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

July 28, 2011

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

SUBJECT: SURRY POWER STATION – NRC INTEGRATED INSPECTION REPORT 05000280, 281/2011003 and 0720055/2011001

Dear Mr. Heacock:

On June 30, 2011, the United States Nuclear Regulatory Commission (NRC) completed an inspection at your Surry Power Station, Units 1 and 2. The enclosed inspection report documents the inspection results, which were discussed on July 27, 2011, with Mr. Gerald Bischof and other members of your staff.

The inspection examined activities conducted under your licenses as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your licenses. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

The report documents two NRC-identified findings of very low safety significance (Green) which were determined to involve violations of NRC requirements. In addition, five licensee-identified violations which were determined to be of very low safety significance are listed in this report. The NRC is treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2 of the NRC Enforcement Policy because of the very low safety significance of the violation and because it is entered into your corrective action program. If you contest any NCV, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN.: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Surry Power Station.

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

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

Sincerely,

/RA/

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

Docket Nos.: 50-280, 50-281, 72-55
License Nos.: DPR-32, DPR-37, SNM-2501

Enclosure: Inspection Report 05000280, 281/2011003 and 0720055/2011001
w/Attachment: Supplemental Information

cc w/encl. (See page 3)

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Letter to David A. Heacock from Gerald J. McCoy dated July 28, 2011

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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos.:	50-280, 50-281, 72-55
License Nos.:	DPR-32, DPR-37, SNM-2501
Report No:	05000280/2011003, 05000281/2011003, 0720055/2011001
Licensee:	Virginia Electric and Power Company (VEPCO)
Facility:	Surry Power Station, Units 1 and 2 and Independent Spent Fuel Storage Installation (ISFSI)
Location:	5850 Hog Island Road Surry, VA 23883
Dates:	April 1, 2011 through June 30, 2011
Inspectors:	R. Clagg, Acting Senior Resident Inspector J. Nadel, Resident Inspector B. Collins, Reactor Inspector (40A5) M. Endress, Reactor Inspector (In Training) L. Lake, Senior Reactor Inspector (1R07) M. Coursey, Reactor Inspector (1R08) C. Fletcher, Senior Reactor Inspector (1R08.4) C. Jones, Senior Construction Inspector D. Jones, Senior Reactor Inspector (4OA5.2) T. Morrissey, SRI Crystal River J. Montgomery, Reactor Inspector (4OA5.2) R. Rodriguez, Senior Reactor Inspector (4OA5.2) S. Sandel, Senior Reactor Inspector (4OA5.2) R. Carrion, Senior Reactor Inspector (4OA7)
Approved by:	Gerald J. McCoy, Chief Reactor Projects Branch 5 Division of Reactor Projects

Enclosure

SUMMARY OF FINDINGS

IR 05000280/, 281/2011003 and 0720055/2011001; 04/01/2011–06/30/2011; Surry Power Station, Units 1 and 2: Event Followup and Other Activities.

The report covered a 3 month period of inspection by resident inspectors and an announced inspection by regional specialists. This report contains two findings which were non-cited ciolations. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). The cross-cutting aspect was determined using IMC 0310, "Components Within The Cross-Cutting Areas." Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process" Revision 4, dated December 2006.

A. NRC Identified & Self-Revealing Findings

Cornerstone: Mitigating Systems

- Green. A Green non-cited violation of Surry Units 1 and 2 Operating License Condition 3.I, "Fire Protection," was identified by the inspectors for failure to have adequate qualification testing results, as directed by Appendix A to Branch Technical Position APCSB 9.5-1. Specifically, the licensee did not have sufficient testing results to qualify certain aluminum conduit configurations that penetrate 3-hour fire rated barriers separating fire areas containing redundant equipment required for safe shutdown. As part of the corrective actions, the licensee performed testing to determine the qualification of aluminum conduit penetrations, and performed modifications, as appropriate, to restore compliance.

  The finding is more than minor because it is associated with the reactor safety Mitigating Systems cornerstone attribute of protection against external factors (i.e., fire) and it affects the cornerstone objective of ensuring the reliability and capability of systems that respond to initiating events. Specifically, not having qualification testing results for aluminum conduits that penetrate fire rated barriers adversely affected the fire confinement capability defense-in-depth element because subsequent testing revealed some conduit configurations that did not meet the penetration seal criteria established in Branch Technical Position APCSB 9.5-1. The inspectors used the guidance of NRC Inspection Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process," and determined that the performance deficiency represented a finding of very low safety significance (Green). Specifically, the fire areas in question either contained a non degraded automatic gaseous or water-based fire suppression system, or the exposed fire areas did not contain potential damage targets that are unique from those in the exposing fire areas. Inspectors determined that no cross cutting aspect was applicable to this performance deficiency because this finding was not indicative of current licensee performance. (Section 4OA5.3)

Cornerstone: Emergency Preparedness

- Green. A Green non-cited violation was identified by the inspectors for the licensee's failure to classify and declare a Notification of Unusual Event when conditions warranted as required by 10 CFR 50.54(q) and 10 CFR 50.47(b)(4).

  The inspectors reviewed IMC0612, Appendix B, and determined that the finding was more than minor because it adversely affected the Emergency Response Organization performance attribute of the Emergency Preparedness cornerstone objective to ensure that the licensee is capable of implementing adequate measures to protect the health and safety of the public in the event of a radiological emergency. Since the finding involved a failure to comply with regulatory requirements during an actual event, the inspectors reviewed IMC0609, Appendix B, Sheet 2, and determined that this was a finding of very low safety significance (Green) because it involved the failure to declare a Notification of Unusual Event. The cause of this finding involved the cross-cutting area of human performance, the component of decision making, and the aspect of conservative assumptions and safe actions, H.1(b), because the licensee failed to use conservative assumptions in the decision to not classify and declare the event as an Unusual Event. (Section 4OA3.3)

B. Licensee Identified Violations

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

REPORT DETAILS

Summary of Plant Status

Unit 1 operated at or near full rated thermal power (RTP) from the beginning of the report period until April 16, 2011, when an automatic reactor trip occurred following a loss of offsite power due to a tornado in the vicinity of the switchyard. The unit returned to RTP on April 25, 2011, and remained in this condition until the end of the report period.

Unit 2 operated at or near 98% power from the beginning of the report period until April 16, 2011, when an automatic reactor trip occurred following a loss of offsite power due to a tornado in the vicinity of the switchyard. The unit then began a previously scheduled refueling outage and returned to 98% on June 27, 2011, where it remained until the end of the report period.

REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection

.1 Review of Offsite Power and Alternate AC Power Readiness

a. Inspection Scope

The inspectors verified that plant features, and procedures for operation and continued availability of offsite and alternate alternating current (AC) power systems were appropriate.

The inspectors reviewed the licensee's procedures affecting those areas, and the communications protocols between the transmission system operator and the nuclear power plant to verify that the appropriate information was exchanged when issues arose that could impact the offsite power system. The inspectors evaluated the readiness of the offsite and alternate AC power systems by reviewing the licensee's procedures that address measures to monitor and maintain the availability and reliability of the offsite and alternative AC power systems.

b. Findings

No findings were identified.

.2 Seasonal Readiness Reviews for Hot Weather

a. Inspection Scope

The inspectors reviewed the licensee's preparations for seasonal hot weather. Inspection focused on verification of design features and implementation of the licensee's procedure for hot weather conditions, 0-OSP-ZZ-003, "Hot Weather Preparation," Revision 1. The inspectors walked down key structures (i.e. the turbine

and auxiliary buildings, safeguards buildings, the emergency switch gear rooms, and emergency battery rooms) and verified HVAC systems were operating properly and that area temperatures remained within design requirements specified in the UFSAR. The mitigating systems reviewed during this inspection include: the auxiliary feedwater systems, the refueling water storage tanks, emergency diesel generators, and emergency switchgear.

b. Findings

No findings of significance were identified.

.3 Site Specific Weather

a. Inspection Scope

The inspectors performed a site specific weather related inspection due to anticipated adverse weather conditions, specifically for tornado watches/warnings which occurred on April 16th and 28th, 2011. The inspectors reviewed the licensee's preparations for potential severe weather as well as severe weather procedures Operations Check List (OC) 21, "Severe Weather," and 0-AP-37.01, "Abnormal Environmental Conditions," Revision 57. The inspectors walked down site areas which included the electrical switchyard, 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.

b. Findings

No findings were identified.

1R04 Equipment Alignment

a. Inspection Scope

The inspectors conducted three 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, Updated Final Safety Analysis Report (UFSAR), 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.

- Unit 2 'A' low head safety injection (LHSI) subsystem following RFO maintenance
- Unit 2 'B' LHSI subsystem following RFO maintenance

- Unit 2 'A' motor driven auxiliary feedwater (MDAFW) pump during 'B' MDAFW pump maintenance

b. Findings

No findings were identified.

1R05 Fire Protection

.1 Quarterly Fire Protection Reviews

a. Inspection Scope

The inspectors conducted tours of the four 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 3, CM-AA-FPA-101, "Control of Combustible and Flammable Materials," Revision 3, and CM-AA-FPA-102, "Fire Protection and Fire Safe Shutdown Review and Preparation Process and Design Change Process," Revision 2. 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.

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- Units 1 and 2 turbine building operating floor (Fire Area 31)
- Units 1 and 2 turbine building general area (Fire Area 31)
- Units 1 and 2 turbine building basement (Fire Area 31)
- Unit 2 containment (Fire Area 16)

b. Findings

No findings were identified.

1R07 Heat Sink Performance (71111.07T)

.1 Triennial Review of Heat Sink Performance

a. Inspection Scope

The inspectors reviewed completed surveillances, performance test results and cooler inspection results associated with the Component Cooling Water heat exchangers (CCW

HX) and the Unit Residual Heat Removal heat exchangers (RHR HX), Charging Pump Coolers, and unit Chillers. These heat exchangers were chosen based on their risk significance in the licensee's probabilistic safety analysis and their important safety related mitigating system support functions.

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

Inspectors also reviewed the methods and results of heat exchanger performance inspections. The inspectors determined whether the methods used to inspect and clean heat exchangers were consistent with as found conditions identified and expected degradation trends and industry standards, the licensee's inspection and cleaning activities had established acceptance criteria consistent with industry standards, and the as found results were recorded, evaluated, and appropriately dispositioned such that the as left condition was acceptable. In addition eddy current test reports and visual inspection records were reviewed to determine the structural integrity of the heat exchanger.

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

The inspectors determined whether the licensee's inspection of the UHS was thorough and of sufficient depth to identify degradation of the shoreline protection or loss of structural integrity. This included determination whether vegetation present along the slopes was trimmed, maintained and was not adversely impacted by the embankment. In addition, the inspectors determined whether the licensee ensured sufficient reservoir capacity by trending and removing debris or sediment buildup in the UHS.

The inspectors performed a system walkdown on service water and closed cooling water systems, which included the CCW Surge tank, the CCW heat exchangers, Recirc Spray Pumps, Bearing Cooling Water Coolers, Chiller Condensers, and Charging Pump Coolers to determine whether the licensee's assessment on structural integrity was adequate. In addition, the inspectors reviewed available licensee's testing and inspections results and any adverse trends since the last NRC inspection. The inspectors interviewed the Service Water system engineer to identify adverse make-up trends that could be indicative of excessive leakage out of the closed system.

The inspectors performed a system walkdown of the service water intake structure to determine whether the licensee's assessment on structural integrity and component functionality was adequate and that the licensee ensured proper functioning of traveling screens and strainers, and structural integrity of component mounts. In addition, the inspectors determined whether service water pump bay silt accumulation was monitored, trended, and maintained at an acceptable level by the licensee, and that water level instruments were functional and routinely monitored. Also, the inspectors observed the visual inspection of the CD system Ht exchanger 1-VS-E-4D and its suction and discharge piping

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

These inspection activities constituted three heat sink inspection samples as defined in IP 71111.07.

b. Findings

No findings were identified.

1R08 Inservice Inspection (ISI) Activities (71111.08P)

.1 Non-Destructive Examination (NDE) Activities and Welding Activities

a. Inspection Scope

From April 25, 2011 to May 13, 2011, the inspectors reviewed the implementation of the licensee's In-service Inspection (ISI) program for monitoring degradation of the reactor coolant system (RCS) boundary and risk significant piping boundaries of Unit 2. The inspectors' activities consisted of an on-site review of NDE to evaluate compliance with the applicable edition of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (BPVC), Section XI (Code of record: 1998 Edition with 2000 Addenda), and to verify that indications and defects (if present) were appropriately evaluated and dispositioned in accordance with the requirements of the ASME Code, Section XI acceptance standards.

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

- Ultrasonic Testing (UT) of ASME Class 1 weld 6-SI-249 6 inch Diameter Safety Injection Valve to Pipe
- VT-3 Report of 11548-WMKS-0125A1/4-RC-314/2-RC-H036
- UT examination of 2-FW-S-200 for FAC

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

- WO38102661659 02-CH-455 Valve Replacement
- WO38102625254 02-SI-85, Replace Valve Seat on Check Valve

b. Findings

No findings were identified.

.2 PWR Vessel Upper Head Penetration (VUHP) Inspection Activities

a. Inspection Scope

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

b. Findings

Not applicable

.3 Boric Acid Corrosion Control (BACC) Inspection Activities

a. Inspection Scope

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

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

- CR424636 – boric acid on 2-CH-ICV-3653
- CR410539 – boric acid at valve stem and gland of 2-SI-166.

- CR410961 – boric acid on 1-CH-E-2 (flange)

The inspectors reviewed the following 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 Section XI and 10 CFR Part 50, Appendix B, Criterion XVI.

- CR410962- Boric acid on CH-MOV-1115E
- CR410964- Boric acid on 1-CH-PCV-1145
- CR411944- Boric acid on 1-SI-169

b. Findings

No findings were identified.

.4 Steam Generator (SG) Tube Inspection Activities

a. Inspection Scope

The inspectors reviewed activities, plans, and procedures for the examination and evaluation of Unit 2 steam generators (SG) B and C tubes to determine if activities were being conducted in accordance with TS, the applicable ASME Section XI Code, Nuclear Energy Institute (NEI) 97-06, Steam Generator Program Guidelines.

The inspectors reviewed the scope of the eddy current (EC) examinations to verify it included the applicable potential areas of tube degradation. The inspectors also verified that appropriate inspection scope expansion criteria were planned based on inspection results. Additionally, the inspectors reviewed EC examination status reports to ensure that all tubes with relevant indications were appropriately screened for in-situ pressure testing. Based on the EC examination results, no new degradation mechanisms were identified, no EC scope expansion was required, and none of the SG tubes examined met the criteria for in-situ pressure testing. Additionally, none of the SG tubes examined met the criteria for tube-plugging.

The inspectors reviewed the last Condition Monitoring and Operational Assessment report to assess the licensee's prediction capability for maximum tube degradation. The inspectors' review also included the licensee's repair criteria and repair process to ensure they were consistent with plant Technical Specifications and industry guidelines. The inspectors also reviewed the primary to secondary leakage (e.g., SG tube leakage) history for the last operating cycle. The inspectors noted that primary to secondary leakage was below the detection threshold during the previous operating cycle.

Additionally, the inspectors reviewed documentation to ensure that data analysts, EC probes, and equipment configurations were qualified to detect the existing and potential SG tube degradation mechanisms. The inspectors' review included a sample of site-specific Examination Technique Specification Sheets (ETSSs) to ensure that their qualification was consistent with Appendix H or I of the Electric Power Research Institute Pressurized Water Reactor Steam Generator Examination Guidelines, Revision 7. The

inspectors also directly observed a sample of EC data acquisition in SGs B and C (Cold Leg and Hot Leg sides). Furthermore, the inspectors reviewed a sample of EC data with a qualified data analyst for the following tubes: SG B (R018C006, R019C006, R015C078, R015C075, and R13C076). Finally, the inspectors reviewed the licensee's corrective actions for indications (either from EC or secondary side visual inspections) of potential loose parts on the SG secondary side, including direct observation of Foreign Object Search and Retrieval (FOSAR) activities.

b. Findings

No findings were identified.

.5 Identification and Resolution of Problems

a. Inspection Scope

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

b. Findings

No findings were identified.

1R11 Licensed Operator Requalification Program

a. Inspection Scope

The inspectors observed an evaluated licensed operator simulator exercise given on June 7, 2011, using scenario RQ-11.7-3-SP-1, Rev. 0. The scenario involved both operational transients and plant casualties, including failure of pressurizer pressure control channel, leak in the chemical and volume control system, and steam generator tube rupture. The inspector verified that simulator conditions were consistent with the scenario and reflected the actual plant configuration (i.e., simulator fidelity). The inspector observed the crew's performance to determine whether the crew met the scenario objectives; accomplished the critical tasks; demonstrated the ability to take timely action in a safe direction and to prioritize, interpret, and verify alarms; demonstrated proper use of alarm response, abnormal, and emergency operating procedures; demonstrated proper command and control; communicated effectively; and appropriately classified events per the emergency plan. The inspector observed the evaluators' post scenario critique and confirmed items for improvement were identified and discussed with the operators to further enhance performance.

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 4, ER-AA-MRL-100, "Implementing the Maintenance Rule," Revision 4, the Surry Maintenance Rule Scoping and Performance Matrix, and industry guidance contained in NUMARC 93-01, "Industry Guidance for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," Revision 2.

- MRE013176, M-rule evaluation to ENG (2-RC-LI-200A not tracking with local level indication)
- MRE013549, Evaluation to Engineering for 2-SI-P-1A

b. Findings

No findings of significance were identified. The inspectors continue to review issues related to reactor coolant system instrumentation erratic level indication under URI 05000281/2011002-01, Reactor Coolant System Instrumentation Erratic Level Indication.

1R13 Maintenance Risk Assessments and Emergent Work Control

a. Inspection Scope

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

reviewed the corrective action program to verify deficiencies in risk assessments were being identified and properly resolved.

- Units 1 and 2 risk associated with tornado warning declared for the area
- Units 1 and 2 risk associated with grid instability
- Units 1 and 2 risk associated with turbine building to emergency switchgear room flood dike removed during 2A battery replacement
- Unit 2 risk associated with RCS draining to decreased inventory condition
- Unit 2 risk associated with 'H' bus logic testing with no LHSI flow paths available

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 determinations of operability followed procedural requirements of OP-AA-102, "Operability Determination." The inspectors reviewed the corrective action program to verify deficiencies in operability determinations were being identified and corrected.

- CR421638, 2G-A3 received, 2-SI-P-1A seal head tank level low
- CR428878, Helicoil installation of CW spray shields
- CR428648, NRC found items in U2 after containment closeout
- CR427585, D/P for 2-CH-P-1C in the inoperable range for 2-OPT-SI-024

b. Findings:

No findings were identified.

1R18 Plant Modifications

Permanent Modifications

a. Inspection Scope

The inspectors reviewed the completed permanent plant modification design change package (DCP) SU-11-01049, "Loop stop MOV stem connection modification." The inspectors reviewed 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.

b. Findings

No findings were identified.

1R19 Post Maintenance Testing

a. Inspection Scope

The inspectors reviewed five 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 13.

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- WO38103036177, 2A battery monthly/quarterly checks following battery replacement
- WO38102727894, Refueling test of the LHSI check valves to the cold legs
- WO38102692366, Refueling test of the LHSI check valves to the hot legs
- WO38103047094, 2-CH-19 internals and bonnet replacement
- WO38103055614, 2-RH-MOV-2720B valve repair

b. Findings

Introduction: An unresolved item (URI) was identified by the inspectors relating to an unplanned dilution caused by primary grade (PG) water leakage past 2-CH-19 and into the RCS on Unit 2.

Description: On May 28, 2011, while Unit 2 was operating in Intermediate Shutdown (>200 °F, 310 psi), a control room operator noticed a decreasing level trend in the primary grade water tank over the past 2.5 hours. Additionally, it was noted that volume control tank and pressurizer level trends were increasing and charging seal injection flow was 101 gpm with letdown flow of 85 gpm. The licensee entered their abnormal procedure for emergency boration and conducted two emergency borations of the RCS while sampling RCS boron concentration and monitoring shutdown margin.

Subsequently, it was identified that the cation demineralizer primary grade header isolation valve, 2-CH-19, indicated closed but was allowing primary grade water to leak by. This caused reverse flow through the cation demineralizer and introduced primary grade water into the RCS via the VCT. The licensee estimated that up to 30,000 gallons of PG water could have entered the RCS. Just prior to this event maintenance was

conducted on 2-CH-19 and the valve was returned to service in a condition that allowed the primary grade water leakage flow path described above. The licensee entered this issue into their CAP as CR428947, and initiated Root Cause Evaluation (RCE) 001054.

The inspectors require additional information, including the licensee's completed investigation in RCE001054, to determine if there is a performance deficiency which is more than minor. This issue is identified as URI 05000281/2011003-01, Unplanned Dilution of Unit 2 RCS.

1R20 Refueling and Other Outage Activities

.1 Unit 2 Forced Outage

a. Inspection Scope

The inspectors reviewed the outage safety review and related contingency plans for the Unit 2 refueling outage, which began on April 16, 2011, to confirm 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 Inspection Procedure 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.

- Licensee configuration management, including daily outage reports, to evaluate maintenance of defense-in-depth commensurate with the OSR 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
- Installation and configuration of reactor coolant pressure, level, and temperature instruments to provide accurate indication and an accounting for instrument error
- 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
- Monitoring of decay heat removal.
- Controls to ensure that outage work was not impacting the ability of the operators to operate the spent fuel pool cooling system
- Reactor water inventory controls including flow paths, configurations, and alternative means for inventory addition, and controls to prevent inventory loss
- Controls over activities that could affect reactivity
- Refueling activities, including fuel handling and sipping to detect fuel assembly
- Startup and ascension to full power operation, tracking of startup prerequisites, 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 refueling outage activities.

b. Findings

No findings were identified.

1R22 Surveillance Testing

a. Inspection Scope

For the six 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.

In-Service Testing:

- 2-OPT-SI-002, "Refueling Test of the Low Head Safety Injection Check Valves to the Cold Legs," Revision 16

Containment Isolation Valve

- 2-OPT-CT-201, "Containment Isolation Valve Local Leak Rate Testing (Type C Containment Testing)," Revision 19, Penetration 63

Surveillance Testing:

- 2-OPT-SI-012, "Refueling Test Of LHSI Lines To Charging Pumps," Revision 13
- 2-OPT-RH-003, "RHR System Operability Test," Revision 15
- 2-OPT-SI-024, "Charging Pump Head Curve Verification and Comprehensive Test," Revision 7

b. Findings

No findings were identified.

4OA1 Performance Indicator (PI) Verification

a. Inspection Scope

The inspectors performed a periodic review of the two 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 6. 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 April 1, 2010 through March 31, 2011. Documents reviewed included applicable NRC inspection reports, licensee event reports, operator logs, station performance indicators, and related CRs.

Mitigating Systems Cornerstone

- Safety System Functional Failures (SSFF)

Barrier Integrity Cornerstone

- RCS Specific Activity
- RCS Leakage

b. Findings

No findings were identified.

4OA2 Identification and Resolution of Problems

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

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

.2 Annual Sample: Review of Dual Unit Trip and Loss of Offsite Power due to a Tornado Impacting the 230 Kv and 500 Kv Switchyards

a. Inspection Scope

Over the period of April 18 - 20, 2011, the inspectors reviewed the licensee's in-progress and completed corrective actions associated with a dual unit trip due to a loss of offsite power to both units on April 16 to verify they were timely and appropriate. The corrective actions were reviewed against the applicable performance attributes contained in NRC inspection procedure 711152, "Identification and Resolution of Problems."

The loss of offsite power was a result of a tornado striking both the 230 KV and 500 KV switchyards. Flying debris demolished numerous bus support insulators and transformer and switch bushings. Neither of the two 500 KV buses were still intact after the tornado passed. The two 230 KV buses (3 and 4) were degraded, but still energized after the passing of the tornado. Prior to restoration of power to reserve station service transformers (RSST) A and B, Transmission and Distribution engineers inspected the available switchyard structures and equipment, including metering and protection

equipment. Licensee engineers determined the offsite feed from Switchyard Bus 3, via Transformer 4 and Switchyard Bus 7 was suitable for short-term service. The inspectors reviewed the engineering analysis of the electrical loads created by this unique distribution system configuration to verify it was adequate to establish cold shutdown of both reactor units. On April 19, the licensee completed restoration of two physically independent connections to the offsite transmission network (i.e. connections to Switchyard Buses 6 and 7).

The inspectors performed walkdowns of the switchyard, areas in and around the tornado path, and intake canal to verify that the licensee completely and accurately identified tornado damage and took appropriate immediate corrective actions. The inspectors verified that actions were taken to protect the emergency diesel generators and switchyard feed when they were the only source of power to the units. In addition, the inspectors walked down the Unit 1 feed water and condensate systems that had experienced water hammer after the plant trip to verify the licensee had properly identified any equipment damage. Licensee documents reviewed are listed in the report attachment.

b. Findings and Observations

No findings were identified. The inspectors determined that the licensee's damage assessments of the tornado impacted switchyards were comprehensive and thorough. The inspectors observed that, considering the degraded condition of Switchyard Bus 3, the licensee appropriately decided to maintain the Notice of Unusual Event (NOUE) emergency classification until after an alternative connection could be made to the offsite transmission network. The inspectors noted that the engineering analysis of the electrical loads created by the unique distribution system configuration needed to accomplish cold shutdown of both reactor units employed an industry accepted methodology for the analysis. The inspectors determined the analysis correctly modeled the electrical distribution system and demonstrated the electrical distribution had sufficient margin to carry the special alignment. The inspectors verified that systems, structures and components important to safety, other than the switchyards, were not impacted by the tornado. The inspectors determined that the licensee appropriately identified and assessed damage caused by the water hammer in the Unit 1 feedwater and condensate systems following the unit trip.

.3 Semi-Annual Trend Review

a. Inspection Scope

The inspectors performed a review of the licensee's correction action program documents to identify trends that could indicate the existence of a more significant safety issue. The inspectors' review was focused on repetitive equipment and corrective maintenance issues but also considered the results of daily inspector corrective action program item screening discussed in Section 4OA2.1. The review included issues documented outside the normal correction action program in system health reports, corrective maintenance work orders, component status reports, site monthly meeting

reports, and maintenance rule assessments. The inspectors' review nominally considered the six month period of January through June 2011, although some examples expanded beyond those dates when the scope of the trend warranted.

The inspectors compared and contrasted their results with the results contained in the licensee's latest integrated quarterly assessment report. Corrective actions associated with a sample of the issues identified in the licensee's trend report were reviewed for adequacy.

b. Assessment and Observations

No findings of significance were identified. In general, the licensee has identified trends and has addressed the trends with their corrective action program. However, the inspectors noted an adverse trend for CAP documents regarding issues with the Unit 2 RCS standpipe remote level indication, 2-RC-LI-200A. Subsequent review of the licensee's recent CAP trend reports identified that the licensee had failed to identify an adverse trend regarding this issue. The inspectors identified several CAP documents dating to 2008 that documented issues with this shutdown level indicator. Specifically, the inspectors identified the following documents regarding this issue:

- CR097576, RCS standpipe level deviated from level recorder and level indicator
- CR098865, RCS standpipe indication
- MRE006751, M-rule evaluation to Engineering (2-RC-LI-200A)
- CR356656, 2-RC-LI-200A showing erratic indication
- MRE011352, M-rule to Engineering (2-RC-LI-200A showing erratic indication)
- CR35674, RCS standpipe recorder showed momentary level decrease
- CR358397, Standpipe level erratic during initial draindown
- CR359052, 2-RC-LI-200A showing erratic indication
- CR359069, 2-RC-LR-200 and 2-RC-LI-200A show erratic indication for U-2 RCS standpipe
- CR412896, Unit 2 standpipe level indication was not tracking with local level indication
- MRE013176, M-rule evaluation to ENG (2-RC-LI-200A not tracking with local level indication)
- CR413022, Deviation developed between U-2 MCR standpipe/containment indication
- MRE013188, M-rule evaluation to Engineering (U-2 RCS standpipe level indication deltas)

The licensee has acknowledged the identified trend and captured it in their CAP under CR413227. The inspectors continue to review issues related to reactor coolant system instrumentation erratic level indication under URI 05000281/2011002-01, Reactor Coolant System Instrumentation Erratic Level Indication.

4OA3 Event Follow-up

.1 (Closed) Licensee Event Report (LER) 05000281/2011-001-00: Auto Reactor Trip on Low Coolant Flow Due to Loop Stop Valve Failure

On February 2, 2011, with Unit 2 operating at 98% power, an automatic reactor trip occurred as a result of low flow in the 'C' RCS loop. The cause of the low flow condition was determined to be the 'C' RCS cold leg loop stop valve disc separating from the valve stem and falling into the flow stream. The licensee entered this issue into their CAP, performed an extent of condition review, and developed corrective actions which are still in progress. This LER is closed.

.2 Units 1 and 2 Automatic Reactor Trip Following a Loss of Offsite Power

a. Inspection Scope

The inspectors responded to an automatic reactor trip of Units 1 and 2 on April 16, 2011, due to a loss of offsite power following a tornado strike on the 230kV and 500kV switchyard. The inspectors discussed the trips with operations, engineering, and licensee management personnel to gain an understanding of the event and assess follow up actions. The inspectors reviewed operator actions taken in accordance with licensee procedures and reviewed unit and system indications to verify that actions and system responses were as expected. The inspectors will perform a detailed review of the cause of the event during a subsequent review of the licensee's respective licensee event report. The inspectors also reviewed the initial licensee notifications to verify that the requirements specified in NUREG-1022, "Event Reporting Guidelines", Revision 2, were met.

b. Findings

No findings were identified.

.3 Nitrogen Leak in Unit 2 Containment

a. Inspection Scope

The inspectors reviewed information available concerning a leak of liquid nitrogen from freeze seal equipment associated with maintenance in the Unit 2 containment on June 5, 2011. The inspectors discussed the event with operations, engineering, maintenance, and licensee management personnel to gain an understanding of the event and assess follow up actions. The inspectors reviewed operator actions taken in accordance with licensee procedures to verify that actions were as expected. The inspectors also reviewed the licensee's actions to verify that the requirements specified in NUREG-1022, "Event Reporting Guidelines," Revision 2, were met.

b. Findings

Introduction: A Green non-cited violation (NCV) was identified by the inspectors for the licensee's failure to classify and declare a Notification of Unusual Event when conditions warranted as required by 10 CFR 50.54(q) and 10 CFR 50.47(b)(4).

Description: On June 3, 2011, the licensee initiated maintenance on a residual heat removal (RHR) system valve inside the Unit 2 containment and utilized a liquid nitrogen freeze seal to isolate the job site from the RCS. The licensee proceduralized normal operations in this condition to include monitoring of the local atmosphere with portable oxygen monitors, which were set to alarm at oxygen levels less than 19.5 percent, continuous monitoring of the freeze seal, and periodic measurement of nitrogen exhaust flow. Additional contingency actions were established in the event of a problem which included installation of a temporary cover on the open valve body, securing the liquid nitrogen supply to the freeze seal, and use of self-contained breathing apparatus by personnel inside the Unit 2 containment. At approximately 0501 on June 5, 2011, the local portable monitors alarmed indicating an oxygen deficient atmosphere existed in the vicinity of the freeze seal. Subsequent readings, taken approximately twenty minutes later, by meters brought to the job site indicated oxygen levels of approximately 19.3%, thus validating the initial alarm. The licensee implemented the contingency actions listed above, evacuated personnel from the maintenance area, and determined that a nitrogen leak was the cause of the alarm. The licensee operated in this configuration until approximately 0500 on June 6, 2011. No emergency classification was made.

The Occupational Safety and Health Administration (OSHA) identifies liquid nitrogen as an asphyxiant. OSHA defines an oxygen deficient atmosphere as one that contains less than 19.5% oxygen and identifies that such an atmosphere may be created when oxygen is displaced by inerting gases such as nitrogen. A review of Attachment 5, Category HU3.1 to the Emergency Action Level Technical Bases Document, Revision 1, lists the Notification of Unusual Event classification condition as the release of toxic, corrosive, asphyxiant, or flammable gases deemed detrimental to normal operation of the plant. The indication listed for the event is report or detection of toxic, corrosive, asphyxiant, or flammable gases that have or could enter the Owner Controlled Area in amounts that can affect normal plant operations. The inspectors concluded that the conditions listed above constituted a detection of an asphyxiant gas in the Owner Controlled Area that affected normal plant operations, the licensee had sufficient information available concerning the situation, and the licensee failed to appropriately classify and declare a Notification of Unusual Event.

Analysis: The inspectors determined that the failure to classify and declare a Notice of Unusual Event when conditions warranted was a performance deficiency. The inspectors reviewed IMC0612, Appendix B, and determined that the finding was more than minor because it adversely affected the Emergency Response Organization performance attribute of the Emergency Preparedness cornerstone objective to ensure that the licensee is capable of implementing adequate measures to protect the health and safety of the public in the event of a radiological emergency. Since the finding

involved a failure to comply with regulatory requirements during an actual event, the inspectors reviewed IMC0609, Appendix B, Sheet 2, and determined that this was a finding of very low safety significance (Green) because it involved the failure to declare a Notification of Unusual Event. The cause of this finding involved the cross-cutting area of human performance, the component of decision making, and the aspect of conservative assumptions and safe actions, H.1(b), because the licensee failed to use conservative assumptions in the decision to not classify and declare the event as an Unusual Event.

Enforcement: 10 CFR 50.54(q), requires, in part, that a power reactor licensee follow an emergency plan that meets the requirements of 10 CFR 50.47(b) and Appendix E to Part 50. 10 CFR 50.47(b)(4) requires, in part, that a licensee have a scheme of emergency action levels for classifying an emergency. Contrary to the above, on June 5, 2011, the licensee failed to follow their scheme of emergency action levels for classifying an emergency. Specifically, the licensee failed to classify and declare a Notification of Unusual Event after conditions were met for Emergency Action Level HU3.1. Because the finding is of very low safety significance (Green) and it was entered into the licensee's CAP as CR435094, this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy: NCV 05000281/2011003-02, Failure to Classify and Declare a Notification of Unusual Event.

.4 (Closed) Licensee Event Report (LER) 05000280, 281/2010-002-00, Use of Aluminum Conduits for Cable Penetrations Degrades Fire Barriers

a. Inspection Scope

On May 13, 2010, testing of aluminum conduit seal penetration revealed certain fire barrier penetration configurations would not perform their design function. This placed fire barriers that are required for separation of redundant safe shutdown trains in a degraded condition. The enforcement aspects of this issue are discussed in section 4OA5.3 of this inspection report. This LER is closed.

4OA5 Other Activities

.1 Quarterly Resident Inspector Observations of Security Personnel and Activities

a. Inspection Scope

During the inspection period, the inspectors conducted observations of security force personnel and activities to ensure that the activities were consistent with the licensee security procedures and regulatory requirements relating to nuclear plant security. These observations took place during both normal and off-normal plant working hours.

These quarterly resident inspector observations of security force personnel and activities did not constitute any additional inspection samples. Rather, they were considered an integral part of the inspectors' normal plant status review and inspection activities.

b. Findings

No findings were identified.

.2 (Discussed) NRC Temporary Instruction (TI) 2515/177, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems (NRC Generic Letter (GL) 2008-01)"

a. Inspection Scope

The inspectors reviewed the implementation of the licensee's actions in response to GL 2008-01, Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems. The subject systems included the emergency core cooling system (ECCS – high head safety injection, low head safety injection), residual heat removal system (RHR), containment spray system (CS), and recirculation spray system (RS).

The inspectors reviewed the licensing basis of the facility to verify that actions to address gas accumulation were consistent with the operability requirements of the subject systems.

The inspectors reviewed the design of the subject systems to verify that actions taken to address gas accumulation were appropriate given the specifics of the functions, configurations, and capabilities of these systems. The inspectors reviewed the design and operation of the RHR system to determine if flashing in RHR suction lines would challenge system operability. The inspectors reviewed selected analyses performed by the licensee to verify that methodologies for predicting gas void accumulation, movement, and impact were appropriate. The inspectors performed walkdowns of selected subject systems to verify that the reviews and design verifications conducted by the licensee had drawn appropriate conclusions with respect to piping configurations and pipe slope which could result in gas accumulation susceptibility.

The inspectors reviewed testing implemented by the licensee to address gas accumulation in subject systems. A selection of test procedures and completed test results were reviewed to verify that test procedures were appropriate to detect gas accumulations that could challenge subject systems. The inspectors reviewed the specified testing frequencies to verify that the testing intervals had appropriately taken historical gas accumulation events as well as susceptibility to gas accumulation into account. The inspectors also reviewed the test programs and processes to verify that they were sensitive to pre-cursors to gas accumulation.

The inspectors reviewed corrective actions associated with gas accumulation in subject systems to verify that identified issues were being appropriately identified and corrected. This review included modifications made to the plant including the installation of additional vent valves. The inspectors reviewed the locations of selected vent valve

installations to verify that the locations selected were appropriate based on piping configuration and pipe slopes.

b. Findings and Observations

Following the performance of inspection activities on March 25, 2011, the inspectors continued to perform an in-office review of inspection-related information through the end of the reporting period on June 30, 2011. Additional review of inspection activities will be required to be performed during the reporting period of July 1, 2011, through September 30, 2011. The inspection results will be documented in the third quarter integrated inspection report (report number 2011004).

.3 (Closed) Unresolved Item (URI) 05000280,281/2009007-01, Qualification of Fire Barrier Floor/Wall Penetration of Aluminum Conduit Through Sleeve

a. Inspection Scope

The inspectors completed an in-office review and evaluation of licensee test results and completed corrective actions associated with URI 05000280, 281/2009007-01 and LER 05000280/2010-002-00. The inspectors examined aluminum conduit test results to determine the qualification of aluminum conduits installed in the plant. The inspectors also evaluated the significance of degraded fire barriers that contained conduit configurations that did not pass the aluminum conduit tests. The licensee's corrective actions were evaluated to ensure that they adequately restored compliance.

b. Findings

Introduction. A Green NCV of Surry Units 1 and 2 Operating License Condition 3.I, "Fire Protection," was identified by the inspectors for failure to have adequate qualification testing results, as directed by Appendix A to Branch Technical Position APCSB 9.5-1. Specifically, the licensee did not have sufficient testing results to qualify certain aluminum conduits that penetrate 3-hour fire rated barriers separating fire areas containing equipment required for safe shutdown.

Description. During the 2009 NRC Triennial Fire Protection Inspection (TFPI) at Surry Nuclear Station (SNS), the team requested the licensee's documentation for the qualification of a particular penetration seal configuration. The penetration seal criteria established in Branch Technical Position (BTP) APCSB 9.5-1 states, in part, that penetrations through fire barriers, including conduits and piping, be sealed or closed to provide a fire resistance rating at least equal to that of the barrier itself. The configuration in question used aluminum schedule 40 conduit (of various sizes as applicable) penetrating a poured concrete floor or wall. In response, the licensee presented Impell Corporation Calculation No. 1250-111-C01, "Penetration Seal Configuration Documentation Package, 10 inch Dow Corning Q3-6548 Silicone RTV Sealing Foam/North Anna and Surry," Rev. 1. The calculation was based on testing performed for galvanized steel conduit, and not aluminum conduit. The team informed the licensee that this calculation was not valid to qualify aluminum conduit, due to the lower melting temperature and greater heat conductance of aluminum as compared to

steel. The licensee entered the issue into the corrective action program as CR 339567. The licensee also declared fire barriers with potential aluminum conduit penetrations non-functional, and established an hourly fire watch, as required by Surry Technical Requirements Manual (TRM) section 3.7.8.

The licensee performed qualification testing for aluminum conduits penetrating fire rated barriers at SNS. Institute of Electrical and Electronics Engineers (IEEE) Standard 634-1978 was used to determine the acceptance criteria. The test results and licensee analysis concluded that 1 conduit configuration, several of which were installed at Surry, required modification. This configuration provided one internal seal installed partially within the plane of the surrounding fire barrier. The internal seal consisted of a nominal depth of 10" of silicone foam plus 1" of damming material. This arrangement allowed the temperature of cable on the unexposed side of the barrier to exceed the cable's self-ignition temperature. Installed configurations in 12 fire areas required modification in order to qualify as an acceptable configuration. The conduits were modified under Design Change SU-10-01024. The licensee restored compliance by installing either Cerafiber (smoke seals) or silicone foam in the affected conduit(s).

Analysis. The licensee's failure to have adequate qualification testing results, as directed by Appendix A to BTP APCSB 9.5-1, is a performance deficiency. The finding is more than minor because it is associated with the reactor safety Mitigating Systems cornerstone attribute of protection against external factors (i.e., fire) and it affects the cornerstone objective of ensuring the reliability and capability of systems that respond to initiating events. Specifically, not having qualification testing results for aluminum conduits that penetrate fire rated barriers adversely affected the fire confinement capability defense-in-depth (DID) element, because subsequent testing revealed conduits that did not meet the penetration seal criteria established in BTP APCSB 9.5-1. Because this issue relates to fire protection, the inspectors used the guidance of NRC Inspection Manual Chapter (IMC_ 0609, Appendix F, "Fire Protection Significance Determination Process," to determine the risk of this non-compliance. The inspectors determined that this finding was in the fire confinement safe shutdown category.

The inspectors assessed the DID element of the degraded fire barriers in the fire confinement category. Since the untested conduit configuration contained between 9" and 11" depth of silicone foam, the degradation level was categorized as Moderate A (IMC 0609, Appendix F, Attachment 2, Table A2.2). For 9 separate fire areas, IMC 0609, Appendix F, Task 1.3.2, Supplemental Screening for Fire Confinement Findings, Questions 2 & 3, screened the finding to very low safety significance (Green) due to the areas having a non degraded automatic gaseous or water-based fire suppression system. For the remaining 3 fire areas, IMC 0609, Appendix F, Task 1.3.2, "Supplemental Screening for Fire Confinement Findings," Question 4, screened the finding to very low safety significance (Green), due to the exposed fire areas not containing potential damage targets that are unique from those in the exposing fire areas. The inspectors determined that no cross cutting aspect was applicable to this performance deficiency, because this finding was not indicative of current licensee performance.

Enforcement. Surry Units 1 and 2 Operating License Condition 3.I. requires that the licensee implement and maintain in effect all provisions of the approved fire protection program as described in the licensee's Updated Final Safety Analysis Report (UFSAR) for the facility and as approved in the Safety Evaluation Report dated September 1979. The UFSAR Section 9.10.1, "Design Bases," states that the station's fire protection program satisfies the regulatory criteria set forth in Appendix A to BTP APCSB 9.5-1. Section C.5 of Appendix A to BTP APCSB 9.5-1 states, in part, that a test program be established and implemented to assure that testing is performed to demonstrate conformance with design and system readiness requirements.

Contrary to the above, the licensee failed to establish a test program to adequately test the qualification of aluminum conduits that penetrate 3-hour fire rated barriers. This condition has existed since initial plant startup. Upon discovery, the licensee declared fire barriers with aluminum conduit penetrations non-functional, and established an hourly fire watch, as required by Surry TRM section 3.7.8. Subsequently, the licensee performed testing to determine the qualification of aluminum conduit penetrations, and performed modifications, as appropriate, to restore compliance. Because this finding is of very low safety significance and it was entered in the licensee's corrective action program as CR 339567, this violation is treated as an NCV consistent with Section 2.3.2 of the NRC Enforcement Policy: NCV 05000280, 281/2011003-03, Inadequate Qualification Testing of Fire Barrier Penetration Seals.

.4 (Closed) NRC Temporary Instruction 2515/183, "Followup to the Fukushima Daiichi Nuclear Station Fuel Damage Event"

a. Inspection Scope

The inspectors assessed the activities and actions taken by the licensee to assess its readiness to respond to an event similar to the Fukushima Daiichi nuclear plant fuel damage event. This included: (1) an assessment of the licensee's capability to mitigate conditions that may result from beyond design basis events, with a particular emphasis on strategies related to the spent fuel pool, as required by NRC Security Order Section B.5.b issued February 25, 2002, as committed to in severe accident management guidelines, and as required by 10 CFR 50.54(hh); (2) an assessment of the licensee's capability to mitigate station blackout (SBO) conditions, as required by 10 CFR 50.63 and station design bases; (3) an assessment of the licensee's capability to mitigate internal and external flooding events, as required by station design bases; and (4) an assessment of the thoroughness of the walkdowns and inspections of important equipment needed to mitigate fire and flood events, which were performed by the licensee to identify any potential loss of function of this equipment during seismic events possible for the site.

b. Findings

NRC Inspection Report 05000280/2011013 (ML111330132) and 05000281/2011013 (ML111330132) documented detailed results of this inspection activity. Following

issuance of the report, the inspectors conducted detailed follow-up on selected issues. No findings were identified during this follow-up inspection.

.5 (Closed) NRC Temporary Instruction (TI) 2515/184, Availability and Readiness of Severe Accident Management Guidelines (SAMGs)

On May 27, 2011, the inspectors completed a review of the licensee's severe accident management guidelines (SAMGs), implemented as a voluntary industry initiative in the 1990's, to determine: (1) whether the SAMGs were available and updated; (2) whether the licensee had procedures and processes in place to control and update its SAMGs; (3) the nature and extent of the licensee's training of personnel on the use of SAMGs; and (4) licensee personnel's familiarity with SAMG implementation.

The results of this review were provided to the NRC task force chartered by the Executive Director for Operations to conduct a near-term evaluation of the need for agency actions following the Fukushima Daiichi fuel damage event in Japan. Plant-specific results for the North Anna Power Station were provided as an Enclosure to a memorandum to the Chief, Reactor Inspection Branch, Division of Inspection and Regional Support, dated June 02, 2011 (ML111530328).

4OA6 Meetings, Including Exit

.1 Exit Meeting Summaries

On July 27, 2011, the inspection results were presented to Mr. Gerald Bischof and other members of his staff, who acknowledged the findings. The inspectors asked the licensee whether any of the material examined during the inspection should be considered proprietary. No proprietary information was identified.

.2 Inservice Inspection Activities Inspection Exit Meeting Summary

Exit meetings were conducted on April 29 (ISI) and May 13 (SGISI), 2011 with licensee management. The inspectors returned all proprietary information back to the licensee or their respective vendors.

.3 Heat Sink Performance Inspection Exit Meeting Summary

On June 17, 2011, inspectors presented the inspection results to Mr. Kenny Sloane, Plant Manager, and members of the Surry licensee staff. The inspectors confirmed that none of the potential report input discussed was considered proprietary

4OA7 Licensee-Identified Violation

The following findings of very low significance (Green) were identified by the licensee and are violations of NRC requirements which meets the criteria of Section 2.3.2 of the NRC Enforcement Policy, NUREG-1600, for characterization as a Green Non-Cited Violation (NCV).

- Licensee Technical Specification, 3.1.B.3, requires, in part, that the spray shall not be used if the temperature difference between the pressurizer and the spray fluid is greater than 320 deg F. Contrary to this, the licensee identified that this specification was exceeded on Unit 1 on April 17, 2011. The licensee created Engineering Technical Evaluation ETE-SU-2011-0042 to evaluate the acceptability of the Pressurizer for continued operation. The evaluation concluded that the structural integrity impact of the transient was within design fatigue analysis margin and therefore did not affect Pressurizer operability. The inspectors determined the finding was more than minor because it adversely impacted the Barrier Integrity cornerstone objective to provide reasonable assurance that physical design barriers (reactor coolant system) protect the public from radionuclide releases caused by accidents or events. The inspectors determined that this finding was a low safety of significance (Green) because there was no actual degradation of the barrier function of the control room against radiological hazards, smoke, or toxic atmosphere. The inspectors determined that licensee correctly evaluated the finding and developed appropriate corrective action as documented in the licensee's CAP as CR422769.

- Licensee Technical Specification, 3.1.B.3, requires, in part, that the spray shall not be used if the temperature difference between the pressurizer and the spray fluid is greater than 320 deg F. Contrary to this, the licensee identified that this specification was exceeded on Unit 2 on April 17, 2011. The licensee created Engineering Technical Evaluation ETE-SU-2011-0058 to evaluate the acceptability of the Pressurizer for continued operation. The evaluation concluded that the structural integrity impact of the transient was within design fatigue analysis margin and therefore did not affect Pressurizer operability. The inspectors determined the finding was more than minor because it adversely impacted the Barrier Integrity cornerstone objective to provide reasonable assurance that physical design barriers (reactor coolant system) protect the public from radionuclide releases caused by accidents or events. The inspectors determined that this finding was a low safety of significance (Green) because there was no actual degradation of the barrier function of the control room against radiological hazards, smoke, or toxic atmosphere. The inspectors determined that licensee correctly evaluated the finding and developed appropriate corrective action as documented in the licensee's CAP as CR422778.

- Licensee Technical Specification, 3.1.B.3, requires, in part, that the pressurizer heatup rate shall not exceed 100 degF per hour. Contrary to this, the licensee identified that this specification was exceeded on Unit 1 on April 20, 2011. The licensee created Engineering Technical Evaluation ETE-CEM-2011-0005 to evaluate the acceptability of the Pressurizer for continued operation. The evaluation concluded that the structural integrity impact of the transient was within design fatigue analysis margin and therefore did not affect Pressurizer operability. The inspectors determined the finding was more than minor because it adversely impacted the Barrier Integrity cornerstone objective to provide reasonable assurance that physical design barriers (reactor coolant system) protect the public from radionuclide releases caused by accidents or events. The inspectors determined that this finding was a low safety of significance (Green) because there was no

actual degradation of the barrier function of the control room against radiological hazards, smoke, or toxic atmosphere. The inspectors determined that licensee correctly evaluated the finding and developed appropriate corrective action as documented in the licensee's CAP as CR423197.

- Licensee Technical Specification, 3.1.B.3, requires, in part, that the pressurizer heatup rate shall not exceed 100 degF per hour. Contrary to this, the licensee identified that this specification was exceeded on Unit 2 on May 26, 2011. The licensee created Engineering Technical Evaluation ETE-SU-2011-0073 to evaluate the acceptability of the Pressurizer for continued operation. The evaluation concluded that the structural integrity impact of the transient was within design fatigue analysis margin and therefore did not affect Pressurizer operability. The inspectors determined the finding was more than minor because it adversely impacted the Barrier Integrity cornerstone objective to provide reasonable assurance that physical design barriers (reactor coolant system) protect the public from radionuclide releases caused by accidents or events. The inspectors determined that this finding was a low safety of significance (Green) because there was no actual degradation of the barrier function of the control room against radiological hazards, smoke, or toxic atmosphere. The inspectors determined that licensee correctly evaluated the finding and developed appropriate corrective action as documented in the licensee's CAP as CR428788.
- NUHOMS Certificate of Compliance 1030, Amendment 0, Technical Specifications 2.1.c, Functional and Operating Limits, requires, in part, that the spent nuclear fuel stored in each 32PTH DSC/HSM-H at the Independent Spent Fuel Storage Installation (ISFSI) is to be "qualified for four (4) heat load zones designated as Zones 1a, 1b, 2 and 3." Contrary to this requirement, the licensee identified that it failed to properly load fuel assemblies into four NUHOMS Dry Shielded Canisters (DSCs) resulting in the fuel assemblies exceeding the decay heat limit for the loading zones in two of the four center zones. Specifically, the Zone "1a" and Zone "1b" locations were reversed, resulting in the DSC Zone "1b" heat load limits being slightly exceeded (less than one per cent in the worst case) at the time of loading. An evaluation performed by the licensee showed that all of the affected DSCs are currently in a safe condition as loaded in the HSMs. This issue is in the licensee's CAP as CR419237, "NUHOMS DSCs Loaded to Incorrect Heat Load Limits for Specific Orientation." This Severity Level IV violation is being treated as a non-cited violation (NCV), consistent with Section 2.3.2.b of the NRC Enforcement Policy; specifically, the violation was identified by the licensee, the issue was placed into the licensee's CAP, the violation was not repetitive as a result of inadequate corrective action, and the violation was not willful.

ATTACHMENT: SUPPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

M. Adams, Director, Station Engineering
J. Ashley, Licensing Engineer
G. Bischof, Site Vice President
P. Blasioli, Director Nuclear Protection & Emergency Preparedness
E. Collins, Manager, Emergency Preparedness
J. Eggart, Manager, Radiation Protection & Chemistry
B. Garber, Supervisor, Licensing
L. Hilbert , Manager, Outage and Planning
B. Hoffner, Fleet Emergency Preparedness Manager
R. Johnson, Manager, Operations
T. Mayer, Steam Generator Program Owner
C. Olsen, Manager, Site Engineering
K. Sloane, Plant Manager (Nuclear)
M. Smith, Manager, Nuclear Oversight
B. Stanley, Director, Station Safety and Licensing
E. Turko, ISI/NDE Supervisor
N. Turner, Supervisor Emergency Preparedness
M. Wilda, Supervisor, Auxiliary Systems

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened		
05000281/2011003-01	URI	Unplanned Dilution of Unit 2 RCS (Section 1R19)
Opened and Closed		
05000281/2011003-02	NCV	Failure to Classify and Declare a Notification of Unusual Event (Section 4OA3.3)
05000280, 281/2011003-03	NCV	Inadequate Qualification Testing of Fire Barrier Penetration Seals (Section 4OA5.3)
Closed		
05000280,281/2010-002-00	LER	Use of Aluminum Conduits for Cable Penetrations Degrades Fire Barriers(4OA3.4)
05000281/2011-001-00	LER	Auto Reactor Trip on Low Coolant Flow Due to Loop Stop Valve Failure(4OA3.1)
05000280, 281/2009007-01	URI	Qualification of Fire Barrier Floor/Wall Penetration Of Aluminum Conduit through Sleeve(4OA5.3)
05000280, 281/2515183	TI	Followup to the Fukushima Daiichi Nuclear Station Fuel Damage Event (Section 4OA5.4)

05000280, 281/2515184	TI	Availability and Readiness of Severe Accident Management Guidelines (SAMGs) (Section 4OA5.5)
Discussed		
05000281/2011002-01	URI	Reactor Coolant System Instrumentation Erratic Level Indication (Section 1R12, 4OA2.3)
05000280, 281/2515177	TI	Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems (NRC Generic Letter (GL) 2008-01) (Section 4OA5.2)

LIST OF DOCUMENTS REVIEWED

Section 1R07: Heat Sink Performance

ER-SU-5314, Generic Letter 89-13 Program, Rev. 1
ER-AA-HTX-1004, Heat Exchanger Program Eddy Current Testing, Rev. 0
0-MCM-0812-01, CC Heat Exchanger Inspection and Cleaning, Rev. 15
VPAP-0811, Service Water System Inspection and Maintenance Program, Rev. 6
1-OSP-SW-003, Measurement of Macro-fouling Blockage of Component Cooling Heat Exchanger 1-CC-E-1B, Rev. 26
0-MCM-0814-02, Control Room Chiller Condenser Tube Cleaning, Rev. 5
0-OP-ZZ-008, Assessment of Maintenance Activities for Potential Flooding of Turbine Building and Associated Areas, Rev. 9
0-OP-SW-001, Emergency SW Pump 1-SW-P-1A Periodic Operations Test, Rev. 46

Section 1R08: Inservice Inspection Activities

ER-AP-BAC-10, Rev. 8, Boric Acid Corrosion Program
ER-AP-BAC-101, Rev. 7, Boric Acid Corrosion Control Program (BACCP) Inspections
ER-AA-NDE-120, Rev. 4, Dominion Written Practice for Certification of Nondestructive Examination Personnel
2-NPT-RC-002, Rev. 7, Inspection of Class 1 Bolted Connections
ER-AA-NDE-UT-701, Rev. 5, Ultrasonic Thickness Measurement Procedure
2-PT-11, Rev. 15, Reactor Coolant Pressure Test
ER-AA-NDE-VT-603, Rev. 3, Visual Examination of Pipe Hangers and Supports
SRY-SGPMS-002, Surry Site Specific Eddy Current Analysis Guidelines, Surry 2R23-April/May 2011, Revision 17

Section 4OA7: Licensee-Identified Violations

CAP Documents
CR419237, “NUHOMS DSCs Loaded to Incorrect Heat Load Limits for Specific Orientation.”

Other Documents
NUHOMS Certificate of Compliance 1030, Amendment 0, Technical Specifications
Event Notification Report 46698
Surry Independent Spent Fuel Storage Installation (ISFSI) Special Report on NUHOMS Dry Shielded Canisters Loaded to Incorrect Heat Load Limits, dated April 25, 2011

LIST OF ACRONYMS

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

ALARA	As Low As Reasonably Achievable
CAP	Corrective Action Program
CFR	Code of Federal Regulations
CR	Condition Report
HP	Health Physics
HPT	Health Physics Technician