



**UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II**

245 PEACHTREE CENTER AVENUE NE, SUITE 1200
ATLANTA, GEORGIA 30303-1257

February 1, 2017

Mr. Daniel G. Stoddard
Senior Vice President and Chief Nuclear Officer
Innsbrook Technical Center
5000 Dominion Boulevard
Glen Allen, VA 23060-6711

SUBJECT: SURRY POWER STATION – NRC INTEGRATED INSPECTION REPORT
05000280/2016004 AND 05000281/2016004

Dear Mr. Stoddard:

On December 31, 2016, the United States Nuclear Regulatory Commission (NRC) completed an inspection at your Surry Power Station, Units 1 and 2. On January 18, 2017, the NRC inspectors discussed the results of this inspection with Mr. R. Simmons and other members of your staff. The results of this inspection are documented in the enclosed report.

NRC inspectors documented two findings of very low safety significance (Green) in this report. One of these findings involved a violation of NRC requirements. The NRC is treating this violation as a non-cited violation (NCV) consistent with Section 2.3.2.a of the Enforcement Policy.

If you contest the violation or significance of the 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.

If you disagree with a cross-cutting aspect assignment 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 Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Surry Power Station.

D. Stoddard

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This letter, its enclosure and your response (if any) will be made available for public inspection and copying at <http://www.nrc.gov/reading-rm/adams.html> and at the NRC Public Document Room in accordance with 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

/RA/

Anthony D. Masters, Chief
Reactor Projects Branch 5
Division of Reactor Projects

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

Enclosure:
IR 05000280/2016004, 05000281/2016004
w/Attachment: Supplemental Information

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D. Stoddard

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D. Stoddard

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Letter to Daniel G. Stoddard from Anthony D. Masters dated February 1, 2017

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05000280/2016004 AND 05000281/2016004

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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: 05000280/2016004, 05000281/2016004

Licensee: Virginia Electric and Power Company (VEPCO)

Facility: Surry Power Station, Units 1 and 2

Location: Surry, VA 23883

Dates: October 1, 2016 through December 31, 2016

Inspectors: P. McKenna, Senior Resident Inspector
C. Jones, Resident Inspector
B. Bishop, Project Engineer (1R04, 1R05)
S. Ninh, Senior Project Engineer (1R04, 1R19)
B. Collins, Reactor Inspector (1R08)
R. Kellner, Senior Health Physicist (2RS3, 2RS4, 2RS5)
J. Panfel, Health Physicist (2RS1, 4OA1)
W. Pursley, Health Physicist (2RS2, 4OA1)
A. Sengupta, Reactor Inspector (1R08)
T. Steadham, Senior Construction Inspector (1R04)
D. Lanyi, Senior Operations Engineer (1R11)

Approved by: Anthony D. Masters, Chief
Reactor Projects Branch 5
Division of Reactor Projects

Enclosure

SUMMARY

IR 05000280/2016004, 05000281/2016004; 10/01/2016-12/31/2016; Surry Power Station Units 1 and 2: Maintenance Effectiveness and Follow-up of Events and Notices of Enforcement Discretion.

The report covered a three-month period of inspection by resident inspectors and region-based inspectors. One self-revealing non-cited violation (NCV) of very low safety significance and one self-revealing finding of very low safety significance were identified. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP), dated April 29, 2015. The cross-cutting aspects were determined using IMC 0310, "Components Within The Cross-Cutting Areas" dated December 4, 2014. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy, dated February 4, 2015. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 6.

Cornerstone: Mitigating Systems

- Green. A self-revealing NCV of 10 CFR 50, Appendix B, Criterion XVI was identified because the surveillance procedure frequency used to flush the service water (SW) piping in Mechanical Equipment Room (MER)-3 and MER-4 was changed from two weeks to four weeks without sufficiently considering the effects of river conditions on biological growth and without getting management permission to change the periodicity. As a result of the periodicity change, the "B" charging (CH) and main control room (MCR) SW header became blocked with biological growth and was declared inoperable on September 22, 2016, during the performance of O-OSP-VS-012, "High Flow Flush of SW Strainers and Piping in MER 3 and MER 4." As immediate corrective action, the licensee cleaned the clogged SW strainer and completed the backflushing of the SW header. The SW flushing periodicity was restored to a two week frequency to be seasonally and risk assessed and reduced as heavy fouling season ends. This issue was documented in the licensee's corrective action program (CAP) as CR 1048251.

The inspectors reviewed Inspection Manual Chapter (IMC) 0612, Appendix B, "Issue Screening," dated September 7, 2012, and determined the performance deficiency (PD) was more than minor because it was associated with the equipment performance attribute of the Mitigating Systems Cornerstone, and it adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using IMC 0609.04, "Initial Characterization of Findings," Table 2, dated June 19, 2012, the finding was determined to affect the Mitigating Systems Cornerstone. The inspectors screened the finding using IMC 0609, Appendix A, "Significance Determination Process (SDP) for Findings at-Power," dated June 19, 2012, and determined that it screened as Green because the deficiency did not affect the design or qualification of the charging pump service water pump system and it did not represent a loss of system safety function. This finding has a cross-cutting aspect in conservative bias aspect of the human performance area, H.14, because the licensee did not use decision making-practices that emphasize prudent choices over those that are simply allowed. (Section 1R12)

- Green. A self-revealing finding was identified because the test requirements section of the station service transformer (SST) design change (DC) was not comprehensive in

that it did not test that the isolated phase bus ducting terminal boxes were constructed to prevent water intrusion into the boxes. This was discovered during a significant rainfall event partially caused by Hurricane Matthew, which filled up the "A" SST terminal box with water and eventually shorted the "A" phase of the main generator causing a Unit 2 main generator, main turbine, and subsequent reactor trip on October 9, 2016. As corrective action, sealant was applied to the SST terminal boxes on all seams and bolt holes; and weep holes with drain assemblies were installed on each box. This issue was documented in the licensee's CAP as CR 1049987.

The inspectors reviewed Inspection Manual Chapter (IMC) 0612, Appendix B, "Issue Screening," dated September 7, 2012, and determined the PD was more than minor because it was associated with the design control attribute of the Initiating Events Cornerstone, and it adversely affected the cornerstone objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Using IMC 0609.04, "Initial Characterization of Findings," Table 2, dated October 7, 2016, the finding was determined to affect the Initiating Events Cornerstone. The inspectors screened the finding using Manual Chapter 0609, Appendix A, "SDP for Findings at-Power," dated June 19, 2012, and determined that it screened as Green because although the deficiency did cause a reactor trip, it did not cause a loss of mitigation equipment relied upon to transition the plant from the onset of the trip to a stable shutdown condition. This finding has a cross-cutting aspect in the Operating Experience aspect of the Problem Identification and Resolution area, P.5, because the licensee did not evaluate and implement relevant external operating experience. (Section 4OA3)

REPORT DETAILS

Summary of Plant Status

Unit 1 operated at or near rated thermal power (RTP) from the beginning of the inspection period until October 22, 2016, when it was shutdown to begin a planned refueling outage (RFO). It remained offline until November 11, 2016, when the main turbine was synchronized to the grid. On November 13, the unit reached RTP and operated there until December 15, when RTP was reduced to 60% for a seal failure on the "A" main feed pump (MFP). On December 18, the unit was returned to RTP after the repair of the "A" MFP and operated there for the remainder of the inspection period.

Unit 2 operated at or near RTP from the beginning of the inspection period until October 9, 2016, when the reactor plant tripped initiated by a turbine trip by main generator trip due to water intrusion into the "A" station service transformer (SST). It remained offline until October 13, when the main turbine was synchronized to the grid. On October 13, the unit reached RTP and operated there for the remainder of the inspection period.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection

.1 Readiness for Impending Adverse Weather Conditions

a. Inspection Scope

The inspectors performed a site specific weather related inspection due to anticipated adverse weather conditions, specifically preparations for Hurricane Matthew. The inspectors reviewed the licensee's preparations for potential severe weather as well as severe weather procedure 0-OP-ZZ-021, "Severe Weather Preparation," Revision 16. The inspectors walked down site areas which included the emergency diesel generators, emergency switchgear rooms, emergency service water pump house, and the turbine, safeguards, and auxiliary buildings. During the walkdown, the inspectors looked for loose items and/or debris that could become a missile hazard during high winds, verified flooding barriers were available and/or in place, and verified that the emergency equipment was available and in the required standby mode. Documents reviewed are listed in the Attachment.

b. Findings

.2 Seasonal Readiness Reviews for Cold Weather

a. Inspection Scope

The inspectors reviewed the licensee's preparations for seasonal cold weather. Inspection focused on verification of design features and implementation of the licensee's procedure for cold weather conditions, 0-OSP-ZZ-001, "Cold Weather Preparation," Revision 20. The inspectors walked down key structures including the turbine and auxiliary buildings, safeguards buildings, the emergency switchgear rooms,

and emergency battery rooms and verified heating, ventilation and cooling (HVAC) systems were operating properly and that area temperatures remained within design requirements specified in the Updated Final Safety Analysis Report (UFSAR). The mitigating systems reviewed during this inspection include: the auxiliary feedwater systems, the refueling water storage tanks, emergency diesel generators and emergency switchgear. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified

1R04 Equipment Alignment

.1 Partial Walkdown

a. Inspection Scope

The inspectors conducted four equipment alignment partial walkdowns to evaluate the operability of selected redundant trains or backup systems, listed below, with the other train or system inoperable or out of service. The inspectors reviewed the functional systems descriptions, system operating procedures, and Technical Specifications (TS) to determine correct system lineups for the current plant conditions. The inspectors performed walkdowns of the systems to verify that critical components were properly aligned and to identify any discrepancies which could affect operability of the redundant train or backup system. Documents reviewed are listed in the Attachment.

- Unit 1 Turbine Driven Auxiliary Feedwater (AFW) pump after preventative maintenance was performed during the Unit 1 refueling outage (RFO).
- Unit 1 "B" Motor Driven AFW pump after its monthly performance test was performed.
- #3 Emergency Diesel Generator (EDG) while the alternate AC (AAC) diesel generator was out of service for maintenance.
- #3 EDG while #2 EDG was out of service for corrective maintenance.

b. Findings

No findings were identified.

.2 Complete Walkdown

a. Inspection Scope

The inspectors performed two detailed walkdowns and inspections to verify systems were properly aligned and capable of performing their safety functions, and to assess their material condition. During the walkdown, the inspectors verified breaker positions were in the proper alignment, component labeling was accurate, hangers and supports were functional, and local indications were accurate. Recent testing history was also reviewed to verify that standby components were performing within their design. The plant health report, system drawings, condition reports, the UFSAR, and TSs were reviewed and outstanding deficiencies were verified to be properly classified and not

affect system operability and capability to perform its safety function. The inspectors reviewed the corrective action program to verify equipment alignment issues were being identified and resolved. Documents reviewed are listed in the Attachment.

- Unit 2 Containment Spray
- Unit 1 Low Head Safety Injection

b. Findings

No findings were identified.

1R05 Fire Protection

.1 Quarterly Fire Protection Reviews

a. Inspection Scope

The inspectors conducted tours of the five areas listed below that are important to reactor safety to verify the licensee's implementation of fire protection requirements as described in fleet procedures CM-AA-FPA-100, "Fire Protection/Appendix R (Fire Safe Shutdown) Program," Revision 11, CM-AA-FPA-101, "Control of Combustible and Flammable Materials," Revision 8, and CM-AA-FPA-102, "Fire Protection and Fire Safe Shutdown Review and Preparation Process and Design Change Process," Revision 7. 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. Documents reviewed are listed in the Attachment.

- Mechanical Equipment Room (MER) 3 and MER 4
- MER 5
- Unit 1 Containment
- Unit 1 Safeguards and Valve Pit
- Unit 2 Safeguards and Valve Pit

b. Findings

No findings were identified.

1R06 Flood Protection Measures

a. Inspection Scope

The inspectors reviewed the internal flood protection measures and procedural controls established to address potential flooding in the Unit 1 and 2 turbine buildings and the emergency switchgear rooms while the Unit 1 "B" circulating water header was drained

and out of service for inspection, repair, and coating. The isolation boundary for this work including placing a stop log in the “B” high level intake structure. The inspectors conducted a walk down of the affected areas to observe and assess the condition of the installed flood dikes, floor drain backflow preventers, the sealing of holes and penetrations between flood areas, the adequacy of water tight doors, the operability of flooding alarms, the installed sump pumps, and the “B” high level intake structure stop log. Additionally, the inspectors verified that the required compensatory actions required as part of the maintenance were being accomplished by the licensee. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

1R08 Inservice Inspection Activities

a. Inspection Scope

Non-Destructive Examination Activities and Welding Activities

From October 24 to 28, 2016, the inspectors conducted an onsite review of the implementation of the licensee's inservice inspection (ISI) program for monitoring degradation of the reactor coolant system boundary, risk-significant piping and component boundaries, and containment boundaries in Unit 1.

The inspectors either directly observed or reviewed the following non-destructive examinations (NDEs) mandated by the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code of Record: 2004 Edition, no Addenda) to evaluate compliance with the ASME Code, Section XI and Section V requirements and, if any indications or defects were detected, to evaluate if they were dispositioned in accordance with the ASME Code or an NRC-approved alternative requirement. The inspectors also reviewed the qualifications of the NDE technicians performing the examinations to determine whether they were current and in compliance with the ASME Code requirements. Documents and records reviewed are listed in the Attachment.

- Ultrasonic Testing (UT), SG-A Girth Weld, Class 2 (observed and reviewed)
- UT, Flow Accelerated Corrosion, Steam Condenser System, Component Line 1-SD-PSF2-888 (observed and reviewed)
- Penetrant Testing (PT), 12 Inch Welded Attachments, Class 1 (observed and reviewed)
- Magnetic Testing (MT), Pressurizer Integral Attachment B-K/B10.10, Class 1 (reviewed)
- Radiography Testing (RT), 01-RC-PCV-1455A Pressurizer Spray Valve to 4"-RC-14-1502 Line, Class 1 (reviewed)
- Visual Testing (VT-3), A Accumulator Discharge Line to A RCS CL, Class 1 (reviewed)
- Bare Metal Visual (VE), N-729-1, Reactor Pressure Vessel Head Examination (reviewed)
- Visual Examination (VT-3) of Containment Liner/Concrete Floor Interfaces (IWE) (reviewed)

- Visual Examination (VT-3) of Concrete Containment (IWL) (reviewed)

The inspectors either directly observed or reviewed the following welding activities, qualification records, and associated documents in order to evaluate compliance with procedures and the ASME Code, Section XI and Section IX requirements. Specifically, the inspectors reviewed the work order, repair and replacement plan, weld data sheets, welding procedures, procedure qualification records, welder performance qualification records, and NDE reports.

- 1-RC-139, Pressurizer Spray Valve to ¾-RC-67-1502 Line, Class 1 (reviewed)
- 1-RC-PCV-1455A, Pressurizer Spray Valve to 4"-RC-14-1502 line, Class 1 (reviewed)

During non-destructive surface and volumetric examinations performed since the previous refueling outage, the licensee did not identify any relevant indications that were analytically evaluated and accepted for continued service; therefore, no NRC review was completed for this inspection procedure attribute.

PWR Vessel Upper Head Penetration Inspection Activities

The inspectors reviewed portions of the bare metal visual examination of the reactor vessel upper head penetrations and reviewed NDE reports for penetration numbers 1, 16, 19, 35, 36, 39, 48, 51, and 55 to determine if the examinations were performed in accordance with the requirements of ASME Code Case N-729-1 and 10 CFR 50.55a(g)(6)(ii)(D). Additionally, the inspectors reviewed the vendor inspection report to determine if the required examination coverage was achieved and if limitations were recorded in accordance with the licensee procedures.

The licensee did not identify any relevant indications that were accepted for continued service. Additionally, the licensee did not perform any welding repairs to the vessel head penetrations since the beginning of the last Unit 1 refueling outage; therefore, no NRC review was completed for these inspection procedure attributes.

Boric Acid Corrosion Control Inspection Activities

The inspectors reviewed the licensee's boric acid corrosion control (BACC) program activities to determine if the activities were implemented in accordance with the commitments made in response to NRC Generic Letter 88-05, "Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary Components in PWR Plants," and applicable industry guidance documents. Specifically, the inspectors performed an onsite records review of procedures and the results of the licensee's containment walkdown inspections performed during the current refueling outage. The inspectors also interviewed the BACC program owner, conducted an independent walkdown 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 the following engineering evaluations, completed for evidence of boric acid leakage, to determine if the licensee properly applied applicable corrosion rates to the affected components; and properly assessed the effects of corrosion

induced wastage on structural or pressure boundary integrity in accordance with the licensee procedures.

- CR1002170, Boric Acid Seal Leak in 1-RH-P-1A RHR Pump
- CR1028531, Packing Leak
- CR1019445, Packing Leak (Diaphragm) BRT Recirculation
- CR1016028, 1-RH-E-2A Seal Cooler Boric Acid Leak
- CR1015853, 1-CH-RV-1209, Boric Acid Leak

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

- CR1013992, Possible Boric Acid Weld Leak from 1-CH-361
- CR1014013, Active Boric Acid Leak from Pipe Cap on 1-CH-436
- CR1001868, Boric Acid on Pipe Cap Downstream of 1-RH-44

Steam Generator Tube Inspection Activities

The inspectors verified that for the Unit 1 “A” and “C” steam generator tubes, no inspection activities were required this refueling outage, in accordance with the requirements of the ASME Code, the licensee’s Technical Specifications, and Nuclear Energy Institute 97-06, “Steam Generator Program Guidelines.”

The inspectors reviewed the eddy current (EC) examination activities performed in Unit 1 “B” steam generator during this current refueling outage to verify compliance with the licensee’s Technical Specifications, ASME BPVC Section XI, and Nuclear Energy Institute 97-06, “Steam Generator Program Guidelines.”

The inspectors reviewed the scope of the EC examinations, and the implementation of scope expansion criteria, to verify these were consistent with the Electric Power Research Institute (EPRI) Pressurized Water Reactor Steam Generator Examination Guidelines, Revision 7. The inspectors reviewed documentation for a sample of EC data analysts, probes, and testers to verify that personnel and equipment were qualified to detect the applicable degradation mechanisms in accordance with the EPRI Examination Guidelines. This review included a sample of site-specific Examination Technique Specification Sheets (ETSSs) to verify that their qualification and site-specific implementation were consistent with Appendix H or I of the EPRI Examination Guidelines. The inspectors also reviewed a sample of EC data for steam generator tubes B-R22C14, B-R-28C28, B-R23C22, B-R8C45 and B-R18C22, with a qualified data analyst, to confirm that data analysis and equipment configuration were performed in accordance with the applicable ETSSs and site-specific analysis guidelines. The inspectors verified that recordable indications were detected and sized in accordance with vendor procedures.

The inspectors selected a sample of degradation mechanisms from the Unit 1 “Degradation Assessment” report and verified that their respective in-situ pressure testing criteria were determined in accordance with the EPRI Steam Generator Integrity Assessment Guidelines, Revision 3. Additionally, the inspectors reviewed EC indication

reports to determine whether tubes with relevant indications were appropriately screened for in-situ pressure testing. The inspectors also compared the latest EC examination results with the last "Condition Monitoring and Operational Assessment" report for the Unit 1 "B" steam generator to assess the licensee's prediction capability for maximum tube degradation and number of tubes with indications. The inspectors verified that the licensee's evaluation was conservative and that current examination results were bound by the operational assessment projections.

The inspectors assessed the latest EC examination results to verify that new degradation mechanisms, if any, were identified and evaluated before plant startup. The review of EC examination results included the disposition of potential loose part indications on the steam generator secondary side to verify that corrective actions for evaluating and retrieving loose parts were consistent with the EPRI Guidelines. The inspectors also reviewed a sample of primary-to-secondary leakage data for Unit 1 to confirm that operational leakage in each steam generator remained below the detection or action level threshold during the previous operating cycle.

The inspectors' review included the implementation of tube repair criteria and repair methods to verify they were consistent with plant Technical Specifications (TS) and industry guidelines. The inspectors verified that based on licensee procedures and EC inspection results, no tubes were required to be plugged in the "B" steam generator during this refueling outage.

Furthermore, the inspectors interviewed licensee staff and reviewed a sample of inspection results for the inspection conducted in the secondary side internals of the "B" steam generator, to verify that potential areas of degradation based on site-specific operating experience were inspected, and appropriate corrective actions were taken to address degradation indications. This review included the results of Foreign Object Search and Retrieval (FOSAR) activities and an evaluation for a potential loose part in the secondary side of the "B" steam generator.

Identification and Resolution of Problems

The inspectors reviewed a sample of ISI related issues entered into the corrective action program to determine if 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.

b. Findings

No findings were identified.

1R11 Licensed Operator Regualification Program

.1 Resident Inspector Quarterly Review

a. Inspection Scope

The inspectors observed and evaluated a licensed operator simulator exercise given on October 11, 2016. The scenario involved a feed flow channel failure, loss of "C" reserve station service transformer (RSST), failure of the "C" charging pump with a failed open discharge check valve, loss of bearing cooling water, manual reactor and main turbine trip, and a loss of coolant accident (LOCA) outside containment resulting in site area emergency. This scenario was intended to exercise the entire operations crew and assess the ability of the operators to react correctly to multiple failures. The inspectors observed the crew's performance to determine whether the crew met the scenario objectives; accomplished the critical tasks; demonstrated the ability to take timely action in a safe direction and to prioritize, interpret, and verify alarms; demonstrated proper use of alarm response, abnormal, and emergency operating procedures; demonstrated proper command and control; communicated effectively; and appropriately classified events per the emergency plan. The inspectors observed the post training critique to determine that weaknesses or improvement areas revealed by the training were captured by the instructor and reviewed with the operators. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

2. Resident Inspector Observation of Control Room Operations

a. Inspection Scope

During the inspection period, the inspectors conducted observations of licensed reactor operator activities to ensure consistency with licensee procedures and regulatory requirements. For the following activities, the inspectors observed the following elements of operator performance: 1) operator compliance and use of plant procedures including technical specifications; 2) control board component manipulations; 3) use and interpretation of plant instrumentation and alarms; 4) documentation of activities; 5) management and supervision of activities; and 6) control room communications.

- On October 12, 2-OP-RX-006, "Withdrawal of the Control Banks to Critical Operation," Revision 34, during Unit 2 reactor startup.
- On October 21, 1-GOP-2.7, "Unit Shutdown, Power Decrease from Allowable Power to Unit Offline for Refueling Outage," Revision 33, during Unit 1 reactor shutdown for RFO.
- On November 10, 1-OP-RX-009, "Dilution to Critical Conditions Following Refueling," Revision 24, during Unit 1 reactor startup following a RFO.

b. Findings

No findings were identified.

.3 Annual Review of Licensee Requalification Examination Results

a. Inspection Scope

Annual Review of Licensee Requalification Examination Results: On March 24 2016, the licensee completed the comprehensive biennial requalification written examinations and the annual requalification operating examinations required to be administered to all licensed operators in accordance with Title 10 of the Code of Federal Regulations 55.59(a)(2), "Requalification Requirements," of the NRC's "Operator's Licenses." The inspectors performed an in-office review of the overall pass/fail results of the individual operating examinations and the crew simulator operating examinations in accordance with Inspection Procedure (IP) 71111.11, "Licensed Operator Requalification Program." These results were compared to the thresholds established in Section 3.02, "Requalification Examination Results," of IP 71111.11. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness

a. Inspection Scope

For the two 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, "Maintenance Rule Program," Revision 6, and ER-AA-MRL-100, "Implementing Maintenance Rule," Revision 10. Documents reviewed are listed in the Attachment.

- CR1048251, Charging SW Clogged Piping During Full Flow Flush
- CR1049987, Station Service Transformer Terminal Boxes Water Intrusion

b. Findings

Introduction: A self-revealing Green NCV of 10 CFR 50, Appendix B, Criterion XVI was identified because the surveillance procedure frequency used to flush the service water (SW) piping in Mechanical Equipment Room (MER)-3 and MER-4 was changed from two weeks to four weeks without sufficiently considering the effects of river conditions on biological growth and without getting management permission to change the periodicity. As a result of the periodicity change, the "B" charging (CH) and main control room (MCR) SW header became blocked with biological growth and was declared inoperable on September 22, 2016 during the performance of 0-OSP-VS-012.

Description: On September 22, 2016, 0-OSP-VS-012, "High Flow Flush of SW Strainers and Piping in MER-3 and MER-4" was performed on the CH and MCR Chiller SW piping. This procedure provides a higher flow backflush through the SW piping by using the discharge of a MCR chiller SW pump (1-VS-P-1B) in order to flush the piping. Per the procedure, 1-SW-324, "B" MCR chiller SW outlet valve, was taken to full open, and within a few seconds the "B" SW strainer obtained a high differential pressure. The MCR chiller SW pump was stopped; and the "B" MCR chiller SW pump and the Unit 1 and Unit 2 "B" CHSW pumps (1-SW-P-10A and 2-SW-P-10A) all indicated a 24 inch vacuum on their suction pressure indicators. The "B" CH and MCR Chiller SW header was declared inoperable and Unit 1 and Unit 2 entered a 24 hour shutdown limiting condition for operation (LCO). This issue was documented in the licensee's CAP as CR 1048251.

On July 24, 2015, the Unit 1 and 2 "A" CHSW pumps were declared inoperable when the "A" CHSW pumps drew a vacuum on the service water header after the rotating strainer upstream of the pumps became clogged during a post maintenance test on the "B" MCR chiller condenser outlet check valve (CR 1003878). The licensee conducted a Root Cause Evaluation (RCE) of the issue and determined that the every three years preventative maintenance cleaning of the six inch SW header upstream of the rotating strainer had been deferred three times using recurring task evaluations (RTEs) without sufficient technical justification. The NRC documented this NCV in Inspection Report 05000280, 281/2015004-01 with the title "Charging Pump Service Water Pump Failure due to Inadequate Preventative Maintenance."

As part of the corrective action from the July 24 SW clogging issue, the licensee entered several corrective actions into their CAP. One of the corrective actions was to develop a design change (DC) to install a chemical injection system in the SW piping in MER-3 and 4 and a follow-on action to install the DC. As compensatory corrective action, until the DC was installed, the licensee issued a corrective action to perform 0-OSP-VS-011 OTO, "Backwashing SW Strainers to Flush Piping in MER-3 and MER-4" on a two week frequency with the frequency to be seasonally and risk assessed and reduced as heavy fouling season ends. Additionally, when this corrective action was closed, the response stated that the procedure was "being performed at a two week frequency and will be adjusted as required per operations and Senior Station Management." It should be noted that this corrective action was later incorrectly translated into the RCE as "Perform 0-OSP-VS-011 OTO on a frequency as determined by System Engineering." Of note, the procedure used to flush the MER-3 and 4 SW piping was changed from O-OSP-VS-011 to O-OSP-VS-012 in June 2016.

The licensee conducted an apparent cause evaluation (ACE) and determined that 0-OSP-VS-011 (12) was being performed on a four week frequency until July 6, 2016 when operations identified CHSW pressures declining, and engineering confirmed the potential degrading condition in CHSW header pressures. Based on this information, a performance test (PT) schedule change request was submitted to change the flush frequency to two weeks and 0-OSP-VS-012 was next performed on July 19. The next performances were on August 9 and August 26 upon which operations personnel fed back to engineering that the flushes appeared to have minimal impact based on the indications in the procedure. A PT schedule change request was then submitted by operations and approved by engineering on September 6 to change the frequency to four weeks. The final review on this change request was an engineering supervisor. The ACE also determined that the flush frequency did not take into account river water

temperature and the impact of water temperature on hydroid growth. In this case, high river water temperature and high salinity are conditions that support significant growth.

Dominion procedure PI-AA-300-3001, "Root Cause Evaluations", Revision 8, step 3.3.9.b states to "Develop and implement additional interim corrective or compensatory actions as necessary to control emergent detrimental conditions until final corrective actions are in place." The MER SW piping chemical injection design change is listed in the July 2015 RCE as the final corrective action for the July 2015 CHSW clogging issue. The RCE compensatory action was to perform 0-OSP-VS-011 on a two week frequency that would be adjusted as required per operations and senior station management.

Analysis: The inspectors determined that the failure of the licensee to control detrimental conditions in the MER-3 and 4 SW headers until the chemical injection system was installed, as required by PI-AA-300-3001, was a performance deficiency (PD) that was within the licensee's ability to foresee and correct. Specifically, the licensee's failure to properly evaluate and implement a periodicity change of the MER-3 and 4 SW piping flushing from two to four weeks caused additional biological growth in the MER-3 and 4 SW piping and an eventual clogging of this piping during the next flushing evolution. Using IMC 0612, Appendix B, Issue Screening, dated September 7, 2012, the inspectors determined that the PD was more than minor because it was associated with the equipment performance attribute of the Mitigating Systems Cornerstone, and it adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the extra biological growth in the MER-3 and 4 SW header caused a blockage of the "B" CH and MCR chiller SW header. As a result, on September 22, 2016, the Unit 1 and 2 "B" CH and MCR chiller SW header was declared inoperable and Surry Unit 1 and 2 entered an unplanned 24 hour shutdown LCO.

Using IMC 0609.04, "Initial Characterization of Findings," Table 2, dated June 19, 2012, the finding was determined to affect the Mitigating Systems Cornerstone. The inspectors screened the finding using IMC Chapter 0609, Appendix A, "SDP for Findings at-Power," dated June 19, 2012, and determined that it screened as Green because the deficiency did not affect the design or qualification of the CHSW pump system and it did not represent a loss of system safety function. This finding has a cross-cutting aspect in Conservative Bias aspect of the Human Performance area, H.14, because the licensee did not use decision making-practices that emphasize prudent choices over those that are simply allowed.

Enforcement: 10 CFR 50, Appendix B, Criterion XVI states, in part, "Measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and non-conformances are promptly identified and corrected." Contrary to the above, on September 6, 2016, the licensee did not establish measures to assure CHSW flow did not become blocked due to excessive biological growth in the SW piping. Specifically, the licensee changed the frequency of 0-OSP-VS-012, "High Flow Flush of SW Strainers and Piping in MER-3 and MER-4" from two weeks to four weeks without sufficiently considering the effects of river conditions on biological growth and without getting management permission to change the periodicity. Consequentially, the "B" CHSW and MCR chiller SW header became blocked with biological growth and was declared inoperable on September 22, 2016 during the performance of 0-OSP-VS-012. Because the licensee entered the issue into

their CAP as CR 1048251 and the finding is of very low safety significance (Green), this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy: NCV 05000280, 281/2016004-01, Change of Surveillance Frequency Caused the Charging Service Water Header to become Biologically Fouled.

1R13 Maintenance Risk Assessments and Emergent Work Control

a. Inspection Scope

The inspectors evaluated, as appropriate, the three activities listed below for the following: (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. Documents reviewed are listed in the Attachment.

- On October 12, Unit 1 and 2 risk with Unit 2 reactor startup preparations in progress and starting up Unit 2 while the "1D" service water (SW) header and Unit 1 "A" main condenser were out of service.
- On October 24, Unit 1 and 2 risk with #3 EDG unplanned inoperability while Unit 1 was in cold shutdown aligned for "1J" bus logic testing.
- On November 1, Unit 1 and 2 risk with "1A" station battery out of service and U1 in a RFO.

b. Findings

No findings were identified.

1R15 Operability Evaluations

a. Inspection Scope

The inspectors reviewed the four 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 operability determinations were made as specified in OP-AA-102, "Operability Determination," Revision 14. The inspectors reviewed the licensee's corrective action program to verify deficiencies in operability determinations were being identified and corrected. One sample included a review regarding the licensee's assessments and corrective actions for operator workarounds (OWAs). The inspectors reviewed the cumulative effects of the licensee's OWAs and licensee procedure OP-AA-1700, "Operations Aggregate Impact," Revision 6 and

evaluated OWAs against the requirements of the licensee's CAP as specified in PI-AA-200, "Corrective Action," Revisions 32, 10 CFR 50, Appendix B, and OP-AA-100, "Conduct of Operations," Revision 32. Documents reviewed are listed in the Attachment.

- CR 1052981, "C" RCS loop hot leg narrow range temperature with incorrect equipment quality (EQ) insulation installation
- CR 1053145, 1-SI-79, "Unit 1 Cold Leg "A" SI Injection Check Valve," seat leakage and mechanical agitation
- CRs 1053506 and 1053491 Unit 1 "A" RCP Seal Leakage
- Operator Work Arounds

b. Findings:

No findings were identified.

1R18 Plant Modifications

.1 Permanent Modification SU-16-01096, "Rod Control Automatic Rod Withdrawal (ARW) Defeat" for Unit 1"

a. Inspection Scope

The inspectors reviewed the completed permanent plant modification design change package (DCP) SU-16-01096, "Rod Control ARW Defeat". The inspectors conducted walkdowns of the installation at various stages of completion, reviewed the 10 CFR 50.59 Safety Review/Regulatory Screening, technical drawings, test plans and the modification package to assess the TS implications. The inspectors also verified that the permanent modification was in accordance with licensee procedure CM-AA-DDC-201, "Design Changes," Revision 18. In addition, the inspectors reviewed calculations and conducted interviews with licensee personnel. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

.2 Permanent Modification SU-13-01053, "EDG Data Acquisition System Quick Connect and Test Setup"

a. Inspection Scope

The inspectors reviewed the completed permanent plant modification DCP SU-13-01053, "EDG Data Acquisition System Quick Connect and Test Setup." The inspectors reviewed the 10 CFR 50.59 Safety Review/Regulatory Screening, technical drawings, test plans and the modification package to assess the TS implications. The inspectors also verified that the permanent modification was in accordance with licensee procedure CM-AA-DDC-201, "Design Changes," Revision 18. In addition, the inspectors reviewed calculations and conducted interviews with licensee personnel. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

1R19 Post Maintenance Testing

a. Inspection Scope

The inspectors reviewed three post maintenance test procedures and/or test activities for selected risk-significant mitigating systems listed below, 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) 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) tests 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 in accordance with VPAP-2003, "Post Maintenance Testing Program," Revision 14. Documents reviewed are listed in the Attachment.

- 1-OPT-FW-003, "Turbine Driven Auxiliary Feedwater Pump PT", Revision 51, after preventative maintenance during Unit 1 RFO.
- 1-OPT-SI-014, "Cold Shutdown Test of SI Check Valves to RCS Cold Legs," Revision 22 following mechanic agitation of 1-SI-79.
- Work Order (WO) 3810376858 after the replacement of the Unit 1 fuel transport upender cable and sheaves.

b. Findings

No findings were identified.

1R20 Refueling and Other Outage Activities

a. Inspection Scope

The inspectors reviewed the station's work schedule and outage risk plan for the Unit 1 RFO, which was conducted October 22 through November 11, 2016. The inspectors confirmed that the licensee had appropriately considered risk, industry experience, and previous site-specific problems in developing and implementing a plan that assured maintenance of defense-in-depth. The inspectors used IP 71111.20, "Refueling and Outage Activities," to observe portions of the maintenance and startup activities to verify that the licensee maintained defense-in-depth commensurate with the outage risk plan and applicable TS. The inspectors monitored licensee controls over the outage activities listed below. Documents reviewed are listed in the Attachment.

- Licensee configuration management, including daily outage reports, to evaluate maintenance of defense-in-depth commensurate with the outage risk plan for key safety functions and compliance with the applicable TS when taking equipment out of service.

- Implementation of clearance activities and confirmation that tags were properly hung and equipment appropriately configured to safely support the work or testing.
- Controls over the status and configuration of electrical systems to ensure that TS and outage safety plan requirements were met, and controls over switchyard activities.
- Controls over activities that could affect reactivity.
- Monitoring of decay heat removal operations.
- Spent fuel cooling operations to verify that outage work was not impacting the ability of the operations staff to operate the spent fuel cooling system during and after core offload.
- Reactor coolant inventory controls, including flow paths, configurations, alternative means for inventory additions, and controls to prevent inventory loss.
- The control of containment penetrations and containment entries to verify that the licensee controlled those penetrations and activities in accordance with the appropriate TS and could achieve/maintain containment closure for required conditions.
- Refueling activities, including fuel handling and fuel receipt inspections.
- Fatigue management.
- Startup and ascension to full power operation, tracking of startup prerequisites, and walkdown of the primary containment to verify that debris had not been left which could block emergency core cooling system strainers.
- Licensee identification and resolution of problems related to forced outage activities.

b. Findings

No findings were identified.

1R22 Surveillance Testing

a. Inspection Scope

For the five surveillance tests listed below, the inspectors examined the test procedures, witnessed testing, or reviewed test records and data packages, to determine whether the scope of testing adequately demonstrated that the affected equipment was functional and operable, and that the surveillance requirements of TS were met. The inspectors also determined whether the testing effectively demonstrated that the systems or components were operationally ready and capable of performing their intended safety functions. Documents reviewed are listed in the Attachment.

Surveillance Testing

- 1-OPT-RS-001, "Containment Outside Recirculation Spray Pumps Flow and Leak Test," Revision 23
- 1-OPT-SI-009, "Refueling Test of the LHSI Check Valves to the Hot Legs," Revision 17 (OTO 1)
- 1-OPT-ZZ-002, "ESF Actuation with Undervoltage and Degraded Voltage - 1J Bus Logic Testing," Revision 40 (OTO 1)

Appendix J Leak Rate Determination

- 1-OPT-CT-201, "Containment Isolation Valve Local Leak Rate Testing (Type "C" Containment Testing)," Revision 23

RCS Leak Rate Determination

- 0-NSP-RC-004, "Establishing and Updating Reactor Coolant System (RCS) Unidentified Leakage Baseline, Unit 2" Revision 3

b. Findings

No findings were identified.

2. RADIATION SAFETY

Cornerstones: Occupational Radiation Safety and Public Radiation Safety

2RS1 Radiological Hazard Assessment and Exposure Controls (Seven Samples)

a. Inspection Scope

Hazard Assessment and Instructions to Workers: During facility tours, the inspectors directly observed radiological postings and container labeling for areas established within the radiologically controlled area (RCA) of the Auxiliary Building, Unit 1 containment, Independent Spent Fuel Storage Facility (ISFSI), and radioactive waste (radwaste) processing and storage locations. The inspectors independently measured radiation dose rates or directly observed conduct of licensee radiation surveys for selected RCA areas. The inspectors reviewed survey records for several plant areas including surveys for airborne radioactivity, gamma surveys with a range of dose rate gradients, surveys for alpha-emitters and other hard-to-detect radionuclides, and pre-job surveys for upcoming tasks. The inspectors also discussed changes to plant operations that could contribute to changing radiological conditions since the last inspection. The inspectors attended pre-job briefings and reviewed Radiation Work Permit (RWP) details to assess communication of radiological control requirements and current radiological conditions to workers.

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. The inspectors also reviewed records of leak tests on selected sealed sources and discussed nationally tracked source transactions with licensee staff.

Hazard Control: The inspectors evaluated access controls and barrier effectiveness for selected High Radiation Area (HRA), Locked High Radiation Area (LHRA), and Very High Radiation Area (VHRA) locations and discussed changes to procedural guidance for LHRA and VHRA controls with Radiation Protection (RP) supervisors. The inspectors reviewed implementation of controls for the storage of irradiated material within the spent fuel pool. Established radiological controls, including airborne controls and electronic dosimeter (ED) alarm setpoints, were evaluated for selected Unit 1 Outage 27 tasks, including reactor disassembly, fuel move activities, and fuel transfer canal cable repair work. In addition, the inspectors reviewed licensee controls for areas where dose rates could change significantly as a result of plant shutdown and refueling operations. The inspectors also reviewed the use of personnel dosimetry including extremity dosimetry and multibadging in high dose rate gradients.

Radiation Worker Performance and RP Technician Proficiency: Occupational workers' adherence to selected RWPs and RP technician proficiency in providing job coverage was evaluated through direct observations and interviews with licensee staff. Jobs observed in high radiation and contaminated areas included the upender cable repair within the transfer canal, scaffolding activities in Unit 1 containment, pressurizer cubicle work, and spent fuel pool area cleanup. The inspectors also evaluated worker responses to dose and dose rate alarms during selected work activities.

Problem Identification and Resolution: The inspectors reviewed and assessed condition reports associated with radiological hazard assessment and control. The inspectors evaluated the licensee's ability to identify and resolve the issues in accordance with licensee procedures. The inspectors also reviewed recent self-assessment results.

Inspection Criteria: Radiation protection activities were evaluated against the requirements of Updated Final Safety Analysis Report (UFSAR) Section 11, 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 and records reviewed are listed in the Attachment.

b. Findings

No findings were identified.

2RS2 Occupational As Low As Reasonably Achievable (ALARA) Planning and Controls (Five Samples)

a. Inspection Scope

Work Planning and Exposure Tracking: The inspectors reviewed work activities and their collective exposure estimates for the Unit 1 refueling outage number twenty seven (U1R27). The inspectors reviewed ALARA planning packages for activities related to the following high collective exposure tasks, reactor head bare metal inspection, crane 61 cable replacement, reactor reassembly and Unit 1 upender cable replacement. For the selected tasks, the inspectors reviewed established dose goals and discussed assumptions regarding the bases for the current estimates with responsible ALARA planners. The inspectors evaluated the incorporation of exposure reduction initiatives and operating experience, including historical post-job reviews, into RWP requirements. Day-to-day collective dose data for the selected tasks were compared with established dose estimates and evaluated against procedural criteria (work-in-progress review limits) for additional ALARA review. Where applicable, the inspectors discussed changes to established estimates with ALARA planners and evaluated them against work scope changes or unanticipated elevated dose rates.

Source Term Reduction and Control: The inspectors reviewed the collective exposure three-year rolling average from 2013 – 2015. The inspectors evaluated historical dose rate trends for reactor coolant system piping and compared them to current dose rates for U1R27. Source term reduction initiatives, including cobalt reduction and zinc injection, were reviewed and discussed with RP and Chemistry staff. The inspectors also reviewed temporary shielding packages for U1R27.

Radiation Worker Performance: As part of Inspection Procedure (IP) 71124.01, the inspectors observed pre-job ALARA briefings and radiation worker performance for various HRA jobs in the auxiliary building and containment. While observing job tasks, the inspectors evaluated the use of remote technologies to reduce dose including teledosimetry and remote visual monitoring.

Problem Identification and Resolution: The inspectors reviewed and discussed selected CAP documents associated with ALARA program implementation. The inspectors evaluated the licensee's ability to identify and resolve the issues. The inspectors also reviewed recent self-assessment results.

Inspection Criteria: ALARA program activities were evaluated against the requirements of UFSAR Section 11, TS Section 6.4, 10 CFR Part 20, and approved licensee procedures. Documents reviewed are listed in the report Attachment.

b. Findings

No findings were identified.

2RS3 In-Plant Airborne Radioactivity Control and Mitigation (Four Samples)

a. Inspection Scope

Engineering Controls: The inspectors reviewed the use of temporary and permanent engineering controls to mitigate airborne radioactivity during U1R27 tasks. The inspectors observed the use of portable air filtration units for work in contaminated areas of the RCA and reviewed filtration unit testing certificates. The inspectors evaluated the effectiveness of continuous air monitors to provide indication of increasing airborne levels and the placement of air samplers in work area "breathing zones." Accounting for alpha emitting nuclides inclusion in setpoint determination.

Respiratory Protection Equipment: 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. The inspectors reviewed ALARA evaluations for the use of respiratory protection as part of IP 71124.02. Selected Self-Contained Breathing Apparatus (SCBA) units and negative pressure respirators (NPR)s staged for routine and emergency use in the Main Control Room (MCR) and other locations were inspected for material condition, SCBA bottle air pressure, number of units, and number of spare masks and availability of air bottles. 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 observed training verification and issuing respiratory protection devices and the use of positive air pressure respirator (PAPR) hoods during fuel transfer canal cable repair work. The inspectors discussed training for various types of respiratory protection devices with licensee staff and interviewed radworkers and control room operators on use of the devices including SCBA bottle change-out and use of corrective lens inserts. The inspectors reviewed respirator qualification records (including medical qualifications) for several MCR operators and emergency responder personnel. In

addition, inspectors evaluated qualifications for individuals responsible for testing and repairing SCBA vital components.

Problem Identification and Resolution: The inspectors reviewed and discussed selected CAP documents associated with airborne controls and respiratory protection activities. The inspectors evaluated the licensee's ability to identify and resolve the issues. The inspectors also reviewed recent self-assessment results.

Inspection Criteria: Radiation protection program activities associated with airborne radioactivity monitoring and controls were evaluated against details and requirements documented in the UFSAR Chapter 11; TS Sections 3.21, 3.22, and 4.12; 10 CFR Part 20; Regulatory Guide (RG) 8.15, "Acceptable Programs for Respiratory Protection" and approved licensee procedures. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

2RS4 Occupational Dose Assessment (Five Samples)

a. Inspection Scope

Source Term Characterization: The inspectors reviewed the plant radiation characterization (including gamma, beta, alpha, and neutron) being monitored verified the use of scaling factors to account for hard-to-detect radionuclides in internal dose assessments.

External Dosimetry: The inspectors reviewed National Voluntary Accreditation Program (NVLAP) certification data for the licensee's Thermoluminescent Dosimeter (TLD) processor for the previous and current year for Ionizing Radiation Dosimetry. The inspectors observed and evaluated onsite storage of TLDs. Comparisons between ED and TLD results, including correction factors, were reviewed and discussed. The inspectors also evaluated licensee procedures for unusual dosimetry occurrences. ED alarm logs were reviewed as part of P 71124.01.

Internal Dosimetry: The inspectors reviewed and discussed the in vivo bioassay program with the licensee. Inspectors reviewed procedures that addressed methods for determining internal or external contamination, releasing contaminated individuals, and the assignment of dose. The inspectors evaluated the licensee's program for in vitro monitoring and in vivo bioassay. The inspectors also reviewed contamination logs and evaluated events with the potential for internal dose.

Special Dosimetric Situations: The inspectors reviewed records for declared pregnant workers (DPWs) from April 2014 through November 2016 and discussed guidance for monitoring and instructing DPWs. Inspectors reviewed the licensee's program for monitoring external dose in areas of expected dose rate gradients, including the use of multi-badging and extremity dosimetry. The inspectors evaluated the licensee's neutron dosimetry program including instrumentation used to perform neutron surveys. In addition, the inspectors reviewed the licensee's program for evaluation of shallow dose equivalent (SDE). The inspectors also reviewed contamination logs and evaluated events with the potential for SDE.

Problem Identification and Resolution: The inspectors reviewed and discussed selected CAP documents associated with occupational dose assessment including self-assessments. The inspectors evaluated the licensee's ability to identify and resolve issues.

Inspection Criteria: The licensee's occupational dose assessment activities were evaluated against the requirements of UFSAR Section 11; TS Section 6; 10 CFR Parts 19 and 20; and approved licensee procedures. Documents reviewed are listed in the report Attachment.

b. Findings

No findings were identified.

2RS5 Radiation Monitoring Instrumentation (Three Samples)

a. Inspection Scope

The inspectors reviewed the licensee's radiation monitoring instrumentation programs to verify the accuracy and operability of radiation monitoring instruments used to monitor areas, materials, and workers to ensure a radiologically safe work environment during normal operations and under postulated accident conditions.

Walkdowns and Observations: During tours of the site areas, the inspectors observed installed radiation detection equipment including the following instrument types: area radiation monitors (ARMs), continuous air monitors (CAMs), personnel contamination monitors (PCMs), small article monitors (SAMs), and portal monitors (PMs). The inspectors observed the calibration status, physical location, material condition and compared technical specifications for this equipment with UFSAR requirements. In addition, the inspectors observed the calibration status and functional checks of selected in-service portable instruments and discussed the bases for established frequencies and source ranges with RP staff personnel. The inspectors reviewed periodic source check records for compliance with plant procedures and manufacturer's recommendation for selected instruments and observed the material condition of sources used.

Calibration and Testing Program: The inspectors reviewed calibration data for selected ARMs, PCMs, PMs, SAMs, and laboratory instruments as well as the last calibration and methodology for the whole body counter. The inspectors reviewed calibration data, methodology used, and the source certification for 1-RM-RMS-127/128 (U1 Containment High Range Monitor), 1-RM-RMS-138, 139 (Spent Resin Handling Area), 1-RM-RMS-153 (Fuel Pit Bridge), 1/2-RM-RMS-162/262 (Reactor Containment), and 1-RM-RMS-157 (Main Control Room). The current output values for the portable instrument calibrator and the instrument certifications used to develop them were reviewed by the inspectors. The inspectors reviewed the licensee's process for investigating instruments that are removed from service for calibration or response check failures and discussed specific instrument failures with plant staff. In addition, the inspectors reviewed 10 CFR-61 data to determine if sources used in the maintenance of the licensee's radiation detection instrumentation were representative of radiation hazards in the plant and scaled appropriately for "hard to detect" nuclides.

Problem Identification and Resolution: The inspectors reviewed and discussed selected CAP documents associated with radiological instrumentation including licensee sponsored assessments. The inspectors evaluated the licensee's ability to identify and resolve issues

Inspection Criteria: Operability and reliability of selected radiation detection instruments were reviewed against details documented in the following: 10 CFR Part 20; NUREG-0737, "Clarification of TMI Action Plan Requirements"; UFSAR Chapter 11; TS Section 3.7, 4.0, and 4.1; and applicable licensee procedures. Documents reviewed are listed in the report Attachment.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

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

4OA1 Performance Indicator (PI) Verification

.1 High Pressure Injection System, Cooling Water, and Residual Heat Removal MSPIs

a. Inspection Scope

The inspectors performed a periodic review of the six following Unit 1 and 2 PIs to assess the accuracy and completeness of the submitted data and whether the performance indicators were calculated in accordance with the guidance contained in NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7. The inspection was conducted in accordance with NRC Inspection Procedure 71151, "Performance Indicator Verification." Specifically, the inspectors reviewed the Unit 1 and Unit 2 data reported to the NRC for the period October 1, 2015 through September 30, 2016. Documents reviewed included applicable NRC inspection reports, licensee event reports, operator logs, station performance indicators, and related CRs.

- Units 1 & 2 High Pressure Injection System MSPI
- Units 1 & 2 Cooling Water MSPI
- Units 1 & 2 Residual Heat Removal MSPI

b. Findings

No findings were identified.

.2 Occupational Radiation Safety Cornerstone

a. Inspection Scope

The inspectors reviewed the Occupational Exposure Control Effectiveness PI results for the Occupational Radiation Safety Cornerstone from June 2015 through September 2016. For the assessment period, the inspectors reviewed electronic dosimeter alarm

logs and CRs related to controls for exposure significant areas. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

.3 Public Radiation Safety Cornerstone

a. Inspection Scope

The inspectors reviewed the Radiological Control Effluent Release Occurrences PI results for the Public Radiation Safety Cornerstone from April 2015 through October, 2016. For the assessment period, the inspectors reviewed cumulative and projected doses to the public contained in liquid and gaseous release permits and CRs related to Radiological Effluent Technical Specifications/ODCM issues. The inspectors also reviewed licensee procedural guidance for collecting and documenting PI data. Documents reviewed are listed in 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:

a. Inspection Scope

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.

b. Findings

No findings were identified.

.2 Annual Sample: Review of CR 1004013 Corrective Actions for "B" Emergency SW (ESW) Pump Inoperable Due to Bio-fouling

a. Inspection Scope

The inspectors performed a review regarding the licensee's assessments and corrective actions associated with CR 1004013, "B' ESW Pump Inoperable Due to Biofouling." Specifically, on July 26, 2015, while performing 0-OPT-SW-002, "ESW Pump 1-SW-P-1B Performance Test," the pump shaft speed was unsatisfactory at 860.9 revolutions per minute (RPM). The satisfactory range is 872 to 888 RPM. The inspectors assessed the licensee's problem identification threshold, cause analyses, extent of condition reviews, compensatory actions, and the prioritization and timeliness of the licensee's corrective

actions to determine whether the licensee was appropriately identifying, characterizing, and correcting problems associated with this issue and whether the planned or completed corrective actions were appropriate. The inspectors compared the actions taken to the requirements of the licensee's CAP as specified in procedure, PI-AA-200, "Corrective Action Program," Revision 32 and 10 CFR 50, Appendix B. In addition, the inspectors reviewed the corrective action program for similar issues, and interviewed engineering personnel to assess the effectiveness of the implemented corrective actions. Documents reviewed are listed in the Attachment.

b. Findings and Observations

No findings were identified.

The licensee determined that the apparent cause was the inability of the pump's protective coating to limit the bio-fouling, which became excessive over a short period of time due to pump/coating aging. The pump cleaning work order was revised for a more detailed cleaning until the pump can be replaced with an overhauled spare ESW pump. The inspectors verified that the licensee had identified problems with this issue at an appropriate threshold and entered them into the CAP; and had proposed or implemented appropriate corrective actions. The inspectors noted that the "B" ESW pump had not yet been replaced and is currently scheduled to be replaced with the refurbished spare in June, 2017. The inspectors determined that the corrective actions developed as a result of the apparent cause analysis were reasonable commensurate with the safety significance of the ESW system.

.3 Annual Sample: Review of CR 1002302 Corrective Actions for 2-RC-PCV-2455A Pressurizer (PZR) Spray Valve Body to Bonnet Leak

a. Inspection Scope

The inspectors performed a review regarding the licensee's assessments and corrective actions associated with CR 1002302, "2-RC-PCV-2455A Leak Seal Unsuccessful. Unit Ramp Required." Specifically, on July 13, 2015, Unit 2 was shutdown due to increased external leakage from 2-RC-PCV-2455A, "Unit 2 "A" PZR Spray Valve". It was identified that 2-RC-PCV-2455A had a body-to-bonnet leak. Multiple joint leak seal attempts were made to stop the leakage; however, the attempts were unsuccessful. The inspectors assessed the licensee's problem identification threshold, cause analyses, extent of condition reviews, compensatory actions, and the prioritization and timeliness of the licensee's corrective actions to determine whether the licensee was appropriately identifying, characterizing, and correcting problems associated with this issue and whether the planned or completed corrective actions were appropriate. The inspectors compared the actions taken to the requirements of the licensee's CAP as specified in procedure, PI-AA-200, "Corrective Action Program," Revision 32 and 10 CFR 50, Appendix B. In addition, the inspectors reviewed the corrective action program for similar issues, and interviewed engineering personnel to assess the effectiveness of the implemented corrective actions. Documents reviewed are listed in the Attachment.

b. Findings and Observations

No findings were identified.

The licensee determined that the root cause was that the maintenance procedure did not have sufficient detail and guidance to ensure a misalignment condition that occurred during the May 2014 overhaul of the valve was resolved prior to placing the valve in service. As corrective action, the maintenance procedures for overhaul of all RCS Copes-Vulcan valves were revised to include a tolerance for individual measurements as well as calculated values for gasket crush thickness. The inspectors verified that the licensee had identified problems with this issue at an appropriate threshold and entered them into the CAP; and had proposed or implemented appropriate corrective actions. The inspectors determined that the corrective actions developed as a result of the apparent cause analysis were reasonable commensurate with the safety significance of the RCS system.

4OA3 Follow-up of Events and Notices of Enforcement Discretion (71153 – 1 Sample)

.1 (Closed) Licensee Event Report (LER), 05000281/2016-001-00, Unit 2 Reactor Trip Due to Generator Differential Lockout

a. Inspection Scope

On October 9, 2016, at 0254 hours with Unit 1 and Unit 2 operating at 100 percent power, Unit 2 experienced an automatic reactor trip initiated by a turbine trip due to main generator differential lockout relay actuation. At the time of the trip, high wind and heavy rain conditions existed due to the effects of Hurricane Matthew. All three auxiliary feedwater pumps automatically started on low-low steam generator water level as expected. All plant systems functioned as required, and Unit 2 was stabilized in hot shutdown. The direct cause of the generator differential lockout was an electrical ground overcurrent initiated by water accumulation in the “A” phase of the “A” SST leads termination enclosure. The affected electrical enclosures were drained, the system was tested, and modifications to the enclosures to prevent recurrence of water intrusion were completed prior to returning Unit 2 to power operation on October 13, 2016. The inspectors reviewed the LER, the associated RCE and corrective actions, interviewed the license staff, and walked down associated components. This LER is closed.

b. Findings

Introduction: A self-revealing Green finding was identified because the test requirements section of the SST design change was not comprehensive in that it did not test that the isolated phase bus ducting terminal boxes were constructed to prevent water intrusion into the boxes. This was discovered during a significant rainfall event partially caused by Hurricane Matthew, which filled up the “A” SST terminal box with water and eventually shorted the “A” phase of the main generator causing a main generator, main turbine, and subsequent reactor trip.

Description: On October 9, 2016, Surry Unit 2 automatically tripped due to a generator differential lockout. At the time of the trip, adverse weather conditions including high winds and heavy rains existed due to hurricane Matthew which was offshore of the North Carolina coastline. The licensee tagged out the main generator to conduct an inspection of the isolated phase bus ducting and the SSTs and found about 5 gallons of water which drained out of the “A” phase of the “A” SST 22KV terminal box when the box was unbolted for inspection. These terminal boxes are bolted to the top of the SSTs and are

connected to the isolated phase ducting by a rubber bellows that is clamped to the terminal box. This issue was documented in the licensee's CAP as CR 1049987.

The licensee had replaced all three Unit 2 SSTs during the October, 2015, Unit 2 RFO. Additionally, the isolated phase bus ducting for Unit 2 was replaced in 2011. DC SU-13-01037 was written for the SST replacements (Units 1 and 2) and DC SU-09-01021 was written for the Unit 2 isolated phase bus ducting replacement. As part of the SST replacement there were new terminal boxes manufactured by the SST vendor.

The licensee conducted a RCE of the trip and determined that the design of the new terminal box enclosures was different than the old enclosures. The previous design consisted of a welded box with a removable cover on the side of the box to allow access for leads termination. The new design consisted of a bolted box which introduced new potential in-leakage sources with eight bolts on the top of the box. Additionally, the old boxes had weep holes in the bottom of the box; whereas, the new boxes did not. The weep holes on the old boxes had been plugged as part of installing a dry air purge system on the terminal boxes to prevent excessive air usage. The new design terminal boxes eliminated this weep hole and consequently a fail-safe feature on the box in the event there was water intrusion into the box. The new box was designed to be weather tight.

Following the reactor trip, discrepancies in the terminal enclosures were identified. The top flange of some bolted boxes had bolts which had been over-torqued to the extent that metal washers were cupped on the top of the box potentially compromising the rubber washers beneath. Additionally, there was evidence that the "A" SST bellows connection on the top of the box was leaking. DC SU-13-01037, which installed the new SSTs, had no instructions to inspect the terminal box construction or connections and no post maintenance test (PMT) to ensure that the enclosures were weather tight.

The RCE also determined that there was applicable operating experience (OE) for the failure that Surry Unit 2 experienced. Crystal River experienced water intrusion in non-welded joints of their isolated phase bus ducting in November, 2009. The RCE concluded that this OE was not evaluated nor included in the new SST DC package, but that it was in the isolated phase bus ducting DC which was implemented in 2011. The inspectors agreed that DC SU-13-01037 did not include any applicable OE for water intrusion in non-welded joints and noted that there was more recent OE from a Grand Gulf isolated phase bus ducting water intrusion event in January, 2013.

Dominion procedure CM-AA-DDC-301, "Post Design Change Testing," Revision 4, states in section 3.1.2, in part, that the "post design change testing (PDCT) plan shall be created in accordance with this procedure" and "the test plan should be comprehensive." The licensee determined that the root cause of the Unit 2 reactor trip was that the DC for the SST and the isolated phase bus duct replacements neither tested nor inspected all the mechanical joints to ensure the design specification of a weather tight system was accomplished. Additionally, section 3.1.1 of CM-AA-DDC-301 states, in part, that the "objectives of the PDCT are to verify that the DC did not create an unintended deficiency." Removing the weep holes from the terminal boxes and not testing the boxes were weather tight, created the unintended deficiency that the terminal box could fill with water and short an isolated phase.

Analysis: The inspectors determined that the failure of the licensee to have a comprehensive test plan for DC SU-13-01037, as required by Dominion procedure CM-AA-DDC-301, was a PD that was within the licensee's ability to foresee and correct. Specifically, DC-SU-13-01037 had no instructions to inspect the SST terminal box construction or connections and no post maintenance test to ensure that the enclosures were weather tight. Using IMC 0612, Appendix B, Issue Screening, dated September 7, 2012, the inspectors determined that the performance deficiency was more than minor because it was associated with the design control attribute of the Initiating Events Cornerstone, and it adversely affected the cornerstone objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, the lack of SST terminal box inspections and testing allowed a non-weather tight terminal box to be installed on the "A" SST which filled with water during a rain storm; causing the Unit 2 main generator to trip on generator differential lockout and a subsequent Unit 2 trip on October 9, 2016.

Using IMC 0609.04, "Initial Characterization of Findings," Table 2, dated October 7, 2016, the finding was determined to affect the Initiating Events Cornerstone. The inspectors screened the finding using Manual Chapter 0609, Appendix A, "SDP for Findings at-Power," dated June 19, 2012, and determined that it screened as Green because although the deficiency did cause a reactor trip, it did not cause a loss of mitigation equipment relied upon to transition the plant from the onset of the trip to a stable shutdown condition. This finding has a cross-cutting aspect in the OE aspect of the Problem Identification and Resolution area, P.5, because the licensee did not evaluate and implement relevant external operating experience. Specifically, there was industry OE available on isolated phase bus ducting bolted connections water intrusion events that was not evaluated by the licensee as part of the SST design change.

Enforcement: Enforcement action does not apply because the performance deficiency did not involve a violation of a regulatory requirement: FIN 05000281/2016004-02, "Inadequate Design Change Post Maintenance Testing Causes Water Intrusion into Station Service Transformer and a Reactor Trip."

4OA6 Meetings, Including Exit

Exit Meeting Summary

On January 18, 2017, the inspection results were presented to Mr. R. Simmons 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.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

L. Baker, Manager, Training
T. Cuthriell, Licensing Engineer
J. Eggart, Manager, Radiation Protection & Chemistry
B. Garber, Manager, Station Licensing
M. Haduck, Manager, Outage and Planning
R. Johnson, Manager, Operations
P. Jurewicz, Borice Acid corrosion Control Program Owner
L. Lane, Site Vice President
D. Lawrence, Director, Station Safety and Licensing
T. Mayer, Surry SGISI Program Owner
A. Murphy, Manager, Protection Services
L. Ragland, Supervisor – Health Physics Operations
M. Ringler, Site Welding Engineer
J. Rosenberger, Director, Station Engineering
R. Scanlan, Manager, Maintenance
R. Simmons, Plant Manager
M. Smith, Manager, Nuclear Organizational Effectiveness
W. Terry, Supervisor – Health Physics Technical Support
E. Turko, ISI Supervisor
N. Turner, Manager, Nuclear Emergency Preparedness

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened and Closed

05000280, 281/2016004-01	NCV	Change of Surveillance Frequency Caused the Charging Service Water Header to Become Biologically Fouled (Section 1R12)
05000281/2016004-02	FIN	Inadequate Design Change Post Maintenance Testing Causes Water Intrusion into Station Service Transformer and a Reactor Trip (Section 4OA3)

Closed

05000281/2016-001-00	LER	Unit 2 Trip Due to Generator Differential Lockout (Section 4OA3)
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LIST OF DOCUMENTS REVIEWED

Section 1R01: Adverse Weather Protection

Procedures

0-EPM-1303-01, Freeze Protection Inspection, Rev. 25

0-OP-ZZ-021, Severe Weather Preparation, Rev. 15

0-OSP-ZZ-001, Cold Weather Preparation, Rev. 14

Condition Reports

1050682	1053604	1053662	1053691	1053606	1054211
1054212	1055332	1055349	1055354	1055355	

Section 1R04: Equipment Alignment

Procedures

0-OP-EG-001-A, EDG 3 System Alignment, Rev. 15

1-OP-FW-001A, Auxiliary Feedwater System Valve Alignment, Rev. 7

1-OP-SI-001A, Safety Injection System Alignment, Rev. 19

2-OP-CS-001A, Containment Spray System Alignment, Rev. 7

2-OPT-CS-002, Containment Spray System Test, Rev. 18

Condition Reports

*1049866	*1049876	*1050387	*1051984	*1053157	*1053158
*1053383	*1054294				

Drawings

11548-FM-084A SH1, Flow/Valve Operating Numbers Diagram Containment Spray System Unit 2, Rev. 38

11548-FM-084A SH2, Flow/Valve Operating Numbers Diagram Containment Spray System Unit 2, Rev. 50

11548-FM-084A SH3, Flow/Valve Operating Numbers Diagram Containment Spray System Unit 2, Rev. 41

Other Documents

CA 295788, Determine/Revise procedures for Relief Valves with Ty Wraps, 6/17/15

VTM 38-C515-00013, Operating and Safety Instructions Direct Spring Operated Safety Valves

Section 1R05: Fire Protection

Procedures

CM-AA-FPA-100, Fire Protection/Appendix R (Fire Safe Shutdown) Program, Rev. 11

0-LSP-FP-045, Fire Extinguisher Annual Maintenance, Rev. 2

0-FS-FP-115, Mechanical Equipment Room #3 Elevation 9 Feet – 6 Inches, Rev. 3

0-FS-FP-224, Mechanical Equipment Room (MER 5) Elevation 27 Feet – 6 Inches, Rev. 3

1-FS-FP-134, Containment Unit 1 Elevation 47 Feet - 4 inches, Rev. 1

1-FS-FP-135, Containment Unit 1 Elevation 18 Feet - 4 inches, Rev. 1

1-FS-FP-136, Containment Unit 1 Elevation -3 Feet - 6 inches, Rev. 1

1-FS-FP-137, Containment Unit 1 Elevation -27 Feet - 6 inches, Rev. 1

Condition Reports

*1052102

Drawings

11448-FAR-200, Site Fire Boundaries – Appendix 'R' Plot Plan Unit 1 & 2, Rev. 15
 11448-FAR-208 SH1, Equipment Location – Appendix 'R' Turbine Area Plan Operating Level Unit 2, Rev. 5
 11448-FAR-208 SH3, Equipment Location – Appendix 'R' Turbine Area Plan Ground Floor Unit 2, Rev. 17

Section 1R06: Flood ProtectionProcedures

0-AP-13.00, Turbine Building or MER 3 Flooding, Rev. 29
 0-MPM-1900-01, Periodic Inspection of Flood and Spill Protection Dikes, Dams, and Expansion Joint Shields, Rev. 10
 0-OP-ZZ-008, Assessment of Maintenance Activities for Potential Flooding, Rev. 13
 GMP-012, Roving and Stationary Flood Watch Responsibilities, Rev. 11

Work Orders

38102916258

Section 1R08: Inservice Inspection ActivitiesProcedures:

ER-AA-FAC-1002, Flow-Accelerated Corrosion (FAC) Inspection and Evaluation Activities, Rev. 10
 ER-AA-NDE-MT-200, ASME Section XI Magnetic Particle Examination procedure, Rev. 4
 ER-AA-NDE-PT-300, ASME Section XI Liquid Penetrant Examination Procedure, Rev. 7
 ER-AA-NDE-PT-301, BOP Liquid Penetrant Examination Procedure, Rev. 6
 ER-AA-NDE-RT-400, Radiographic Examination Procedure, Rev. 0
 ER-AA-NDE-UT-701, Ultrasonic Thickness Measurement Procedure, Rev. 6
 ER-AA-NDE-UT-702, Ultrasonic Examination of Ferritic Vessel Welds Greater than 2" in Thickness, Rev. 4
 ER-AA-NDE-UT-802, Ultrasonic Examination of Austenitic Piping Welds in accordance with ASME Section XI, Appendix VIII, Rev. 3
 ER-AA-NDE-VT-603, VT-3 Visual Examination Procedure, Rev. 4
 ER-AA-NDE-VT-603, VT-3 Visual Examination Procedure, Rev. 5
 ER-AA-NDE-VT-604, Visual Examination (VE) for Leakage of PWR Reactor Head Penetration, Rev. 2
 ER-AP-BAC-101, Boric Acid Corrosion Control Program Inspections, Rev. 12
 ER-AP-BAC-102, Boric Acid Corrosion Control Program Evaluations, Rev. 12
 ER-AP-BAC-102, Boric Acid Corrosion Control Program Evaluations, Rev. 13
 MA-AA-1002, Leakage Management, Rev. 5
 NS-WKI-000006-008, Mechanical Tube Plug & Stabilizer Installation for RSGS, Rev. 0
 WM-AA-100, Work Management, Rev. 27

Drawings:

38-1-F024-1286709D, Closure Head of Vessel, Rev. 0
 11448-WMKS-RC-1.2, Inservice Inspection Detail Drawing Reactor Vessel Head and CRDM Welds, Surry Power Station-Unit 1

NRC-Identified Condition Reports:

CR1051558, Boric Acid Dusting Found on Fitting 1-RC-FT-1415 during NRC Walkdown
 CR1051984, NRC Inspector Commented on 1-RH-P-1A Seal Leakage

Condition Reports

CR1051835, NQA-1 Requirements Not Being Met on Some QA Records
 CR1052226, Two Foreign Objects Identified during Steam Generator Inspections
 CR1052111, CA to Engineering to Document the Results of the Inspection (RVH BMV)
 CR1052116, Foreign materials Found during Reactor Head Bare Metal Visual Examination
 CR1013992, Possible Boric Acid Weld Leak from 1-CH-361
 CR1014013, Active Boric Acid Leak from Pipe Cap on 1-CH-436
 CR1001868, Boric Acid on Pipe Cap Downstream of 1-RH-44
 CR1051868, Relevant Indications Identified During ISI Liquid Penetrant Examination
 CR1051836, IWL Cosmetic Repairs of Unit 1 Containment Concrete
 CR1051866, Spring Support 1-SHP-H042, Rejected cannot determine Cold Setting, missing scale
 CR1051008, Outside Diameter Piping Identified on Steam Drain Piping
 CR1051216, 1B CW Inlet through Wall and Weld Inspection Results
 CR1051236, ISI Section XI Visual (VT-3) Indications Found on 1-RS-P-2A Recirc Spray Pump Support
 CR1051421, Loose Locknut on Reactor Vessel Seismic Restraint
 CR1051543, CC Leak in Containment at Pipe Penetration Coolers
 CR1051463, Engg Completes the Unit 1 IWE Liner Inspection
 CR1009468, Extreme Corrosion on 01-PL-P-10
 CR1033841, Timeliness of Completed Mechanical WOs with ASME Section XI Repair/Replacement Plan
 CR100986, Inaccurate EPRI Modelling Results in Reduced Coverage for ISI Exams
 CR1051619, Unit 1 Containment Coatings Assessment 1R-27

Work Orders/Work Requests:

38103634771, UT of SG-A Girth Weld
 38103698577, UT of Flow Accelerated Corrosion (FAC), Steam Condenser System, Component Line 1-SD-PSF2-888
 38103634771, PT, 12 Inch Welded Attachments
 38103517058, MT, Pressurizer Integral Attachment B-K/B10.10
 38103517511, RT, 01-RC-PCV-1455A Pressurizer Spray Valve to 4"-RC-14-1502 Line
 38103517058, VT-3 of A Accumulator Discharge Line to A RCS CL
 38103533149, Welding of 01-RC-139 Pressurizer Spray Valve to ¾-RC-67-1502 Line
 38103517511, Welding of 01-RC-PCV-1455A Pressurizer Spray Valve to 4"-RC-14-1502 line
 38103634771, Visual Examination of Containment Liner/Concrete Floor Interfaces (IWE)
 38103704016, Visual Examination of Concrete Containment (IWL)

Self-Assessments:

ETE-SU-2016-0030, Surry Unit 1 – Fall 2016, Steam Generator Degradation Assessment, Rev. 0
 SAR000486, Welding Program Fleet Self-Assessment, 1/17/14
 SAR001227, Reactor Coolant System Materials Degradation Process Fleetwide Self Assessment, 12/14/11
 SAR002257, Inservice Inspection/Risk Informed Inservice Inspection Program Formal Self – Assessment, 1/30/14
 SAR002813, Boric Acid Corrosion Control Program Self- Assessment, 12/17/14

Examiner Quals:

Record of Welder Performance Qualification Test – J. Hamilton, J. Hunter, N. Johnson, H. Maxey, N. Sadler, W. King, W. Callis

Visual Acuity Exam Record- J. Gatica, M. Smith, R. Davies, B. Matowitz, P. Kunze, R. Kimmen, B. Scott, T. Kupfer, E. Humphrey, D. Lubinskui, S. Hutt, D. Austin, J. Calabrese, S. Duvall, M. Key, J. Busse, J. Scruggs, D. Austin, S. Duvall

Certificate of Qualification for Examiner - J. Gatica, M. Smith, R. Davies, B. Matowitz, P. Kunze, R. Kimmen, B. Scott, T. Kupfer, E. Humphrey, D. Lubinskui, S. Hutt, D. Austin, J. Calabrese, S. Duvall, M. Key, J. Busse, J. Scruggs, D. Austin, S. Duvall, C. Almond, D. Valdivieso, B. LoGioco, D. Germano

Other Documents:

180-9264066-000, Surry S1R27 Bare Head Visual Examination

0193-TECR-100735, BWXT Surry Unit 1 1R27 EPRI Appendix H/I Eddy Current Technique Validation, 09/15/16

0193-WKP-100659, BWXT Surry 1R27 – RSG ECT Inspection Plan, 09/12/16

51-9182600-000, Surry Unit 1-S1R24 Reactor Head Inspection Report (UT/Volumetric), Rev. 0

51-9183324, Bare Metal Visual Exam, Rev. 0

NS-WKI-000006-008, Mechanical Tube Plug & Stabilizer Installation for RSGS, Rev. 0

NDE Technology Personnel Vision Certification (McLeod), 07/29/16

NDE Technology Personnel Vision Certification (Thompson), 08/03/16

NDE Technology Personnel Vision Certification (Wheeler), 08/08/16

NDE Technology, Inc. Personnel Certification Summary, Eddy Current, Level IIA/QDA (McLeod), 06/29/15

NDE Technology, Inc. Personnel Certification Summary, Eddy Current, Level IIA/QDA (Thompson), 06/09/15

NDE Technology, Inc. Personnel Certification Summary, Eddy Current, Level IIA/QDA (Wheeler), 05/01/16

Zetec Certificate of Qualification, Eddy Current IIIA/QDA (Woller), 09/17/15

Zetec Eye Examination Certification (Woller), 01/06/16

Section 1R11: Licensed Operator Regualification Program

Procedures

1-GOP-2.7, Unit Shutdown, Power Decrease from Allowable Power to Unit Offline for Refueling Outage, Rev. 33

1-OP-RX-009, Dilution to Critical Conditions Following Refueling, Rev. 24

2-OP-RX-005, Rod Control System Withdrawal of the Shutdown Banks, Rev. 28

2-OP-RX-006, Withdrawal of the Control Banks to Critical Operations, Rev. 34

RQ-16.7-SP-1, Simulator Scenario, Rev. 0

Section 1R12: Maintenance Effectiveness

Procedures

0-AP-12.00, Service Water System Abnormal Conditions, Rev. 14

0-OSP-VS-011, Backwashing SW Strainers to Flush Piping in MER 3 and MER 4, Rev. 10

0-OSP-VS-012, High Flow Flush of SW Strainers and Piping in MER 3 and MER 4, Rev. 2

CM-AA-DDC-201, Design Changes, Rev. 18

CM-AA-DDC-301, Post Design Change Testing, Rev. 4

PI-AA-300-3001, Root Cause Evaluations, Rev. 8

Condition Reports

1027241	1027568	1003878	1030984	1048251	1049987
1049997	1050133	1050137	1050138	1050201	1050249
1050498	1051789	1051794	1051803		

Work Orders
38103498214

Drawings

D-7085-24-AC, 29.5KV, 20,000A, 125KV BIL Unit 2 Main Transformer Termination
Compartment, Rev. 4
D-7497-F04-AC, 29.5KV, 20,000A, 125KV BIL Unit 2 Main Transformer Termination
Compartment Detail, Rev. 7
S-0901021-2-E-8001, Isometric Bus Duct Tracking Surry Power Station – Unit 2, Rev. 0

Other Documents

ACE 3040737, During Performance of 0-OSP-VS-012 CHSW Header was Rendered
Inoperable, 11/07/16
DC 09-01021, Unit 2 Isolated Phase Duct Upgrade, Rev. 5
DC 13-01037, Station Service Transformer Replacement, Rev. 20
DC 16-00103, Transformer Drains, Rev. 0
RCE 3003883, Degraded Service Water Conditions Resulted in 0-AP-12 Entry, 11/18/15
RCE 3042011, Unit 2 Automatic Reactor Trip Due to Generator Differential Lockout, 11/04/16
SWI-13-01037-WP009, Replacement of Station Service Transformer 2 “A”, Rev. 2
System Health Report, Service Water, 1st quarter 2016

Section 1R13: Maintenance Risk Assessments and Emergent Work Control

Condition Reports

1055998 1056106

Other Documents

EOOS Schedulers Risk Evaluation for Surry Power Station, October 12, 2016
EOOS Schedulers Risk Evaluation for Surry Power Station, October 24, 2016
EOOS Schedulers Risk Evaluation for Surry Power Station, November 1, 2016

Section 1R15: Operability Determinations and Functionality Assessments

Procedures

0-NSP-RC-004, Establishing and Updating RCS Unidentified Leakage Baseline, Unit 2
1-OPT-SI-007, Refueling Test of the High Head Safety Injection Check Valves to the Cold Legs,
Rev. 22
1-OPT-SI-014, Cold Shutdown Test of SI Check Valves to RCS Hot and Cold Legs, Rev. 22
1-OSP-SI-003, Cold Shutdown Leak Check of SI Check Valves to RCS Cold Legs, Rev. 12
1-OSP-SI-013, Determination of HHSI Containment Isolation Valve Leakby, Rev. 7
OP-AA-100, Conduct of Operations, Rev. 32
OP-AA-1700, Operations Aggregate Impact, Rev. 6

Condition Reports (*NRC Identified)

1051887	1052567	1052981	1053145	1053358*	1053491
1053506	1055859	105866	1055867		

Other Documents

3043916, Prompt Operability Determination on 1-RC-TE-1432N/P, Loop “C” Hot Leg Narrow
Range Temperature, Rev. 0
Code Case N-566-2, Evaluation of 1-RC-P-1A, 11/10/16
Code Case N-566-2, Evaluation of 1-RC-P-1C, 11/10/16

ETE-SU-2016-0052, Engineering Evaluation for Mechanical Agitation of 1-SI-79, Rev. 0
 RCE S-2004-2018, Excessive Backleakage through Check Valve 2-SI-241 during Startup,
 Rev. 1
 U1/U2 Operations Aggregate Impact Report, 10/06/16

Section 1R18 Plant Modifications

Procedures

0-ECM-0704-03, EDG Data Acquisition System, Rev. 39
 0-OPT-EG-009, #3 EDG Major Maintenance Operability Test, Rev. 57
 0-OPT-EG-001, #3 EDG Monthly Start Exercise Test, Rev. 74
 1-OPT-EG-009, #1 EDG Major Maintenance Operability Test, Rev. 56
 1-OPT-EG-001, #1 EDG Monthly Start Exercise Test, Rev. 69
 1-NSP-RX-014, Rod Exercise Test, Rev. 17
 2-OPT-EG-009, #2 EDG Major Maintenance Operability Test, Rev. 75
 2-OPT-EG-001, #2 EDG Monthly Start Exercise Test, Rev. 54

Condition Reports

1053387

Other Documents

DC 13-01053, EDG Data Acquisition System Quick Connect and Test Setup, Rev. 14
 DC 16-01096, Rod Control ARW Defeat, Rev. 0
 ETE-NAF-2013-0090, Safety Analysis Evaluation of the Removal of Automatic Rod Withdrawal
 Function at Surry Power Station, Rev. 0

Section 1R19: Post Maintenance Testing

Procedures

1-OPT-FW-020, Turbine Driven AFW Pump Performance Test Less Than 350 degF/450 PSIG,
 Rev. 8
 1-OPT-SI-014, Cold Shutdown Test of SI Check Valves to RCS Hot and Cold Legs, Rev. 22
 SU-VTM-000-38-S095-00002, Instruction Manual Cable Drive Transfer System, Rev. 7

Drawings

11448-2.101-9A, Fuel System Mechanism, Rev. 1

Condition Reports

1052459 1053145

Work Orders

38103628875 38103768585

Other Documents

ETE-SU-2016-0047, Unit 1 Fuel Upender Cable Repair, Rev. 1
 ETE-SU-2016-0052, Engineering Evaluation for Mechanical Agitation of 1-SI-79, Rev. 0

Section 1R20: Refueling and Other Outage Activities

Procedures

1-GOP-2.7, Unit Shutdown, Power Decrease from Allowable Power to Unit Offline for Refueling
 Outage, Rev. 33
 1-OP-RX-009, Dilution to Critical Conditions Following Refueling, Rev. 24

Condition Reports (* NRC Identified)

*1044868	*1044872	1051202	1051211	1051213	1051392
1051627	1051811	1051846	1052164	1052281	1052384
1052455	1052459	1052555	1052723	1052832	1052983
1053071	1053195	*1053358	1053384	1053598	

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1-OPT-CT-201, Containment Isolation Valve Local Leak Rate Testing (Type C Containment Testing), Rev. 23
 1-OPT-RS-001, Containment Outside Recirculation Spray Pumps Flow and Leak Test, Rev. 23
 1-OPT-SI-009, Refueling Test of the LHSI Check Valves to the Hot Legs, Rev. 17 (OTO1)
 1-OPT-ZZ-021, ESF Actuation with Undervoltage and Degraded Voltage – 1J Bus, Rev. 40 (OTO1)

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1050567	1054419
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Work Orders

38103609176	38103620558
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PI-AA-200, Corrective Action, Rev. 31
 RP-AA-106, Radiological Work Control Program, Rev. 3
 RP-AA-201, Access Controls for High and Very High Radiation Areas, Rev. 8
 RP-AA-202, Radiological Posting, Rev. 8
 RP-AA-203, Radiological Labeling and Marking, Rev. 4
 RP-AA-222, Radiation Surveys, Rev. 3
 RP-AA-224, Airborne Radioactivity Surveys, Rev. 3
 RP-AA-225, Unrestricted Release of Material, Rev. 5
 RP-AA-226, Alpha Monitoring, Rev. 5
 RP-AA-231, Radiological Control Areas, Rev. 4
 RP-AA-261, Control of Radiological Diving Activities, Rev. 1
 RP-AA-270, Providing HP Coverage during Work, Rev. 2
 RP-AA-274, Radiation Work Permits, Rev. 6
 RP-AA-274-2001, RWP Writer's Guide, Rev. 0
 0-HPT-ISFSI-001, Independent Spent Fuel Storage Installation (ISFSI) Quarterly Radiological Surveillance, Rev. 13
 0-HPT-TRKSOURCE-001, Inventory of Nationally Tracked Sources by Health Physics, Rev. 4

Records and Data

Excel Spreadsheet, Non-SNM Items in Surry Pool, 9/13/16
 Independent Fuel Storage Facility Installation (ISFSI): Security Fence Survey Map, 1/14/16 and 7/7/16; Perimeter Fence Survey Map, 1/14/16 and 7/7/16;
 ISFSI Quarterly Doses: Calendar 2015, 1/14/16; 2nd Quarter 2016, 7/7/16;
 ISFSI Perimeter Dose Rate Trending Evaluation, ETE-NAF-2011-0139, 11/30/15
 Radioactive Source Master Listing – Sources Requiring Leak Testing (SPS) – 09/01/16
 Restricted and Controlled Area Dose Evaluation: 4th Quarter 2015, 1/7/16; 1st Quarter 2016 4/4/16

Routine Radiological Surveys: Map #510 Boron Recovery Building, Map #512 Decon Building 27' Elevation, Map #375 Aux Building -2' Elevation, Map #350 Aux Building 13' Elevation, Map #325 Aux Building 27' Elevation, Map #300 Aux Building 45' Elevation; 08/16-10/16
 RWP 16-0-1011, Unit 1 Containment Entries with Reactor Online, Rev. 0
 RWP 16-0-2009, U1R27 Low Risk Activities in Radiation Areas – Self Briefing, Rev. 0
 RWP 16-0-2108, U1R27 Fuel Move Activities, Rev. 1
 RWP 16-0-2501, U1R27 HP De-post VHRAs, Rev. 0
 RWP 16-0-2508, U1R27 Reactor Head Lift, Rev. 0
 RWP 16-0-2515, U1R27 Transfer Canal Activities, Rev. 0
 RWP 16-0-2531, U1R27 Fuel Building Transfer Canal Entry for Cable Repairs, Rev. 0
 U1R27 Outage Schedule, 08/30/16
 U1R27 Outage RWP List, 09/29/16
 U1R27 Outage Surveys: Containment Reactor Cavity, 10/26/16; Containment 27' Elevation, 10/26/16; Containment 47' Elevation, 10/31/16; Reactor Head, 10/25/16; Containment Reactor Cavity, 10/25/16; Containment 47' Elevation, 10/24/16; Auxiliary Building 13' Elevation, 10/31/16;
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 10 CFR 61 Analysis, 2014 and 2015 DAW
 2016 Non-Outage RWP List, 9/29/16

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 SAR003162, Contamination Control Program Self-Assessment, 08/31/15
 SAR003166, Radiological Survey Program Review Self-Assessment, 09/30/15
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 RP-AA-103, ALARA Program, Rev. 2
 RP-AA-103-1000, Department, Station and Fleet ALARA Committees, Rev. 5
 RP-AA-274, Radiation Work Permits, Rev. 6
 RP-AA-275, Radiological Risk Assessment Process, Rev. 2
 RP-AA-300, ALARA Reviews and Reports, Rev. 8
 RP-AA-301, ALARA Goals, Rev. 3
 RP-AA-303, ALARA 5 Year Plan, Rev. 1

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ALARA Plan 16-0-2105, U1R27 - Valve Maintenance
 ALARA Plan 16-0-2111: Reactor Reassembly
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 ALARA Post Job Review RWP 15-0-3118, U2R26 Scaffold Activities, 06/06/16

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Surry Power Station Unit 2 2015 Refueling Outage Report, 12/27/15

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Unit 1 EPRI Loop Piping Reading Averages 2009 - 2016

U1R27 Outage Goals, 09/01/16

U1R27 Daily Exposure Report, 11/03/16 and 11/11/16

U1R27 Outage Dose Summary by RWP, 11/11/16.

U1R27 Crudburst Cleanup Curve, 10/26/16

U1R27 Temporary Shielding Request Log, 10/15/16

2015 Station ALARA Goals [Non-Outage], 12/18/14

2016 Station ALARA Goals [Non-Outage], 02/16/16

Corrective Action Program (CAP) Documents (*NRC Identified)

RP and Chemistry Department Self Evaluation Report, June 2016

CR034601, CR562160, CR580397, CR580935, CR582814, CR1007516, CR1013208, CR1013424, CR1014924, CR1021068, CR1034601, CR1052325, CR1052677, CR1052729, and CR1055464*

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Procedures

C-HP-1042.122, Quantitative Fit Testing: PortaCount Pro Fit Testing System, Rev. 12

C-HP-1042.210, Respiratory Hazards Evaluation and Respiratory Protection Selection, Rev. 4

C-HP-1042.230, Airborne Radioactivity Exposure Tracking, Rev. 6

C-HP-1042.510, Atmosphere-Supplying Respiratory Equipment Performance Verification, Rev. 8

C-HP-1042.520, Respiratory Protection Program Equipment Verification, Rev. 6

HP-1042.451, Self-Contained Breathing Apparatus Maintenance, Rev. 3

HP-1042.525, Respiratory Protection Equipment Performance Testing Using the POSICHECK 3, Rev. 2

PI-AA-200, Corrective Action, Rev. 31

RP-AA-104, Internal Radiation Exposure Control Program, Rev. 2

RP-AA-110, Radiological Respiratory Protection Program, Rev. 3

RP-AA-160, Donning and Removal of Respiratory Protection Equipment, Rev. 0

RP-AA-162, Issue and Control of Respiratory Protection Equipment, Rev. 3

RP-AA-163, Inspection and Inventory of Respiratory Protection Equipment, Rev. 5

RP-AA-223, Contamination Surveys, Rev. 4

RP-AA-226, Alpha Monitoring, Rev. 5

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Air Sample Gamma Spectroscopy Analysis Results:

Sample # 13-OCT-2016-0034, A/B 27', Entry into 1-CH-FL-2 cube, 10/13/16

Sample # 26-OCT-2016-0059, U-1 CTMNT Cavity, Head lift, 10/26/16

Sample # 26-OCT-2016-0060, U-1 CTMNT Cavity edge, Head lift, 10/26/16

Sample # 26-OCT-2016-0069, U-1 CTMNT Cavity edge, Head lift, 10/26/16

Sample # 26-OCT-2016-0071, U-1 CTMNT Cavity, Head lift, 10/26/16
 Sample # 27-OCT-2016-0037, U-1 CTMNT Cavity, Upper Internals Lift, 10/27/16
 Sample # 01-NOV-2016-0052, U-1 Fuel Building Xfer Canal, Upender Repair, 11/01/16
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 C-HP-1032.51, Attachment 1, Air Sample Count Room Log, 8/7/16 through 11/2/16
 Grade D Breathing Air Sample Analysis Results for the following:
 SRF "A" Instrument Air Compressor, 4/1/14, 9/26/14, 4/20/15, 9/28/15, and 3/24/16
 SRF "B" Instrument Air Compressor, 8/28/14, 3/3/15, 9/1/15, and 2/25/16
 Station Service Air Compressor, 4/1/14, 9/26/14, 4/20/15, 9/28/15, and 3/24/16
 HP-1033.248 Attachment 3, Lapel Air Sampler (PAS) as an Internal Dosimeter: Plant ID# 478, 11/3/16; Plant ID# 8272, 11/28/16
 HP-1061.052 Attachment 3, Portable Ventilation/Vacuum Cleaner Leak Test Records: Unit ID# EVH-33, 3/10/16; Unit ID# HV 500-16, 9/8/16; Unit ID# HV 500-17, 9/8/16
 Lapel Personal Air Sampler (PAS) as Internal Dosimeter [Internal Dose Calculation Worksheet]: Plant ID# 8272, 11/2/16; Plant ID# 478, 11/3/16
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 MSA MMR Certified C.A.R.E. Technician Certification, 4/1/14
 NUCON International Inc. Radioiodine Test Report, 1-VS-FL-3A, 2/18/16
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 PortaCount Pro, S/N 8030084515, Certificate of Testing, 8/30/16
 PortaCount Pro, S/N 8030084601, Certificate of Testing, 6/30/16
 Posi3 [SCBA Test Equipment], S/N L01906, Certificate of Calibration, Certificate # 56030516L01906, 3/5/16
 RP-AA-131, Attachment 9, Intakes Greater Than or Equal to 1 WBC Action Level [0.1 ALI] for Calendar Year (CY) 2014, 1/9/15
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 WO 38103560976, 1-VS-FL-3A, Auxiliary Building Ventilation Test, 0-M PT-0620-11, 5/13/16
 0-HSP-BSRD-001, Bioassay Program Significant Radionuclide and Whole Body Count (WBC) Action Level Determination, 2/17/14
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C-HP-1031.011, Exposure Control Records and Reports, Rev. 10
 C-HP-1031.023, RWP: Exposure Control Support, Rev. 7
 C-HP-1031.024, Administrative Dose Control, Rev. 5
 C-HP-1031.042, Computerized Personnel Exposure Management System Operation, Rev. 3
 C-HP-1031.302, Calibration of Electronic Dosimeters, Rev. 18
 C-HP-1031.303, Use of Dosimass Software to Configure, Read, and Issue Electronic Dosimeters, Rev. 10
 CY-AA-LQC-400-1000, Confirmatory Measurements Using Blind Samples, Rev. 3
 HP-1031.124, Performing Effective Dose Equivalent from External Exposure (EDEX) Calculations, Rev. 5
 HP-1041.055, Whole Body Counter: Whole Body Counting Individuals, Rev. 6
 PI-AA-200, Corrective Action, Rev. 31
 RP-AA-121, Manual Skin Dose Assessment, Rev. 2
 RP-AA-122, Skin Dose Assessment, Rev. 0
 RP-AA-124, Dosimetry Investigation and Processing, Rev. 7
 RP-AA-138, Declared or Expected Pregnant Woman, Rev. 2
 RP-AA-150, TLD Performance Testing, Rev. 5
 RP-AA-132, Urine and Fecal Sampling and Analysis, Rev. 1
 RP-AA-133, Internal Dose Calculation Based on Radionuclide Intake, Rev. 0
 RP-AA-134, Radionuclide Intake Determination Based on Bioassay Results, Rev. 2
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CA3043722
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 Electronic Dosimeter Calibrator 1, DMC-3000 Dosimeter Calibration Certificate, 11/24/2014, 12/2/15, and 11/7/16
 Excel Spreadsheet, List of 10 CFR 61 Samples – Surry Power Station 1983 through 2016
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 Personnel Contamination Event (PCE) Logs for CY 2014, 2015, and 2016 through 11/28/16
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Report of Analysis/Certificate of Conformance, LIMS# L57808-3, [DAW2014], 3/14/14
Whole Body Counter QA/QC Charts and Data, 8/1/16 through 11/30/16

Condition Reports (*NRC Identified)

554422 570473 580719 1003192 1052677

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Procedures

C-HP-1033.011, Check Source Reference Readings and Geotropism Checks for Portable Instruments, Rev. 5
C-HP-1033.012, Portable Radiation Protection Instrumentation Control, Rev. 3
C-HP-1033.021, Reference Sources for Radiation Protection Instrumentation, Rev. 0
C-HP-1033.532, MGP AMP100/200: Calibration and Operation, Rev. 3
C-HP-1033.533, MGP Telepole: Calibration and Operation, Rev. 4
C-HP-1033.540, Eberline RO-2, RO-2A, RO-20, and Thermo Scientific RO-20AA: Calibration and Operation, Rev. 6
C-HP-1033.610, Eberline Air Monitor AMS-4 Calibration and Operation, Rev. 7
C-HP-1033.620, Portable Air Samplers Calibration and Operation, Rev. 9
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EP-AA-303, Equipment Important to Emergency Response, Rev. 14
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HP-1033.020, Radiation Protection Instrument Calibration Facility Use, Rev. 3
HP-1033.148, Canberra iSolo Performance Checks, Rev. 3
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HP-1033.742, Calibration of Canberra Argos 5PAB Personnel Contamination Monitor, Rev. 1
HP-1041.045, Whole Body Counter: Performance Checks, Rev. 6
HP-1041.065, Whole Body Counter: Calibration, Rev. 1
IMP-C-RM-36, Radiation Monitoring System Maintenance, Rev. 36
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0-IPM-RM-G-002, 945B Series Area Radiation Monitor Ratemeter and Detector Calibration, Rev. 6, 17, and 18
1-IPT-CC-RM-RMS-127, Containment High Range Area Radiation Monitor 1-RM-RMS-127 Channel Calibration, Rev. 3
1-IPT-CC-RM-RMS-128, Containment High Range Area Radiation Monitor 1-RM-RMS-128 Channel Calibration, Rev. 3
2-IPT-CC-RM-RMS-227, Containment High Range Area Radiation Monitor 2-RM-RMS-227 Channel Calibration, Rev. 3
2-IPT-CC-RM-RMS-228, Containment High Range Area Radiation Monitor 2-RM-RMS-228 Channel Calibration, Rev. 3

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Calibration Certificate - Canberra Genie/Apex, Detector 4, S/N 3902328, 9/29/16
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 HP-1041.065, Attachment 1 and 2, Efficiency Calibration Summary and Calibration Record – Whole Body Counter (Standup), 8/20/14 and 9/25/15
 HP-1041.065, Attachment 1 and 2, Efficiency Calibration Summary and Calibration Record – Whole Body Counter (Chair), 8/22/14 and 9/25/15
 Model 848-8 Field Calibrator Calibration Data Sheet, 977 Detector, 848-8 S/N 231, 3/26/96
 Model 878-10 High Range Calibrator Log Sheet, 878-10 S/N 105, 3/19/02
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 AMP-100 – S/N 5001-070, 4/15/15 and 6/30/16; S/N 5012-040, 9/12/14 and 6/30/16
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 E-130A – S/N 421, 8/15/12 and 4/30/14
 E-520 – S/N 3065, 6/20/13 and 6/20/14
 H-809-V11 Air Sampler – S/N 11269, 9/16/16
 H-809-V1 Air Sampler – S/N 7371, 9/15/15 and 9/20/16
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 MicroREM – S/N 2061, 7/15/13 and 8/28/14; S/N B772V, 4/21/14 and 4/3/15
 Radeye G - S/N 30262, 10/22/15 and 9/21/16; S/N 30462, 3/10/16
 Radeye GX - S/N 11250, 1/20/15 and 11/3/15; S/N 11580, 3/9/16
 Radeye PRD - S/N 31300, 4/14/16
 Radeye SX - S/N 0430, 4/10/15 and 1/26/16; S/N 0431, 4/14/15
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 RO-20 – S/N 0491, 2/30/15 and 6/9/16; S/N 12074, 9/14/15 and 8/20/16
 RO-7 – S/N 756 with RO-7-BH probe S/N 409102, 8/19/14 and 9/17/15
 RSO-50E – S/N 193, 10/16/12; S/N 352, 9/18/13 and 6/26/14
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103565, 8/5/16; Source # 103566, 8/5/16; Source # 103567, 8/5/16; Source # 103568, 8/5/16; Source # 103569, 8/5/16; Source # 103570C, 8/26/16; Source # 103571, 8/5/16; Source # 103572, 8/5/16; Source # 103573, 8/5/16; Source # 103574, 8/5/16; Source # 103575, 8/5/16; Source # 100739, 7/30/15; Source # 100740, 7/30/15; Source # 100741, 7/30/15; Source # 100742, 7/30/15; Source # 100743, 7/30/15; Source # 100744, 7/30/15; Source # 149821 - UH 348, 3/19/2012; Source # 149821 - UH 347, 3/19/12; Source # 81041-44, 11/23/09; Source # 96892, 7/1/14; Source # 96887, 7/1/14; Source # 96888, 7/1/14; Source # 96889, 7/1/14; Source # 96890, 7/1/14; Source # 96891, 7/1/14; Source # 100739, 7/1/15; Source # 100740, 7/1/15; Source # 100741, 7/1/15; Source # 100742, 7/1/15; Source # 100743, 7/1/15; Source # 100744, 7/1/15

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WO 38103082822, CAL Control Room Area Rad Monitor, 1-RM-RMS-157, 7/8/13

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WO 38103424220, CAL Manipulator Crane Area Rad Monitor, 1-RM-RMS- 1-RM-RMS-162, 4/22/14

WO 38103439917, Cont High Range Area Rad Mon, 1-RM-RMS-127 Channel Calib, 5/14/15

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