



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

REGION II  
SAM NUNN ATLANTA FEDERAL CENTER  
61 FORSYTH STREET, SW, SUITE 23T85  
ATLANTA, GEORGIA 30303-8931

January 25, 2007

EA-06-046

South Carolina Electric & Gas Company  
ATTN: Mr. Jeffrey B. Archie  
Vice President, Nuclear Operations  
Virgil C. Summer Nuclear Station  
P. O. Box 88  
Jenkinsville, SC 29065

SUBJECT: VIRGIL C. SUMMER NUCLEAR STATION - NRC INTEGRATED INSPECTION  
REPORT 05000395/2006005

Dear Mr. Archie:

On December 31, 2006, the United States Nuclear Regulatory Commission (NRC) completed an inspection at your Virgil C. Summer Nuclear Station. The enclosed integrated inspection report documents the inspection results, which were discussed on January 9, 2007, with Mr. Dan Gatlin and other members of your staff.

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

This report documents two self-revealing findings of very low safety significance (Green) which were determined to be violations of NRC requirements. However, because of their very low safety significance and because they are entered into your corrective action program, the NRC is treating these violations as non-cited violations (NCVs) consistent with Section VI.A.1 of the NRC Enforcement Policy. If you contest any NCV in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the United States 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 Virgil C. Summer Nuclear Station.

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Sincerely,

**/RA/**

Eugene F. Guthrie, Chief  
Reactor Projects Branch 5  
Division of Reactor Projects

Docket No.: 50-395  
License No.: NPF-12

Enclosure: NRC Integrated Inspection Report 05000395/2006005  
w/Attachment: Supplemental Information

cc w/encl: (See page 3)

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Letter to Jeffrey B. Archie from Eugene F. Guthrie dated January 25, 2007

SUBJECT: VIRGIL C. SUMMER NUCLEAR STATION - NRC INTEGRATED INSPECTION  
REPORT 05000395/2006005

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**U. S. NUCLEAR REGULATORY COMMISSION**

**REGION II**

Docket No.: 50-395

License No.: NPF-12

Report No.: 05000395/2006005

Licensee: South Carolina Electric & Gas (SCE&G) Company

Facility: Virgil C. Summer Nuclear Station

Location: P. O. Box 88  
Jenkinsville, SC 29065

Dates: October 1, 2006 - December 31, 2006

Inspectors: J. Zeiler, Senior Resident Inspector  
J. Polickoski, Resident Inspector  
J. Diaz, Health Physicist (Sections 2OS2 and 4OA1.2)  
R. Hamilton, Senior Health Physicist (Sections 2OS1, 2PS1, and 4OA1.2)  
L. Lake, Reactor Inspector (Section 1R08)  
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J. Rivera-Ortiz, Reactor Inspector (Section 1R08 and 4OA5.1)  
C. Peabody, Reactor Inspector (Section 4OA5.2)

Approved by: Eugene F. Guthrie, Chief  
Reactor Projects Branch 5  
Division of Reactor Projects

Enclosure

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## SUMMARY OF FINDINGS

IR 05000395/2006005; 10/01/2006 - 12/31/2006; Virgil C. Summer Nuclear Station; Surveillance Testing and Event Followup.

The report covered a three-month period of inspection by resident inspectors and three announced inspections by regional inspectors. Two Green self-revealing findings, all of which were non-cited violations (NCVs), were identified. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). 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 3, dated July 2000.

### A. Self-Revealing Findings

#### Cornerstone: Initiating Events

- Green. A green self-revealing non-cited violation of Technical Specification 6.8.1.a was identified for operator failure to follow procedure for maintaining steam generator water level while transitioning from the emergency feedwater system to the main feedwater system. This resulted in a turbine trip including feedwater isolation and feedwater pump trip. As immediate corrective actions, the oncoming operations crew was provided simulator training on the evolution emphasizing lessons learned from the incident and procedures were enhanced to limit the main feedwater pump acceleration response ramp rate.

This finding is more than minor because it affected the human performance attribute of the Initiating Events cornerstone and affected the cornerstone objective, in that, the failure to utilize all available indications and anticipate plant response resulted in a plant transient causing a turbine trip. The finding was evaluated using Inspection Manual Chapter 0609, Significance Determination Process, Phase I Worksheet for initiating events. The finding is determined to be of very low safety significance because all necessary plant safety equipment responded as designed to the turbine trip event. The contributing cause of this finding involved the human performance and error prevention aspect of the Human Performance cross-cutting area (Section 4OA3).

#### Cornerstone: Mitigating Systems

- Green. A green self-revealing non-cited violation of Technical Specification 6.8.1.c was identified for failure to follow surveillance testing procedure resulting in the inadvertent partial draining of the "B" emergency core cooling system accumulator. The licensee was in the process of completing an apparent cause evaluation for the human performance error at the end of the inspection period.

This finding is more than minor because it affected the human performance attribute of the Mitigating Systems cornerstone and affected the cornerstone

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objective to ensure the capability of systems that respond to initiating events to prevent undesirable consequences, in that, it had an actual impact of rendering an ECCS accumulator inoperable requiring an unexpected Technical Specification Limiting Condition for Operation entry. The finding was evaluated using Inspection Manual Chapter 0609, Significance Determination Process, Phase I Worksheet for mitigating systems. The finding is determined to be of very low safety significance because the accumulator always maintained adequate inventory to fulfill its safety function, it did not result in an actual loss of a single train for greater than its Technical Specification allowed outage time, and is not potentially risk significant due to external events. The direct cause of this finding involved the procedural compliance aspect of the Human Performance cross-cutting area (Section 1R22).

B. Licensee-Identified Violation

None.

## REPORT DETAILS

### Summary of Plant Status

The unit began the inspection period at 100 percent rated thermal power (RTP). On October 11, 2006, power was reduced to 80 percent RTP to support planned maintenance on the "C" main feedwater pump and "C" main feedwater booster pump. The unit remained at 80 percent RTP until October 13, when a planned shutdown was commenced to implement the sixteenth refueling outage (RF-16). Following outage related work activities, reactor criticality was achieved on November 21. On November 22, with the unit at 1-3 percent RTP, a turbine trip without reactor trip occurred due to high water level in the "B" steam generator. The main turbine was placed online November 22 and the unit was returned to 100 percent RTP on November 28. The unit remained at or near full power for the remainder of the inspection period.

### 1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity

#### 1R01 Adverse Weather Protection

##### Seasonal Weather Susceptibilities

##### a. Inspection Scope

The inspectors performed one adverse weather inspection for readiness of cold weather. The inspectors verified the licensee had implemented applicable sections of operations administrative procedure (OAP)-109.1, "Guidelines for Severe Weather." The inspectors walked down two accessible areas of risk-significant equipment, including level instrumentation associated with the condensate storage tank and the service water pumphouse, to assess whether the equipment was adequately protected from cold weather conditions. Also, the inspectors reviewed the licensee's corrective action program (CAP) database to verify that freeze protection problems were being identified at the appropriate level, entered into the CAP, and appropriately resolved.

##### b. Findings

No findings of significance were identified.

#### 1R04 Equipment Alignment

##### .1 Quarterly Partial System Walkdowns

##### a. Inspection Scope

The inspectors conducted three partial equipment alignment walkdowns (listed below) to evaluate the operability of selected redundant trains or backup systems with the other train or system inoperable or out-of-service (OOS). Correct alignment and operating conditions were determined from the applicable portions of drawings, system operating

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procedures (SOPs), Final Safety Analysis Report (FSAR), and technical specifications (TS). The inspections included review of outstanding maintenance work requests (MWRs) and related Condition Evaluation Reports (CERs) to verify that the licensee had properly identified and resolved equipment alignment problems that could impact mitigating system availability. Documents reviewed are listed in the Attachment to this report.

- “B” motor driven emergency feedwater pump (MDEFW) while “A” MDEFW was OOS for scheduled maintenance;
- “A” and “B” residual heat removal (RHR) pumps following return to standby alignment from outage shutdown cooling operations; and,
- “B” emergency diesel generator (EDG) while “A” EDG was OOS for emergent repair work.

b. Findings

No findings of significance were identified.

.2 Semi-annual Complete System Walkdown

a. Inspection Scope

The inspectors performed a detailed review and walkdown of the “A” component cooling water (CCW) system to identify any discrepancies between the actual operating system equipment lineup and the designed lineup. This walkdown included accessible areas inside and outside the containment. In addition, the inspectors reviewed completed surveillance procedures, outstanding MWRs, system health reports, and related CERs to verify that the licensee had properly identified and resolved equipment problems that could affect the availability and operability of the system. Documents reviewed are listed in the Attachment to this report.

b. Findings

No findings of significance were identified.

1R05 Fire Protection

a. Inspection Scope

The inspectors reviewed recent CERs, MWRs, and impairments associated with the fire protection system. The inspectors reviewed surveillance activities to determine whether they supported the operability and availability of the fire protection system. The inspectors assessed the material condition of the active and passive fire protection systems and features and observed the control of transient combustibles and ignition sources. The inspectors conducted routine inspections of the following nine areas (respective fire zones also noted):

- 1DA switchgear room (fire zone IB-20);
- 1DB switchgear and heating, ventilation, and air conditioning (HVAC) rooms (fire zones IB-16, IB-17, IB-22.2);
- Service water pumphouse (fire zones SWPH-1, SWPH-3, and SWPH-5.1/5.2);
- “A” and “B” CCW pumps/heat exchangers and service water booster pump (SWBP) room (fire zones IB-25.1.1, IB-1.2, IB-1.3, and IB-1.5);
- “A” and “B” EDG rooms (fire zones DG-1.1/1.2 and DG-2.1/2.2);
- Auxiliary Building Switchgear Room 1DB1 and 1DB2X (fire zone AB-1.29);
- “A” and “B” battery and charger rooms (fire zones IB-2, IB-3, IB-4, IB-5, and IB-6);
- Turbine driven emergency feedwater pump (TDEFW) room (fire zone IB-25.2); and,
- RHR and reactor building spray pump rooms (fire zone AB-1.0).

b. Findings

No findings of significance were identified.

1R06 Flood Protection Measures

a. Inspection Scope

The inspectors reviewed and walked down one area (i.e., the intermediate building IB-412' elevation) regarding internal flood protection features and equipment to determine consistency with design requirements, FSAR, and flood analysis documents. Risk significant structures, systems, and components in these areas included the 125 volt direct current safety-related batteries and associated chargers, reactor building HVAC chillers, CCW pumps, SWBPs, and emergency feedwater pumps. The inspectors reviewed the licensee's CAP database to verify that internal flood protection problems were being identified at the appropriate level, entered into the CAP, and appropriately resolved.

b. Findings

No findings of significance were identified.

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

.1 Piping Systems ISI

a. Inspection Scope

On October 23-27, 2006, the inspectors reviewed the implementation of the licensee's ISI program for monitoring degradation of the reactor coolant system (RCS) boundary and risk significant piping system boundaries. The inspectors reviewed a sample from the following activities performed during RF-16: a) 1989 Edition Through the 2000 Addenda of American Society of Mechanical Engineers (ASME) Boiler and Pressure

Vessel Code, Section XI required nondestructive examinations (NDE), b) augmented examinations of alloy 600 welds, Material Reliability Program (MRP-139), c) disposition of NDE recordable indications, and d) welding activities performed in accordance with ASME as part of repair and replacement activities.

Specifically, the inspectors reviewed NDE procedures, NDE reports, NDE electronic data (as applicable), equipment calibration and certification records, and personnel qualification records for the following NDE activity:

- Ultrasonic (UT) examination of Weld 1-4504-29, Pressurizer Spray piping.

The inspectors also reviewed procedures, NDE reports, equipment calibration records, and personnel qualification records for the following VT-2 activities (examination for leakage) and Bare Metal Visual examinations performed to meet the examination requirements of MRP-139 for Alloy 600 welds:

- Bare Metal Visual examination of the Pressurizer bottom head heater penetrations;
- Bare Metal Visual examinations of Pressurizer Surge nozzle and the 5 nozzles on pressurizer head;
- VT-2 examination of Pressurizer safety nozzles to safe end welds;
- VT-2 examination of Pressurizer relief nozzle to safe end weld;
- VT-2 examination of Pressurizer spray nozzle to safe end weld; and,
- VT-2 examination of Pressurizer surge line to safe end weld.

The inspectors reviewed a sample of UT recordable indications to verify that the evaluation and disposition of indications were in accordance with the applicable criteria of ASME Section XI, IWB-3000, that are identified in the procedures listed in Section 1R08 of the Attachment to this report.. Specifically, the inspectors reviewed the disposition of indications for the following weld:

- Rejectable penetrant test (PT) indication on RHR Heat Exchanger (XHE0005B-RH) outlet nozzle reinforcing plate to pipe fillet weld.

The inspectors reviewed a sample of welding activities performed since the beginning of the last refueling outage to evaluate compliance with procedures and the ASME Code. This included the completed portion of the repair/replacement of reactor vessel level instrumentation system (RVLIS) piping on top of the reactor pressure vessel (RPV) head. Specifically, the inspectors reviewed weld process control sheets, welding procedure specifications, welding procedure qualification records, welder qualification records, Certified Material Test Reports for weld material, ASME Code reconciliation documents, and NDE reports. Documents reviewed are listed in the Attachment to this report.

b. Findings

No findings of significance were identified.

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## .2 Vessel (Upper Head) Penetration Inspection Activities

### a. Inspection Scope

This inspection requirement was accomplished through the performance of Temporary Instruction (TI) 2515/150, which is documented in Section 4OA5.1 of this inspection report.

### b. Findings

No findings of significance were identified.

## .3 Boric Acid Corrosion Control (BACC) Program

### 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 onsite record review of procedures and condition reports documenting the results of containment walkdown inspections performed in the RF-16 outage. The inspectors also conducted an independent walkdown of the reactor building to evaluate compliance with licensee's BACC program requirements and verify that degraded or non-conforming conditions, such as boric acid leaks, were properly identified and corrected in accordance with the licensee's corrective action program.

The inspectors reviewed a sample of engineering evaluations completed for evidence of boric acid found on systems containing borated water to verify that the minimum design code required section thickness had been maintained for the affected components. Specifically, the inspectors reviewed the following evaluations:

- CER 0-C-06-2675, "B" RHR Pump, XPP0031B, seal leak; and,
- CER 0-C-06-2504, boron concentration measure inlet valve, XVT08461-CS, packing area leak.

Documents reviewed are listed in the Attachment to this report.

### b. Findings

No findings of significance were identified.

.4 Steam Generator Tube Inspection Activities

a. Inspection Scope

The licensee did not perform steam generator tube examinations this outage. No samples were available.

b. Findings

No findings of significance were identified.

.5 Identification and Resolution of Problems

The inspectors performed a review of ISI related problems, including welding, and BACC program that were identified by the licensee and entered into the corrective action program as CER documents. The inspectors reviewed the CERs 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. Documents reviewed are listed in the Attachment to this report.

1R11 Licensed Operator Regualification Program

.1 Quarterly Review

a. Inspection Scope

On November 22, the inspectors observed performance of senior reactor operators and reactor operators on the plant simulator during a "just-in-time" training exercise prior to commencing the evolution in the actual plant. The exercise involved raising reactor power from 3 percent and placing the main feedwater system and main turbine online. The inspectors assessed overall crew performance, communications, oversight of supervision, and the evaluators' critique. The inspectors verified that any training issues were appropriately captured in the licensee's CAP.

b. Findings

No findings of significance were identified.

.2 Annual Exam Results Review

a. Inspection Scope

Annual review of Licensee Regualification Examination Results. The inspectors performed an in-office review of the licensee's 2006 regualification annual operating

tests results. The inspectors reviewed both individual operating tests and the crew simulator operating tests overall pass/fail results. The licensee administered the operating test to all licensed operators as required by 10 CFR 55.59(a)(2). These results were compared to the thresholds established in Manual Chapter 609 Appendix I, Operator Requalification Human Performance Significance Determination Process.

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness

a. Inspection Scope

The inspectors evaluated two equipment issues described in the CERs listed below to verify the licensee's effectiveness of the corresponding preventive or corrective maintenance associated with structures, systems or components (SSCs). The inspectors reviewed maintenance rule (MR) implementation to verify that component and equipment failures were identified, entered, and scoped within the MR program. Selected SSCs were reviewed to verify proper categorization and classification in accordance with 10 CFR 50.65. The inspectors examined the licensee's 10 CFR 50.65(a)(1) corrective action plans to determine if the licensee was identifying issues related to the MR at an appropriate threshold and that corrective actions were established and effective. The inspectors' review also evaluated if maintenance preventable functional failures (MPFF) or other MR findings existed that the licensee had not identified. The inspectors reviewed the licensee's controlling procedures, i.e., engineering services procedure (ES)-514, "Maintenance Rule Implementation," and the Virgil C. Summer "Important To Maintenance Rule System Function and Performance Criteria Analysis" to verify consistency with the MR requirements.

- CER 0-C-06-2861, "A" EDG breaker inadvertently opened during diesel testing; and,
- CER 0-C-06-3572, Foreign material was found on the inlet portion of both the CCW heat exchanger and intercooler heat exchanger.

b. Findings

No findings of significance were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control

a. Inspection Scope

The inspectors reviewed the licensee's assessments of the risk impacts of removing from service those components associated with planned and emergent work items. The inspectors evaluated the five selected work activities listed below for: (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 emergent work problems were adequately identified and resolved. The inspectors evaluated the licensee's work prioritization and risk characterization to determine, as appropriate, whether necessary steps were properly planned, controlled, and executed for the planned and emergent work activities listed below:

- Work Week 2006-40, risk assessment for emergent reactor building sump valve maintenance; scheduled 10-year preventive maintenance on "A" MDEFW pump; and electrical troubleshooting of a 120 volt direct current bus hard ground;
- Review of outage shutdown risk and contingency plans during RCS draindown, lack of steam generator as heat sink, and one offsite power supply available;
- Review of outage shutdown risk and contingency plans for RCS inventory at nine inches below the reactor vessel flange;
- Review of outage shutdown risk and contingency plans for reactor core offload, single train of offsite power source available, and single train of engineered safety features equipment available; and,
- Work Week 2006-48, risk assessment for yellow configuration for "A" EDG emergent maintenance.

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations

a. Inspection Scope

The inspectors reviewed four operability evaluations affecting risk significant mitigating systems to assess, as appropriate: (1) the technical adequacy of the evaluations; (2) whether operability was properly justified and the subject component or system remained available, such that no unrecognized increase in risk occurred; (3) whether other existing degraded conditions were considered; (4) where compensatory measures were involved, whether the compensatory measures were in place, would work as intended, and were appropriately controlled; and (5) the impact on TS limiting conditions for operations and the risk significance in accordance with the Significance Determination Process (SDP). Also, the inspectors verified that the operability evaluations were performed in accordance with station administrative procedure (SAP)-999, "Corrective Action Program."

- CER 0-C-06-3197, Reactor building sump discharge containment isolation valve, XVD6242A-ND, failed closed during operation;
- CER 0-C-06-3329, Seismic analysis discrepancy with TDEFW turbine lube oil piping vendor design and plant installation;
- CER 0-C-06-3417, "B" RHR pump flow dropped unexpectedly during shutdown cooling operation; and,

- CER 0-C-06-3587, Cavitation related erosion damage discovered in service water cooling return valve, XVB3121A-SW, to “A” EDG.

b. Findings

No findings of significance were identified.

1R17 Permanent Plant Modifications

a. Inspection Scope

The inspectors evaluated one engineering change request (ECR) package for a modification in the Mitigating Systems cornerstone area to evaluate the modification for adverse effects on system availability, reliability, and functional capability. The modification and the associated attributes reviewed is as follows:

ECR 50555, “Alternate engineered safety feature alternating current (AC) offsite power source:”

- Plant Document Updating
- Post-Modification Testing
- Installation Records
- Materials / Replacement Components

For the selected modification package, the inspectors observed the as-built configuration. Documents reviewed included procedures, engineering calculations, modification design and implementation packages, work orders, site drawings, corrective action documents, applicable sections of the FSAR, supporting analyses, TS, and design basis information. The inspectors witnessed aspects of the post-modification testing to verify adequate testing of the new alternate AC power source was implemented following installation. The inspectors also reviewed selected CERs associated with the modification to confirm that problems encountered with the implementation of the modification were entered into the CAP.

b. Findings

No findings of significance were identified.

1R19 Post-Maintenance Testing

a. Inspection Scope

For the seven maintenance activities listed below, the inspectors reviewed the associated post-maintenance testing (PMT) procedures and witnessed either the testing and/or reviewed test records to assess whether: (1) the effect of testing on the plant had been adequately addressed by control room and/or engineering personnel; (2) testing was adequate for the maintenance performed; (3) test acceptance criteria were clear

and adequately demonstrated operational readiness consistent with design and licensing basis documents; (4) test instrumentation had current calibrations, range, and accuracy consistent with the application; (5) 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 its safety function. The inspectors verified that these activities were performed in accordance with general test procedure (GTP)-214, "Post Maintenance Testing Guideline."

- PMT for MWR's 0525704, 0525706, 0525708, on "A" EDG for replacement of check valves at the attached fuel oil pump discharge and "A" and "B" fuel oil return headers;
- PMT for EMSI-ECR 50555, Phase 2, Phase rotation verification tests with busses energized but not loaded;
- PMT for "B" RHR pump and check valves using surveillance test procedure (STP)-230.007 following RF-16 related preventive maintenance;
- PMT for TDEFW pump using STP-220.002 following RF-16 related preventive maintenance;
- PMT for MWR 0612855 on "B" charging pump for emergent breaker maintenance;
- PMT for preventive maintenance activities on "A" reactor building spray pump using STP-212.002; and,
- PMT of "A" EDG using STP-125.002A following load swings and lockout of engineered safety features 115 kilovolt transformer XTF-4.

b. Findings

No findings of significance were identified.

1R20 Refueling and Other Outage Activities

a. Inspection Scope

On October 14, the unit began refueling outage RF-16. The 39 day and 16 hour outage was completed on November 22, 2006. The inspectors used inspection procedure 71111.20, "Refueling and Outage Activities," to complete the inspections described below.

Prior to and during the outage, the inspectors reviewed the licensee's outage risk assessments and controls for the outage schedule to verify that the licensee had appropriately considered risk, industry experience and previous site specific problems, and to confirm that the licensee had mitigation/response strategies for losses of any key safety functions.

In the area of licensee control of outage activities, the inspectors reviewed equipment removed from service to verify that defense-in-depth was maintained in accordance with

applicable TS and that configuration changes due to emergent work and unexpected conditions were controlled in accordance with the outage schedule and risk control plan.

The inspectors reviewed selected components which were removed from service to verify that tags were properly installed and that associated equipment was appropriately configured to support the function of the clearance.

During the outage, the inspectors:

- Reviewed RCS pressure, level, and temperature instruments to verify that those instruments were installed and configured to provide accurate indication;
- Reviewed the status and configuration of electrical systems to verify that those systems met TS requirements and the licensee's outage risk control plan. The inspectors also evaluated if switchyard activities were controlled commensurate with their risk significance and if they were consistent with the licensee's outage risk control assessment assumptions;
- Observed spent fuel pool operations to verify that outage work was not impacting the ability of the operations staff to operate the spent fuel pool cooling system during and after core offload. The inspectors also reviewed the licensee's calculations of spent fuel pool and reactor vessel heatup rates in case of a potential loss of cooling event;
- Observed licensee control of containment penetrations and containment entries to verify that the licensee controlled those penetrations and activities in accordance with the appropriate TS and could achieve/maintain containment closure for required conditions; and,
- The inspectors examined all accessible areas inside the reactor building prior to reactor startup to verify that debris had not been left which could affect the performance of the containment sumps.

The inspectors reviewed the following activities for conformance to applicable procedural and TS requirements:

- Plant shutdown activities;
- Decay heat removal system operations;
- Inventory controls and measures to provide alternate means for inventory addition;
- Reactivity controls;
- Reactor vessel defueling and refueling operations; and,
- Reactor heatup, mode changes, initial criticality, startup and power ascension activities.

The inspectors also reviewed various problems that arose during the outage to verify that the licensee was identifying problems related to outage activities at an appropriate threshold and was entering them in the CAP.

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing

a. Inspection Scope

The inspectors observed and/or reviewed the six surveillance tests listed below to verify that TS surveillance requirements were followed and that test acceptance criteria were properly specified to ensure that the equipment could perform its intended safety function. The inspectors verified that proper test conditions were established as specified in the procedures, that no equipment preconditioning activities occurred, and that acceptance criteria had been met.

In-Service Tests:

- STP-401.002, "Main Steam Line Code Safety Valves ASME OM Code Test" (STP performed for "B" loop main steam safety valves).

Containment Isolation Valve (CIV):

- STP-215.004, "Containment Isolation Valve Leakage Test for the AC, CC, DN, FS, and SW Systems" (for fire service penetration 427).

Other Surveillance Tests:

- STP-124.010, "Integrated Safeguards Test, Train A;"
- STP-124.011, "Integrated Safeguards Test, Train B;"
- STP-125.021, "Periodic Testing of the Alternate AC Power Supply," and STP-125.022, "Parr Hydro Timed Blackout Recovery Test;" and,
- STP-208.001, "Shutdown and Control Rod Drop Test."

b. Findings

Introduction. A Green self-revealing non-cited violation (NCV) of TS 6.8.1.c was identified for failure to follow surveillance testing procedure resulting in the inadvertent partial draining of an emergency core cooling system (ECCS) accumulator.

Description. On November 19, 2006, with the plant in Mode 3 and the RCS at 2010 psig, operations test personnel were performing STP-215.008, "SI and RH System Valve Leakage Test," Revision 5, which was written to accomplish TS surveillance requirement 4.4.6.2.2 for verifying that each RCS pressure isolation valve seat leakage is within its required limits. Step 6.13.5.C.10 of the procedure directed the closure of the "B" ECCS accumulator test pressurization valve, XVT8879B-SI, to be followed by Step 6.13.5.D, for opening the "B" ECCS accumulator discharge valve, XVG08808B-SI. Contrary to this sequence, test personnel failed to close XVT8879B-SI prior to opening XVG08808B-SI resulting in a flowpath from the "B" ECCS accumulator to the refueling water storage tank (RWST) through the 0.75-inch test pressurization line. Upon receiving accumulator low level and pressure alarms, the main control room operators

realized the step had been missed and immediately closed XVT8879B-SI, terminating the draining of the accumulator. The "B" accumulator level dropped to approximately 55 percent, which was below the 65.6 percent required to be maintained by TS 3.5.1 for operability. The operators restored accumulator level above 65.6 percent prior to exceeding the TS Limiting Condition for Operation, which required the inoperable accumulator be restored to operability within one hour. The licensee later determined that the accumulator was still capable of fulfilling its design safety function at the reduced inventory condition.

Analysis. The performance deficiency associated with this event is the failure to follow surveillance procedure, which led to the inadvertent transfer of water from the "B" ECCS accumulator to the RWST, rendering the accumulator inoperable by TS. This finding is more than minor because it affected the human performance attribute of the Mitigating Systems cornerstone and affected the cornerstone objective to ensure the capability of systems that respond to initiating events to prevent undesirable consequences. The finding was evaluated using Inspection Manual Chapter 0609, Significance Determination Process, Phase I Worksheet for Mitigating Systems. The finding was determined to be of very low safety significance because the accumulator always maintained adequate inventory to fulfill its safety function, it did not result in a loss of safety function of a single train for greater than its TS allowed outage time, and is not potentially risk significant due to external events. The direct cause of this finding involved the Procedural Compliance aspect of the Human Performance cross-cutting area.

Enforcement. TS 6.8.1.c requires that written procedures be established, implemented and maintained covering surveillance and test activities of safety-related equipment. Contrary to the above, the licensee failed to implement STP-215.008, Revision 5, on November 19, 2006, when operations test personnel opened the "B" ECCS accumulator discharge valve, XVG08808B-SI, prior to closing a pressure test valve, XVT8879B-SI, resulting in the inoperability of the "B" ECCS accumulator. Because the finding is of very low safety significance and has been entered into the corrective action program as CER 0-C-06-4246, this violation is being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy: NCV 05000395/2006005-01, Failure to Follow Surveillance Procedure Resulting in Inoperability of "B" ECCS Accumulator.

## 2. RADIATION SAFETY

Cornerstone: Occupational Radiation Safety

### 2OS1 Access Control To Radiologically Significant Areas

#### a. Inspection Scope

Access Controls To Radiologically Significant Areas. Licensee activities for monitoring workers and controlling access to radiologically significant areas were inspected. The inspectors evaluated procedural guidance and directly observed implementation of administrative and physical controls; appraised radiation worker and technician

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knowledge of, and proficiency in implementing, radiation protection program activities; and assessed worker exposures to radiation and radioactive material.

Radiological postings and material labeling were directly observed during tours of the auxiliary and reactor buildings and radioactive waste processing areas. The inspectors conducted independent surveys in these areas to verify posted radiation levels and to compare with current licensee survey records. During plant tours, control of locked high radiation area (LHRA) keys and the physical status of LHRA doors were examined. In addition, the inspectors observed radiological controls for non-fuel items stored in the spent fuel pools. The inspectors also reviewed selected Radiation Protection procedures and radiation work permits (RWPs), and discussed current access control program implementation with Radiation Protection supervisors.

During the inspection, radiological controls for work activities in high radiation areas (HRA) were observed and discussed. The inspectors attended a pre-job briefing for work that involved entries into posted locked high radiation areas and directly observed the work activities involved. The inspectors observed workers' adherence to RWP guidance and health physics technician (HPT) proficiency in providing job coverage. Controls for limiting exposure to airborne radioactive material were reviewed and operation of ventilation units and positioning of air samplers were also observed. The inspectors evaluated electronic dosimeter alarm setpoints for consistency with radiological conditions in and around the containment, auxiliary building, and radioactive waste processing areas. In addition, the inspectors interviewed workers to assess knowledge of RWP requirements.

The inspectors evaluated worker exposures through review of data associated with discrete radioactive particle and dispersed skin contamination events. Controls used for monitoring extremity dose and the placement of dosimetry when work involved significant dose gradients were reviewed.

Radiation Protection program activities were evaluated against 10 CFR Part 20; TS Sections 6.11, "Radiation Protection Program," and 6.12, "High Radiation Areas;" Regulatory Guide 8.38, "Control of Access to High and Very High Radiation Areas in Nuclear Power Plants;" and approved licensee procedures. Licensee guidance documents, records, and data reviewed are listed in the Attachment to this report.

Problem Identification and Resolution. Five CERs and two audits associated with radiological work practices, and dosimetry assessments were reviewed and discussed with Radiation Protection supervisors. The inspectors assessed the licensee's ability to identify, characterize, prioritize, and resolve the identified issues in accordance with licensee procedure SAP-999, "Corrective Action Program," Revision 1. Specific documents reviewed are listed in the Attachment to this report.

The inspectors completed 21 of 21 required samples.

b. Findings

No findings of significance were identified.

## 2OS2 ALARA Planning and Controls

### a. Inspection Scope

As Low As Is Reasonably Achievable (ALARA). Guidance and implementation of the licensee's ALARA program during RF-16 were observed and evaluated by the inspectors. The inspectors reviewed ALARA planning, dose estimates, and prescribed ALARA controls for outage work tasks expected to incur the maximum collective exposures. Reviewed activities included removal of spent fuel bundles for video inspection and re-arrangement of fuel, the removal of shielding and insulation over the reactor vessel head to perform an inspection and repairs of the RVLIS line. While performing this review, the inspectors directly observed fuel movement within the spent fuel pool area and work performed on the RVLIS line while evaluating the licensee's use of engineering controls, low-dose waiting areas, and on-the-job supervision. Incorporation of planning, established work controls, expected dose rates, and dose expenditure into the ALARA pre-job briefings and RWPs for those activities were also reviewed. The inspectors observed on-the-spot ALARA plans being created for emergent work and reviewed the licensee's proposed course of action from the ALARA program. The inspectors observed several RWP ALARA briefings conducted by the licensee, and the staff interactions with employees and contractors.

Selected elements of the licensee's source term reduction and control program were examined to evaluate the effectiveness of the program in supporting implementation of the ALARA program goals. Shutdown chemistry program implementation and the resultant effect on containment and auxiliary building dose rate trending data were reviewed and discussed with cognizant licensee representatives.

Trends in individual and collective personnel exposures at the facility were reviewed. Records of year-to-date individual radiation exposures sorted by work groups were examined for significant variations of exposures among workers. The inspectors examined the dose records of all declared pregnant workers during 2005 and 2006 to evaluate total or current gestation dose. Applicable procedures were reviewed to assess licensee controls for declared pregnant workers. Trends in the plant's three-year rolling average collective exposure history, outage, non-outage and total annual doses for selected years were reviewed and discussed with licensee representatives.

The licensee's ALARA program implementation and practices were evaluated for consistency with FSAR Chapter 12, "Radiation Protection;" 10 CFR Part 20 requirements; Regulatory Guide 8.29, "Instruction Concerning Risks from Occupational Radiation Exposure," February 1996; and licensee procedures. Documents reviewed during the inspection of this program area are listed in Section 2OS2 of the Attachment to this report.

Problem Identification and Resolution. The inspectors reviewed the corrective action program documents listed in Section 2OS2 of the Attachment to this report that were related to the licensee's ALARA program. The inspectors assessed the licensee's ability to identify, characterize, prioritize, and resolve the identified issues in accordance with SAP-999, "Corrective Action Program."



The inspectors completed 15 of 15 required samples.

b. Findings

No findings of significance were identified.

Cornerstone: Public Radiation Safety

2PS1 Radioactive Gaseous and Liquid Effluent Treatment and Monitoring Systems

a. Inspection Scope

The inspectors reviewed and discussed the licensee's action plan for ground water protection and communication plan initiatives for identification, reporting and mitigation of onsite and offsite releases.

The inspectors reviewed the site's 10 CFR 50.75(g) files. These files are the historical documentation of spills, unmonitored and abnormal releases that are maintained to support decommissioning planning. The review was to determine if there were historical events that were likely to affect groundwater.

A review was performed of the licensee's ground water monitoring program and its technical bases. This review included the site hydrology studies in the FSAR and any subsequent reassessments. The relationship between the sampling wells and site structures was reviewed. This included supplemental National Pollutant Discharge Elimination System wells that are routinely sampled and not officially part of the Radiological Environmental Monitoring Program.

The inspectors completed four samples as a regional initiative to evaluate groundwater protection activities at the site.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator (PI) Verification

.1 Reactor Safety: Barrier Integrity Cornerstone

a. Inspection Scope

To verify the accuracy of the data reported for the PI listed below, the inspectors used performance indicator definitions and guidance contained in Nuclear Energy Institute (NEI) 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 4. The inspectors reviewed station chemistry logs and databases, corrective action

program documents, and PI data sheets to verify the basis for reporting the data element. The inspectors interviewed licensee personnel associated with the PI data collection, evaluation and distribution. The inspectors verified data for the period annotated for the following PI:

- Reactor Coolant System Activity (October 2004 - June 2006).

b. Findings

No findings of significance were identified.

.2 Occupational Radiation Safety and Public Radiation Safety Cornerstones

a. Inspection Scope

The inspectors sampled licensee records to verify the accuracy of reported PI data for the periods listed below. To verify the accuracy of the reported PI elements, the reviewed data were assessed against guidance contained in NEI 99-02, "Regulatory Assessment Indicator Guideline," Revision 4, and the PI Frequently Asked Questions (FAQ) list.

Occupational Radiation Safety Cornerstone. The inspectors reviewed the Occupational Exposure Control Effectiveness PI results for the period of January 2005 through September 2006. For the assessment period, the inspectors reviewed health physics shift log entries, electronic dosimeter alarm logs, and licensee procedural guidance for collecting and documenting PI data. CERs were reviewed for uptakes and abnormal thermal luminescent dosimeter (TLD) results. Report Section 2OS1 contains additional details regarding the inspection of controls for exposure significant areas and review of related CERs. Documents reviewed are listed in sections 2OS1 and 4OA1 of the Attachment to this report.

Public Radiation Safety Cornerstone. The inspectors reviewed the Radiological Control Effluent Release Occurrences PI results for the period of January 2005 through September, 2006. For the assessment period, the inspectors reviewed cumulative and projected doses to the public. The inspectors also reviewed licensee procedural guidance for collecting and documenting PI data. Documents reviewed are listed in section 4OA1 of the Attachment to this report.

The inspectors completed two of two required radiation protection samples.

b. Findings

No findings of significance were identified.

## 4OA2 Identification and Resolution of Problems

### .1 Daily Screening of Corrective Action Items

#### a. Inspection Scope

As required by 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 corrective action program. This review was accomplished by either attending daily screening meetings that briefly discussed major CERs, or accessing the licensee's computerized corrective action database and reviewing each CER that was initiated.

#### b. Findings

No findings of significance were identified.

### .2 Annual Sample Review

#### a. Inspection Scope

The inspectors reviewed one issue in detail to evaluate the effectiveness of the licensee's corrective actions for important safety issues documented in CER 0-C-05-3970 and CER 0-C-05-3344. These CERs identified an operator workaround involving the need for operators to manually reduce condensate reject flow to the condensate tank during some secondary plant transients when operating with a single condensate pump to prevent potential pump runout conditions. The inspectors assessed whether the licensee adequately addressed all of the applicable causal factors and identified effective corrective actions. Also, the inspectors reviewed the licensee's list of identified operator workarounds to assess the cumulative effect on the functional capability, reliability or availability of any related mitigating system. The inspectors reviewed the human reliability aspect of the cumulative effect of the workarounds to determine if they affected the operators' ability to respond in a correct and timely manner to any initiating event or their ability to implement abnormal or emergency operating procedures.

#### b. Findings

No findings of significance were identified.

### .3 Semi-Annual Trend Review

#### a. Inspection Scope

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

also considered trends in human performance errors, the results of daily inspector corrective action item screening discussed in Section 4OA2.1 above, licensee trending efforts, and licensee human performance results. The review nominally considered the six-month period of July 2006 through December 2006. Documents reviewed included licensee monthly and quarterly corrective action trend reports, engineering system health reports, maintenance rule documents, department self-assessment activities, and quality assurance audit reports.

b. Findings

No findings of significance were identified. The inspectors evaluated the licensee's trending methodology and observed that the licensee had performed a detailed review. The licensee routinely reviewed the cause codes, involved organizations, key words, and system links to identify potential trends in their CAP data. The inspectors compared the licensee's reviews with the results of the inspectors' daily screening and did not identify any discrepancies or potential trends in the data which the licensee had failed to identify.

4OA3 Event Followup

Turbine Trip from High Steam Generator Level During Power Escalation

a. Inspection Scope

The inspectors reviewed the November 22, 2006, automatic turbine trip that resulted from high level in the "B" steam generator. The inspectors reviewed CER 0-C-06-4275 associated with the event, plant logs, plant computer data, and interviewed operations personnel to assess the cause of the event, confirm plant equipment performed as required, and ensure that operator actions were appropriate and in accordance with required operating, alarm response, abnormal, and emergency procedures.

b. Findings

Introduction. A Green self-revealing NCV of TS 6.8.1.a was identified for operator failure to follow procedure to maintain steam generator water level while transitioning from the emergency feedwater system to the main feedwater system.

Description. On November 22, 2006, with the plant in Mode 2, between 1-3 percent reactor power, operators were preparing to increase reactor power and place the main turbine online. The governing procedure, general operating procedure (GOP)-4A, Revision 0, "Power Operation (Mode 1 - Ascending)," requires the start of the feedwater system via SOP-210, Revision 19, "Feedwater System," in order to transition feeding of steam generators from the emergency feedwater system to the main feedwater system. With "A" feedwater pump (FWP) online and the main feedwater pump master speed controller and main feedwater regulating valve (FRV) bypass valve controllers in manual, the feedwater operator at the main control board commenced increasing main feedwater system flow by opening the three steam generator FRV bypass valves and by

increasing FWP speed via the master speed controller in order to maintain the differential pressure between the feedwater and steam headers at approximately 150 psig. The feedwater operator was unable to maintain narrow range steam generator water levels between 60-65 percent as required in GOP-4A, Step 3.7.e. As a result, "B" steam generator water level reached the hi-hi alarm setpoint and the P-14 reactor protection signal setpoint causing a turbine trip, feedwater isolation, and trip of the "A" FWP. As designed, a reactor trip did not occur since reactor power was below 50 percent. Coincidental with this transient was low pressurizer level causing a letdown isolation and tripping of the pressurizer heaters, and average RCS temperature briefly decreasing below the TS minimum for criticality of 551 degrees Fahrenheit. Following the turbine trip, the plant was stabilized, and all plant equipment performed as designed. The licensee's apparent cause evaluation concluded that the feedwater operator failed to utilize all available indications and anticipate plant response during the transition from emergency feedwater to main feedwater evolution.

Analysis. The inspectors determined the operator's failure to maintain steam generator water level as required per GOP-4A, was a performance deficiency. Specifically, the feedwater operator failed to utilize all available indications and anticipate plant response. This finding is more than minor because it affected the human performance attribute of the Initiating Events cornerstone and affected the cornerstone objective, in that, the failure to utilize all available indications and anticipate plant response resulted in a plant transient causing a turbine trip. The finding was evaluated using Inspection Manual Chapter 0609, Significance Determination Process, Phase I Worksheet for Initiating Events. The finding was determined to be of very low safety significance (Green) because all necessary plant safety equipment responded as designed to the turbine trip event. The contributing cause of this finding involved the Human Performance and Error Prevention aspect of the Human Performance cross-cutting area.

Enforcement. TS 6.8.1.a requires, in part, that written procedures be implemented covering activities listed in Regulatory Guide 1.33, Revision 2, Appendix A, February 1978, which includes procedures for general plant operations. Contrary to the above, on November 22, 2006, the feedwater operator failed to implement GOP-4A, Step 3.7.e when "B" steam generator water level increased to the hi-hi setpoint causing a turbine trip. Because the finding is of very low safety significance and has been entered into the corrective action program as CER 0-C-06-4275, this violation is being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy: NCV 05000395/2006005-02, Failure to Follow Procedure for Maintaining Steam Generator Water Level Results in Turbine Trip During Power Escalation.

#### 40A5 Other

- .1 (Closed) NRC TI 2515/150: Reactor Pressure Vessel Head and Head Penetration Nozzles (NRC Order EA-03-009).
- a. Inspection Scope

From October 23 to October 27, 2006, the inspectors reviewed the licensee's activities

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relative to the NDE of the reactor pressure vessel head (RPVH) nozzles, the bare metal visual (BMV) examination of the RPVH nozzles and head surface area, and the visual examination to identify potential boric acid leaks from pressure-retaining components above the RPVH. These activities were reviewed during RF-16 in order to verify licensee compliance with the regulatory requirements of NRC Order EA-03-009, Modifying Licenses dated February 20, 2004, (hereinafter NRC Order) and gather information to help the NRC staff identify possible further regulatory positions and generic communications.

The inspectors' review of the NDE of RPVH nozzles included: a) review of NDE procedures; b) assessment of NDE personnel training and qualification; c) review of NDE equipment certification and performance demonstration; and d) observation and assessment of UT examinations. The inspectors also held discussions with the licensee's contractor representatives and licensee personnel involved in the RPVH examination. Specifically, the inspectors reviewed a sample of the volumetric UT and surface PT examinations of the RPVH penetrations as follows:

- Observed portion of in-process UT scanning of RPVH nozzle Nos. 14 and 65;
- Reviewed the UT data sheets and electronic data for RPVH nozzle Nos. 24, 25, 32, 38, 39, 40, 45, and 52;
- Reviewed the PT data sheets for the RPVH vent line penetration;
- Reviewed the results of the UT examination performed to assess for leakage into the annulus between the RPVH penetration nozzle and the RPVH low-alloy steel (interference fit zone) for penetration Nos. 24, 25, 32, 38, 39, 40, 45, and 52;
- Reviewed training and qualification records, including qualification and certification procedures, for NDE personnel who performed the above volumetric and surface examinations;
- Reviewed certification, performance demonstration, and calibration records for NDE equipment used to perform the above volumetric examinations; and,
- Reviewed the licensee's contractor's examination procedures used to perform the above volumetric and surface examinations.

The inspectors' review of the BMV examination of the RPVH nozzles and head surface area included: a) review of procedures used to perform the remote automated examination; b) assessment of personnel training and qualification; c) review of a sample of recorded video for RPVH penetration Nos. 13, 17, 18, 21, 32, 39, and 63; d) review of pictures taken for all RPVH penetrations for previous and recent RF-16 BMV examinations; e) review of a sample of resolution and sensitivity demonstration; and f) review of performance demonstration documents.

The inspectors' review of the visual examination to identify potential boric acid leaks from pressure-retaining components above the RPVH consisted of the review of licensee procedures used to meet this requirement and the results from the visual examinations performed in the previous and recent RF-16 refueling outage. The inspectors also observed an accessible area of the RPVH to assess the general condition of the head.

The inspectors also reviewed the licensee's effective degradation years calculation performed to determine the RPVH's susceptibility category and its examination requirements.

b. Observations and Findings

- 1) Verification that the examinations were performed by qualified and knowledgeable personnel.

The inspectors reviewed personnel training and qualifications to verify that volumetric and surface NDEs were performed by trained and qualified personnel. All examiners were qualified in accordance with the ASME Code and had additional training on RPVH examination, as required in the licensee's contractor's "Written Practice for the Qualification and Certification of NDE Personnel" document.

- 2) Verification that the examinations were performed in accordance with approved and demonstrated procedures.

V. C. Summer's RPVH has a total of 66 penetrations. The penetration configurations available were: 48 control rod drive mechanism (CRDM) penetrations with thermal sleeves, 8 CRDM penetrations with open bores, 5 "part length" CRDM penetrations with open bores, 4 thermocouple penetrations, and 1 vent line penetration. All penetration nozzles, including the vent line nozzle, were examined by remote automated UT from the inside diameter (ID) surface in accordance with the licensee's contractor's approved procedures 54-ISI-603-002 for sleeved penetrations and 54-ISI-605-01 for small bore penetrations.

All RPVH penetrations, except the vent line, were examined with the Time of Flight Diffraction (TOFD) technique using a blade probe containing one set of 50 degree/5 MHz/L-Wave transducers circumferentially oriented for axial flaws (COAF). The transducer set was contained in a single inspection housing. For the RPVH penetrations without thermal sleeves, the inspection equipment was adjusted by using a dummy sleeve to simulate a penetration with a thermal sleeve. Assessment of leakage into the interference fit zone was employed by analyzing the pattern and amplitude of the backwall reflection from the TOFD transducers set up.

The vent line penetration nozzle was examined with a set of 0 degree/5 MHz/L-Wave transducers, one set of 45 degree/5 MHz/S-Wave transducers (clockwise and counter clockwise beam direction), and one set of 70 degree/5 MHz/S-Wave transducers (up and down beam direction). All transducer sets were contained in a single inspection housing. Assessment of leakage through the J-groove weld was employed by performing a PT examination on the surface of the J-groove weld in accordance with the licensee's contractor's procedure 54-ISI-240-43.

The inspectors reviewed the licensee's contractor's NDE procedures and performance demonstration documents, and observed in-process examinations to verify that activities were performed in accordance to demonstrated procedures. The inspectors found that the licensee's contractor's examination procedure for CRDM nozzles were demonstrated to be able to detect and size flaws in the RPVH nozzles in accordance with Electric Power Research Institute (EPRI) NDE Center's protocol contained in "Materials Reliability Program: Demonstration of Vendor Procedures for the Inspection of Control Drive Mechanism Head Penetrations (MRP-89)." The licensee's contractor's equipment demonstration took place from August 14 to August 24, 2006. The licensee's contractor had performed a similar demonstration in 2002, as documented in MRP-89. However, because the licensee's contractor modified their equipment including changing the essential variables of the demonstration in 2002, the demonstration was repeated. The 2006 demonstration was performed with three RPVH nozzle mockups with multiple tube flaws representing the expected field degradations. These mockups were different from the ones used during the demonstration performed in 2002 (i.e., demonstration documented in MRP-89). The demonstration adopted security portions from the EPRI Performance Demonstration Initiative protocol by restricting the access to the mockups and making them available to the licensee's contractor only when the EPRI NDE personnel were present. EPRI letter to South Carolina Electric and Gas (SCE&G), dated October 3, 2006, documents the comparison of the licensee's contractor's equipment demonstration with the previous demonstration performed in 2002. The letter states that the scatter observed is within the variability of the examination and the reliability of the examinations conducted with the new instrumentation will be comparable to the previous demonstration.

The procedure used for the RPVH vent line was not demonstrated under a specific program such as the EPRI MRP. This procedure was developed with standards similar to the CRDM demonstration process with regard to basic fundamental ultrasonic requirements. The procedure used for the PT examination of the vent line weld surface was developed in accordance with the ASME Code.

- 3) Verification that the licensee was able to identify, disposition, and resolve deficiencies.

All indications of cracks or interference fit zone leakage were required to be reported for further examination and disposition as specified in the licensee's contractor's NDE procedures. Based on observation of the examination process and discussions with contractor's personnel, the inspectors considered that deficiencies would be appropriately identified, dispositioned, and resolved. UT indications associated with the fabrication of the J-groove weld and nozzle tube material were identified at several RPVH penetrations. All indications did not exhibit service related crack characteristics and were documented for future reference.



- 4) Verification that the licensee was capable of identifying the primary water stress corrosion cracking (PWSCC) and/or RPVH corrosion phenomenon described in the NRC Order.

The NDE techniques employed for the examination of RPVH CRDM nozzles had been previously demonstrated under the EPRI MRP/Inspection Demonstration Program as capable of detecting PWSCC type manufactured cracks. Based on the review of performance demonstration documents, observation of in-process examinations, and review of NDE data, the inspectors considered that the licensee was capable of identifying PWSCC and/or corrosion as required by the NRC Order.

- 5) Evaluation of the RPVH condition (e.g. debris, insulation, dirt, boron from other sources, physical layout, viewing obstructions).

A BMV examination was performed per the licensee's contractor's procedure 54-ISI-367-07 by qualified and trained personnel. All RPVH penetrations were inspected remotely by using an automated camera. The examiners were able to have access to essentially 95 percent of the required examination surface. No evidence of corrosion or leakage from the annular gaps around the penetrations was observed. The licensee did identify several boron deposits on several RPVH penetrations and the RPVH surface area. These boron deposits did not appear to have originated from the penetration nozzles. However, the cause of these deposits was undetermined at the time of the NRC inspection. The planned disposition of these indications was to clean all boron deposits and determine the cause of the leakage. The inspectors reviewed all pictures taken as part of the first automated BMV examination and found no indications of leakage from the RPVH nozzles or significant corrosion of the RPVH top surface area around the penetration nozzles. A second automated BMV examination was scheduled after the RPVH cleaning to fully meet the NRC Order requirements.

- 6) Evaluation of the licensee's ability to identify and characterize small boron deposits, as described in NRC Bulletin 2001-01.

As noted above, the licensee was able to have access to essentially 95 percent of the required examination surface. The examination procedure established requirements for the illumination and resolution of the examination equipment. Per procedure, the light source must deliver at least 50 foot-candles and the equipment resolution/sensitivity must resolve lower case characters with a 0.044 inch height. Based on the inspector's assessment of the BMV examination implementation, the review of personnel qualifications, the review of the BMV examination procedure, and the review of licensee's observations captured in the examination results, the inspectors determined that the licensee had the ability to identify and characterize small boron deposits in the examination area.

- 7) Evaluation of the extent of material deficiencies (i.e., cracks, corrosion, etc.) that required repair.

No examples of leakage through RPVH nozzle penetrations, material deficiencies, or flaws requiring repair were identified during the volumetric NDE. As indicated above, UT indications were identified at several RPVH penetrations and they were dispositioned as fabrication indications (not service related). In addition, boric acid indications on the RPVH surface area were identified during the BMV examination, but the cause and need for repair were undetermined at the time of the NRC inspection. The planned licensee's actions for these indications included cleaning of the RPVH surface area, determining the cause of the leakage, and conducting a second BMV examination.

- 8) Evaluation of any significant impediments to effectively perform each examination method (e.g., centering rings, insulation, thermal sleeves, nozzle distortion, etc.)

The volumetric examination coverage extended from a minimum of 2-inch above the highest point of the J-groove weld to the maximum coverage possible below the lowest point of the J-groove weld, which resulted to be more than 1-inch for all nozzles. The inspectors reviewed Dominion Engineering Calculation C-8605-00-01, Revision 1, which contains the axial and hoop stress analysis for V. C. Summer's RPVH nozzles. The analysis determined the distance below the J-groove weld where the stresses reach 20 thousand pounds per square inch (ksi) tension, and covered certain RPVH penetration set up angles representative of the V. C. Summer RPVH's design. For those penetrations with set up angles not specifically covered by the analysis, interpolation was performed to determine the distance below the J-groove weld where the stresses reach 20 ksi tension. The inspectors reviewed the coverage obtained for a sample of RPVH penetrations at different set up angles to verify that the distance below the lowest point of J-groove weld to reach 20 ksi was bounded by the examination coverage. No issues concerning the UT coverage below the J-groove weld were found during the NRC inspection.

The licensee did not experience any significant limitations to obtain the required examination coverage specified in the NRC Order for the BMV examination. The calculation of the accessible RPVH surface area for the BMV examination was documented in Engineering Information Record 51-9032210-000, which resulted in achieving at least 95 percent of the required examination area.

The inspectors considered that the examination coverage requirement of the NRC Order was met for the NDE activities reviewed during the NRC inspection. The licensee did not experience any significant impediment that would preclude the effective and complete performance of the volumetric and BMV examinations.

- 9) Evaluation of the basis for the temperatures used in the susceptibility category calculation.

The inspectors reviewed the susceptibility ranking category and the basis for the RPVH temperatures used in the calculation. The calculation determined the RPVH Effective Degradation Years (EDY) and PWSCC susceptibility category for the current operating cycle and a projection for several future cycles. The licensee used the best known estimated values of effective full power days (EFPD) for the calculation. The temperature used for the calculation was the reactor coolant system cold leg temperature. The basis for the RPVH operating temperature used in the calculation was based on documentation from Westinghouse to SCE&G (references listed in the report attachment).

- 10) Verification that the methods used for disposition of NDE identified flaws were consistent with NRC flaw evaluation guidance.

No indications considered to be flaws were found during the volumetric examination of the RPVH nozzles. As indicated above, UT indications were identified at several RPVH penetrations and they were dispositioned as fabrication indications (not service related). In addition, boric acid indications on the RPVH surface area were identified during the BMV examination, but the cause and need for repair were undetermined at the time of the NRC inspection. The planned licensee's actions for these indications included cleaning of the RPVH surface area, determining the cause of the leakage, and conducting a second BMV examination.

- 11) Evaluation of the existing procedures to identify potential boric acid leaks from pressure-retaining components above the RPVH and the licensee's followup actions for indications of boric acid leaks.

The inspection activities required by the NRC Order to identify potential boric acid leaks from pressure retaining components above the RPVH were implemented as part of the Boric Acid Corrosion Control Program and ASME Code Inservice Inspection of bolted connections. These inspection activities were employed per procedures PTP-151.001A and STP-250.001C. The first procedure was exclusively implemented to meet the requirements of the NRC Order and GL 88-05 and had steps to inspect components that may leak boric acid over the RPVH surface and penetrations. The second procedure was implemented, in part, to inspect leakage of bolted connections above the RPVH, including the RPVH general area.

The inspectors reviewed the visual examination results for the previous and recent RF-16 refueling outages, and held discussions with licensee personnel to confirm followup actions taken for any evidence of boric acid leaks above the RPVH. As noted above, boric acid indications on the RPVH surface area were identified during the BMV examination and follow-up actions were planned to correct the problem. The inspectors considered that the implementation of the procedures mentioned above met the requirements of the NRC Order.

.2 (Closed) NRC TI 2515/166: Pressurized Water Reactor Containment Sump Blockage (NRC Generic Letter 2004-02)

a. Inspection Scope

The inspectors verified implementation of the licensee's commitments documented in their September 1, 2005, responses to Generic Letter 2004-002, "Potential Impact of Debris Blockage on Emergency Recirculating During Design Basis Accidents at Pressurized Water Reactors," as supplemented by response letter dated February 17, 2006. These commitments included permanent modifications to replace the sump screens and strainers, installation of debris catchers and trash racks, and manipulation of toe plates to divert flow to the sump in a manner that minimizes the transport of Reflective Metal Insulation (RMI). The licensee also committed to replacement of 12 high head safety injection (HHSI) throttle valves to ensure that downstream clearances exceed the 1/16-inch strainer perforation size. The inspectors reviewed the sump screen assembly, HHSI throttle valve replacement procedures, and associated 10 CFR 50.59 evaluations. The inspectors completed a visual walkdown to verify the installed strainer assembly configuration and HHSI throttle valve replacement were consistent with drawings and tested configuration. Additionally the inspectors verified that the post-modification test results for the flow and head through the HHSI throttle valves were consistent with test results from the previous configuration.

b. Findings and Observations

No findings of significance were identified.

Permanent modifications were completed on the "A" Emergency Recirculation Sump at the time of this inspection, and scheduled to be completed on the "B" Emergency Recirculation Sump by the end of the refueling outage. Modifications to the HHSI throttle valves had been completed and post-modification test results were available for inspectors' review. All modifications were implemented in accordance with the licensee's Generic Letter 2004-02 response. Licensing basis documents were updated in accordance with 10 CFR 50.59.

.3 (Closed) NRC TI 2515/169: Mitigating Systems Performance Index (MSPI) Verification.

a. Inspection Scope

During this inspection period, the inspectors completed a review of the licensee's implementation of the MSPI guidance for reporting unavailability and unreliability of monitored safety systems in accordance with NRC TI 2515/169.

The inspectors examined surveillances that the licensee determined would not render the train unavailable for greater than 15 minutes or during which the system could be promptly restored through operator action and therefore, are not included in unavailability calculations. As part of this review, the recovery actions were verified to be uncomplicated and contained in written procedures.

On a sample basis, the inspectors reviewed operating logs, equipment tagout records, work history information, maintenance rule information, corrective action program documents, and surveillance procedures to determine the actual time periods the MSPI systems were not available due to planned and unplanned activities. The results were then compared to the baseline planned unavailability and actual planned and unplanned unavailability determined by the licensee to ensure the data's accuracy and completeness. Likewise, these documents were reviewed to ensure MSPI component unreliability data determined by the licensee identified and properly characterized all failures of monitored components. The unavailability and unreliability data were then compared with performance indicator data submitted to the NRC to ensure it accurately reflected the performance history of these systems.

b. Findings and Observations

No findings of significance were identified.

The licensee accurately documented the baseline planned unavailability hours, the actual unavailability hours and the actual unreliability information for the MSPI systems. No significant errors in the reported data were identified which resulted in a change to the indicated index color. No significant discrepancies were identified in the MSPI basis document which resulted in: (1) a change to the system boundary, (2) an addition of a monitored component, or (3) a change in the reported index color.

.4 (Closed) Violation 0500395/2006011-01: White Finding Involving Failure to Properly Prepare a Radioactive Material Package for Shipment.

On October 13, 2006, the NRC issued supplemental inspection report number 05000395/2006013. This report concluded that the licensee's evaluation identified the appropriate causes for the event and that adequate corrective actions have been implemented. Based upon this report's findings, this violation is considered closed. Also, the report states that given the licensee's acceptable performance in addressing the shipment of radioactive waste that exceeded U. S. Department of Transportation dose rate limits, the White finding associated with this issue will only be considered in assessing plant performance for a total of four quarters in accordance with the guidance in IMC 0305, "Operating Reactor Assessment Program."

40A6 Meetings, Including Exit

Exit Meeting Summary

The inspectors presented the inspection results to Mr. Dan Gatlin and other members of the licensee staff on January 9, 2007. Although proprietary material was examined as part of the inspection activities discussed in this report, the report does not contain proprietary material.

ATTACHMENT: SUPPLEMENTAL INFORMATION

Enclosure

## SUPPLEMENTAL INFORMATION

### KEY POINTS OF CONTACT

#### Licensee

J. Archie, Vice President, Nuclear Operations  
F. Bacon, Manager, Chemistry Services  
M. Browne, Manager, Quality Systems  
A. Cribb, Supervisor, Nuclear Licensing  
G. Douglass, Manager, Nuclear Protection Services  
M. Fowlkes, General Manager, Engineering Services  
D. Gatlin, General Manager, Nuclear Plant Operations  
D. Lavigne, General Manager, Organizational Effectiveness Training  
G. Lippard, Manager, Operations  
G. Moffatt, Manager, Nuclear Training  
P. Mothena, Manager, Health Physics and Safety Services  
J. Nesbitt, Manager, Materials and Procurement  
K. Nettles, General Manager, Nuclear Support Services  
R. Stokes, Manager, Design Engineering  
W. Stuart, Manager, Plant Support Engineering  
B. Thompson, Manager, Nuclear Licensing  
A. Torres, Manager, Planning / Scheduling and Project Management  
S. Zarandi, Manager, Maintenance Services

### ITEMS OPENED, CLOSED, AND DISCUSSED

#### Opened

None

#### Opened and Closed

05000395/2006005-01	NCV	Failure to Follow Surveillance Procedure Resulting in Inoperability of "B" ECCS Accumulator (Section 1R22)
05000395/2006005-02	NCV	Failure to Follow Procedure for Maintaining Steam Generator Water Level Results in Turbine Trip During Power Escalation (Section 4OA3)

#### Closed

2515/150	TI	Reactor Pressure Vessel Head and Head Penetration Nozzles (NRC Order EA-03-009) (Section 4OA5.1)
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2515/166	TI	Pressurized Water Reactor Containment Sump Blockage (NRC Generic Letter 2004-02) (Section 4OA5.2)
2515/169	TI	Mitigating Systems Performance Index (MSPI) Verification (Section 4OA5.3)
0500395/2006011-01	VIO	White Finding Involving Failure to Properly Prepare a Radioactive Material Package for Shipment (Section 4OA5.4)

Discussed

None

**LIST OF DOCUMENTS REVIEWED****Section 1R04: Equipment Alignment**Procedures and Drawings:

SOP-211, Emergency Feedwater System  
 SOP-115, Residual Heat Removal  
 SOP-306, Emergency Diesel Generator  
 SOP-118, Component Cooling Water  
 Drawings D-302-611, -612, and -614

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

UT-98-2, Rev. 1, - Manual Ultrasonic Examination of Austenitic Steel Welds, PDI UT-2, Rev. C;  
 UT-98-3, Rev. 0, - Ultrasonic Through Wall sizing in pipe welds, PDI-UT-3, Rev. C;  
 UT-CP-2, Rev. 0, System performance checks.  
 SAP - 1100, Rev. 1 - Boric Acid Control Program;  
 PSEG - 19, Rev. 0 - Boric Acid Corrosion Evaluation;  
 PTP-151, Inspection for Boric Acid Corrosion.  
 PDI-ISI-254-SE-\_NB, Rev. 0, "Remote Inservice Inspection of Reactor Vessel to Safe End, Nozzle to Pipe and Safe End to Pipe Welds Using The Nozzle Scanner," and PDI Performance Demonstration Qualification Sheet (PDQS)-537 .  
 NDE-1, Training, Examination and Certification of Non-destructive Personnel.

CAP Documents:

PIP No: 0-C-06-3321, ISI inspection (liquid penetrant exam) revealed a rejectable indication on the "B" RHR Heat Exchanger outlet nozzle (XHE005B-RH), reinforcing plate to fillet weld.

PIP No: 0-C-06-3645, White substance identified on the hot and cold leg nozzles of C Steam Generator. Does not appear to be boron.

PIP No: 0-C-06-3685, Evaluate the evidence of white substance ( thought to be penetrant developer) noted to be present, apparently left from construction. Also some boots surrounding the heater electrical connections were cracked.

PIP No: 0-C-05-1822, ISI ultrasonic examination has revealed a recordable indication in weld CGE-1-2100B-10, Pressurizer to vessel Weld.

Other Records:

VCS Manual ISE-5, Rev. 1, - Third Interval Inspection Program Plan for VC Summer Nuclear Station;

ISI Examination Summary for Refuel 16;

WO - 0609739, Perform visual inspection of heater sleeves as well as the adjacent insulation for evidence of Boric Acid leakage.

WO - 0612261, Valve XVT-18023 piping replacement;

WO - 0601781, cut and weld leak-off line;

CER 06-2675 Pump XPP0031B seal leak;

CER 06-2504 XVT08461-CS packing area leak.

**2OS1: Access Control To Radiologically Significant Areas**

Procedures, Manuals, and Guides:

HPP-150, Requirement for Issuance and Use of Personnel Dosimetry, Rev.9

HPP-151, Use of the Radiation Work Permit and Standing Radiation Work Permit, Rev.8

HPP-152, Radiation Control Area Access Control, Rev.9

HPP-155, Control Of Airborne Radiation Exposure (DAC-HRS), Rev. 11

HPP-160, Control And Posting Of Radiation Control Zones, Rev. 11

HPP-245, Radiological Controls for Failed Fuel, Rev. 0

HPP-302, Radiation And Contamination Survey Techniques, Rev. 9

HPP-401, Issuance, Termination And Use Of RWPS And SRWPS, Rev. 18

HPP-402, Radiological Survey Requirements and Controls for Reactor Building and Incore Pit Entries, Rev. 11

HPP-403, Radiological Controls For Nuclear Work Activities, Rev. 9

HPP-410, Health Physics Routine Surveys, Rev. 8

HPP-411, Monitoring Exposure with Multiple Badging, Rev. 10

HPP-413, Diving Operations, Rev. 2

HPP-419, Electronic Dosimeter Alarm Set Point Determination And Alarm Response Actions, Rev. 0

HPP-515, Interpretation Of Bioassay Analyses, Rev. 12

Station Administrative Procedure(SAP)-0105, Statement of Responsibilities for Health Physics and Safety Services, Rev. 9

SAP-154, Failed Fuel Action Plan, Rev. 1

CAP Documents:

SAP-999, Corrective Action Program, Rev. 1

CER 0-C-05-0368, Worker received dose rate alarm while performing job planning in the RCA.

CER 0-C-05-0696, CER to track recommendations and enhancements from a gap analysis performed on radiation protection program/ procedures and the Industry Adverse RP Trends Document.



CER 0-C-05-0920, Drink can found in clean trash inside RCA.  
CER 0-C-05-1027, Soda can and cigarette butts found on auxiliary building roof.  
CER 0-C-06-1972, NRC Regulatory Guide 8.38 Revision 1 needs to be reviewed for applicability.  
Self Assessment Report, Radioactive Material Control, March 27-April 6, 2006  
Self Assessment Report, Dosimetry Assessment, October 10-20, 2005

**2OS2: ALARA Planning and Controls**

Procedures, Instructions, Guidance Documents, and Operating Manuals:

HPP-401, Issuance, Termination and Use of RWPS and SRWPS, Rev. 17  
HPP-155, Control of Airborne Radiation Exposure (DAC-HRS), Rev. 11  
HPP-419, Electronic Dosimeter Alarm Set Point Determination And Alarm Response Actions, Rev. 0  
HPP-411, Monitoring Exposure With Multiple Badging, Rev. 10  
SAP-121, ALARA Committee, Rev. 9

Records and Data:

HPP-419, Electronic Dosimeter Alarm Set Point Determination And Alarm Response Actions, Rev. 0, Enclosure 7.2, Dated 10/23/06  
ALARA Committee Meeting Minutes dated 03/30/05, 06/28/05, 11/11/05, 12/06/05, 03/29/06, 06/28/06, 08/28/06  
RWP 06-00132/001, Fuel Handling Operations to Include Inspections, Underwater Lights, and Bridge Crane Operations  
RWP 06-00101/001, Repair Reactor Head RVLIS Line  
RWP 06-00058/001, Fuel Handling Operations in the Reactor Building to Include PM's and Fuel Sipping  
HPP-401, Issuance, Termination and Use of RWPS and SRWPS, Rev. 17, Attachment V for RWPs 06-00160, 06-00027, 06-00034, 06-00159, 06-00028, 05-00077, 05-00159 (including RWP packages)  
HPP-401, Issuance, Termination and Use of RWPS and SRWPS, Rev. 17, Enclosure 5.1, Stay Time Card, dated 10/23/06  
System Health Report (ALARA HOTSPOT DATABASE) Not Dated  
Plant of the Day Schedule (Outage Central @ 18:30) dated 10/24/06  
Plant Information Meeting RF-16 Outage Day 16 Report dated 10/24/06  
Refuel 16 Daily Exposure Report dated 10/24/06  
Refuel 16 Outage Schedule Total Float Less Than 73 Hrs dated 10/14/06, 00:00

CAP Documents:

SAP-999, Corrective Action Program, Rev. 1  
0-C-05-0644, SA05-HP-03, Self Assessment of the HP ALARA Program  
0-C-06-0692, Observation of Pre-Job Brief Did Not Cover Safety  
0-C-06-1580, Dose Impact From Searching for Unidentified RCS Leakage in Containment  
0-C-06-2689, Two Individuals Performed Work on the Wrong RWP  
0-C-06-2902, Radiological survey performed without pre-job briefing IAW HPP-401  
0-C-06-2903, Radiological Pre-Job briefing performed without using proper documentation IAW HPP-401

Self-Assessment and Other Reports:

SA05-HP-03, Self-Assessment Report (ALARA Program)  
2005 Annual ALARA Report  
Exposure Reduction Plan 2004-2009 dated 08/25/04  
Refuel 15 ALARA Plan not dated  
Refuel 15 Outage Report dated 08/04/05  
Refuel 16 Outage ALARA Plan not dated

**2PS2: Radioactive Effluents**

Procedures, Instructions, Guidance Documents, and Operating Manuals:

Off Site Dose Calculation Manual -Virgil C. Summer Nuclear Station, Rev. 24  
HPP-1024, Groundwater Monitoring Well Sampling, Rev.3  
HPP-1060, Meteorological Data Checks, Verification and Correction, Rev.5  
HPP-200, Control of the Offsite Dose Calculation Manual and the Corporate Alara Plan, Rev.2  
HPP-202, Interlaboratory Intercomparison Program, Rev.2  
HPP-201, Annual Radioactive Effluent Release and Waste Disposal Report, Rev.4  
HPP-0246, 10CFR50.75(g) Recordkeeping, Rev.0

Corrective Action Program (CAP) Documents:

(All of the CAP documents listed below except 0-C-06-0990 had been previously evaluated during the course of routine radiation protection inspections.)

Recent (Under Primary Identification Program (PIP))

0-C-01-0284, Vacuum cleaner spilled  
0-C-06-0990, Tritium identified in water from Penstock Manhole #5.

Historical (Under various previous corrective action programs.)

Health Physics Problem Report 85-15, Leaking sample valve on CST.  
Health Physics Problem Report 85-48, Sludge lance hoses were leaking on ground.  
Health Physics Problem Report 86-23, Leaking water from hoses used to pump water off the CST bladder.  
VCSNS Off-Normal Occurrence Report 87-010, Failed fire system valve during normal plant operations.  
VCSNS Off-Normal Occurrence Report, 87-031, Repair & Maintenance to CST resulted in release to storm drain system.  
Radiological Incident/Deficiency Report, 92-29, Small amount of radioactivity detected in storm drain system in radioactive waste yard.  
Radiological Incident/Deficiency Report, 92-32, Tritium found in ground water sample taken from leak detection sump outside RCA boundary.  
Radiological Deficiency Report, 94-27, Fork lift fork penetrated liner resulting in water spilling on ground.

Self Assessments, Audits and Other Documents:

Environmental Self Assessment, SA05-HP-98, 12/15/2005  
Radioactive Material Control Self Assessment, SA06-HP-03, 6/8/2006  
V.C. Summer Station Groundwater Action Plan, 8/4/06  
White Paper, Tritium at VC Summer

**40A1: Performance Indicator Verification**

Procedures:

SAP-999, Corrective Action Program, Rev.1  
SAP- 1167, NRC Performance Indicators, Rev.0  
HPP-242, Reporting NRC Performance Indicators, Rev. 0

Records:

Liquid Radioactive Release Permits , 12/2005-8/2006  
Post release liquid radioactive release permit updates, 12/2005-8/2006  
Gaseous Radioactive Waste Release Permits, 12/2005-8/2006  
Post release Gaseous Radioactive Waste Release Permits, 12/2005-8/2006  
Monthly Effluent Summaries, 1/2005-9/2006  
Queries of condition reporting system for system codes HP, HPC, RM, WL, WD, WP, WX  
(Health Physics, Health Physics Contractor, Radiation Monitor, Waste Liquid, etc.)

**Section 40A5.1: Other Activities (TI2515/150)**

Procedures:

54-ISI-30-04, "Written Practice for the Qualification and Certification of NDE Personnel," Rev. 3/8/2006

54-ISI-240-43, "Visible Solvent Removable Liquid Penetrant Examination Procedure," Rev. 02/01/2006

54-ISI-603-002, "Automated Ultrasonic Examination of RPV Closure Head Penetrations Containing Thermal Sleeves," Rev. 09/13/2006

Safety Document Change Notice SDCN-No. 30-9033740-000, dated 10/12/2006

Safety Document Change Notice SDCN-No. 30-9033201-000, dated 10/6/2006

54-ISI-605-001, "Automated Ultrasonic Examination of RPV Closure Head Small Bore Penetrations," Rev. 09/13/2006

54-ISI-367-07, Visual Examination for Leakage of Reactor Head Penetrations," Rev. 8/31/04

Procedure Qualification Record 54-PQ-367-01, dated 8/31/01

STP-250.001C, "Reactor Coolant System Bolted Connections Examinations and Boron Induced Corrosion Inspection," Rev. 0

PTP-151.001A, "Inspection for Boric Acid Corrosion," Rev. 1

SAP-1100, "Boric Acid Corrosion Control Program," Rev. 1

Engineering Documents:

Calculation Number DC04010-001, "Reactor Vessel Head Effective Degradation Years," Rev. 2

Areva Document 51-9026825-001, "RPV Head Penetration Inspection Plan and Coverage Assessment for VC Summer Nuclear Station," Rev. 9/26/06

Dominion Engineering Calculation C-8605-00-01, "VC Summer CRDM Nozzle Stress Analysis," Rev. 1

Letter L-8605-00-02, "Interpolation of Data in Calculation C-8605-00-01 Rev. 1, VC Summer CRDM Nozzle Stress Analysis," Rev. 0

Engineering Information Record 51-9032210-000, "VC Summer Base Head Visual Coverage Calculation," dated 9/26/06

CAP Documents:  
PIP 0-C-06-3474

Other Records:  
EPRI Letter from Mr. Jack Spanner (Program Mng.) to Terry McAlister (SCE&G Project Manager) dated October 3, 2006

Data Sheet No. 0403121, "Inspection of RCS for Boric Acid Corrosion," dated 6/30/05

Data Sheet No. 0517666, "Inspection of RCS for Boric Acid Corrosion," dated 11/30/06

Response to NRC Bulletin 2002-02, Reactor Pressure Vessel Head and Vessel Head Penetration Nozzle Inspection Programs (RC-03-0254, dated 12/23/03)

Areva Document 03-9025801, "Reactor Head Nozzle Penetration Remote Visual Inspection Plan for VC Summer," Rev. 0, dated 7/12/06

WCAP-13712, Reactor Pressure Vessel and Internals System Evaluations for the VC Summer Steam Generator Replacement/Uprating Program," April 1993

WCAP-13714, Replacement Steam Generator/Uprating Engineering Report," June 1994

Design Basis Document – Reactor Coolant System, Rev. 7

WOG-97-105, "Verification of Reactor Vessel Closure Head Temperature to be Used in WOG Program Technical Support for Generic Letter 97-01 Response for Reactor Vessel Head Penetration Alloy 600 PWSCC-Calculate Probabilities (MUHP-5025)

WCAP-13493, "Reactor Vessel Closure Head Penetration Key Parameters Comparison," dated September 1992

Personnel Certification Records for all Areva NDE examiners

Areva Acceptance Test Report for UT Probes: S0984NL (blade probe)

Calibration Records for UT Instrument  $\mu$ Tomoscan VH# 8169, S/N 63593

Calibration Block Examination Report for Cal. Block 6011137-A

Calibration Data Sheet CDS-4 (blade probe)

PT Consumables Records for Batches: 05L17K, 03E04K, and 04L03K

**Section 4OA5.2: Other Activities (TI2515/166)**

Engineering Change Requests:

ECR 50579, RB Sump Debris Collection

ECR 50579A, RB Sump Debris Collection

ECR 50579B, RB Sump Debris Collection (HHSI Throttle Valve and Orifice Plate Replacement)

ECR 50579C-1, RB Sump Debris Collection

ECR 50579D, RB Sump Debris Collection (HHSI Throttle Valve and Orifice Plate Replacement)

ECR 50579E-1, RB Sump Debris Collection

ECR 50579F-1, RB Sump Debris Collection

Technical Evaluations:

06-41, V.C. Summer Replacement Throttling Valves and Orifice Plates in HHSI System, Westinghouse, Rev. 0

Surveillance Test Results:

STP0230.006A, ECCS / Charging Pump Flow Testing, 12/31/2003

STP0230.006A, ECCS / Charging Pump Flow Testing, 11/30/2006

**Section 4OA5.3: Mitigating Systems Performance Index (MSPI) Verification**

Procedures, Manuals, and Guidance Documents

TR-03300-001, NRC Mitigating Systems Performance Index (MSPI) Basis Document, V. C. Summer Nuclear Station, Revision 0

Records and Data

Selected Control Room Logs, January 2002 through September 2006

Monthly Operating Reports

System Health Reports

Maintenance Rule Database

MSPI Database

**LIST OF ACRONYMS**

AC	Alternating Current
ALARA	As Low As Is Reasonably Achievable
ASME	American Society of Mechanical Engineers
BACC	Boric Acid Corrosion Control
BMV	Bare Metal Visual

CAP	Corrective Action Program
CCW	Component Cooling Water
CER	Condition Evaluation Report
CIV	Containment Isolation Valve
CFR	Code of Federal Regulations
COAF	Circumferentially Oriented for Axial Flaws
CRDM	Control Rod Drive Mechanism
ECCS	Emergency Core Cooling System
ECR	Engineering Change Request
EDG	Emergency Diesel Generator
EDY	Effective Degradation Years
EFPD	Effective Full Power Days
EPRI	Electric Power Research Institute
ES	Engineering Service
FAQ	Frequently Asked Questions
FRV	Feedwater Regulating Valve
FSAR	Final Safety Analysis Report
FWP	Feedwater Pump
GOP	General Operating Procedure
GTP	General Test Procedure
HHSI	High Head Safety Injection
HPT	Health Physics Technician
HRA	High Radiation Area
HVAC	Heating, Ventilation, and Air Conditioning
IB	Intermediate Building
ID	Inside Diameter
IMC	Inspection Manual Chapter
ISI	Inservice Testing
ksi	Thousand pounds per Square Inch
LHRA	Locked High Radiation Area
MDEFW	Motor Driven Emergency Feedwater
MHz	Mega-Hertz
MPFF	Maintenance Preventable Functional Failures
MR	Maintenance Rule
MRP	Material Reliability Project
MSPI	Mitigating System Performance Index
MWR	Maintenance Work Request
NCV	Non-Cited Violation
NDE	Nondestructive Examinations
NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission
OAP	Operations Administrative Procedure
OOS	Out-of-Service
PI	Performance Indicator
PMT	Post-Maintenance Testing
PT	Penetrant Test
PWSCC	Primary Water Stress Corrosion Cracking

RCS	Reactor Coolant System
RF-16	Sixteenth Refueling Outage
RHR	Residual Heat Removal
RMI	Reflective Metal Insulation
RPV	Reactor Pressure Vessel
RPVH	Reactor Pressure Vessel Head
RTP	Rated Thermal Power
RWST	Refueling Water Storage Tank
RWP	Radiation Work Permit
RVLIS	Reactor Vessel Level Instrumentation System
SAP	Station Administrative Procedure
SCE&G	South Carolina Electric and Gas
SDP	Significance Determination Process
SOP	System Operating Procedure
SSC	Structures, Systems, or Components
STP	Surveillance Test Procedure
SWBP	Service Water Booster Pump
SWPH	Service Water Pumphouse
TDEFW	Turbine Driven Emergency Feedwater
TI	Temporary Instruction
TLD	Thermal Luminescent Dosimeter
TOFD	Time of Flight Diffraction
TS	Technical Specification
UT	Ultrasonic Test