inspectors reviewed Radiation Work Permit (RWP) details and attended pre-job briefings to assess communication of radiological control requirements to workers. Occupational worker adherence to selected RWPs and Health Physics Technician (HPT) proficiency in providing job coverage were evaluated through direct observations, remote observations, and interviews with licensee staff. Electronic dosimeter alarm set points and worker stay times were evaluated against applicable radiation survey results. For High Radiation Area (HRA) tasks involving significant dose gradients, the inspectors evaluated the use and placement of whole body and extremity dosimetry to monitor worker exposure.

Postings and physical controls established within the radiologically controlled area (RCA) for access to the U2 reactor containment building (RCB), the Unit 1 (U1) and U2 reactor auxiliary building (RAB) locations, radioactive material storage locations, decontamination building, and Independent Spent Fuel Storage Installation (ISFSI) were evaluated during facility tours. Results were compared to current licensee surveys and assessed against established postings and radiation controls. Licensee controls were observed for selected U1 and U2 RAB LHRA and VHRA locations.

The inspectors evaluated implementation and effectiveness of licensee controls for both airborne and external radiation exposure. The inspectors directly observed processes used for externally contaminated individuals, including those with potential uptakes of radioactive material. The inspectors reviewed administrative and physical controls including air sampling, barrier integrity, engineering controls, and postings for tasks having the potential for individual worker internal exposures to exceed 30 millirem committed effective dose equivalent.

Radiation protection activities were evaluated against Updated Final Safety Analysis Report (UFSAR), Technical Specifications (TS), and 10 CFR Parts 19 and 20 requirements. Detailed procedural guidance and records reviewed for this inspection area are listed in Sections 2OS1 and 4OA5 of the Attachment.

Problem Identification and Resolution: Licensee Corrective Action Program (CAP) documents associated with access controls to radiologically significant areas were reviewed and assessed. The inspectors evaluated the licensee's ability to identify,

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characterize, prioritize, and resolve the identified issues in accordance with procedure PI-AA-200, Corrective Actions, Revision (Rev.) 9. Licensee CAP documents associated with access control issues, personnel radiation monitoring, and personnel exposure events which were reviewed and evaluated in detail during inspection of this program area are identified in Sections 2OS1, and 4OA5 of the Attachment.

The inspectors completed the 21 specified line-item samples detailed in Inspection Procedure (IP) 71121.01.

b. Findings

No findings of significance were identified.

2OS2 ALARA Planning and Controls

a. Inspection Scope

As Low As is Reasonably Achievable (ALARA): Implementation of the licensee's ALARA program during the 2009 U2 RFO was observed and evaluated by the inspectors. The inspectors reviewed ALARA planning, dose estimates, and prescribed ALARA controls for outage work tasks expected to incur the maximum collective exposures. Reviewed activities included containment scaffolding, blind flange removal, shielding, steam generator manway removal, and routine health physics coverage. Incorporation of planning, established work controls, expected dose rates, and dose expenditure into the ALARA pre-job briefings and RWPs for those activities were also reviewed. Selected elements of the licensee's source term reduction and control program were examined to evaluate the effectiveness of the program in supporting implementation of the ALARA program goals. Shutdown chemistry program implementation and the resultant effect on Radiation Containment Building, and Reactor Auxiliary Building dose rate trending data were reviewed and discussed with cognizant licensee representatives.

Trends in individual and collective personnel exposures at the facility were reviewed. The inspectors examined the dose records of participants in the declared pregnant worker program from 2008 to present to evaluate total or current gestation doses. Applicable procedures were reviewed to assess licensee controls for declared pregnant workers. Trends in the plant's three-year rolling average collective exposure history, outage, non-outage, and total annual doses for selected years were reviewed and discussed with licensee representatives.

The licensee's ALARA program implementation and practices were evaluated for consistency with Updated Final Safety Analysis Report Chapter 11, Radioactive Wastes and Radiation Protection; 10 CFR Part 20 requirements; Regulatory Guide 8.29, Instruction Concerning Risks from Occupational Radiation Exposure, February 1996; and licensee procedures. Documents reviewed during the inspection of this program area are listed in Section 2OS2 of the Attachment.

Problem Identification and Resolution: The inspectors reviewed the Corrective Action Program documents listed in Section 2OS2 of the report Attachment that were related to

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the licensee's ALARA program. The inspectors assessed the licensee's ability to identify, characterize, prioritize, and resolve the identified issues in accordance with PI-AA-200, Corrective Action, Revision 9.

The inspectors completed the 15 required samples listed in IP 71121.02. In addition to the required samples, 14 optional samples were completed in accordance with IP 71121.02 for plants with three-year rolling average collective exposures in excess of the top quartile.

b. Findings

No findings of significance were identified.

Public Radiation Safety Cornerstone

2PS2 Radioactive Material Processing and Transportation

a. Inspection Scope

Waste Processing and Characterization During inspector walk-downs, accessible sections of the liquid and solid radioactive waste (radwaste) processing systems were assessed for material condition and conformance with system design diagrams. Inspected equipment included monitor tanks, resin transfer piping, resin and filter packaging components, and abandoned solidification equipment. The inspectors discussed component function, processing system changes, and radwaste program implementation with licensee staff.

The 2008 Effluent Report and radionuclide characterizations from 2008 - 2009 for each major waste stream were reviewed and discussed with radwaste staff. For primary resin and Dry Active Waste (DAW), the inspectors evaluated analyses for hard-to-detect nuclides, reviewed the use of scaling factors, and examined comparison results between licensee waste stream characterizations and outside laboratory data. Waste stream mixing and concentration averaging methodology for resins and filters was evaluated and discussed with radwaste operators. The inspectors also reviewed the licensee's procedural guidance for monitoring changes in waste stream isotopic mixtures.

Radwaste processing activities and equipment configuration were reviewed for compliance with the licensee's Process Control Program and UFSAR, Chapter 11. Waste stream characterization analyses were reviewed against regulations detailed in 10 CFR Part 20, 10 CFR Part 61, and guidance provided in the Branch Technical Position on Waste Classification and Waste Form. Reviewed documents are listed in Section 2PS2 of the Attachment.

Transportation The inspectors directly observed preparation activities for the shipment of a Residual Heat Removal pump motor. The inspectors noted package markings and placarding, performed independent dose rate measurements, and interviewed shipping technicians regarding Department of Transportation (DOT) regulations.

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Five shipping records were reviewed for consistency with licensee procedures and compliance with NRC and DOT regulations. The inspectors reviewed emergency response information, DOT shipping package classification, radiation survey results, and evaluated whether receiving licensees were authorized to accept the packages. Licensee procedures for opening and closing Type A and Type B shipping casks were compared to recommended vendor protocols and Certificate of Compliance (CoC) requirements. In addition, training records and training curricula for selected individuals currently qualified to ship radioactive material were reviewed.

Transportation program implementation was reviewed against regulations detailed in 10 CFR Part 20, 10 CFR Part 71, 49 CFR Parts 172-178; as well as the guidance provided in NUREG-1608. Training activities were assessed against 49 CFR Part 172 Subpart H. Documents reviewed during the inspection are listed in Section 2PS2 of the Attachment.

Problem Identification and Resolution Selected plant issue reports in the area of radwaste/shipping were reviewed in detail and discussed with licensee personnel. The inspectors assessed the licensee's ability to characterize, prioritize, and resolve the identified issues in accordance with licensee procedure PI-AA-200, Corrective Action, Rev. 0. The inspectors also evaluated the scope of the licensee's internal audit program and reviewed recent assessment results. Documents reviewed for problem identification and resolution are listed in Section 2PS2 of the Attachment.

The inspectors completed 6 of 6 samples as required by inspection procedure 71122.02.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator (PI) Verification

a. Inspection Scope

The inspectors sampled licensee data for the Performance Indicators (PIs) listed below. To verify the accuracy of the PI data reported during the period reviewed, PI definitions and guidance contained in NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Rev. 6, were used to verify the basis for each data element.

.1 Mitigating Systems Cornerstone

Mitigating Systems Performance Index (MSPI)

The inspectors reviewed, on a sampling basis, the Mitigating Systems Performance Index performance indicators (PI) for Units 1 and 2 for the fourth quarter 2008 through the third quarter of 2009. The evaluation included verification of compliance with the licensee's "NRC Mitigating System Performance Index Basis Document," and review of selected consolidated entry forms for accuracy of information entered into the MSPI

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calculation computer program. Data reviewed for the monitored components included unavailability, reliability and run times; the number of starts, and failures to start and run. Information from logs and other plant documentation was used to verify the data was accurate. The data gathering and entry was discussed with cognizant personnel

- Unit 1 and 2 High Pressure Injection System
- Unit 1 and 2 Cooling Water System
- Unit 1 and 2 Residual Heat Removal System

.2 Occupational Radiation Safety Cornerstone

The inspectors reviewed the Occupational Exposure Control Effectiveness PI results for the Occupational Radiation Safety Cornerstone from October 2008 to October 2009. For the assessment period, the inspectors reviewed ED alarm logs and selected condition reports related to controls for exposure significant areas. The inspectors also reviewed licensee procedural guidance for collecting and documenting PI data. Documents reviewed are listed in sections 2OS1 and 4OA1 of the Attachment.

.3 Public Radiation Safety (PS) Cornerstone

To evaluate the Radiological Effluent Technical Specification/Offsite Dose Calculation Manual Radiological Effluent Occurrences PI the inspectors reviewed data from October 2008 through October 2009. The inspectors reviewed documents listed in Section 4OA1 of the Attachment. In addition, the inspectors reviewed out-of-service effluent monitor logs and effluent release permits.

b. Findings

No findings of significance were identified.

4OA2 Identification and Resolution of Problems

.1 Daily Reviews of items Entered into the Corrective Action Program:

As required by NRC Inspection Procedure 71152, "Identification and Resolution of Problems," and in order to help identify repetitive equipment failures or specific human performance issues for follow-up, the inspectors performed a daily screening of items entered into the licensee's CAP. This review was accomplished by reviewing daily CR report summaries and periodically attending daily CR Review Team meetings.

.2 Semi-Annual Trend Review

a. Inspection Scope

As required by Inspection Procedure 71152, Identification and Resolution of Problems, the inspectors performed a review of the licensee's corrective action program and associated documents to identify trends that could indicate the existence of a more significant safety issue. The inspectors' review focused on repetitive equipment and

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corrective maintenance issues but also considered the results of daily inspector corrective action program item screening. The review also included issues documented outside the normal correction action program in system health reports; corrective maintenance works orders, component status reports, and maintenance rule assessments. The inspectors' review nominally considered the six-month period of July 1, 2009 through December 28, 2009.

b. Findings

No findings of significance were identified. In general, the licensee has identified trends and has appropriately addressed the trends with their CAP.

4OA3 Event Follow-up

(Closed) LER 05000280, 281/2009-002-00, Emergency Service Water Pumps Potential Flooding Due to Inadequate Procedure

On September 24, 2009, with Units 1 and 2 operating at 100% reactor power, it was discovered that the three diesel driven emergency service water pumps oil cooler outlet lines, which penetrate the pumps' base plate, were not sealed too prevent water intrusion into the pump house. The inspectors reviewed the LER for accuracy and adequacy of corrective actions. A licensee identified violation was reviewed by the inspectors. This licensee-identified finding involved a violation of TS 6.4, Procedures. The enforcement aspects of the violation are discussed in Section 4OA7. This LER is closed.

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 the 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 review and inspection activities.

b. Findings

No findings of significance were identified.

#### 40A6 Meetings, Including Exit

##### Exit Meeting Summary

On January 21, 2010 the inspection results were presented to Mr. K. Sloane and other members of his staff, who acknowledged the findings. The inspectors asked the licensee whether any of the material examined during the inspection should be considered proprietary. No proprietary information was identified.

#### 40A7 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 characterization as NCVs:

- 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 activity. Contrary to the above, on November 12-13, 2009, the licensee altered the evaluated work sequence for restoring the Unit 2J safety bus and 2A battery and DC electrical buses without re-evaluating the risk. This event was documented in the licensee's corrective action program as CR 357883. The finding is of very low safety significance (Green) because the change in risk had existed for only a short period of time prior to being corrected.
- Technical Specification 6.4 requires, in part, that detailed written procedures with appropriate check-off lists and instructions shall be provided and followed for the operation of components involving nuclear safety of the station. Licensee procedure GMP-012, "Roving Flood Watch Responsibilities," requires that the water tight door to mechanical equipment room (MER) #3 be closed or monitored. Contrary to the above, on October 5, 2009, the watertight door to MER #3 was found open and unattended. This was identified in the licensee's CAP as condition report 350894. A regional Senior Reactor Analyst performed a Phase 3 evaluation under the Significance Determination Process and concluded that the finding was of very low safety significance (Green). The dominant accident sequence involved an internal flood in the Mechanical Equipment Room #3 that was not isolated. Eventually, the flooding would have caused a sustained loss of all electrical power to the facility resulting in core damage. The exposure period used in the evaluation was less than two hours.
- Technical Specification 6.4 requires, in part, that detailed written procedures with appropriate check-off lists and instructions be provided and followed for maintenance which could have an effect on the safety of the reactor. Contrary to the above, procedures for maintenance of the ESW pumps did not contain appropriate instructions to assure water tight integrity of the ESW pump house was maintained, and three unsealed penetrations in the emergency service water building floor were identified by the licensee on September 24, 2009. This was identified in the licensee's CAP as condition report 349378. A regional Senior Reactor Analyst performed a Phase 3 evaluation under the Significance Determination Process and

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concluded that the finding was of very low safety significance (Green). The dominant accident sequence involved a postulated tornado-induced non-recoverable Loss of Offsite Power that failed all the Emergency Service Water Pumps, due to the performance deficiency. The accident sequence included numerous combinations of motor operated valves in the Service/Circulating Water System failing which drained the intake canal without the ability to makeup the lost inventory. The Auxiliary Feedwater System would have provided secondary side heat removal. However, without the Service Water System, cooling to the Reactor Coolant Pump seals would not have been maintained and a Seal Loss of Coolant Accident would have occurred, leading to core damage. The exposure period evaluated was one year, and no recovery of the Emergency Service Water Pumps was considered.

ATTACHMENT: SUPPLEMENTAL INFORMATION

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## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### **Licensee Personnel**

M. Adams, Director, Station Engineering  
G. Bischof, Site Vice President  
B. Garber, Supervisor, Licensing  
K. Grover, Manager, Operations  
A. Harrow, Supervisor, Electrical Systems  
R. Johnson, Manager, Outage and Planning  
L. Jones, Manager, Radiation Protection and Chemistry  
R. Manrique, Supervisor, Primary Systems  
C. Olsen, Manager, Site Engineering  
L. Ragland, Supervisor, Health Physics Operations  
R. Simmons, Manager, Maintenance  
K. Sloane, Plant Manager (Nuclear)  
B. Stanley, Director, Station Safety and Licensing  
M. Wilda, Supervisor, Auxiliary Systems  
D. Boone, Supervisor, Exposure Control  
J. Eggart, Manager, Radiation Protection & Chemistry  
B. Hilt, Supervisor, HP Technical Services  
D. White, Supervisor, ALARA

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

#### **Opened and Closed**

05000280, 281/2009005-01	NCV	Inoperability of MCR isolation Damper 1-VS-MOD-103D due to failure to promptly identify and correct internal hydraulic leakage (Section 1R12)
05000280, 281/2009005-02	FIN	Failure to perform an adequate operability determination for main control room isolation damper 1-VS-MOD-103D (Section 1R15)

#### **Closed**

05000280, 281/2009-002-00	LER	Emergency Service Water Pumps Potential Flooding Due to Inadequate Procedure (Section 40A3)
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## LIST OF DOCUMENTS REVIEWED

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

Operations Checklist, OC-21 - Severe Weather Checklist  
0-AP-37.01, Rev.45; Abnormal Environmental Conditions  
GMP-031, Rev 3; Emergency Service Water (ESW) Pump House Stop Log Installation and Removal  
DWG 11448-FM-55A, Rev 11; Arrangement Intake Structure  
DWG 11448-FM-55B, Rev 9; Arrangement Intake Structure

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

2-OP-CS-001A, Rev. 4, Containment Spray System Alignment  
2-OP-RS-002A, Rev. 3, Inside Recirc Spray System Alignment  
2-OP-RS-001A, Rev. 4, Outside Recirc Spray System Alignment  
2-OP-SI-001A, Rev. 10, Safety Injection System Alignment  
2-OP-FW-001A, Rev. 6, Auxiliary Feedwater System Valve Alignment  
DWG 11548-FM-084A Unit 2 Containment Spray System  
DWG 11548-FM-089A Unit 2 Safety Injection System  
DWG 11548-FM-084B Unit 2 Recirculation Spray System  
DWG 11548-FM-084A Unit 2 Containment Spray System  
DWG 11548-FM-068A Unit 2 Feedwater System

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

Technical Report EE-0064, Evaluation of Electrical Cable for Installation in Wet Locations  
Apparent Cause Evaluation CR 002199, Water Intrusion Event 10/7/06 Unit 1 &2.  
0-MCM-1207-01, Rev. 3, Pumping of Security and Electrical Cable Vaults  
UFSAR Appendix 9C, Re. 41, Flood Control System  
GMP-012, Rev. 8, Roving and Stationary Flood Watch Responsibilities  
GMP-013, Rev. 10  
0-AP-13.00, Rev. 21, Turbine Building or MER 3 Flooding  
Surry Power Station Life Cycle Management Plan Medium Voltage Cable Units 1 and 2  
UFSAR Appendix 9C, Flood Control System  
W.O 38102357174, 1<sup>st</sup> quarter 2009 manhole inspections  
W.O 38102406230, 2nd quarter 2009 manhole inspections  
W.O 38102496094, 3rd quarter 2009 manhole inspections  
W.O 38102457022, 4<sup>th</sup> quarter 2009 manhole inspections

### **Section 1R07: Heat Exchanger**

3<sup>rd</sup> Quarter 2009 System Health Report  
1-OSP-SW-002, Rev 23, Measurement of Macrofouling Blockage of Component Cooling Heat Exchanger 1-CC-E-1A

### **Section 1R08: Inservice Inspection Activities**

#### Procedures

0-NSP-RC-002 Rev 004, "Visual Examination of Reactor Pressure Vessel Head Penetration Nozzles" 05/07/2008  
0-NSP-RX-018 Rev 002, "Reactor Vessel Head Effective Degradation Years Calculation", 09/21/2009

0-NSP-RC-003 Rev 002, "Visual Examination of Reactor Pressure Vessel Bottom Mounted Instrumentation (BMI)", 11/03/2009  
 ER-AA-NDE-UT-802, Rev 0 "Ultrasonic Examination of Austenitic Piping Welds in Accordance with ASME Section XI, Appendix VII"  
 ER-AA-NDE-PT-300, Rev 2 "ASME Section XI Liquid Penetrant Examination Procedure"  
 ER-AP-BAC-10, Rev 0, "Boric Acid Corrosion Control Program"  
 ER-SU-BAC-1613, Rev 0, "Boric Acid Corrosion Control Program"  
 ER-AP-BAC-101, Rev 0, "Boric Acid Corrosion Control Program (BACCP) Inspections"  
 ER-AP-BAC-102, Rev 0, "Boric Acid Corrosion Control Program (BACCP) Evaluations"

#### Corrective Action Documents

350547, ASME Section XI Inspection of Integral Attachment  
 355574, Class 3 Integral Attachments for ISI Program  
 355887, Boric acid on 2-SI-82 (body to bonnet)  
 355913, Leakage discovered on 2-RH-31 (packing)  
 355912, Leakage discovered on 2-RH-12 (flange)  
 355874, During the performance of 1-NPT-RC-002 boric acid residue was observed in the packing area of 2-CH-361  
 355901, During 2-OPT-RC-10.1, observed an inactive leak on a threaded connection vent plug for 2-RC-FC-2481A  
 355919, During 2-OPT-RC-10.1, an ICV for 2-RC-FT-2416 was observed to have an inactive fitting leak  
 357419, BACC Streamer markings  
 357391, 2-RC-ICV-3062 (packing)  
 357393, 2-RC-ICV-3146 (fitting)  
 357396, 2-RC-ICV-3200 (packing)  
 357399, 2-CH-PT-2155 (post venting residue)  
 357401, 2-RC-ICV-3018 (packing)  
 357402, 2-RC-ICV-3005 (packing)  
 357407, 2-CH-PT-2156 (post venting residue)  
 357408, 2-RC-ICV-3082 (packing)  
 357409, 2-RC-ICV-3054 (packing)  
 357411, 2-RC-ICV-3049 (packing)  
 357413, 2-RC-ICV-3048 (packing)  
 357415, 2-CH-HCV-2303A (packing)  
 357417, Residual developer could mask boric acid deposits  
 097623, Defective SG tubes in 2-RC-E-1B  
 097716, ECT probe head separated from poly connection in 2-RC-E-1B  
 098455, Foreign objects identified during 2-RC-E-1B FOSAR and in-bundle inspection  
 099528, PWSCC found in tube end of all 3 SG's

#### Other

CEM-0026 Rev 000, "Structural Integrity of the Main Flange Connection of RHR Heat Exchanger 1-RH-E-1A with the degradations in the bolts, SPS 1", 04/03/2009  
 "Code Case N-566-2 Evaluation of 1-RH-E-1A", 05/13/2009  
 PT Report No. PT-09-025  
 PT Report No. PT-09-028  
 UT Report No. UT-09-102

UT Report No. UT-09-115  
 PT-100 Certificate of Calibration #092964030900376  
 Certificate of Calibration for EPOCH 4  
 Certificate of Certification for Krautkramer Transducer SN 00L8T3  
 Certified Test Report for Spotcheck Cleaner/Remover Batch No. 08M13K  
 Certified Test Report for Spotcheck Penetrant Batch No. 04K05K  
 Certified Test Report for Spotcheck Developer Batch No. 08F03K  
 WO 38077498902, "Replace Flux Thimbles on locations; D3; D5; D12; N7; B5; B6; C12; G9; L4; L6; M3; H13; N12"  
 WO 38102476092, "Steam Generator 2B, Perform DMT on 2<sup>nd</sup> Side Component ID's- 02-RC-E-1A-HTEXCH, 02-RC-E-1B-HTEXCH, 02-RC-E-1C-HTEXCH

**Section 1R13: Maintenance Risk Assessments and Emergent Work Control**

Medium/High Risk Contingency Plan Actions dated 9/30/09  
 0-OMP-SW-014 (Rev 11 OTO1), removal From Service and return to Service of Service Water Supply Strainer 1-VS-1A.

**Section 1R18: Plant Modifications**

Temporary Modification SI-09-140, Alternate Power to 1-FC-P-1B  
 VPAP-1403, Rev. 13, Temporary Modifications  
 DWG 11548-FE-1L, Rev. 57, 480V One Line Diagram Unit 2  
 2-OP-FW-010, Rev. 1, Motor Driven AFW Pumps Operation During Unit Startup Without Condenser Vacuum  
 DNAP-3004, Rev 4, Dominion Program for 10 CFR 50.59 and 10 CFR 72.48 Changes, Tests, and Experiments

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

2-PT-1.1, Rev. 36, NIS Trip Channel Test Prior to Start-up  
 IMP-C-NI-19, Rev. 15, OTO-1, Nuclear Instrument Maintenance  
 2-IPM-NI-SR-001, Rev. 1, OTO-1, Nuclear Instrumentation Source Range detector and Cable Testing  
 IMP-C-NI-30, Rev. 30 OTO-1 Replacing the Source and Intermediate Range Nuclear Instrument Detector Assembly  
 CAL-047, Rev. 10, Nuclear Instrument SR Drawer  
 CAL-046, Rev. 8, OTO-1, Source Range Discriminator and High Voltage Determination Westinghouse Nuclear Instrumentation Technical Manual 38-W893-00061  
 2-OPT-CT-201, Rev. 18, Containment Isolation Valve Local leak Rate Testing (Type C Containment Testing)  
 WOs related to the 18 month overhaul of EDG #2: 38102530367, 38102293238, 38102528178, 38102290475, 38102289606, 38102273226, 38102207182, 38102207207, 38102613924, 38102613771, 38102613941, 38102613958, 38102295561, 38102299464, 38102244424, 38102375178  
 ET-NAF-09-0100, Rev. 0, Surry Unit 2, Cycle 23 Design Report

**Section 1R20: Outage**

2-OSP-ZZ-004, Rev. 35, Unit 2 Safety Systems Status List for Cold Shutdown/Refueling Conditions

0-OSP-RC-001, Rev 6, Reactor Coolant System and Pressurizer Heatup and Cooldown Verification

2-OP-RH-001, Rev. 19., RHR Operations

2-OP-RH-001A, Rev. 5, RHR System Valve Alignment

2-OP-RX-009, Rev. 12, "Dilution to Critical Conditions Following refueling

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

2-OPT-RS-001, Rev. 22, Containment Outside Recirculation Spray Pumps Flow and Leak Test CR 356087

2-OPT-CT-201, Rev. 18, Containment Isolation Valve Local leak Rate Testing (Type C Containment Testing)

### **Section 20S1: Access Controls to Radiologically Significant Areas**

#### Procedures, Manuals, and Guidance Documents

C-HP-1031.023, RWP Dosimetry: Exposure Control Support, Revision (Rev.) 6

C-HP-1031.024, Administrative Dose Control, Rev. 5

C-HP-1031.025, Dosimetry Requirements for Site Restricted Areas, Rev. 4

C-HP-1041.011, Evaluating and Tracking Intakes of Radioactive Material, Rev. 5

C-HP-1041.020, DAC-Hour Determination Based On Bioassay Results, Rev. 3

C-HP-1041.021, Radionuclide Intake Determination Based On Bioassay Results, Rev. 6

C-HP-1041.022, Internal Dose Calculation Based On DAC-Hour Exposure. Rev. 5

C-HP-1041.023, Internal Dose Calculation Based On Radionuclide Intake, Rev. 8

C-HP-1081.040, Radiation Work Permits: Providing HP Coverage during Work, Rev.6

RP-AA-201, Access Controls for High and Very High Radiation Areas, Rev. 3

RP-AA-202, Radiological Posting, Rev. 2

RP-AA-221, Radiological Survey Records, Rev. 0

RP-AA-222, Radiation Surveys, Rev. 0

RP-AA-224, Airborne Radioactivity Surveys, Rev 0

RP-AA-261, Control of Radiological Diving Activities, Rev. 1

RP-AA-260, Control of Radiography, Rev. 1

RP-AA-262, Steam Generator Primary Side Work Controls, Rev.0

RP-AA-263, Steam Generator Secondary Side Work Controls, Rev.0

#### Surveys, Data, Records

U-2 2009 RFO Schedule

Audit 08-06, Radiological Protection and Process Control Program, Dated 09/05/08

Audit 09-08, Radiation Protection/ Process Control / Chemistry, Dated 07/29/09

RWP 09-2103 U1 RFO: Outage Operations Support and Testing

RWP 09-2104 U1 RFO: General Maintenance

RWP 09-2110 U1 RFO: Steam generator secondary side

RWP 09-2122 U1 RFO: Scaffold outage related activities

RWP 09-2123 U1 RFO: Insulation outage related activities to include bare head inspection insulation.

#### CAP Documents (Condition Reports)

ACE017570, High radiation area posting in front of the U-1 containment elevator on the -27 elevation was removed.

CR323238, Radioactive check sources were not in the designated location and were found in the auxiliary building.

CR323431, Worker was issued dosimetry for a revised RWP without being rebriefed on the RWP.

CR323569, HP received a DAD alarm while performing a radiation survey in a poorly lit area in Unit 1 containment.

CR323514, Gamma dose rate alarm received in U1 containment on secondary neutron dosimeter. This function is normally disabled and gamma dose is tracked using normal dosimeter.

## **Section 2OS2: ALARA Planning**

### **Procedures and Guidance Documents**

C-HP-1041.025, Declared or Expected Pregnant Women, Rev. 3

C-HP-1081.012, Radiation Work Permits: Preparing and Approving, Rev. 3

C-HP-1081.022, Radiation Work Permits: RWP Briefing and Controlling Work, Rev. 1

C-HP-1081.030, Radiation Work Permits: Extending, Revising and Terminating, Rev. 5

C-HP-1081.040, Radiation Work Permits: Providing HP Coverage During Work, Rev. 6

C-HP-1091.281, Radiation Work Permit Program: Surveillance and Evaluation, Rev. 3

HP-1032.110, Standard Radiation Monitoring & Dose Rate Trending, Rev. 0

HP-1032.120, Radiation Hot Spot Program Survey Criteria and Scheduling, Rev. 1

PI-AA-200, Corrective Action, Rev. 9

PI-AA-200-2001, Trending, Rev. 2

RP-AA-109, Radiological Survey Program, Rev. 0

RA-AA-222, Radiation Surveys, Rev. 0

RA-AA-262, Steam Generator Primary Side Work Controls, Rev. 0

RA-AA-263, Steam Generator Secondary Side Work Controls, Rev. 0

RP-AA-224, Airborne Radioactivity Surveys, Rev. 0

RP-AA-300, ALARA Program, Rev. 0

RP-AP-1001, Source Term Reduction and Control, Rev. 3

### **Records and Data**

ALARA Evaluation No. 09-040, U-2 SI Check Valve – Open, Inspect and Repair,  
Dated 10/14/09

Dosimetry records for Declared Pregnant Females, January 2008 to October 2009

Map No. 203, Unit #2 Containment Transfer Canal, Dated 11/04/09

Map No. 226, Unit #2 Containment 18' Elevation – "A" RCP Cube, Dated 11/03/09

Map Nos. 228, Unit #2 Containment 18' Elevation – "C" RCP Cube, Dated 11/14/09 and  
11/15/09

Map No. 250, Unit #2 Containment – 3'6 Elevation, Dated 11/03/09

Map No. 900, "C" S/G Hand Holes, Dated 11/14/09

RWP No. 09-2-3110-2, Hand Hole Cover Removal/Replacement, FOSAR, and Sludge Lance  
Activities

RWP No. 09-2-3111-2, Platform Set-Up, Remove/Replace Manways and Bolt Hole Cleaning

RWP No. 09-2-3116-1, SI Check Valve Inspection and Repair

RWP No. 09-2-3118-3, Blind Flange Removal & Installation

RWP No. 09-2-3120-1, Reactor Head Lift

RWP No. 09-2-3122-1, U2 RFO: Scaffold Outage Related Activities

RWP No. 09-2-3122-2, Permanent Scaffolding Installation Activities

RWP No. 09-2-3123-1, Insulation Related Activities  
 RWP No. 09-2-3123-2, Insulation Support of Bare Head Inspection  
 Station ALARA Goals for 2008, Dated 12/14/07 and 2009, Dated 01/02/09  
 Surry Power Station, 2008 Annual ALARA Report  
 Surry Power Station, 2008 Annual Outage Report  
 Surry Power Station, Unit 1 Refueling Outage Report, 04/19/09 – 05/11/09  
 Surry Power Station, Unit 2 Refueling Outage Report, 04/27/08 – 05/21/08  
 Surry Power Station ALARA Committee (SAC), Meeting Minutes for 06/25/09, 07/13/09,  
 09/09/09, 10/13/09, and 10/27/09

#### CAP Documents

CR 102113, Emergent Scope – Unit #1 and Unit #2 Subatmospheric Containment Entries  
 CR 337754, Emergent dose for Emergency Light Testing for Week 23  
 CR 345971, 1-LW-P-13 discharge elbow hot spot (Gate 22)  
 CR 357939, Evaluate methods for ensuring uniform monthly exposure rate for DPWs  
 Dominion, Nuclear Oversight Audit Report, Audit 08-06, Radiological Protection and Process  
 Control Program, Dated 09/04/08  
 Dominion, Nuclear Oversight Audit Report, Audit 09-08, Radiological Protection/Process Control  
 Program/Chemistry, Dated 07/29/09

#### **2PS2: Radioactive Material Processing and Transportation**

##### Procedures, Manuals, and Guides

C-HP-1071.040, Packaging and Shipment of Radioactive Material, Rev. 5  
 C-HP-1072.010, Packaging Radioactive Waste, Rev.1  
 C-HP-1072.050, Radioactive Waste transfer to Licensed Waste Processors, Rev. 6  
 C-HP-1072.070, Radioactive Waste Disposal Using the Energy Solutions Containerized Waste  
 Facility, Rev. 2  
 C-HP-1072.071, Radioactive Waste Disposal Using the Energy Solutions Bulk Waste Facility,  
 Rev. 2  
 HP-1072.020, Sampling, Analyzing, and Classifying Radioactive Waste, Rev. 5  
 VPAP-2104, Radioactive Waste Process Control Program (PCP), Rev. 7  
 CoC No. 9168, Model No. CNS 8-120B Shipping Package, Rev. 16  
 CoC No. 9204, Model No. CNS 10-160B Shipping Package, Rev. 12

##### Shipping Records and Radwaste Data

10CFR61 Waste Stream Analysis Reports for 2008 and 2009  
 Training and Qualification Records for Radioactive Waste/ Transportation Personnel  
 Radioactive Shipping Log for September 2008 through October 2009  
 Surry Nuclear Power Station 2008 Annual Effluent Release Report  
 Shipment SH-2008-062, 25 Pistols with Tritium Sights  
 Shipment SH-2009-025, PZR Safety (1)  
 Shipment SH-2009-027, Orex Sealand Containers (2)  
 Shipment SH-2009-65, 10CFR61 Samples  
 Disposal D-2008-009, RO Filter Boxes (2)  
 Disposal D-2008-010, CP Resin Boxes, (4)  
 Disposal D-2009-012, RO Filter Boxes (2)

CAP Documents

White Paper: Monitoring of In-Service Filters for the Prevention of NRC Class B/C Waste Generation

SAA000342, Radioactive Material Control Program Evaluation –Content and Implementation, Dated 11/25/08

SAR000835, Solid Radioactive Waste Program Evaluation, Dated 6/29/09

CR091973, Primary resin dose rates preclude the use of Type A shipping cask.

CR101214, Documenting Critical Observation of June 10, 2008

CR340180, Documenting assessment by EPRI for the plants readiness to store class B and C waste on site with the impending loss of access to the Barnwell, South Carolina burial site.

CR355517, CR creates a tasking for support for the generation and storage of 4 8-120 HICs on site.

CR336842, CR requesting clear guidance on appropriate disposal of smoke detectors

40A1: Performance Indicator VerificationCAP Documents

CR113034 SRF yard storm drains empty into discharge canal without rad monitoring.

CR323431 Worker was issued dosimetry for a revised RWP, without being rebriefed on RWP.

CR332569 Worker received DAD alarm in Unit 1 containment

ACE017570, High radiation area posting in front of the U-1 containment elevator on the -27 elevation was removed.

**Section 40A1: Performance Indicator Verification**

NEI 99-02, Regulatory Assessment Performance Indicator Guideline.

ER-AA-SPI-1001, Rev. 1, Implementation of the Consolidated Data Entry Reporting for Mitigating System Performance Index

## LIST OF ACRONYMS

ADAMS	Agencywide Document Access and Management System
ALARA	As Low As Reasonably Achievable
CA	Corrective Action
CAP	Corrective Action Program
CFR	Code of Federal Regulations
CR	Condition Report
DOT	Department of Transportation
EDG	Emergency Diesel Generator
HP	Health Physics
HPT	Health Physics Technician
HPAP	Health Physics Administrative Procedure
HRA	High Radiation Area
IMC	Inspection Manual Chapter
ISFSI	Independent Spent Fuel Storage Installation
JPM	Job Performance Measures
LHSI	Low Head Safety Injection
NCV	Non-cited Violation
NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission
OD	Operability Determination
PARS	Publicly Available Records
PCP	Process Control Program
PI	Performance Indicator
QS	Quench Spray
RAB	Reactor Auxiliary Building
RCE	Root Cause Evaluation
RCP	Reactor Coolant Pump
RCS	Reactor Coolant System
RFO	Refueling Outage
RP	Radiation Protection
RTP	Rated Thermal Power
RWP	Radiation Work Permit
SDP	Significance Determination Process
SR	Surveillance Requirements
TDAFWP	Turbine Driven Auxiliary Feedwater Pump
TS	Technical Specifications
UFSAR	Updated Final Safety Analysis Report
URI	Unresolved Item
VEPCO	Virginia Electric and Power Company
VHRA	Very High Radiation Area
VPAP	Virginia Power Administrative Procedure
WO	Work Order
ALARA	As Low As Reasonably Achievable
CAP	Corrective Action Program
CFR	Code of Federal Regulations
CR	Condition Report
HP	Health Physics
HPT	Health Physics Technician