



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

November 1, 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
05000280/2011004, 05000281/2011004,**

Dear Mr. Heacock:

On September 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 October 19, 2011, with Mr. 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. 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 violations and because they were entered into your corrective action program. If you contest any NCV, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN.: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Surry Power Station.

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

VEPCO

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

Sincerely,

/RA/

Shakur Walker, Acting Chief
Reactor Projects Branch 5
Division of Reactor Projects

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

Enclosure: Inspection Report 05000280/2011004, 05000281/2011004
w/Attachment: Supplemental Information

cc w/encl. (See page 3)

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Letter to David A. Heacock from Shakur Walker dated November 1, 2011

SUBJECT: SURREY POWER STATION – NRC INTEGRATED INSPECTION REPORT
05000280/20110004, 05000281/20110004

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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: 05000280/2011004, 05000281/2011004

Licensee: Virginia Electric and Power Company (VEPCO)

Facility: Surry Power Station, Units 1 and 2

Location: 5850 Hog Island Road
Surry, VA 23883

Dates: July 1, 2011 through September 30, 2011

Inspectors: S. Sanchez, Senior Resident Inspector
J. Nadel, Resident Inspector
B. Collins, Reactor Inspector (4OA5.1)
D. Jones, Senior Reactor Inspector (4OA5.1)
S. Sandal, Senior Reactor Inspector (4OA5.1)
G. Wiseman, Senior Reactor Inspector (4OA5.3)

Approved by: Shakur Walker, Acting Chief
Reactor Projects Branch 5
Division of Reactor Projects

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SUMMARY OF FINDINGS

IR 05000280/2011004, 05000281/2011004; 07/01/2011–09/30/2011; Surry Power Station, Units 1 and 2: Equipment Alignment; Event Followup; and Other Activities.

The report covered a 3 month period of inspection by resident inspectors and region based inspectors. Two findings were identified and were determined to be non-cited violations (NCVs). 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.

NRC Identified and Self-Revealing Findings

Cornerstone: Mitigating Systems

- Green. An NRC-identified non-cited violation (NCV) of 10 CFR 50, Appendix B, Criterion XI, "Test Control," (with two examples) was identified for the failure to establish measures to apply rotameter instrument measurement error and appropriate instrument calibration controls or standards when using instruments of this type to determine the size of voids discovered as a result of ECCS system venting. The issue was entered into the licensee's corrective action program (CAP) as CR419024 and CR419243.

The failure to establish and implement measures (1) to ensure the application of +/- 5% rotameter instrument error to as-found void measurement, and (2) to ensure that rotameters calibrated to standard pressure conditions were used when utilizing those instruments to evaluate the size of as-found voids were performance deficiencies. The performance deficiencies were greater than minor, because, if left uncorrected, they could result in a more significant safety concern. Specifically, the performance deficiencies represented programmatic issues and if instrument error and/or appropriate calibration standards were not applied to instruments used for future void characterization, then sufficient measurement error could reasonably result such that as-found voids, which challenge or exceed established acceptance criteria, may not be identified as intended by post venting evaluations. The finding was screened for significance using the Mitigating Systems cornerstone column of Inspection Manual Chapter (IMC) 0609, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," and determined to be of very low safety significance (Green) because the finding did not represent a design or qualification deficiency, did not represent the loss of a safety system function, did not represent the loss of a train for greater than the allowed outage time, did not represent the loss of risk significant equipment for greater than 24 hours, and was not potentially risk significant due to external events. Because the licensee had failed to implement complete, accurate, and up-to-date controls necessary to ensure that rotameter error and calibration standards were adequately addressed by procedures used to evaluate the impact of voids on

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emergency core cooling systems, this finding is assigned a cross-cutting aspect in resources component of the human performance area [H.2(c)]. (Section 4OA5.1)

- Green. The inspectors identified a NCV of Technical Specifications (TS) 6.4.D for failing to follow the requirements of procedure MA-AA-105, "Scaffolding." Specifically, the licensee did not adequately implement scaffold evaluation, screening, and risk requirements for multiple scaffolds constructed in the vicinity of safety-related equipment.

The inspectors determined that the failure to follow TS required procedure MA-AA-105, "Scaffolding," by not properly identifying scaffolds for safety-related systems and performing the required engineering evaluations, constitutes a performance deficiency. This finding is considered more than minor because it is similar to IMC 0612, Appendix E, Example 4.a in that the licensee routinely failed to perform the required engineering reviews and evaluations for scaffolding. This finding is also associated with the external factors and equipment performance attributes of the Mitigating Systems cornerstone and affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The inspectors screened this finding in accordance with IMC 0609, "Significance Determination Process," Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," and determined the finding was of very low safety significance since it was a deficiency determined not to have resulted in the loss of operability or functionality. The cause of this finding involved the cross-cutting area of human performance, the component of resources and the aspect of training [H.2(b)], because the licensee failed to implement training sufficient to ensure that operators were aware of plant equipment which is designated as safety-related. (Section 1R04)

REPORT DETAILS

Summary of Plant Status

Unit 1 operated at essentially full rated thermal power (RTP) during this entire inspection period.

Unit 2 operated at essentially full RTP until the unit was down powered to about 65 percent RTP on September 11, 2011, for planned circulating water motor operated valve testing. That same day the unit was returned to full RTP and operated at full power for the remainder of the inspection period.

REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection

.1 External Flooding

a. Inspection Scope

The inspectors performed walkdown inspections of the Unit 1 and Unit 2 Emergency Switchgear Rooms and Relay Rooms, including doors, flood protection barriers, penetrations, backflow preventers, and the integrity of the perimeter structure. The inspectors also reviewed the applicable Updated Final Safety Analysis Report (UFSAR) sections, Technical Specifications (TS), and other licensing basis documents regarding external flooding and flood protection, including specific plant design features to mitigate the maximum flood level. Corrective Action Program (CAP) documents and work orders (WO) related to actual flooding or water intrusion events over the past five years were also reviewed by the inspectors to ensure that the licensee was identifying and resolving severe weather related issues that caused or could lead to external flooding of safety related equipment.

b. Findings

No findings were identified.

.2 Site Specific Weather

a. Inspection Scope

The inspectors performed a site specific weather related inspection due to anticipated adverse weather conditions associated with Hurricane Irene, which arrived on August 28, 2011. The inspectors reviewed the licensee's preparations for potential severe weather as well as severe weather procedure, Operations Check List (OC) 21, "Severe Weather," and 0-AP-37.01, "Abnormal Environmental Conditions." The inspectors walked down multiple site areas including the electrical switchyard, emergency diesel

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generators, emergency switchgear rooms, emergency service water pump house, low level intake structure, 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

.1 Partial Equipment Walkdowns

a. Inspection Scope

The inspectors conducted four equipment partial alignment 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 (OOS). The inspectors reviewed the functional systems descriptions, UFSAR, system operating procedures, and 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. The inspectors also verified that the licensee had identified and resolved equipment alignment problems that could cause initiating events or impact the capability of mitigating systems or barriers by entering them into the CAP.

- Number 2 and 3 Emergency Diesel Generators (EDG) While Alternate AC EDG OOS
- Main Control Room Chiller 4B, 4C, 4D, and 4E, While 4A was OOS for Planned Maintenance
- Emergency Service Water Pump 1A and 1B While 1C was OOS for Planned Maintenance
- Unit 2 Charging Pump 1A and 1B While 1C was OOS for Planned Maintenance

b. Findings

Introduction. The inspectors identified a non-cited violation (NCV) of TS 6.4.D for failing to follow the requirements of procedure MA-AA-105, "Scaffolding." Specifically, the licensee did not adequately implement scaffold evaluation, screening, and risk requirements for multiple scaffolds constructed in the vicinity of safety-related equipment.

Description. On August 4, 2011, during a partial equipment walkdown inspection in the emergency service water (ESW) pump house, the inspectors reviewed the scaffold order associated with a scaffold built over the safety-related ESW pump diesel fuel oil storage

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tank. Numerous discrepancies were identified. The MA-AA-105 Attachment 1, "Scaffolding Evaluation," Section 3.0, "Operations Review," question 3.2, "Will scaffolding be erected over or within 10 feet of any Safety-Related SSC or critical SSC", was marked "No." Section 2.0, "Nuclear Support Services (NSS) Construction Walkdown Review," question 2.10, which asked if the scaffolding is built within two inches of any safety-related plant equipment, was marked N/A due to the answers in the "Operations Review" section. Upon further review, the inspectors discovered a scaffold knuckle that was less than two inches from the tank with no engineering evaluation having been performed. Operations had also categorized the scaffold as medium risk, which allows them to waive the walkdown by a licensed operator and does not require an engineering evaluation. The inspectors determined that the scaffold was required to be designated a high risk scaffold because it was built in a safety related area and could impact protected/redundant train equipment operability. Scaffolds categorized as high risk, or those within two inches of safety-related equipment, are required to be evaluated by Engineering. The inspectors notified the licensee of this condition and the scaffold was removed.

The inspectors performed an extent of condition review and found four other scaffolds in the plant that were built near or over safety-related equipment without being recognized as such by Operations on the scaffold evaluation attachment. In addition, the inspectors performed a records review for the past evaluations of the recurring scaffold over the ESW pump diesel fuel oil storage tank and determined that the past nine scaffolds had not been properly assessed as high risk and thus, had not received the required engineering evaluation.

As a result of the inspectors' findings, the licensee wrote several condition reports and performed their own extent of condition review. In total, 25 scaffold evaluations were found to be deficient and of those, 16 were currently installed, 12 were required to remain in place, and four were removed. Additionally, 11 of the 25, required engineering evaluations because they were not properly categorized as high risk or they were found to be within two inches of safety-related equipment. This includes the nine past scaffolds mentioned above. In all cases, there was a breakdown of multiple barriers to ensure that scaffolds are built properly and in accordance with the procedure. Specifically, the Operations review did not recognize that the scaffolds were being built near or over safety-related equipment or that scaffolds met the requirements to be classified as high risk. These designations have the potential to affect the level of involvement of other organizations such as Engineering and NSS. For example, NSS supervisors require an operator to walkdown the job site with the scaffold builders for all scaffolds built over or near safety-related equipment, primarily to ensure that the crew building the scaffold is aware of what equipment to avoid. Additionally, as happened in the case of the ESW diesel storage tank scaffold, the NSS review may not identify scaffolds built within two inches of safety-related equipment because the NSS organization relies on Operations to determine if there is any sensitive or safety-related equipment in the area.

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After removing the scaffolds that were no longer required to remain in place, the licensee corrected the procedural compliance issues associated with the 12 remaining scaffolds and also performed engineering evaluations to address the scaffolds that required them. Engineering provided a supporting evaluation for the past operability determination associated with the ESW pump diesel fuel oil storage tank, which concluded that past operability was maintained. In addition, Operations has identified corrective actions to improve the training of licensed operators when it comes to identification of safety-related equipment.

Analysis. The inspectors determined that the failure to follow TS required procedure MA-AA-105, "Scaffolding," by not properly identifying scaffolds for safety-related systems and performing the required engineering evaluations, constitutes a performance deficiency. This finding is considered more than minor because it is similar to Inspection Manual Chapter (IMC) 0612, Appendix E, Example 4.a in that the licensee routinely failed to perform the required engineering reviews and evaluations for scaffolding. This finding is also associated with the external factors and equipment performance attributes of the Mitigating Systems cornerstone and affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The inspectors screened this finding in accordance with IMC 0609, "Significance Determination Process," Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," and determined the finding was of very low safety significance (Green) since it was a deficiency determined not to have resulted in the loss of operability or functionality. The cause of this finding involved the cross-cutting area of human performance, the component of resources and the aspect of training [H.2(b)], because the licensee failed to implement training sufficient to ensure that operators were aware of plant equipment which is designated as safety-related.

Enforcement. Technical Specification 6.4.D requires that procedures involving preventative and corrective maintenance be followed. Licensee procedure MA-AA-105, "Scaffolding," requires all scaffolds be identified as safety-related when constructed near safety-related equipment, and that all high risk scaffolds receive an engineering evaluation. Contrary to the above, the inspectors identified multiple examples of the licensee failing to follow procedural requirements for both the identification of scaffolds built near safety-related equipment and the performance of engineering evaluations. Because this issue is of very low safety significance (Green) and the licensee entered this issue into their CAP as CRs 437736, 437687, and 439432, this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy: NCV 05000280, 281/2011004-01: Failure to Follow Scaffolding Procedure Requirements.

.2 Complete System Walkdown

a. Inspection Scope

The inspectors conducted a detailed walkdown/review of the alignment and condition of the Unit 1 Vital 125 Volt DC system to verify its capability to meet its design basis function. The inspectors utilized licensee procedures 1-MOP-EP-030/031, "Removal From Service and Return to Service of Station Batteries" and 0-EPM-0105-06,

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“Miscellaneous Battery Checks,” as well as other licensing and design documents to verify the system alignment was correct. During the walkdown, the inspectors verified, as appropriate, that: (1) valves were correctly positioned and did not exhibit leakage that would impact their function; (2) electrical power was available as required; (3) major portions of the system and components were correctly labeled, cooled, and ventilated; (4) hangers and supports were correctly installed and functional; (5) essential support systems were operational; (6) ancillary equipment or debris did not interfere with system performance; (7) tagging clearances were appropriate; and (8) valves were locked as required by the licensee’s locked valve program. Pending design and equipment issues were reviewed to determine if the identified deficiencies significantly impacted the system’s functions. Items included in this review were the operator workaround list, the temporary modification list, system health reports, system description, and outstanding maintenance work requests/work orders. In addition, the inspectors reviewed the licensee’s CAP to ensure that the licensee was identifying and resolving equipment alignment problems.

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,” CM-AA-FPA-101, “Control of Combustible and Flammable Materials,” and CM-AA-FPA-102, “Fire Protection and Fire Safe Shutdown Review and Preparation Process and Design Change Process.” 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 CAP to verify fire protection deficiencies were being identified and properly resolved.

- Low Level Intake Structure Pump House (Fire Areas 28B, 28C)
- Unit 1 Battery Rooms (Fire Areas 9, 10)
- Unit 2 Charging Pump Cubicles (Fire Area 17)
- Fire Pump House (Fire Areas, 32A, 32B)

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b. Findings

No findings were identified.

.2 Fire Protection - Drill Observation

a. Inspection Scope

The inspectors observed an unannounced fire drill on September 25, 2011, that took place in the Unit 1 Lube Oil Storage Room. The drill was observed to evaluate the readiness of the plant fire brigade to fight fires. The inspectors verified that the licensee staff identified deficiencies, openly discussed them in a self-critical manner at the debrief, and took appropriate corrective actions as required. Specific attributes evaluated were: (1) proper wearing of turnout gear and self-contained breathing apparatus; (2) proper use and layout of fire hoses; (3) employment of appropriate fire fighting techniques; (4) sufficient fire fighting equipment brought to the scene; (5) effectiveness of command and control; (6) search for victims and propagation of the fire into other plant areas; (7) smoke removal operations; (8) utilization of pre-planned strategies; (9) adherence to the pre-planned drill scenario; and (10) drill objectives.

b. Findings

No findings were identified.

1R06 Flood Protection Measures

a. Inspection Scope

The inspectors conducted walkdowns of the Unit 1 Turbine Building Basement and Emergency Switchgear Relay Room, as well as multiple manholes during licensee inspections. These walkdowns included checks of building structure sumps to ensure that flood protection measures were in accordance with design specifications. The inspectors reviewed applicable UFSAR sections and other licensing basis documents regarding internal flooding and flood protection. The inspectors also reviewed plant procedures that discussed the protection of areas containing safety-related equipment that may be affected by internal flooding. Specific plant attributes that were checked included structural integrity, sealing of penetrations, control of debris, and operability of sump pump systems.

b. Findings

No findings were identified.

1R11 Licensed Operator Requalification Programa. Inspection Scope

The inspectors observed a licensed operator simulator exercise conducted on September 21, 2011, using scenario RQ-11.5-ST-2. The scenario involved operational transients, including isolation of letdown, a leak of component cooling water into the reactor coolant system (RCS), thus diluting the RCS, and a trip of Unit 2 with safety injection. The inspectors verified that simulator conditions were consistent with the scenario and reflected the actual plant configuration (i.e., simulator fidelity). 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 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 Effectivenessa. Inspection Scope

For the two equipment issues described in the CRs 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). The 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;" ER-AA-MRL-100, "Implementing the Maintenance Rule;" 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."

- MRE013749, 2-FW-MOV-251A, S/G C AFW Isolation Valve Failed to Open During Testing
- MRE013969, 1-SW-P-10B, Charging Service Water Pump Inoperable During Testing

b. Findings

No findings were identified.

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

The inspectors evaluated, as appropriate, for the three 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 CAP to verify deficiencies in risk assessments were being identified and properly resolved.

- Green Risk Associated with Planned Maintenance of the Station Blackout Diesel Generator and Emergency Service Water Pump 1C
- Green Risk Associated with NUHOMS Cask Loading Activities While SFP Cooling Secured
- Green Risk During a Tropical Storm Warning and Loss of Two Offsite Power Lines

b. Findings

No findings were identified.

1R15 Operability Evaluationsa. Inspection Scope

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

- CR 438887, Unit 2 B Battery in Alert Due to Temperature Difference Greater than Five Degrees
- CR 433889, Water Noted in Unit 1 Containment Spray Pump 1B Oil Sample
- CR 439012, VSP-E7 Annunciator Did Not Annunciate During Seismic Motion
- ETE-SU-2011-0066, Unit 2 Charging Pump 1C Operability
- Revised Operability Determination for Unit 2 Containment Sump Pending AECL Testing Completion
- CR433462, Unit 2 Low Head Safety Injection Pump 1A Seal Head Tank Leak

b. Findings

No findings were identified.

1R18 Plant Modifications

.1 Temporary Modifications

a. Inspection Scope

The inspectors reviewed the temporary modification to install a leak seal box around charging system valve 2-CH-HCV-2310A, to verify that the modification did not affect system operability or availability as described by the TS and UFSAR. In addition, the inspectors verified that the temporary modification was in accordance with CM-AA-TDC-204, "Temporary Modifications," and the related work package, that adequate controls were in place, procedures and drawings were updated, and post-installation tests verified the operability of the affected systems.

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 testing in accordance with VPAP-2003, "Post Maintenance Testing Program."

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- WO 38102849668, Alternate AC Diesel 18 Month Preventive Maintenance (PM)
- WO 38102707478, Unit 1 Motor Driven Auxiliary Feedwater Pump, Various PMs
- WO 38103084152, Common Main Control Room Chiller, Corrective Maintenance for Low Oil Pressure
- WO 38102600301, Unit 1 Charging Pump 1A, Major Overhaul
- WO 38102978378, Unit 1 Emergency Service Water Pump 1C, PMs for Angle Drive

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.

In-Service Testing:

- 2-OSP-PL-001, Turbine Building Sump Pump Performance Test

Surveillance Testing:

- 0-NSP-CW-001, High Level Intake Structure Canal Level Probe Inspection/Cleaning
- 0-EPT-0104-01, Semi-Annual Station Battery Test
- 0-OPT-EG-001, Number 3 Emergency Diesel Generator Monthly Start Exercise Test

RCS Leak Rate Determination:

- 1-OPT-RC-10.0, Reactor Coolant Leakage - Computer Calculated

b. Findings

No findings were identified.

Cornerstone: Emergency Preparedness1EP6 Drill Evaluationa. Inspection Scope

The inspectors observed two emergency response training drills conducted on August 16 and September 27, 2011, to assess licensee performance in event classification per the emergency plan, protective action recommendations, and off-site notifications. The drill required emergency plan response actions be taken by personnel located in the simulator control room, the technical support center (TSC), and the local emergency operating facility (LEOF). The inspectors observed conduct of the drill from the simulator, the TSC, the LEOF, and the subsequent critique performance. These drills were included in the Emergency Response Performance Indicator Statistics.

b. Findings

No findings were identified.

4OA1 Performance Indicator (PI) Verificationa. Inspection Scope

The inspectors performed a periodic review of the following two Unit 1 and 2 Mitigating Systems 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." The inspection was conducted in accordance with NRC Inspection Procedure 71151, "Performance Indicator Verification." Specifically, the inspectors reviewed the data reported to the NRC for the period July 1, 2010, through June 30, 2011. Documents reviewed included applicable NRC inspection reports, licensee event reports, operator logs, station performance indicators, and related CRs.

- Unit 1 and 2 Heat Removal System (Auxiliary Feedwater)
- Unit 1 and 2 Emergency AC Power (Emergency Diesel Generator)

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

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entered into the licensee's CAP. This review was accomplished by reviewing daily CR report summaries and periodically attending daily CR Review Team meetings. Additionally, RCS unidentified leakage was checked on a daily basis to verify no substantive or unexplained changes.

b. Findings

No findings were identified.

.2 Annual Sample Review

a. Inspection Scope

The inspectors conducted a more in-depth review of the issue listed below to evaluate the effectiveness of the licensee's corrective actions for important safety issues.

- Operating Experience Smart Sample (OpESS) FY 2010-01, "Recent Inspection Experience for Components Installed Beyond Vendor Recommended Service Life"

The inspectors performed searches of the licensee's corrective action database for the previous 5 years to identify aging concerns that were similar to those listed in OpESS FY 2010-01. From the results of this search, inspectors selected CRs 423653, 438076, 412522, and 435753 and performed an in-depth review of the associated corrective actions, with a focus on aging and lifecycle management procedure compliance and preventive maintenance for components.

The above listed CRs dealt with deficiencies identified in the licensee's aging management program, service life of valve position limiters, license renewal commitments for inspections of fire dampers, and issues associated with the replacement of a large number of emergency diesel generator relays that were identified as original plant equipment. The inspectors assessed whether the issue was properly identified; documented accurately and completely; adequately considered extent of condition; and identified appropriate and timely corrective actions. Documents reviewed by the inspectors included:

- ER-AA-AMP-10, "License Renewal Aging Management Program"
- ER-AA-5003, "Life Cycle Management Planning"
- CR 423653, License Renewal Commitment for Fire Damper Inspections
- CR 438076, Valve Position Limiters Require Replacement Due to Aging Concerns
- CR 412522, Results of EDG Collective Significance Review
- CR 435753, Aging Management Process Needs Improvements

b. Findings

No findings were identified.

4OA5 Other Activities

.1 (Closed) 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

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

b. Findings

Introduction. A Green, NRC-identified NCV of 10 CFR 50, Appendix B, Criterion XI, "Test Control," (with two examples) was identified for the failure to establish measures to apply rotameter measurement error and appropriate calibration controls or standards when using instruments of this type to determine the size of voids discovered as a result of ECCS system venting.

Description. In response to NRC Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems" the licensee implemented station procedure ER-SU-SYS-301, "ECCS Gas Accumulation Monitoring Plan." ER-SU-SYS-301 contains the results of the licensee's technical evaluation of their systems and establishes, in part, the procedures normally used to monitor systems for void formation and the void size acceptance criteria for those locations determined to be susceptible to void formation and accumulation. Section 3.1.3 of this plan also contains requirements for quantification of any voids discovered and to evaluate voids against the acceptance criteria found in Attachment 2 of the procedure. Section 3.1.3 also directs the licensee to enter any voids found into the corrective action program (CAP) and to perform measurements using ultrasonic testing (UT) techniques. Accurate quantification of as-found void size allows the licensee to properly evaluate the impact of the void on system performance for past operability. The UT measurements and system monitoring following void venting would be necessary to confirm that the venting had been effective in removing the void and to ensure gas did not continue to accumulate in that location.

The inspectors reviewed historical records for the venting of ECCS and noted that on January 30, 2011 during the Unit 1 performance of 1-OPT-SI-003, "Quarterly Test of SI MOVs and RWST Crosstie Trip Valves (TVs)," approximately 0.43 ft³ of gas was vented from the upstream portion of 1-SI-MOV-1863B. The void size was calculated in the procedure by multiplying the observed rotameter volumetric flow rate of 8.557 SCFH by the 3 minute time period to fully vent the void. The licensee concluded from subsequent monitoring that the void had formed in that location due to previous outage maintenance activities and did not represent an active at-power phenomenon of gas accumulation. The inspectors reviewed the vendor technical manual for the rotameter used to perform the venting and noted an instrument accuracy of +/- 5%. This instrument error was not applied to the observed volumetric flowrate when the void size was subsequently calculated and compared to the acceptance criteria contained in ER-SU-SYS-301. For this case, the inspectors verified that sufficient margin existed such that, had the instrument error been applied, the void size would have met the acceptance criteria. The inspectors also reviewed other procedures used to quantify void size and did not find evidence that this uncertainty had been accounted for in the procedure calculation step. Therefore, the team concluded that no programmatic measures existed to provide assurance that future evaluation of discovered voids would apply inherent instrument

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error when characterizing the as-found condition. The licensee entered this issue into the CAP as CR419243.

During the review of procedures used to vent gas from ECCS systems using rotameters, the inspectors noted that the procedures required the use of rotameters calibrated to standard pressure (consistent with their use in the vent rig used to vent gas to ambient room conditions). The inspectors asked the licensee to provide evidence that the rotameters used to perform venting were being calibrated to the appropriate pressure standard. The licensee reviewed the inventory of rotameters that were maintained by the calibration program and concluded that none of the rotameters in the licensee's program met this requirement. Specifically, rotameters maintained by the calibration program were calibrated to higher than standard pressure (approximately 45 psi). Additionally, the team noted that some venting procedures would allow the use of rotameters not maintained by the site's calibration program and no venting procedures required documentation of which rotameters were used to perform the venting. The team concluded that the licensee had failed to establish adequate measures to ensure that rotameters used to perform ECCS venting were calibrated to appropriate standards and therefore, had adversely affected the ability to accurately characterize the as-found condition. The licensee entered this issue into their CAP as CR419024.

Analysis. The failure to establish and implement measures (1) to ensure the application of +/- 5% rotameter instrument error to as-found void measurement, and (2) to ensure that rotameters calibrated to standard pressure conditions were used when utilizing those instruments to evaluate the size of as-found voids were performance deficiencies. The performance deficiencies were greater than minor, because, if left uncorrected, they could result in a more significant safety concern. Specifically, if instrument error and/or appropriate calibration standards were not applied to instruments used for future void characterization, then sufficient measurement error could reasonably result such that voids which challenge or exceed established acceptance criteria may not be identified as intended by post venting evaluations. The finding was screened for significance using the Mitigating Systems cornerstone column of IMC 0609, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings" and determined to be of very low safety significance (Green) because the finding did not represent a design or qualification deficiency, did not represent the loss of a safety system function, did not represent the loss of a train for greater than the allowed outage time, did not represent the loss of risk significant equipment for greater than 24 hours, and was not potentially risk significant due to external events. Because the licensee had failed to implement complete, accurate, and up-to-date controls necessary to ensure that rotameter uncertainty and calibration standards were adequately addressed by procedures used to evaluate the impact of voids on ECCS systems, this finding is assigned a cross-cutting aspect in resources component of the human performance area [H.2(c)].

Enforcement. 10 CFR 50, Appendix B, Criterion XI, "Test Control" requires, in part, that a test program shall be established to assure that all testing required to demonstrate that structures, systems, and components will perform satisfactorily in service is identified and performed in accordance with written test procedures which incorporate the requirements and acceptance limits contained in applicable design documents.

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Additionally, Criterion XI requires that adequate test instrumentation is available and used, and that test results shall be documented and evaluated to assure that test requirements have been satisfied. Contrary to the above, since the initial issuance of procedure ER-SU-SYS-301, "ECCS Gas Accumulation Monitoring Plan" on April 21, 2009, the licensee failed to establish measures to assure that instrument error and appropriate calibration standards were used when evaluating as-found void size (measured by rotameters) against acceptance criteria used to verify that test requirements had been satisfied. Because this violation was determined to be of very low safety significance and was entered into the licensee's corrective action program as CR419024 and CR419243, this violation is being treated as an NCV, consistent with the NRC Enforcement Policy: 05000280, 281/2011004-02: Failure to Consider Instrument Error and Establish Calibration Controls for Rotameters Used to Vent Gas from ECCS Systems.

.2 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.

.3 (Closed) SLIV VIO 05000280, 281/2011-012-01, Inaccurate Fire Watch Records

This SL IV Violation was issued for the failure of an individual to perform his assigned fire watch rounds and then deliberately document that the fire watch rounds were complete. The licensee's investigation concluded that the individual understood his duties, responsibilities, and expectations, but chose to violate licensee's policies and procedures, including the fire protection procedure. The investigation identified that the occurrences extended back to September 2009 and occurred on nights and weekend shifts when no supervision was present. The investigation did not find any other workers engaged in misconduct with respect to their assigned fire watch duties. The individual's employment was terminated. Management met with workers assigned fire watch duties to reiterate expectation regarding the performance of fire watch duties. Management will continue to periodically verify the performance of workers assigned fire watch duties on backshifts and weekends when supervisor is not present by reviewing fire watch log records or direct observations. All corrective actions have been completed and NSS

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Directive 11-02, "Supervisor Review of Assigned Fire Watch Tour Logs" was being implemented. Therefore, this VIO is considered closed.

4OA6 Meetings, Including Exit

Exit Meeting Summaries

.1 Resident Inspection

On October 19, the inspectors presented the inspection results to Mr. Bischof and members of the Surry Station licensee staff. The inspectors asked the licensee whether any of the material examined during the inspection should be considered proprietary. No proprietary information was identified.

.2 TI-177 Inspection

A preliminary debrief with licensee management and staff was conducted on March 25, 2011, to discuss the progress of the TI-177 inspection. Following additional in-office review and inspection, a final exit with licensee management and staff was conducted on September 20, 2011. Proprietary information reviewed by the team as part of routine inspection activities was returned to the licensee in accordance with prescribed controls.

ATTACHMENT: SUPPLEMENTAL INFORMATION

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SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

M. Adams, Director, Station Engineering
J. Ashley, Licensing Engineer
C. Baer, Engineer, Site Engineering
G. Bischof, Site Vice President
C. Bruce, Supervisor, Secondary Systems
E. Collins, Manager, Emergency Preparedness
B. Downer, Manager, Supply Chain Management
J. Eggart, Manager, Radiation Protection & Chemistry
B. Garber, Supervisor, Licensing
G. Haynes, Manager, Protection Services
D. Herring, Acting Manager, Organizational Effectiveness
L. Hilbert, Manager, Outage and Planning
R. Johnson, Manager, Operations
R. Manrique, Supervisor, Primary Systems
T. Mayer, Steam Generator Program Owner
C. Olsen, Manager, Site Engineering
M. Pittman, Manager, Nuclear Support Services
J. Rosenberger, Manager, Engineering Programs
E. Shore, Supervisor, Mechanical Design Engineering
K. Sloane, Plant Manager
M. Smith, Manager, Nuclear Oversight
D. Souza, Supervisor, Nuclear Training
K. Spencer, Acting Manager, Maintenance
B. Stanley, Director, Station Safety and Licensing
E. Turko, Supervisor, ISI/NDE
N. Turner, Supervisor, Emergency Preparedness
M. Wilda, Supervisor, Auxiliary Systems
D. Wilson, Acting Manager, Operations

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened and Closed

05000280, 281/2011004-01	NCV	Failure to Follow Scaffolding Procedure Requirements (Section 1R04)
05000280, 281/2011004-02	NCV	Failure to Consider Instrument Uncertainty and Establish Calibration Controls for Rotameters Used to Vent Gas from ECCS Systems (Section 4OA5.1)

Closed

05000280, 281/2515/177 TI Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems (NRC Generic Letter (GL) 2008-01) (Section 4OA5.1)

05000280, 281/2011-012-01 VIO Inaccurate Fire Watch Records (Section 4OA5.3)

Discussed

None

LIST OF DOCUMENTS REVIEWED**Licensing Bases Documents**

ML080980543, Generic Letter 2008-01, Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems Schedule Extension for Three Month Response, April 7, 2008

ML081300282, Generic Letter 2008-01, Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems Three-Month Response Containing Alternative Actions, May 8, 2008

ML081980640, Kewaunee Power Station, Millstone Power Station, Units 2 and 3, North Anna Power Station, Unit Nos. 1 and 2, and Surry Power Station, Unit Nos. 1 and 2 - Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems," Response to Extension Request (TAC Nos. MD7838, MD7845, MD7846, MD7850, MD7851, MD7884 AND MD7885), July, 23, 2008

ML082890094, Nine-Month Response to NRC Generic Letter 2008-01, Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems, October 14, 2008

ML083090065, Correction to Nine-Month Response to NRC Generic Letter 2008-01, Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems, November 3, 2008

ML091871307, Surry Power Station Unit 1 Supplemental Response to NRC Generic Letter 2008-01, Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems, July 6, 2009

ML100630121, Request for Additional Information for Surry – "Generic Letter 2008-01, Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems", March 4, 2010

ML101600115, Surry Power Station Units 1 and 2 Response to Request for Additional Information Generic Letter 2008-01, Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems, June 8, 2010

Miscellaneous

CR 109060, Prompt Operability Determination for LHSI Pumps w/o Eductors, Rev. 0 and 1

CR 120278, Prompt Operability Determination for LSHI Pumps w/o Eductors, Rev. 1

NEI 09-10, Guidelines for Effective Prevention and Management of System Gas Accumulation, Rev. 1
 OD-000192, Prompt Operability Determination Water Operated Gas/Vapor Ejectors Removed from LHSI Pumps, Rev. 0
 SAR001289, GL 2008-01 Gas Accumulation Management Self-Assessment and Gap Analysis, February 18, 2011
 X-VA-1350E-eng, Brooks Instrument, Installation and Operation Manual Sho-Rate "50" Model 1350E and Sho-Rate "150" Model 1355E Sizes 2-6, dated February 2011

Drawings

11448-FM-084A, Containment Spray System Unit 1, Sheet 1, Rev. 42
 11448-FM-084A, Containment Spray System Unit 1, Sheet 2, Rev. 48
 11448-FM-084A, Containment Spray System Unit 1, Sheet 3, Rev. 42
 11448-FM-084B, Recirculation Spray System Unit 1, Sheet 1, Rev. 24
 11448-FM-084B, Recirculation Spray System Unit 1, Sheet 2, Rev. 33
 11448-FM-087A, Residual Heat Removal System Unit 1, Sheet 1, Rev. 23
 11448-FM-087A, Residual Heat Removal System Unit 1, Sheet 2, Rev. 29
 11448-FM-088B, CVCS Unit 1, Sheet 1, Rev. 39
 11448-FM-088B, CVCS Unit 1, Sheet 2, Rev. 44
 11448-FM-089A, Safety Injection System Unit 1, Sheet 1, Rev. 59
 11448-FM-089A, Safety Injection System Unit 1, Sheet 2, Rev. 53
 11448-FM-089B, Safety Injection System Unit 1, Sheet 1, Rev. 31
 11448-FM-089B, Safety Injection System Unit 1, Sheet 2, Rev. 25
 11448-FM-089B, Safety Injection System Unit 1, Sheet 3, Rev. 27
 11448-FM-089B, Safety Injection System Unit 1, Sheet 4, Rev. 25
 11448-FP-60A, Containment Recirculation Spray & Low Head Safety Injection Pump Piping Surry Power Station Unit 1, Rev. 25
 11448-FP-60B, Containment Recirculation Spray & Low Head Safety Injection Pump Piping Surry Power Station Unit 1, Rev. 22
 11448-FP-60D, Containment Recirculation Spray & Low Head Safety Injection Pump Piping Surry Power Station Unit 1, Rev. 14
 11448-FV-5A, Containment Recirculation Spray & Low Head Safety Injection Pump Casings, Rev. 10
 11548-FM-084A, Containment Spray System Unit 2, Sheet 1, Rev. 38
 11548-FM-084A, Containment Spray System Unit 2, Sheet 2, Rev. 46
 11548-FM-084A, Containment Spray System Unit 2, Sheet 3, Rev. 40
 11548-FM-084B, Recirculation Spray System Unit 2, Sheet 1, Rev. 29
 11548-FM-084B, Recirculation Spray System Unit 2, Sheet 2, Rev. 38
 11548-FM-087A, Residual Heat Removal System Unit 2, Sheet 1, Rev. 18
 11548-FM-087A, Residual Heat Removal System Unit 2, Sheet 2, Rev. 23
 11548-FM-088B, CVCS Unit 2, Sheet 1, Rev. 42
 11548-FM-088B, CVCS Unit 2, Sheet 2, Rev. 40
 11548-FM-089A, Safety Injection System Unit 2, Sheet 1, Rev. 51
 11548-FM-089A, Safety Injection System Unit 2, Sheet 2, Rev. 49
 11548-FM-089A, Safety Injection System Unit 2, Sheet 3, Rev. 39
 11548-FM-089B, Safety Injection System Unit 2, Sheet 1, Rev. 35

11548-FM-089B, Safety Injection System Unit 2, Sheet 2, Rev. 28
 11548-FM-089B, Safety Injection System Unit 2, Sheet 3, Rev. 28
 11548-FM-089B, Safety Injection System Unit 2, Sheet 4, Rev. 28
 38-0-B940-2C5028, Vapor Removal Piping Low Head Safety Injection Pump, Rev. 1

Calculations

0114-0059-01, MPR Associates, Inc. – LHSI Pump Gas Binding, Rev. 0
 0114-0061-01, MPR Associates, Inc. – Low Head Safety Injection Pump Air Transport, Rev. 0
 0114-0065-jlh-1, MPR Associates, Inc. – LHSI Pump Air Entrainment Analysis, Rev. 1
 12846.07-49, Refueling Water Storage Tank (RWST) Chemical Addition Tank (CAT) Drawdown Test, dated 5/20/80
 12846.19-NPB-024-XF, Time History Analysis for Recirculation Spray System Modification Prob 3310, dated 1/22/82
 12846.19-NPB-025-XF, Recirculation Spray Time History Analysis Prob 3311, dated 1/25/82
 ME-0180, Evaluation of Gas Accumulation in ECCS, Containment Spray and RHR Systems for GL 2008-01 Response, Rev. 2
 ME-0408, Minimum and Maximum Safety Injection System Flow Analysis for Input to Surry Core Up-rating Containment Analysis, Rev. 0
 ME-0771, Minimum Delivered HHSI Flow for LOCA Analysis and CH/HHSI Pump Flow Test Acceptance Criteria, Surry 1 & 2, Rev. 3
 SM-1474, Design Inputs for GOTHIC Containment Analysis for Surry Power Station, Rev. 0

CRs Reviewed During Inspection

113792, Gas Voids in Chemical Addition Tank Supply Line to Containment Spray Pumps
 120278, Beaver Valley LHSI Sump Suction Gas Void OE
 410018, Technical Report ME-0180 Acceptance Criteria and Self Assessment Gaps
 412045, Gas Void Upstream of 1-SI-MOV-1863B
 412160, Gas Void Downstream of 1-SI-MOV-1863B
 414017, Gas Void Downstream of 2-SI-MOV-2863B

Procedures

ER-SU-SYS-301, ECCS Gas Accumulation Monitoring Plan, Rev. 2
 1-MOP-CS-002, RWST Chemical Addition Tank Removal From and/or Return to Service, Rev.3
 1-MOP-CS-003, Removal From and Return to Service of the RWST, Rev. 3
 1-MOP-RH-001, Draining and Filling the RHR System, Rev. 5
 1-MOP-RS-001, Outside Recirc Spray System Removal From and/or Return To Service, Rev. 1
 1-MOP-SI-001, LHSI Pumps Removal From and/or Return to Service, Rev. 15
 1-OPT-SI-002, Refueling Test of the LHSI Check Valves to the Cold Legs, Rev. 22
 1-OPT-SI-003, Quarterly Test of SI MOVs and RWST Crosstie TVs, Rev. 18
 1-OPT-SI-003, Quarterly Test of SI MOVs and RWST Crosstie TVs, Rev. 17
 1-OPT-SI-005, LHSI Pump Test, Rev. 27
 1-OPT-SI-006, SI Accumulator Discharge Check Valves Full Open Test, Rev. 007
 1-OPT-SI-007, Refueling Test of the HHSI Check Valves to the Cold Legs, Rev. 19
 1-OPT-SI-008, Refueling Test of the HHSI Check Valves to the Hot Legs, Rev. 18
 1-OPT-SI-009, Refueling Test of the LHSI Check Valves to the Hot Legs, Rev. 16

1-OPT-SI-012, Refueling Test of LHSI Lines to Charging Pumps, Rev. 15
 1-OPT-SI-014, Cold Shutdown Test of SI Check Valves to RCS Cold Legs, Rev. 19
 1-OPT-SI-022, SI Accum. Discharge Check Valve Test with Reactor Head Removed, Rev. 4
 1-OPT-SI-024, Charging Pump Head Curve Verification and Comprehensive Test, Rev. 5
 1-OSP-SI-001, Venting Safety Injection Piping, Rev. 11
 1-OSP-SI-013, Determination of HHSI Containment Isolation Valve Leak By, Rev. 4
 2-MOP-CH-002, RWST Suction Header Maintenance, Rev. 6
 2-MOP-CS-001, Containment Spray Pumps Removal From and/or Return To Service, Rev. 4
 2-MOP-CS-002, RWST Chemical Addition Tank Removal from and/or Return To Service, Rev.4
 2-MOP-CS-003, Removal From and Return To Service of the RWST, Rev. 3
 2-MOP-RH-001, Draining and Filling the RHR System, Rev. 3
 2-MOP-RS-001, Outside Recirc Spray System Removal from and/or Return To Service, Rev. 1
 2-MOP-SI-001, LHSI Pumps Removal From and/or Return To Service, Rev. 14
 2-OPT-SI-002, Refueling Test of the LHSI Check Valves to the Cold Legs, Rev. 16
 2-OPT-SI-003, Quarterly Test of SI MOVs and RWST Crosstie TVs, Rev. 19
 2-OPT-SI-003, Quarterly Test of SI MOVs and RWST Crosstie TVs, Rev. 18
 2-OPT-SI-005, LHSI Pump Test, Rev. 29
 2-OPT-SI-006, SI Accumulator Discharge Check Valves Full Open Test, Rev. 007
 2-OPT-SI-007, Refueling Test of the HHSI Check Valves to the Cold Legs, Rev. 15
 2-OPT-SI-008, Refueling Test of the HHSI Check Valves to the Hot Legs, Rev. 13
 2-OPT-SI-009, Refueling Test of the LHSI Check Valves to the Hot Legs, Rev. 11
 2-OPT-SI-012, Refueling Test of LHSI Lines to Charging Pumps, Rev. 13
 2-OPT-SI-014, Cold Shutdown Test of SI Check Valves to RCS Cold Legs, Rev. 25
 2-OPT-SI-022, SI Accum. Discharge Check Valve Test with Reactor Head Removed, Rev. 4
 2-OPT-SI-024, Charging Pump Head Curve Verification and Comprehensive Test, Rev. 5
 2-OSP-SI-001, Venting Safety Injection Piping, Rev. 13
 2-OSP-SI-013, Determination of HHSI Containment Isolation Valve Leak By, Rev. 4
 ER-AA-NDE-UT-724, Ultrasonic Examination Procedure for Liquid Level Measurements, Rev. 1

Completed Testing

ET-S-08-0108, GL 2008-01 SPS Engineering Walkdowns/Potential Gas Voids S1S2, Rev. 2
 NDE-R 11-061, Nuclear Non-Destructive Examination Request and Gas/Void Examination Report
 NDE-R 11-084, Nuclear Non-Destructive Examination Request and Gas/Void Examination Report
 NDE-R 11-103, Nuclear Non-Destructive Examination Request and Gas/Void Examination Report
 NDE-R 11-140, Nuclear Non-Destructive Examination Request and Gas/Void Examination Report
 NDE-R 11-141, Nuclear Non-Destructive Examination Request and Gas/Void Examination Report
 WO 38102919777, 84 Day Freq. PT: Qtrly Test of SI MOVs & RWST X-t
 WO 38102774099, 84 Day Freq. PT: Qtrly Test of SI MOVs & RWST X-t
 WO 38102817409, 84 Day Freq. PT: Qtrly Test of SI MOVs & RWST X-t
 WO 38102844297, 84 Day Freq. PT: Venting Safety Injection Piping
 WO 38102800010, 84 Day Freq. PT: Venting Safety Injection Piping

CRs Generated As a Result of Inspection

418994, LHSI discharge gauge indicating higher than other pump

418996, High reading on 1-SI-PI-100

419024, 1/2-OSP-SI-001 and 1/2-OPT-SI-003 do not require SQC rotameters

419243, Rotameter uncertainty not applied

419244, GL 2008-01 NRC inspection: Walkdown documentation deficiency with ET-S-08-0108

419246, GL 2008-01 NRC inspection: Tech Report ME-0180 did not address HHSI discharge

419249, GL 2008-01 NRC inspection: Evaluate the LHSI pump with air educators installed

419355, ME-0180, supporting documentation for OD192, requires update to provide addition

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
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