



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

January 31, 2011

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
05000280/2010005, 05000281/2010005**

Dear Mr. Heacock:

On December 31, 2010, 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 11, 2011, with Mr. Bischof and other members of your staff.

The inspections 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 findings that have potential safety significance greater than very low safety significance. The findings are associated with the failure to correct multiple conditions adverse to fire protection, and the failure to effectively manage risk with the common emergency switchgear room (ESGR) door. Although these findings have potential safety significance, the findings did not represent immediate safety concerns because compensatory measures to deenergize adjacent loads was in place after the fire to prevent additional failures, and the licensee immediately closed the ESGR door. These findings do not present current safety concerns because for the fire protection issue, the failed load has been repaired and all existing unprotected breakers were isolated from their loads as a compensatory measure to prevent additional failures and for the ESGR door issue, the door has been repaired and access control has been restored to normal.

In addition, the report documents one NRC-identified finding and one self-revealing finding of very low safety significance (Green) which were determined to involve violations of NRC requirements. Additionally, one licensee-identified violation which was determined to be of very low safety significance is listed in this report. The NRC is treating these violations as non-cited violations (NCV) consistent with Section 2.3.2 of the NRC Enforcement Policy because of the very low safety significance of the violations and because they were entered into your corrective action program. 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.

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 05000280/2010005, 05000281/2010005
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 31, 2011

SUBJECT: SURRY POWER STATION – NRC INTEGRATED INSPECTION REPORT
05000280/2010005, 05000281/2010005

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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: 05000280/2010005, 05000281/2010005

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, 2010 through December 31, 2010

Inspectors: C. Welch, Senior Resident Inspector
G. Kolcum, Acting Senior Resident Inspector
J. Nadel, Resident Inspector
J. Dodson, Senior Project Engineer
E. Lea, Senior Operations Engineer (1R11)
R. Hamilton, Senior Health Physics Inspector (2RS1-S3, 4OA1, 4OA5)
L. Lake, Senior Reactor Inspector (1R08)
R. Chow, Reactor Inspector (1R07)

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

Enclosure

SUMMARY OF FINDINGS

IR 05000280/2010005, 05000281/2010005, 10/01/2010 – 12/31/2010; Surry Power Station, Units 1 and 2, Operability Evaluations, Refueling and Other Outage Activities, and Surveillance Testing.

The report covered a 3 month period of inspection by resident inspectors and by regional engineering, operator licensing and health physics inspectors. This report contains two Green findings, which were non-cited violations (NCVs), and two apparent violations (AVs) with potential safety significance greater than Green. 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 0310, "Components Within The Cross-Cutting Areas." Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process" Revision 4, dated December 2006.

A. NRC Identified and Self-Revealing Findings

Cornerstone: Initiating Events

- Green. A self-revealing Green NCV of TS 6.4, Unit Operating Procedures and Programs, was identified for the failure to follow procedure 1-OPT-ZZ-001, ESF Actuation with Undervoltage and Degraded Voltage 1H Bus. Specifically, on October 26, 2010, a test lead was incorrectly installed in the Unit 1 relay room for the logic circuit associated with the A train of Consequence Limiting Safeguards (CLS). This resulted in an inadvertent safety injection, isolated component cooling water supply to the standby residual heat removal (RHR) train, and automatically initiated several safety-related components including emergency diesel generator (EDG) #1. Operators entered AP-10.20, Response To Spurious Safety Injection With RCS Temperature Less Than 350°F, and terminated the safety injection in approximately three minutes. The licensee entered this issue into the CAP (CR 400908).

Failure to install the test leads as required by procedure 1-OPT-ZZ-001, is a performance deficiency. The finding is more than minor because it is associated with the configuration control attribute of the Initiating Events Cornerstone and adversely affected the cornerstone's objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. The finding, evaluated in accordance with NRC Inspection Manual Chapter (IMC) 0609, Appendix G, "Shutdown Operations Significance Determination Process," Attachment 1, Checklist 3, identified the finding is of very low safety significance (Green) because the finding did not lead to a loss of decay heat removal. This finding has a cross cutting aspect in the work practices component in the Human Performance area, because human error prevention techniques were not properly used commensurate with the risk significance of the assigned task (H.4(a)). (Section 1R22)

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Cornerstone: Mitigating Systems

- TBD. A self-revealing apparent violation (AV) of Condition 1.B to the Surry Unit 1 and Unit 2 Updated Facility Operating Licenses, DPR-32 and DPR-37, was identified for the licensee's failure to take corrective action for degraded conditions adverse to the fire protection program. Specifically, in 2003-2004, three breakers with loads including the Unit 2 1B Refueling Water Storage Tank (RWST) chiller motor, the Unit 1 2B charging component cooling water pump, and the Unit 2 B hydrogen recombiner were identified as being oversized with respect to the Surry design standard for breaker sizing and cable protection. The failure to take corrective action on the affected breakers led to a fault on the Unit 2 RWST Chiller Motor 1B on October 11, 2010, and a resulting fire which damaged the electrical cable and motor controller. The fire was promptly extinguished by the fire brigade. The licensee entered this issue into the CAP (CR 398628) and isolated the remaining breakers to prevent additional failures.

The inspectors found that the failure to take action to correct multiple oversized breakers constituted a performance deficiency. The finding is more than minor because it adversely affected the external factors attribute (fire) of the Mitigating Systems Cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the Unit 2 1B RWST chiller motor and the Unit 2 B hydrogen recombiner breakers were the most susceptible to fire due to their size; also a cable fault could potentially damage safety related cables routed nearby. In addition, the Unit 1 2B charging component cooling water pump is safety related and was also unprotected. The inspectors reviewed IMC 0609, Appendix F, Attachment 1, and determined the category of post fire safe shutdown was affected and the finding required a phase 3 analysis. The significance of this finding is to be determined pending completion of the phase 3 evaluation. This finding has a cross cutting aspect in the work control component in the Human Performance area because the licensee did not appropriately plan work activities by incorporating risk insights. Specifically, although work orders were planned in 2006 they were neither prioritized consistent with their safety significance nor scheduled and completed in a timely manner. (H.3(a)). (Section 1R15.b.1)

- TBD. A licensee identified AV of 10CFR50.65 (a)(4), Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants, was revealed after the licensee discovered that 2-BS-DR-21, common emergency switchgear room (ESGR) door was blocked open for two hours without clear communication to licensed operators. The licensee did not adequately assess the increase in operational risk that resulted in the required risk management actions of fire and environmentally qualified watches not being established. The licensee immediately corrected the condition by shutting the HELB door and having security control personnel access. The issue was entered into the licensee's CAP as CR397720.

The failure to adequately assess the increased risk associated with blocking open the common ESGR door and to take the required risk management actions is a performance deficiency. This finding is more than minor because it is associated with the Mitigating Systems Cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences.

Enclosure

Specifically, both Unit 1 and Unit 2 plant risk were not evaluated and risk management activities were not put in place when the common ESGR door was blocked open for maintenance and unable to perform its function as a fire barrier, a halon suppression pressure boundary, a main control room pressure boundary, and a HELB boundary. In accordance with IMC 0609, Appendix K, Maintenance Risk Assessment and Risk Management Significance Determination Process, this finding will require a phase 3 analysis. The significance of this finding is to be determined pending completion of the phase 3 evaluation. The inspectors determined that this finding had a cross-cutting aspect in the work control component of the human performance area because the licensee did not appropriately plan work activities by incorporating risk insights (H.3(a)). (Section 1R15.b.2)

Cornerstone: Barrier Integrity

- Green. An NRC-identified Green NCV of Technical Specification (TS) 6.4, Unit Operating Procedures and Programs, was identified. Personnel failed to follow the defined heavy load shipping path inside containment as specified in procedure, GMP-001, Heavy Load Rigging and Movement, which resulted in the movement of the 1B reactor coolant pump motor over exposed reactor fuel. The licensee has entered the issue into the CAP (CR 404106).

Transport of the 1B reactor coolant pump motor over the exposed reactor core is a performance deficiency. The finding is more than minor because it can reasonably be viewed as a precursor to a significant event, the heavy load traveled over exposed irradiated fuel with the reactor vessel head removed. In accordance with NRC Inspection Manual Chapter (IMC) 0609, Appendix G, "Shutdown Operations Significance Determination Process," Attachment 1, Checklist 4, the inspectors conducted a Phase 1 SDP screening and determined the finding required a Phase 2 analysis. The Phase 2 analysis determined the finding is of very low safety significance (Green) because: (1) there is a low probability of dropping the load based on a study in NUREG-1774 performed for crane operating experience; (2) the polar crane was in working condition and had no known deficiencies that would have affected the crane's ability to lift the load; and, (3) the duration of the heavy load lift over the exposed reactor core was very short. In addition, in accordance with NRC IMC 0609, Appendix H, "Containment Integrity SDP," the finding would not contribute to LERF due to the time since the reactor was shutdown. The finding has a cross-cutting aspect in the work practices component of the Human Performance area because plant supervisors failed to properly supervise workers executing procedure steps (H.4(c)). (Section 1R20)

B. Licensee Identified Violations

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

REPORT DETAILS

Summary of Plant Status

Unit 1 entered the period at full rated thermal power (RTP) and subsequently entered into coast down operations, for refueling outage on October 23, 2010. The unit was taken off-line and the reactor shutdown on October 24. Startup commenced on November 30, 2010. The reactor was brought critical on December 1, 2010. The Unit was connected to the electrical grid, following physics testing, on December 2, 2010. RTP was reached on December 5, 2010. The Unit operated at RTP for the remainder of the period.

Unit 2 operated at or near full RTP throughout the inspection period.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R04 Equipment Alignment

.1 Partial Walkdown

a. Inspection Scope

The inspectors performed a partial walk down on the five risk-significant systems identified below to verify the redundant or diverse train for equipment removed from service was operable and/or that the system had been 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. During the walkdown, the inspectors attempted to identify any discrepancies that could impact the function of the system, and, therefore, potentially increase risk.

- Unit 1 containment spray system
- Unit 1 inside and outside recirculation spray systems
- Unit 1 low head safety injection system and passive accumulators
- Unit 1 motor driven auxiliary feedwater systems
- Unit 1 turbine driven auxiliary feedwater system

b. Findings

No findings were identified.

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1R05 Fire Protection

.1 Quarterly Fire Protection Reviews

a. Inspection Scope

The inspectors conducted a defense-in-depth (DID) review for the four 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 15, Unit 1 Containment
- Fire zone 7, EDG #2 Room
- Fire zone 8, EDG #3 Room
- Fire zone 17, Auxiliary Building – 27ft elevation

b. Findings

No findings were identified.

1R07 Heat Sink Performance

a. Inspection Scope

The inspectors reviewed the licensee's heat exchanger program document, trending data maintained by the system engineer, maintenance rule information, and specific commitments related to the recirculation spray heat exchangers. The inspectors also directly observed the flow testing of 1-RS-E-1A and 1-RS-E-1D which was performed during the Unit 1, November 2010, refueling outage. Inspectors reviewed records and as found photographs associated with heat exchanger inspections performed during the outage for heat exchangers 1-RS-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 were identified.

1R08 Inservice Inspection (ISI) Activities (71111.08P).1 Non-Destructive Examination (NDE) Activities and Welding Activitiesa. Inspection Scope

From November 1 to November 12, 2010, the inspectors reviewed the implementation of the licensee's In-service Inspection (ISI) program for monitoring degradation of the reactor coolant system (RCS) boundary and risk significant piping boundaries of Unit 1. The inspectors' activities consisted of an on-site review of NDE to evaluate compliance with the applicable edition of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (BPVC), Section XI (Code of record: 2001 Edition with 2003 Addenda), and to verify that indications and defects (if present) were appropriately evaluated and dispositioned in accordance with the requirements of the ASME Code, Section XI acceptance standards.

The inspectors observed and/or reviewed portions of the NDE activities listed below. The review included examination procedures, NDE reports, video of the inspection, equipment and personnel qualification records, and calibration reports (as applicable).

- Ultrasonic Testing (UT) of ASME Class 1 weld 12-SI-147-105A in 12 inch Safety Injection piping
- UT examinations of "C" Steam Generator Bottom Head DM welds 1-05DM and 1-06DM
- UT examination of RHR Heat Exchanger welds 1-B08, 1-A01 and 1-A-02

The inspectors' review of welding activities specifically covered the welding activity listed below in order to evaluate compliance with procedures and the ASME Code. The inspectors reviewed the work order, repair and replacement plan, weld data sheets, welding procedures, procedure qualification records, welder qualification records, and NDE reports.

- Repair Replacement Plan 2010-106 associated with Work Order # 3810285663, for replacement of Safety Injection Check Valve 01-SI-147, 4/1/09
- Welding Technique Sheet and welding Data Sheet for completed weld 12-SI-147-105A-1-05A

b. Findings

No findings were identified.

.2 PWR Vessel Upper Head Penetration (VUHP) Inspection Activitiesa. Inspection Scope

No volumetric/surface or bare metal visual (BMV) inspections were planned this outage.

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b. Findings

N/A

.3 Boric Acid Corrosion Control (BACC) Inspection Activitiesa. Inspection Scope

The inspectors reviewed the licensee's BACC program activities to ensure implementation with commitments made in response to NRC Generic Letter 88-05, "Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary," and applicable industry guidance documents. Specifically, the inspectors performed an on-site record review of procedures and the results of the licensee's containment walk-down inspections performed during the current fall outage. The inspectors also interviewed the BACC program owner, conducted an independent walk-down of containment to evaluate compliance with licensee's BACC program requirements, and verified that degraded or non-conforming conditions, such as boric acid leaks, were properly identified and corrected in accordance with the licensee's BACC and corrective action programs.

The inspectors reviewed an engineering evaluation completed for evidence of boric acid found on systems containing borated water to verify compliance with generally accepted industry guidance.

- CR #401992 – possible through wall leak on SI ICV-3581
- CR #401994 – Boric Acid leak on Seal Table fitting 1-RC-TW-J7
- CR #402001 – Packing leak on valve 1-SI-339

b. Findings

No findings were identified.

.4 Steam Generator (SG) Tube Inspection Activitiesa. Inspection Scope

The NRC inspectors interviewed eddy current testing (ET) personnel including the licensee SG engineer, ET Level III, and ET Qualified Data Analyst (QDA), and vendor lead ET Level III; and reviewed documentation related to the SG ISI program. The following items were evaluated against the requirements of the ASME B&PV Code, Section XI; the Technical Specifications; and the guidance documents referenced in NEI 97-06, "Steam Generator Program Guidelines," Revision 2:

- Assessed whether assumed NDE flaw sizing accuracy was consistent with data from the EPRI examination technique specification sheets (ETSS) or other applicable performance demonstrations

- Reviewed ET data (including historical ET data) from: SG A - Row (R)2, Column (C)57, R3C66, R6C88, R8C38, R16C35, R29C24, and R34C67; and SG B – R1C7, R9C3, R25C85, R31C16, R38C21, R40C50, R40C51, and R41C51
- 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 the licensee's SG tube ET examination scope for 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
- Reviewed the licensee's examination scope expansion plans and implementation when defects were identified
- Reviewed the licensee's repair criteria and processes
- Evaluated ET equipment and techniques used by the licensee to acquire data from the SG tubes for site-validation 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 disposition procedures of irretrievable foreign objects left within the secondary side of the steam generators
- Verified the licensee was complying with appropriate probe wear criteria during implementation of Generic Letter 95-05
- Reviewed equipment and data acquisition and analysis personnel certification and medical examination reports

b. Findings

No findings were identified.

.5 Identification and Resolution of Problems

a. Inspection Scope

The inspectors performed a review of ISI-related problems which were identified by the licensee and entered into the corrective action program as Condition Reports (CRs). The inspectors reviewed the CRs to confirm that the licensee had appropriately described the scope of the problem, and had initiated corrective actions. The review also included the licensee's consideration and assessment of operating experience events applicable to the plant. The inspectors performed this review to ensure compliance with 10CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requirements. The corrective action documents reviewed by the inspectors are listed in the report attachment.

b. Findings

No findings were identified.

1R11 Licensed Operator Regualification Program

.1 Annual Review of Licensee Regualification Examination Results

a. Inspection Scope

On January 5, 2010, the licensee completed the annual requalification operating test and on February 16, 2010, the licensee completed the comprehensive biennial requalification written examinations tests required to be administered to all licensed operators in accordance with 10 CFR 55.59(a)(2). The inspectors performed an in-office review of the overall pass/fail results of the written examinations, individual operating tests and the crew simulator operating tests. These results were compared to the thresholds established in Manual Chapter 609 Appendix I, Operator Requalification Human Performance Significance Determination Process.

b. Findings

No findings were identified.

.2 Resident Inspector Quarterly Review

a. Inspection Scope

The inspectors observed “just in time” training conducted on October 19, 2010 in both the classroom and the simulator. The training was conducted under scenario RQ-ST-JIT-AIA-2.16. The training focused on the upcoming ramp and Unit 1 shutdown for refueling. The inspectors reviewed procedure 1-GOP-2.7, “Unit Shutdown, Power Decrease from Allowable Power to Unit Offline for Refueling Outage” and verified that licensed operators were aware of recent changes to the procedure. The inspectors verified that simulator conditions were consistent with the scenario and reflected the actual plant configuration (i.e., simulator fidelity). The inspectors observed a portion of the crew’s performance to determine whether proper communication, procedure adherence, and human performance techniques were being used. The inspectors observed the evaluators’ ongoing comments and confirmed items for improvement were identified and discussed with the operators to further enhance performance.

b. Findings

No findings were identified.

1R12 Maintenance Effectivenessa. Inspection Scope

For the three equipment issues described in the 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(s). 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), station procedures ER-AA-MRL-10, Rev. 4, "Maintenance Rule Program;" and ER-AA-MRL-100, Rev. 1, "Implementing the Maintenance Rule;" the Surry Maintenance Rule Scoping and Performance Matrix. And industry guidance contained in NUMARC 93-01, Rev. 2, "Industry Guidance for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants."

- CR 387191, Elevated Temperatures of the AAC Diesel
- CR 386337, Low Head Safety Injection Pump 1B is Inoperable due to High Flow during pump testing
- CR 402225, Received Loss of Detector Voltage Alarm for Source Range N-35 on Unit 1

b. Findings

No findings were identified.

1R13 Maintenance Risk Assessments and Emergent Work Controla. Inspection Scope

The inspectors evaluated, as appropriate, for the five 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.

- On-line unplanned entry into an elevated (yellow) risk condition for Unit 2 on October 4 associated with the common emergency switchgear room door being held open without the required risk management actions in place.

- On-line unplanned entry into an elevated (yellow) risk condition for Unit 2 on October 27 associated with an issued tornado watch.
- Shutdown elevated (yellow) risk condition for Unit 1 on November 10 associated with planned shutdown activities.
- On-line unplanned entry into an elevated (yellow) risk condition for Unit 1 on December 1 associated with an issued tornado watch during preparations for criticality.
- On-line green risk condition for Unit 2 on December 10 associated with the planned removal of the A circulating water line spray shield.

b. Findings

No findings 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, "Operability Determination." The inspectors reviewed the corrective action program to verify deficiencies in operability determinations were being identified and corrected.

- CR 405545 – 1-SW-MOC-103A/103B leaking
- CR 399859 – Supplemental neutron shields (Benelex) are not included in GSI-191 debris load
- CR 398124 – Microtherm® on CRDM nozzles in Unit 1 and Unit 2 containment
- CR 398628 – Unit 2 RWST chiller caught fire due to short causing breaker and cable damage
- CA 173178 – CA to engineering to review NAPS RCE 000976, failure of CRDM fan circuit breaker
- CR331819 – Klockner-Moeller breaker contactor testing practice

b. Findings

1. Failure To Correct Multiple Conditions Adverse to Fire Protection

Introduction: A self-revealing apparent violation (AV) of Condition 1.B to the Surry Unit 1 and Unit 2 Updated Facility Operating Licenses, DPR-32 and DPR-37, was identified for the licensee's failure to take corrective action for degraded conditions adverse to the

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fire protection program. Specifically, in 2003-2004, three breakers with loads including the Unit 2 1B Refueling Water Storage Tank (RWST) chiller motor, the Unit 1 2B charging component cooling water pump, and the Unit 2 B hydrogen recombiner were identified as being oversized with respect to the Surry design standard for breaker sizing and cable protection. The failure to take corrective action on the affected breakers led to a fault on the Unit 2 RWST chiller motor 1B on October 11, 2010, and a resulting fire which damaged the electrical cable and motor controller. The fire was promptly extinguished by the fire brigade.

Description: In 2003 and 2004, three plant issue reports were written: S-2004-1395, S-2004-2571, and S-2003-4662. These reports were written for a population of breakers at the station that were not appropriately sized in accordance with the original Stone and Webster design standards to protect the cables they fed. The two breakers most susceptible to a fire due to inadequate protection for their respective cables included the Unit 2 1B RWST chiller motor and the Unit 2 B hydrogen recombiner. In addition, the Unit 1 2B charging component cooling water pump was the only safety related load identified as being unprotected. There was a two year delay before a design change package (DCP) was created to begin the process of replacing these breakers.

On October 11, 2010, at 0824 a security officer reported a fire at the Unit 2 1B RWST chiller with arcing, fire, and smoke seen at the control panel. The fire was promptly extinguished at 0831 by the fire brigade. The chiller is located in an outside area next to the RWST inside the Radiologically Controlled Area (RCA). Additionally, smoke was reported in the upper cable vault area coming from breaker cubicle 2-EP-BKR-2C1-1E-2B, which is the breaker that feeds the RWST chiller. A subsequent inspection identified overheated and damaged cabling inside the breaker cubicle.

It was discovered that the RWST chiller breaker was a 225 ampere breaker serving a single load of 28 amperes. The cable was sized as a #12 American Wire Gauge rated at 21 amperes. Plant issue report S-2004-2571 first identified that the RWST chiller breaker was oversized. The remaining population of affected breakers were later isolated from their loads as a compensatory measure to prevent additional failures.

Analysis: The inspectors found that the failure to take action to correct multiple oversized breakers constituted a performance deficiency. The finding is more than minor because it adversely affected the external factors attribute (fire) of the Mitigating Systems Cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the Unit 2 1B RWST chiller motor and the Unit 2 B hydrogen recombiner breakers were the most susceptible to fire due to their size; also a cable fault could potentially damage safety related cables routed nearby. In addition, the Unit 1 2B charging component cooling water pump is safety related and its breaker was also unprotected. The inspectors reviewed IMC 0609, Appendix F, Attachment 1, and determined the category of post fire safe shutdown was affected and the finding required a phase 3 analysis. The significance of this finding is to be determined pending completion of the phase 3 evaluation. This finding has a cross cutting aspect in the work control component in the Human Performance area because the licensee did not appropriately plan work activities by incorporating risk insights. Specifically, although work orders were planned in 2006 they were neither prioritized consistent with their

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safety significance nor scheduled and completed in a timely manner. (H.3(a)). (Section 1R15.B.1)

Enforcement: 10 CFR Part 50.48 states, in part, that each operating nuclear power plant “. . . must have a fire protection plan that satisfies Criterion 3 of appendix A to this part.” The Surry Unit 1 Updated Facility Operating License DPR-32, and Unit 2 Updated Facility Operating License DPR-37, Condition 1.B, specify, in part, that the licensee implement and maintain in effect all provisions of the approved fire protection program as described in the UFSAR and as approved in the Safety Evaluation Report (SER) and subsequent supplements. The UFSAR requires, in part, that the fire protection program (FPP) meet Appendix A to Branch Technical Position (BTP) APCS 9.5-1, “Guidelines for Fire Protection for Nuclear Power Plants Docketed Prior to July 1, 1976,” dated August 23, 1976.” Section C.8 of Appendix A to BTP APCS 9.5-1 requires, in part, that measures be established to assure conditions adverse to fire protection, such as failures, malfunctions, and deficiencies, are promptly identified, reported, and corrected. Contrary to the above, the licensee failed to take corrective action within an adequate time period for deficiencies associated with circuits where the breakers were not providing the required electrical protection for their associated cables. As a result, on October 11, 2010, a fire developed on the 1B RWST Chiller Motor due to a fault in one of the unprotected cables. The licensee has entered the issue into the CAP (CR 398628). Pending determination of safety significance, this finding is identified as: AV 05000280,281/2010005-01; Failure to Correct Multiple Conditions Adverse to Fire Protection.

2. Inadequate Risk Evaluation for Leaving Common ESGR Door Open

Introduction: A licensee identified AV of 10CFR50.65 (a)(4), Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants, was revealed after the licensee discovered that 2-BS-DR-21, common emergency switchgear room (ESGR) door was blocked open for two hours without clear communication to licensed operators. The licensee did not adequately assess the increase in operational risk that resulted in the required risk management actions of fire and environmentally qualified watches not being established. The licensee immediately corrected the condition by shutting the HELB door and having security control personnel access. The issue was entered into the licensee’s CAP as CR397720.

Description: On October 4, 2010, the licensee discovered that 2-BS-DR-21, common emergency switchgear room (ESGR) door would not function electrically to allow access into or out of the room. The common ESGR door functions as a fire barrier, a halon suppression pressure boundary, a main control room pressure boundary, and a HELB boundary. Maintenance was planned to correct the electrical malfunction on the door. Instructions provided by licensed operators to security were to manually open the door each time access was requested. Security misunderstood the instructions and blocked open the door for approximately two hours. Upon discovery of the open ESGR door by licensed operators, the licensee entered TS 3.0.1 and declared all equipment in the common ESGR inoperable. TS 3.0.1 was exited when the ESGR door was closed and secured.

Analysis: The failure to adequately assess the increased risk associated with blocking open the common ESGR door and to take the required risk management actions is a performance deficiency. This finding is more than minor because it is associated with the Mitigating Systems Cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, both Unit 1 and Unit 2 plant risk were not evaluated and risk management activities were not put in place when the common ESGR door was blocked open for maintenance and unable to perform its function as a fire barrier, a halon suppression pressure boundary, a main control room pressure boundary, and a HELB boundary. In accordance with IMC 0609, Appendix K, Maintenance Risk Assessment and Risk Management Significance Determination Process, this finding will require a phase 3 analysis. The significance of this finding is to be determined pending completion of the phase 3 evaluation. The inspectors determined that this finding had a cross-cutting aspect in the work control component in the human performance area because the licensee did not appropriately plan work activities by incorporating risk insights (H.3(a)).

Enforcement: 10 CFR Part 50.65 (a)(4) requires 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 October 4, 2010, the licensee failed to adequately assess the risk associated with leaving the common ESGR room door open for two hours. Pending determination of safety significance, this finding is identified as: AV 05000280, 281/2010005-04; Inadequate Risk Evaluation for Leaving Common ESGR Door Open.

1R19 Post Maintenance Testing

a. Inspection Scope

For the five 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.

- Unit 1 turbine driven auxiliary feedwater pump maintenance per W.O.s 38102562086 & 038102544025
- Accumulator discharge check valve replacement per W.O.s 38102856653 and 38102585535.
- 1-PT-11.0, Rev.18, Reactor Coolant Pressure Test

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- 1-NPT-RX-14, Rev. 15; Hot Rod Drops By Bank
- 1-NPT-RX-008, Rev 23; Startup Physics Testing

b. Findings

No findings were identified.

1R20 Refueling and Other Outage Activities

.1 Unit 1 Refueling Outage

a. 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 1 Refueling Outage (RFO) that began on October 24, 2010 and ended November 30, 2010.

Review of Outage Plan:

Prior to the outage, the inspectors reviewed the "Surry Unit 1 2010 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 1 2010 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 had not been left which could affect the performance of the containment sump.

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 1 reactor vessel head removal and installation of the 1B reactor coolant pump.

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 and refueling bridge 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 1 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

Heavy Load Lift of the 1B RCP Motor Over Exposed Reactor Fuel

Introduction: An NRC-identified Green NCV of Technical Specification (TS) 6.4, Unit Operating Procedures and Programs, was identified. Personnel failed to follow the defined heavy load shipping path inside containment as specified in procedure, GMP-001, Heavy Load Rigging and Movement, which resulted in the movement of the 1B reactor coolant pump motor over exposed reactor fuel.

Description: On November 17, 2010, the reactor was in refueling shutdown mode with the reactor vessel head removed, the cavity flooded in excess of 23 feet, and more than two thirds of the core had been loaded into the reactor vessel. The inspectors observed movement of the B reactor coolant pump motor (1-RC-P-1B) from the containment equipment hatch to the pump cubicle. During transport of the motor with the polar crane, the inspectors noted that the transport path deviated from the safe load path and the reactor coolant pump motor was rigged over the exposed reactor core for several minutes during the transport. The implementing procedure was GMP-001, Heavy Load Rigging and Movement. The inspectors confirmed their observations with refueling personnel located closer to the reactor cavity.

Analysis: Transport of the 1B reactor coolant pump motor over the exposed reactor core is a performance deficiency. The finding is more than minor because it can reasonably be viewed as a precursor to a significant event, the heavy load traveled over exposed irradiated fuel with the reactor vessel head removed. In accordance with NRC Inspection Manual Chapter (IMC) 0609, Appendix G, "Shutdown Operations Significance Determination Process," Attachment 1, Checklist 4, the inspectors conducted a Phase 1 SDP screening and determined the finding required a Phase 2 analysis. The Phase 2 analysis determined the finding is of very low safety significance (Green) because: (1) there is a low probability of dropping the load based on a study in NUREG-1774 performed for crane operating experience; (2) the polar crane was in working condition and had no known deficiencies that would have affected the crane's ability to lift the load; and, (3) the duration of the heavy load lift over the exposed reactor core was very short. In addition, in accordance with NRC IMC 0609, Appendix H, "Containment Integrity SDP," the finding would not contribute to LERF due to the time since the reactor

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was shutdown. The finding has a cross-cutting aspect in the work practices component of the Human Performance area because plant supervisors failed to properly supervise workers executing procedure steps (H.4(c)).

Enforcement: TS 6.4, Unit Operating Procedures and Programs, states that detailed written procedures with appropriate check-off lists and instructions shall be provided and followed. Procedure GMP-001, Heavy Load Rigging and Movement, was established to perform this maintenance activity, which requires in Attachment 2 that heavy loads follow the approved safe load path. Contrary to the above, the licensee moved the 1B RCP motor over the exposed reactor fuel which deviated from the safe load path as outlined in the procedure. Because this finding is of very low safety significance and has been entered into the licensee's CAP (CR 404106), this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy and is identified as: NCV 05000280/2010005-03; Heavy Load Lift of the 1B RCP Motor Over Exposed Reactor Fuel

1R22 Surveillance Testing

a. Inspection Scope

The inspectors witnessed and/or reviewed test records for the seven risk-significant surveillance tests listed below, to determine the SSCs' operational readiness and whether the SSCs selected meet the Technical Specifications (TS), Updated Final Safety Analysis Report (UFSAR), and licensee's procedure requirements and if the test adequately demonstrated 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).

In-Service Testing:

- 1-OPT-RS-001, Rev. 20; Containment Outside Recirculation Spray Pumps Flow and Leak Test
- 1-OPT-RH-003, Rev. 17; RHR System Operability Test

Surveillance Testing:

- 1-OPT-ZZ-002, Rev. 30; ESF Actuation with Undervoltage and Degraded Voltage – 1J Bus
- 1-OSP-SW-007, Rev 5; Service Water Flow Test of Recirculation Spray Heat Exchangers 1-RS-E-1A and 1-RS-E-1D
- 1-OSP-TM-003, Rev. 11; Functional Check of Turbine Valves Stroke and Limit Switch Operation

Containment Isolation Valve

- 1-OPT-CT-201, Rev. 20; Containment isolation Valve Local Leak Rate Testing, Penetration 57C
- 1-OPT-CT-201, Rev. 20; Containment isolation Valve Local Leak Rate Testing, Penetration 92

b. Findings

Failure to Follow Procedure Results in Inadvertent Actuation of Safety Injection

Introduction: A self-revealing Green NCV of TS 6.4, Unit Operating Procedures and Programs, was identified for the failure to follow procedure 1-OPT-ZZ-001, ESF Actuation with Undervoltage and Degraded Voltage 1H Bus. Specifically, on October 26, 2010, a test lead was incorrectly installed in the Unit 1 relay room for the logic circuit associated with the A train of Consequence Limiting Safeguards (CLS). This resulted in an inadvertent safety injection, isolated component cooling water supply to the standby residual heat removal (RHR) train, and automatically initiated several safety-related components including emergency diesel generator (EDG) #1.

Description: On October 26, 2010, while Unit 1 was in cold shutdown, licensee personnel were in the Unit 1 relay room setting up test equipment to support the upcoming H bus undervoltage and degraded voltage logic testing in accordance with 1-OPT-ZZ-001, ESF Actuation with Undervoltage and Degraded Voltage 1H Bus. Step 6.1.8 aligns the A train of CLS for testing and connects digital multimeters for system actuation monitoring. On step 6.1.8.m, the electrician inadvertently contacted the test lead to a non-targeted component in the cabinet and a spark was observed with a subsequent popping sound.

The control room received annunciators for logic actuation and safety injection with an immediate indication that the high head safety injection system was pumping through the cold leg injection path. Operators immediately entered AP-10.20, Response To Spurious Safety Injection With RCS Temperature Less Than 350°F. Injection was terminated after three minutes. Pressurizer level had increased from approximately 23 percent to 42 percent. The Auxiliary Building Filter Exhaust Fans and EDG #1 auto started due to the logic signal. The logic signal also initiated an A train containment isolation, which resulted in the component cooling water supply valve to the A train of Residual Heat Removal (RHR) Heat Exchanger going closed.

Analysis: Failure to install the test leads as required by procedure 1-OPT-ZZ-001 is a performance deficiency. The finding is more than minor because it is associated with the configuration control attribute of the Initiating Events Cornerstone and adversely affected the cornerstone's objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. The finding, evaluated in accordance with NRC Inspection Manual Chapter (IMC) 0609, Appendix G, "Shutdown Operations Significance Determination Process," Attachment 1, Checklist 3, identified the finding is of very low safety significance (Green) because the finding did not lead to a loss of decay heat removal. This finding has a cross cutting aspect in the work practices component in the Human Performance area, because human error prevention techniques were not properly used commensurate with the risk significance of the assigned task (H.4(a)).

Enforcement: TS 6.4, Unit Operating Procedures and Programs, states that detailed written procedures with appropriate check-off lists and instructions shall be provided and

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followed. Contrary to the above, on October 26, 2010, the licensee failed to follow procedure 1-OPT-ZZ-001, ESF Actuation with Undervoltage and Degraded Voltage 1H Bus, resulting in an inadvertent actuation of safety injection. Because this finding is of very low safety significance and has been entered into the licensee's CAP (CR 400908), this violation is being treated as a NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy and is identified as: NCV 05000280/2010005-02, Failure to Follow Procedure Results in Inadvertent Actuation of Safety Injection.

2. RADIATION SAFETY

Cornerstones: Occupational Radiation Safety (OS) and Public Radiation Safety (PS)

2RS1 Radiological Hazard Assessment and Exposure Controls

a. Inspection Scope

Hazard Assessment and Instructions to workers During facility tours, the inspectors observed labeled radioactive material, postings for radiation areas and high radiation areas (HRAs) in the radiologically controlled area (RCA), and radioactive waste (radwaste) processing and storage locations. Inspectors also observed and evaluated labels on selected containers. The inspectors reviewed survey records for several plant areas including surveys for alpha emitters, hot particles, airborne radioactivity, gamma surveys within areas of high dose rate gradients, and pre-job surveys for upcoming tasks. Inspectors independently surveyed areas in the plant and compared results to radiological conditions and postings in the plant. Inspectors also reviewed air sample records and observed work in potential airborne areas to assess the location of air monitors.

The inspectors discussed changes to plant operations that could contribute to changing radiological conditions since the last inspection. Inspectors attended pre-job briefings for selected tasks and reviewed Radiation Work Permit (RWP) details to assess communication of radiological control requirements and current radiological conditions to workers. RWPs for work in airborne areas were also reviewed to assess airborne radioactive controls and monitoring.

Work Practices The inspectors evaluated access barrier effectiveness including key control for selected U1 and U2 Locked High Radiation Area (LHRA) and Very High Radiation Areas (VHRA) locations. Changes to procedural guidance for LHRA and VHRA controls were discussed with Health Physics (HP) supervisors. Controls and their implementation for storage of irradiated material within the Spent Fuel Pool (SFP) were reviewed and discussed. Areas where dose rates could change significantly as a result of plant shutdown and refueling operations were also discussed.

Occupational workers' adherence to selected RWPs and HP technician (HPT) proficiency in providing job coverage were evaluated through direct observations and interviews with licensee staff. Electronic Dosimeter (ED) alarm set points and worker stay times were evaluated against area radiation survey results for jobs in lower containment and lower annulus. ED alarm logs were reviewed and worker response to

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dose and dose rate alarms during selected work activities was evaluated. HPT coverage and actions at the Unit 1 containment access point were reviewed and discussed in detail.

Control of Radioactive Material The inspectors observed surveys of material and personnel being released from the RCA using small article monitor, personnel contamination monitor, and portal monitor instruments. The inspectors discussed equipment sensitivity, alarm setpoints, and release program guidance with licensee staff. In addition, the inspector reviewed controls for hand surveying large tools and equipment for release from the RCA and the PA. The inspectors also reviewed source inventory and discussed leak tests for selected sealed sources, and discussed nationally tracked source transactions with licensee staff.

Problem Identification and Resolution The inspectors reviewed selected Condition Reports (CR) associated with radiological hazard assessment and control. The reviewed items included CR's, self-assessments, and quality assurance audit documents. The inspectors evaluated the licensee's ability to identify and resolve the issues in accordance with procedure PI-AA-200, Corrective Action.

Radiation protection activities were evaluated against the requirements of Updated Final Safety Analysis Report (UFSAR) Section 12; Technical Specification (TS), Section 6.4 10 CFR Parts 19 and 20; and approved licensee procedures. Licensee programs for monitoring materials and personnel released from the RCA were evaluated against 10 CFR Part 20 and IE Circular 81-07, Control of Radioactively Contaminated Material. Documents reviewed are listed in Section 2RS1 of the Attachment.

The inspectors completed all specified line-items detailed in Inspection Procedure (IP) 71124.01.

b. Findings

No findings were identified.

2RS2 As Low As Reasonably Achievable (ALARA)

a. Inspection Scope

ALARA Program Status The inspectors reviewed and discussed plant exposure history and current trends including the site's Three-Year Rolling Average (TYRA) collective exposure history for calendar year (CY) 2007, through CY 2009. Current and proposed activities to manage site collective exposure and trends regarding collective exposure were evaluated through review of previous TYRA collective exposure data, and review of the licensee's 5-year ALARA program implementing plan. The inspectors reviewed the Licensee's implementation of the use of Tungsten Vest as an ALARA tool and inspectors reviewed Licensee's position paper, procedures, training records, survey methods, and dosimetry results for implementation of Effective Dose Equivalent (EDE) per Regulatory Guide 8.4, "Methods for Measuring Effective Dose Equivalent from External Exposure," US Nuclear Regulatory Commission, July 2010, for compliance.

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Current ALARA program guidance and recent changes, as applicable, regarding estimating and tracking exposure were discussed and evaluated.

Radiological Work Planning The inspectors reviewed planned work activities and their collective exposure estimates for the current Unit 1 Refueling Outage (RFO). Work activities, exposure estimates and mitigation activities were reviewed for the following high collective exposure tasks: reactor head disassembly and re-assembly; U1 containment scaffold installation and removal; and coatings, painting and all associated work in U1 containment. For the selected tasks, the inspectors reviewed dose mitigation actions and established dose goals. During the inspection, use of remote technologies including teledosimetry and remote visual monitoring were verified as specified in RWP or procedural guidance. Current collective dose data for selected tasks were compared with established estimates and, where applicable, changes to established estimates were discussed with responsible licensee ALARA Planning representatives. The inspectors reviewed previous post-job reviews conducted for the U2 RFO and verified that the items were entered into the licensee's corrective action program for evaluation.

Verification of Dose Estimates and Exposure Tracking Systems The inspectors reviewed select ALARA work packages and discussed assumptions with responsible planning personnel regarding the bases for the current estimates. The licensee's on-line RWP cumulative dose data bases used to track and trend current personal and cumulative exposure data and/or to trigger additional ALARA Planning activities in accordance with current procedures were reviewed and discussed. Selected work-in-progress reviews for S/G secondary side activities and adjustments to cumulative exposure estimate data were evaluated against work scope changes or unanticipated elevated dose rates.

Source Term Reduction and Control The inspectors reviewed historical dose rate trends for shutdown chemistry, cleanup, and resultant chemistry and radiation protection trend-point data against the current U1 RFO data. Licensee actions to mitigate noble gas and iodine exposures resulting from fuel leaks were discussed in detail.

Problem Identification and Resolution The inspectors reviewed and discussed selected CRs associated with ALARA program implementation. The reviewed items included CRs, self-assessments, and quality assurance audit documents. The inspectors evaluated the licensee's ability to identify, characterize, prioritize, and resolve the identified issues in accordance with licensee procedure PI-AA-200, Corrective Action.

The licensee's ALARA program activities and results were evaluated against the requirements of UFSAR Section 12; Technical Specification (TS), Section 6.4; 10 CFR Parts 19 and 20; and approved licensee procedures. Records reviewed are listed in Sections 2RS1 and 2RS2 of the Attachment.

Radiation worker performance was reviewed as part of observations conducted for IP 71124.01 and is documented in section 2RS1.

b. Findings

No findings were identified.

2RS3 In-Plant Airborne Radioactivity Control and Mitigation

a. Inspection Scope

Engineering Controls: The inspectors reviewed the use of temporary and permanent engineering controls to mitigate airborne radioactivity during the refueling outage including the Containment Purge and Auxiliary Ventilation systems. The inspectors observed the use of high efficiency particulate air ventilation and vacuums to control contamination during surface disturbing work. Use of containment purge to reduce airborne levels in general areas was reviewed. The inspectors evaluated the effectiveness of continuous air monitors and air samplers placed in work areas to provide indication of increasing airborne levels.

Use of Respiratory Protection Devices The inspectors reviewed the use of respiratory protection devices to limit the intake of radioactive material. This included review of devices used for routine tasks and devices stored for use in emergency situations. Selected Self-Contained Breathing Apparatus (SCBA) units, negative pressure respirators (NPRs), and Powered Air Purifying Respirators (PAPRs) staged for routine and emergency use in the Main Control Room and other locations were inspected for material condition, SCBA bottle air pressure, the number of units, and the number of spare masks and air bottles available. The inspectors reviewed maintenance records for selected SCBA units for the past two years and evaluated SCBA and NPR compliance with National Institute for Occupational Safety and Health certification requirements. The inspectors also reviewed records of air quality testing for supplied-air devices and SCBA bottles.

The inspectors verified the licensee has procedures in place to ensure that the use of respiratory protection devices was ALARA when engineering controls were not practicable. Due to limited respirator use during the period of inspection, the training curriculum for respiratory protection users was reviewed for various types of respiratory protection devices and radworkers and control room operators were interviewed on the use of the devices including SCBA bottle change-out and use of corrective lens inserts. Respirator qualification records and medical fitness records were reviewed for several Main Control Room operators and emergency responder personnel in the Maintenance and RP departments. In addition, qualifications for individuals responsible for testing and repairing SCBA vital components were evaluated through review of training records.

The inspectors verified that the licensee has procedural requirements in place for evaluating air samples for the presence of alpha emitters, and reviewed airborne radioactivity and contamination survey records for several plant areas to ensure air samples are screened and evaluated per the procedure requirements.

The inspectors walked-down the respirator issue and storage locations and verified that the equipment was appropriately stored and maintained. Records of monthly and

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quarterly inventory and inspection of the equipment were also reviewed by the inspectors. The inspectors discussed the process for issuing respirators, and verified that selected individuals qualified for respirator and/or self-contained breathing apparatus (SCBA) use had completed the required training, fit-test, and medical evaluation.

In addition, the inspectors walked-down the compressor used for filling SCBA bottles and reviewed records of Grade D air testing for the compressor and service air systems. The ability to fill and transport bottles to the control room during an emergency was assessed by the inspectors.

Self-Contained Breathing Apparatus for Emergency Use The inspectors reviewed the status and surveillance records of SCBAs staged for in-plant use during emergencies through review of records and walk-down of SCBA staged in the control room, technical support center, and operations support center. The walk-down verified the appropriate number of SCBA kits were staged as specified by the emergency plan, appropriate mask sizes and types available for use, and, through interviews, that users were knowledgeable of storage locations of SCBA, spare masks, and vision correction, as well as how to don and use the equipment. Selected maintenance records for SCBA units and air cylinder hydrostatic testing documentation were reviewed.

Problem Identification and Resolution Licensee CAP documents associated with the control and mitigation of in-plant radioactivity were reviewed and assessed. This included review of selected CRs related to use of respiratory protection devices including SCBA. The inspectors evaluated the licensee's ability to identify, characterize, prioritize, and resolve the identified issues in accordance with procedure PI-AA-200, Corrective Action. The inspectors also evaluated the scope of the licensee's internal audit program and reviewed recent assessment results. Licensee CAP documents reviewed are listed in Section 2RS3 of the Attachment.

Radiation protection activities were evaluated against the requirements UFSAR Section 11; 10 CFR Parts 19 and 20; Regulatory Guide 8.15, Acceptable Programs for Respiratory Protection; and approved licensee procedures. Records reviewed are listed in Section 2RS3 of the Attachment.

b. Findings

No findings 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 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 2009 through the third quarter of 2010. 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 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 ORS Cornerstone from January, to October 2010. For the assessment period, the inspectors reviewed ED alarm logs and selected CRs 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 2RS1 and 4OA1 of the Attachment.

Public Radiation Safety (PS) Cornerstone

The inspectors reviewed the Radiological Effluent Technical Specification/Offsite Dose Calculation Manual Radiological Effluent Occurrences PI results from January, through October 2010. The inspectors reviewed CRs, effluent dose data, and licensee procedural guidance for classifying and reporting PI events. The inspectors also interviewed licensee personnel responsible for collecting and reporting the PI data. Reviewed documents are listed in Section 4OA1 of the Attachment.

b. Findings

No findings 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 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; self-assessment reports, control room status logs, and lists of control room deficiencies. The inspectors' review nominally considered the twelve-month period of January 1, 2010 through December 31, 2010.

b. Findings and Observations

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

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 were identified.

Enclosure

.2 (Closed) TI 2515/179 Verification of Licensee Responses to NRC Requirement for Inventories of Materials Tracked in the National Source Tracking System (NSTS)

The inspectors reviewed the source inventories and identified category 1 and 2 sources that required reporting. The inspectors visually verified the presence of the applicable apparatus and verified presence of the sources by means of a radiation survey through the shielding using a handheld survey meter. The inspectors reviewed the licensees' records of the submittals to the NSTS. This activity was performed concurrently with the performance of IP 71124.01. Since there were no identified compliance issues, TI 2515/179 is deemed to be complete for this licensee.

4OA6 Meetings, Including Exit

Exit Meeting Summary

An interim exit with licensee management and staff was conducted on November 6 and the final exit with licensee management and staff was conducted on November 12, 2010, to discuss the results of the DRS Inservice Inspection. Proprietary information reviewed by the team as part of the routine inspection activities was returned to the licensee in accordance with prescribed controls.

On November 19, 2010, the inspectors discussed results of the onsite radiation protection inspection with Mr. Bischof, Site Vice-President, and other cognizant licensee representatives. The inspectors noted that proprietary information was reviewed during the course of the inspection but would not be included in the documented report.

On January 11, 2011 the inspection results were presented to Mr. Bischof 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.

4OA7 Licensee-Identified Violation

The following finding of very low significance was identified by the licensee and is a violation of NRC requirements which meet the criteria of Section 2.3.2 of the NRC Enforcement Policy, NUREG-1600, for characterization as a Green Non-Cited Violation (NCV).

- 10 CFR 50, Appendix B, Criterion III, Design Control, requires, in part, that design control measures shall provide for verifying or checking the adequacy of designs such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program. Contrary to this, the licensee identified in CR398124 that they failed to verify the adequacy of design changes that implemented a new drainage path through the primary shield wall. The design changes were inadequate because the impact to the sump from Microtherm® insulation known to be installed on the reactor vessel head had not been evaluated or tested. The licensee removed all Microtherm® from the Unit 1 reactor head and plans on removing all Microtherm® from the Unit 2 reactor head

Enclosure

during the outage in Spring 2011. The violation was determined to be of very low safety significance because the licensee was able to show that the debris loading was bounded by testing.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

M. Adams, Director, Station Engineering
G. Bischof, Site Vice President
P. Blasioli, Director Nuclear Protection & Emergency Preparedness
D. Boone, Supervisor Exposure Control
G. Canter, HP Technician (Respiratory Protection Program Manager)
E. Collins, Manager Emergency Preparedness
J. Eggart, Manager, Radiation Protection & Chemistry
B. Garber, Supervisor, Licensing
P. Harris, Supervisor Rad Analysis and Instrumentation
L. Hilbert, Manager Outage and Planning
B. Hilt, Supervisor HP Tech Services
B. Hoffner, Fleet Emergency Preparedness Manager
R. Johnson, Manager, Operations
C. Olsen, Manager, Site Engineering
K. Sloane, Plant Manager (Nuclear)
M. Smith, Manager Nuclear Oversight
B. Stanley, Director, Station Safety and Licensing
N. Turner, Supervisor Emergency Preparedness
M. Wilda, Supervisor, Auxiliary Systems

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened

05000280, 281/2010005-01	AV	Failure to Correct Multiple Conditions Adverse to Fire Protection (Section 1R15)
05000280, 281/2010005-04	AV	Inadequate Risk Evaluation for Leaving Common ESGR HELB Door Open (Section 1R15)

Opened and Closed

05000280/2010005-02	NCV	Failure to Follow Procedure Results in Inadvertent Actuation of Safety Injection (Section 1R22)
05000280/2010005-03	NCV	Heavy Load Lift of the 1B RCP Motor Over Exposed Reactor Fuel (Section 1R20)

Closed

05000280, 281/2515/179	TI	Verification of Licensee Responses to NRC Requirement for Inventories of Materials Tracked in the National Source Tracking System (NSTS) (Section 40A5)
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Attachment

LIST OF DOCUMENTS REVIEWED

Section 1R04: Equipment Alignment

DWG 11448-FM-068A, Unit 1 Feedwater System
DWG 11548-FM-068A, Unit 2 Feedwater System
DWG 11448-FM-084A, Unit 1 Containment Spray System
DWG 11448-FM-084B, Unit 1 Recirculation Spray System
DWG 11448-FM-089A, Unit 1 Safety Injection System
2-OPT-FW-004, Rev. 5; AFW Valve Position Verifications

Section 1R05: Fire Protection

1-FS-FP-200, Rev. 2, Unit 1 High Level Intake Control House Elevation 35FT- 6IN
2-FS-FP-200, Rev. 0, Unit 2 High Level Intake Control House Elevation 35FT- 6IN
0-FS-FP-209, Rev. 1, Intake Vacuum Priming House – Low Level Elevation 37 Feet
0-FS-FP-213, Rev. 0, Intake Structure Transformers – Low Level Elevation 13 Feet
0-FS-FP-211, Rev. 2, Emergency Service Water Pump House - Low Level Elevation 18FT
0-FS-FP-210, Rev. 2, Electrical Equipment Room – Low Level Elevation 12 Feet

Section 1R08: Inservice Inspection Activities

Procedures

Areva Document 54-ISI-400-18, Multi-Frequency Eddy Current Examination of Tubing
Areva Document Examination Technique Specification Sheet, ETSS_BOB001_MIZ80, ETSS_RPC001_MIZ80, ETSS_RPC002_MIZ80, and ETSS_RPC003_MIZ80
Procedure SRY-SGPMS-002, Surry Site Specific Eddy Current Analysis Guidelines, Surry 1R23, November 2010, Revision 16
Areva Document 03-1275284, Field Procedure for Remote Rolled Plugging Utilizing the LAN SAP Box
ER-AP-BAC-10, Rev. 7, Boric Acid Corrosion Program
ER-AA-NDE-PT-300, Rev.5, RHR Integral Attachment and Reinforcing Plate PTs H002-1 AND 1-B08
ER-AA-NDE-UT-703, Rev.1, RHR Vessel Weld UTs 1-A01 AND 1-A02
ER-AA-NDE-UT-700, Rev.0, "C" S/G DM Welds 1005DM and 1-06DM

Corrective Action Documents

CR 332168, Eddy Current Data Has Recorded a Discontinuity Indicative of Cracking in SG-A, Tube R2C63
CR 332172, Eddy Current Data Has Recorded a Discontinuity Indicative of Cracking in SG-A, Tube R9C69
CR 333167, Electronic Permeability Partially Obstructing Eddy Current Exam
CR 364900, EPRI SGMP Interim Guidance Noted Errors in EPRI SG Integrity Assessment
CR 403610, An Indication Indicative Of ODSCC On the Top Of Tube Sheet In Tube R30C21 in SG C
CR 401992, Through wall leak on 1-SI-ICV-3581 flange connection
CR 401994, Boric Acid on 1-RC-TW-J7
CR 402001, Boric Acid on 1-SI-339
CR 402047, New PT indication on 30-01-E-1A-HTEXCH associated with RHR Heat exchanger 1A

Attachment

CR 401824, ISI examination of "A" RHR Heat exchanger LP indications

Other

Surry Nuclear Station Unit 1, Eddy Current Inspection Plan, 1R23, November 2010
 Areva Document 51-9142604-000, Surry Unit 1 – 1R23 ECT Inspection Plan
 Areva Document 51-9146220-000, Surry Unit 1 1R23 EPRI Appendix H/I Eddy Current
 Technique Review Including ETSS
 EPRI Document, Pressurized Water Reactor Steam Generator Examination Guidelines, Rev.7
 Dominion Document ETE-SU-2010-0013, Surry Unit 1 – Fall 2010 Steam Generator
 Degradation Assessment
 Steam Generator Condition Monitoring and Operational Assessment, Surry Unit 1, EOC
 22/REOC 17, April 2009
 Dominion Document ETE-SU-2010-0029, Condition Monitoring and Operational Assessment
 Unit 1 CMOA Fall 2010, Dated November 24, 2010
 Daily Eddy Current Data Analysis Report
 Summary of Non-AVB-Wear Volumetric Degradation
 WO #38102856653, Check Valve replacement to Cold Leg C
 Surry Inservice Inspection Plan For Components and Component Supports, Fourth Inservice
 Inspection Interval, October 14, 2003 – December 13, 2013, Rev. 8, March 2010

Section 1R15: Operability Determination

OP-AA-102, Rev 5; Operability Determination
 0-ECM-0306-02, Rev 0; Motor Control Center Maintenance
 0-ECM-0306-02, Rev 1; Motor Control Center Maintenance
 0-ECM-0306-02, Rev 48; Motor Control Center Maintenance

Section 1R18: Plant Modifications

ET-S-10-0060, Rev. 1; Assembly, Testing, and Installation for 0.22uf and 150 ohm RC filter.
 1-PT-1.1, Rev. 36; Nuclear Instrumentation System Trip Channel Test Prior to Startup
 IMP-C-NI-19, Rev. 15; Nuclear Instrumentation Maintenance
 CAL-048, rev 4, Nuclear Instrument Intermediate Range Drawer
 CAL-050, Rev 5; Nuclear Instrument Comparator and Rate Drawer
 1-IPT-CC-NI-N42, Rev. 1; Nuclear Instrumentation Power Range N-42 Channel Calibration
 0-ECM-1801-01 Rev. 23 OTO1, Westinghouse Type BF-BFD-or-NBFD65NR Relay
 Replacement
 2-PT-8.1, Rev 32 OTO1; Reactor Protection System Logic (For Normal Operations)
 Reactor Protection System DWGs 113E244A sh 3 Rev 15, sh 4 Rev 16, Sh 15 Rev 13, sh 16
 Rev 8, sh 17 Rev 5, sh 18 Rev 25 sh 16 Rev 19.

Section 1R19: Post-Maintenance Testing

0-OP-ZZ-008, Rev. 9; Assessment of Maintenance Activities for Potential Flooding of Turbine
 Building and Associate Areas
 O-MCM-1003-01, Rev. 24; Expansion Joint Removal, Inspection, and Installation
 DWG 11548-FM-071A Rev. 56 Circulating and Service Water System Unit 2
 NIC work orders: 38102803832, 38102805711, 38102803844, 38102805749, 38102803730,
 38102804478, 38102805735, 38102805766, 38102803742, 38102806124, 38102805502,
 38102803648, 38102803551, 38102805517, 38102805469, 38102803662, 38102805556,
 38102803609.

Section 1R20: Outage

1-OP-RX-002, Rev. 24; Shutdown Margin (Calculated At Zero Power)
 1-OP-RX-003, Rev. 24; Shutdown Margin (Refueling and Special Conditions)
 1-OP-RX-004, Rev 22; The Calculation of Estimated Critical Conditions
 1-GOP-1.4, Rev. 44; Unit Startup, HSD to 2% Reactor Power
 1-GOP-1.5, Rev. 55; Unit 1 reactor Startup 2% reactor Power to Max Allowable Power
 1-OP-RX-006, Rev 24; Withdrawal of the Control Banks to Critical Conditions
 1-NPT-RX-008, Rev 23; Startup Physics Testing
 1-OPT-RH-003, Rev 17; RHR System Operability Test
 1-OSP-SW-007, Rev 5 {OTO1}; Service Water Flow Test of Recirculation Spray Heat Exchangers 1-RS-E-1A and 1-RS-E-1D
 1-NPT-RX-014, Rev 15; Hot Rod Drops by Bank

Section 1R22: Surveillance Testing

1-OPT-RS-001, Rev. 20; Containment Outside Recirculation Spray Pumps Flow and Leak Test
 1-OPT-RH-003, Rev. 17; RHR System Operability Test
 1-OPT-ZZ-002, Rev. 30; ESF Actuation with Undervoltage and Degraded Voltage – 1J Bus
 1-OSP-SW-007, Rev 5 {OTO1}; Service Water Flow Test of Recirculation Spray Heat Exchangers 1-RS-E-1A and 1-RS-E-1D
 1-OSP-TM-003, Rev. 11; Functional Check of Turbine Valves Stroke and Limit Switch Operation
 1-OPT-CT-201, Rev. 20; Containment isolation Valve Local Leak Rate Testing, Penetration 57C
 1-OPT-CT-201, Rev. 20; Containment isolation Valve Local Leak Rate Testing, Penetration 92

Section 1EP2: Alert and Notification System Testing**Procedures**

Surry Power Station Site-Specific Offsite Radiological Emergency Preparedness Alert and Notification System Quality Assurance Verification
 0-LSP-EW-001, Early Warning System Polling Functional Test, Rev. 7
 0-LSP-EW-002, Early Warning System Siren Activation Monitoring, Rev. 7

Records and Data

Early Warning System Polling Function Test results from inspection period
 Early Warning System Siren Activation Monitoring Test results from inspection period
 Emergency Warning System Surry, Telecommunications Operability (quarterly) Testing from inspection period

Section 1EP3: Emergency Preparedness Organization Staffing and Augmentation System**Procedures**

DNAP-2605, Emergency Preparedness Performance Indicators, Rev. 10
 EPCP-0010, Nuclear Emergency Preparedness Training Program, Rev. 5
 EPIP-3.05, Augmentation of Emergency Response Organization, Rev. 6

Records and Data

03/18/2009 Augmentation Capability Assessment - ERO

06/29/2009 Augmentation Capability Assessment - ERO
 09/30/2009 Augmentation Capability Assessment - ERO
 12/14/2009 Augmentation Capability Assessment - ERO
 03/31/2010 Augmentation Capability Assessment - ERO

Section 1EP4: Emergency Action Level and Emergency Plan Changes

Procedures

EP-AA-101, 10 CFR 50.54(q) Change Evaluation, Rev. 2
 EPCP-0007, Emergency Preparedness Plan and Procedure Management, Rev. 8
 Surry Power Emergency Plan, Rev. 54

Records and Change Packages

EPIP-4.01, Radiological Assessment Director Controlling Procedure, Rev. 24
 EPIP-4.03, Dose Assessment Team Controlling Procedure, Rev. 14
 EPIP-4.04, Emergency Personnel Radiation Exposure, Rev. 9
 EPIP-4.07, Protective Measures, Rev. 13
 EPIP-4.21, Evacuation and Remote Assembly Area Monitoring, Rev. 11

Section 1EP5: Correction of Emergency Preparedness Weaknesses

Procedures

PI-AA-200, Corrective Action, Rev. 14
 03/18/2009 Self Assessment

Audits and Self-Assessments

SAR000848, Emergency Response Facilities and Equipment, 08/27/09
 10-21-S, Surry May 5th Functional Emergency Exercise SMAY10FE
 09-03, Emergency Preparedness, 03/10/09
 10-02, Emergency Preparedness, 04/22/10

Condition Reports (CRs)

RCE001000 – Errors in Emergency Classifications, Notifications and Protective Action

Recommendations

CR 383089, Two individuals on Ops Qual listing for NRC Quals were not included on ERO list
 CR 319755, Declining ERO performance
 CR 112183, Augmentation initiation error
 CR 382661, ERO qualification list discrepancy
 CR 381918, ERO qualification list not updated
 CR 343823, Confusion about TSC accountability card reader light response
 CR 343852, RCS sample issues during ERO graded exercise
 CR 343921, Operations shift is not meeting expectations for EP exercise critique
 CR 344002, Evaluate the process of tracking total dose
 CR 343730, Time critical operation during biennial exercise delayed
 CR 344050, Confusion of Rad Protection coverage requirements
 CA 144818, No more than 5 minute delay of EOP actions
 CR 344051, Process for assessing cross-cutting drill/exercise issues is not formalized
 CR 350408, Vender made changes to emergency notification protocol without coordination

CR 352266, Surry EP Group Pagers inadvertently activated
 CR 352626, ACE 017640 determined an additional PAR opportunity exceeded 15 minutes
 CR 353980, Replacement of ANS engineering design document
 CR 366945, Audit 10-02 EP program inconsistency for demo and evaluation of station evacuation
 CR 370649, ERO staffing shortfall interim compensatory measures
 CR 370898, Compensatory Actions ERF minimum staffing augmentation reduced ERO PI
 CR 372760, Dose assessment team performance gaps
 CR 378124, Potential applicability of Beaver Valley EP-dose assessment finding to Surry
 CR 381021, Expectations for ACA drill ERO performance/response are not being met
 CR 386233, ERO Augmentation capabilities for minimum ERO staffing low margin

Section 2RS1: Radiological Hazard Assessment and Exposure Controls

Procedures, Guidance Documents, and Manuals

C-HP-1041.011, Evaluating and Tracking Intakes of Radioactive Material
 C-HP 1041.020, DAC-Hour Determination Based on Bioassay Results
 C-HP 1041.021, Radionuclide Intake Determination Based on Bioassay Results
 C-HP 1041.022, Internal Dose Calculation Based on DAC-Hour Exposure
 C-HP-1091.275, Restricted And Controlled Area Doses: Surveillance And Evaluation, Rev.9
 C-HP-1091.281, Radiation Work Permit Program: Surveillance and Evaluation, Rev. 8
 C-HP-1031.011, Exposure Control Records and Reports, Rev.7
 C-HP-1091.271, Radioactive Material Control Program: Surveillance and Evaluation, Rev. 5
 HP-1031.335, Siemens Telemetric Area Monitoring System: Operation and Maintenance, Rev. 0
 HP-1071.021, Storing Radioactive Material outside the Protected Area, Rev.10
 0-HPT-ISFSI-001, Independent Spent Fuel Storage Installation (ISFSI) Quarterly Radiological Surveillance, Rev.12
 0-HSP-LHRA DOOR-001, LHRA/VHRA Barrier Doors and Locks Inspection, Rev.1
 0-HSP-RM-002, Monitoring Normally Non-Radioactive Systems for Radioactive Contamination, Rev.9
 0-HSP-NM-001, Physical Inventory of SNM Calibration Sources, Rev.8
 0-HPT-TRKSOURCE-001 Inventory of Nationally Tracked Sources by Health Physics, Rev.3
 0-HPT-LKTEST-001, Health Physics Source Leak Test, Rev.5

Records and Data

SPS Calibration Certificates for SAM-11 SN147 and SN149, 8/24/2010

Corrective Action Program (CAP) Documents

CR352730, Dose Rate Alarm Received While Working In the Aux. Bldg. Basement
 CR352873, Increase of Dose Rate On 1-CH-FL-2
 CR352879, Dose Rate Increase near Unit 2 Letdown Line In AB Basement
 CR356286, Dosimeter Alarmed Due To Malfunction
 CR357094, U-2 "C" RCP Cubicle Gate Lock Not Properly Locking- Latch Failing
 CR357801, Identified Potential Access Way into A Locked High Rad By Climbing Pipe
 CR358555, Primary Resin Dewatering Activity Created High Radiation Areas In Auxiliary Building.
 CR358998, High Dose Rate Irradiated Material from Unit 2 Flux Thimble Cut-Up.

CR389566, Worker Attempted To Enter The RCA And Was Denied Access By HIS-20 –Worker Was Issued The Wrong TLD# Resulting In Him Being Blocked Out By HIS-20.
 CR401881, Induction Heating System Caused Multiple Dose And Dose Rate Alarms In Digital Alarming Dosimeters History That Were Not Apparent To Workers Nor Personnel Monitoring Telemetry. Work Around Is To Use Self Reading Dosimeters And Continuous RP Coverage.

Section 2RS2: ALARA

Procedures, Guidance Documents, and Manuals

HP-1031.123, Effective Dose Equivalent (EDE) For Use of Protective Vest in Uniform Radiation Field, Rev. 0
 HP-1032.100, Elemental Cobalt Sampling, Rev.2
 HP-1032.110, Standard Radiation Monitoring & Dose Rate Trending, Rev.0
 HP-1032.120, Radiation Hot Spot Program Survey Criteria and Scheduling, Rev. 1
 RP-AA-103-1000, Station ALARA Committee, Rev.0
 RP-AA-103, ALARA Program. Rev.0

Records and Data

Surry Power Station Unit 1 Refueling Outage Report April 19, 2009, to May 10, 2009
 Surry Power Station Unit 2 Refueling Outage Report November 1, 2009, through November 30, 2009
 Spreadsheet: 2010 Dose Rate Trending Data
 Spreadsheet: 2010 Hotspot Master List Action Plans
 Spreadsheet: 2010 ALARA Incentive Award Data
 Surry power station 2010 mid-cycle report February 2010
 ALARA Plan (AP) 10 -006 Unit 1 Refueling Outage RP Support
 AP 10-008 Unit 1 Refueling Outage General Maintenance
 AP 10-009 Unit 1 Refueling Outage AOV Maintenance
 AP 10-011 Unit 1 Refueling Outage Fuel Movement Activities And Tri- Nuke Operations
 AP 10-013 Unit 1 Refueling Outage Steam Generator Feeding Replacement
 AP 10-019 SI Check Valve -Open, Inspect And Repair
 AP 10-021 Unit 1 Refueling Outage Reactor Disassembly/Reassembly
 AP 10-022 Unit 1 Refueling Outage BACC Inspection And Maintenance Activities
 AP 10-023 Unit 1 Refueling Outage Scaffold Support
 AP 10-024 Unit 1 Refueling Outage Insulation Support
 AP 10-025 Unit 1 Refueling Outage Gamma Metrics and Source Range Detector Change Out
 AP 10-026 Unit 1 Refueling Outage Decon Support
 AP 10-028 Unit 1 Refueling Outage Excess Letdown Heat Changer Maintenance (1-CH-E-4)
 AP 10-029 MICRO-THERM Insulation Removal
 Surry Station ALARA Committee Meeting Minutes 2/11/2010, 3/9/2010, 4/13/2010, 5/4/2010, 5/11/2010, 5/27/2010, 10/5/2010, 10/19/2010
 RWP 09 -2 -3104, Unit 2 Refueling Outage: General Maintenance
 RWP 09 -2 -3105 Unit 2 Refueling Outage Valve Maintenance
 RWP 09 -2 -3111 Unit 2 Refueling Outage Steam Generator Primary Side Maintenance
 RWP 09 -2 -3116 Unit 2 Refueling Outage SI Check Valve Inspection, Repair, Cut Out, and replacement
 RWP 10 -1 -2104, Unit 1 Refueling Outage General Maintenance Activities

RWP 10 -1 -2122 Unit 1 Refueling Outage Routine Scaffold Sport
 RWP 10 -1 -2110 Unit 1 Refueling Outage Steam Generator Feeding Replacement
 RWP 10 -1 -2116 Unit 1 Refueling Outage Safety Injection Check Valves: Open, Inspect and Repair
 RWP 10 -1- 2111 Unit 1 Refueling Outage Primary Steam Generator
 RWP 10 -1 -2122 Unit 1 Refueling Outage Scaffold Support
 RWP 10 -1 -2102 Unit 1 Refueling Outage Radiation Protection Support

Corrective Action Program (CAP)

CR358573, Two Scaffolds Rebuilt on the RHR Flats
 CR360250, Station Exposure Exceeded Projections
 CR365037, Hot Spot Removal
 CR365098, 2009, Unit 2 RFO Radiation Exposure-CR Submitted to Create Apparent Cause Evaluation Assignment to RP.
 CR372306, Perform Hot Spot Flush - DA Piping in LW Filter Room

2RS3: In-Plant Airborne Radioactivity Control and Mitigation

Procedures, Guidance Documents, and Manuals

C-HP-1031.011, Exposure Control Records and Reports, Rev. 7
 C-HP-1032.051, Airborne Radioactivity Counting and Analysis, Rev. 1
 C-HP-1033.610, Eberline AMS-4, Calibration and Operation, Rev. 5
 C-HP-1033.620, Portable Air Samplers, Calibration and Operation, Rev. 8
 C-HP-1033.640, Portable Sampling Pumps, Calibration and Operation, Rev. 5
 C-HP-1041.011, Evaluating and Tracking Intake of Radioactive Material, Rev. 5
 C-HP-1041.020, DAC-Hour Determination Based on Bioassay Results, Rev. 4
 C-HP-1041.021, Radionuclide Intake Determination Based on Bioassay Results, Rev. 7
 C-HP-1041.022, Internal Dose Calculation Based DAC-Hour Exposure, Rev. 6
 C-HP-1041.023, Internal Dose Calculation Based on Radionuclide Intake, Rev. 9
 C-HP-1042.011, Respirator User Qualification, Rev. 2
 C-HP-1042.122, Quantitative Fit Testing: Portacount Plus Fit Testing System, Rev. 10
 C-HP-1042.151, Respirator Issue, Rev. 1
 C-HP-1042.210, Respiratory Hazards Evaluation and Respiratory Protection Selection, Rev. 3
 C-HP-1042.220, Airborne Radioactive Material Exposure Authorization, Rev. 4
 C-HP-1042.230, Airborne Radioactivity Exposure Tracking, Rev. 4
 C-HP-1042.310, Full Facepiece Air-Purifying Respirator Use, Rev. 2
 C-HP-1042.321, Powered Air-Purifying Respirator Hood Use, Rev. 1
 C-HP-1042.350, Self Contained Breathing Apparatus Use, Rev. 4
 C-HP-1042.410, Full Facepiece Respirator Maintenance, Rev. 3
 C-HP-1042.420, Powered Air-Purifying Respirator Maintenance, Rev. 1
 C-HP-1042.450, Self-Contained Breathing Apparatus Maintenance, Rev. 14
 C-HP-1042.510, Atmosphere-Supplying Respiratory Equipment Performance Verification, Rev.7
 C-HP-1042.520, Respiratory Protection Program Equipment Criteria and Verification, Rev. 5
 C-HP-1061.321, Portable Ventilation Systems: Use and Control, Rev. 4
 C-HP-1061.322, Use of Vacuum Cleaners in the RCA, Rev. 6
 C-HP-1061.530, Carbon Dioxide Cleaning System Operation, Rev.4
 C-HP-1091.242, Radiological Respiratory Protection Program: Surveillance and Evaluation, Rev. 5

HP-1033.348, Canberra iSolo: Calibration, Rev. 0
 HP-1033.661, RADECO Air Sampler Model H-809C: Calibration and Operation, Rev. 1
 HP-1033.662, Calibration and Operation of HI-Q Air Sampler Models, Rev. 2
 HP-1041.055, Whole Body Counter: Whole Body Counting Individuals, Rev. 5
 HP-1042.525, Use of the Posicheck 3 Computerized Performance Tester to Verify Performance of Respiratory Protection Equipment, Rev.1
 HP-1042.610, DEL-MOX Air Purification System Operation and Maintenance, Rev. 6
 RP-AA-161, Qualitative Fit Testing for Industrial Face Masks/Dust Masks/N95 Masks using 3-M Qualitative Testing, Rev. 0
 RP-AA-202, Radiological Posting, Rev. 4
 RP-AA-224, Airborne Radioactivity Surveys, Rev. 0
 RP-AA-226, Alpha Monitoring, Rev. 0
 RP-AA-230, Personnel Contamination Monitoring and Decontamination, Rev. 3
 RP-AA-104, Internal Radiation Exposure Monitoring Program, Rev. 0
 RP-AA-106, Radiological Work Control Program, Rev. 1
 RP-AA-109, Radiological Survey Program, Rev. 0
 RP-AA-110, Radiological Respiratory Protection Program, Rev. 0
 RP-AA-265, Failed Fuel Action Plan, Rev. 0
 HPAP-2109, Radiological Protection Program and Procedure Technical Bases Documents, Rev. 1
 HPAP-2113, Bioassay Program: Technical Bases, Rev. 5
 HPAP-2114, Radiological Respiratory Protection Program: Technical Bases, Rev. 2
 Vendor Document - MAXAIR System Hood, Part # 2000-25DM (Assy. # 01031118)
 Vendor Document - MAXAIR Systems Instruction Manual, Li-Ion Powered Systems 2065-03, 2066-03, 2025-03, 2026-03 Helmets

Records and Data

C-HP-1032.051, Attachment 1, Air Sample Count Room Log: Results for the following Air Sample ID Numbers (YY-RWP#-MMDD-HHMM); 10-2104-3-1029-0030, 10-2116-2-1107-1520, 10-2116-2-1108-1535, 10-2116-2-1108-1550, 10-2116-2-1106-1245, 10-2116-2-1113-0920, 10-2116-2-1113-1010
 Gamma Spectroscopy Analysis: Results for Sample ID Numbers; 101106026, 101108056, 101107044, 101108055, 101113024, 101113025
 HP-1033.248, Attachment 2, iSolo Radiological Air Sample Counting Data: Results for Sample ID Numbers; 101106026, 101108056, 101107044, 101108055, 101113024, 101113025

Corrective Action Program

CR355172, Worker Alarmed PM7 at Security Exit Point.
 CR403613, Worker Received Radionuclide Intake Above 1 Whole Body Count Action Level
 CR403746, Worker Received Radionuclide Intake Just Below 1 Whole Body Count Action Level

Section 40A1: Performance Indicator Verification

Procedures, Guidance Documents and Manuals

NEI 99-06, Regulatory Assessment Performance Indicator Guideline, Rev. 6
 RP-AA-112, Radiation Safety Performance Indicator Reporting, Rev. 4
 ER-AA-SPI-1001, Rev. 1, Implementation of the Consolidated Data Entry Reporting for Mitigating System Performance Index

Corrective Action Program

CR358353, Insulator Received Dose Rate Alarm While Working In Unit 2 Containment.

CR401150, A Dose Rate Alarm Was Received.

CR357072, Gaseous Effluent and Airborne Tritium Results Incorrect Because of Perkin Elmer Tri-Card 3100TR Setup Incorrectly

CR378595, Environmental Charcoal Cartridge Collection Efficiency Incorrect

Section 40A7: Licensee-Identified Violation

Memorandum of Understanding Maintenance Work Schedules Surry Power Station

Amendment to Surry Power Station Emergency Plan, December 31, 1980

Letter to Mr. H. Denton, Director NRR, contains revised version of Surry Power Station Emergency Plan, June 30, 1980

Tabulation of hours worked for mechanical and electrical maintenance personnel September 7, 2009 – January 1, 2010

LIST OF ACRONYMS

ADAMS	Agencywide Document Access and Management System
ALARA	As Low As Reasonably Achievable
ANS	Alert and Notification System Testing
CA	Corrective Action
CAP	Corrective Action Program
CFR	Code of Federal Regulations
CR	Condition Report
DEP	Emergency Response Organization Drill/Exercise Performance
DOT	Department of Transportation
EAL	Emergency Action Level
EDG	Emergency Diesel Generator
ERO	Emergency Response Organization
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
PARS	Publicly Available Records
PCP	Process Control Program
PI	Performance Indicator
PS	Planning Standard
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