



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

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

October 30, 2006

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 05000395/2006004

Dear Mr. Archie:

On September 30, 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 findings, which were discussed on October 5, 2006, 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 one NRC-identified finding and one self-revealing finding of very low safety significance (Green) which were determined to be violations of NRC requirements. Additionally, a licensee-identified violation, which was determined to be of very low safety significance, is listed in this report. However, because of the 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.

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

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 05000395/2006004  
w/Attachment: Supplemental Information

cc w/encl: (See page 3)

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Report to J.B. Archie from Eugene F. Guthrie dated October 30, 2006

SUBJECT: VIRGIL C. SUMMER NUCLEAR STATION - NRC INTEGRATED INSPECTION  
REPORT 05000395/2006004

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U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.: 50-395

License No.: NPF-12

Report No.: 05000395/2006004

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

Facility: Virgil C. Summer Nuclear Station

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

Dates: July 1, 2006 through September 30, 2006

Inspectors: J. Zeiler, Senior Resident Inspector  
J. Polickoski, Resident Inspector  
G. Laska, Senior Operations Examiner (Section 1R11.2)  
M. Bates, Senior Operations Engineer (Section 1R11.2)

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

Enclosure

## SUMMARY OF FINDINGS

IR 05000395/2006-004; 07/01/2006 - 09/30/2006; Virgil C. Summer Nuclear Station; Operator Performance during Non-Routine Evolutions and Surveillance Testing.

The report covered a three-month period of inspection by resident inspectors and one announced inspection by regional inspectors. Two Green findings, both 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. NRC-Identified and Self-Revealing Findings

#### Cornerstone: Mitigating Systems

- Green. The inspectors identified a non-cited violation (NCV) of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," for the licensee's failure to take adequate corrective actions for a previously identified NCV. The corrective actions taken were not adequate as demonstrated by the failure of control room personnel to be cognizant of the new procedural guidance when a partial loss of control room annunciators occurred on July 24, 2006. The licensee presently plans to develop an abnormal operating procedure which has a formal training review.

This finding is more than minor because if left uncorrected, it would result in a more significant safety concern if appropriate compensatory actions were not implemented for loss of control room annunciator events. The finding is of very low safety significance because during the latest loss of annunciator event, operators took reasonable actions to address the condition; there was no actual loss of mitigating system equipment; and no other plant transients occurred during the time period the annunciators were inoperable. The direct cause of this finding involved the cross-cutting area of problem identification and resolution, in that, previous corrective actions were not adequate to ensure that operators were cognizant of, and implemented, procedures for responding to a loss of control room annunciator event (Section 1R14).

- Green. A Green self-revealing non-cited violation (NCV) of Technical Specification (TS) 6.8.1.f was identified for failure to follow a fire protection surveillance testing procedure resulting in a TS Limiting Condition for Operation (LCO) entry due to exceeding the allowed room temperature of the control building relay room. The licensee is considering procedural enhancements and associated training.

This finding is more than minor because it is associated with the human performance and configuration control attributes of the Mitigating Systems cornerstone, and affected the cornerstone objective of ensuring the reliability of

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systems which respond to initiating events to prevent undesirable consequences, in that, it resulted in an unexpected TS LCO entry and high temperatures in an area of the plant containing temperature sensitive safety-related electronic equipment which could have been adversely impacted by the elevated temperatures. The finding is of very low safety significance because the environmental qualification temperatures of the most limiting equipment in the affected area was not exceeded; it did not result in a loss of safety function of one or more trains of mitigating system equipment; and was not potentially risk-significant due to possible external events. The direct cause of this finding is related to the procedural compliance aspect of the cross-cutting area of human performance (Section 1R22).

B. Licensee-Identified Violations

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



## REPORT DETAILS

### Summary of Plant Status

The unit began the inspection period at 100 percent rated thermal power (RTP). On July 12, 2006, power was reduced to 90 percent following the unexpected trip of the "B" main feedwater pump. The unit returned to 100 RTP on July 13, 2006. The unit operated 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

##### a. Inspection Scope

The inspectors performed one readiness inspection for impending adverse weather conditions. This included review and evaluation of the licensee's preparation and readiness for high winds and heavy rains expected from Tropical Storm Ernesto. The inspectors evaluated the adequacy of the licensee's implementation of operations administrative procedure (OAP)-109.1, "Guidelines for Severe Weather," and walked down outside areas of the plant to verify that loose debris was properly addressed to prevent adverse interaction with important plant equipment. In addition, the inspectors reviewed the licensee's corrective action program (CAP) database to verify that adverse weather related 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

##### 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 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.

- "A" control room emergency ventilation system while the "B" system was OOS for scheduled maintenance;

- “A” emergency diesel generator (EDG) while the “B” EDG was OOS for emergent repair work; and,
- “A” residual heat removal system (RHR) while “B” RHR was OOS for scheduled maintenance.

b. Findings

No findings of significance were identified.

1R05 Fire Protection

.1 Quarterly Inspection

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):

- Control room (fire zone CB-17.1);
- 1DA switchgear room (fire zone IB-20);
- “A” and “B” EDG rooms (fire zones DG-1.1/1.2 and DG-2.1/2.2);
- Relay room solid state protection system (SSPS) instrumentation and inverter (fire zones CB-6, CB-10, CB-12);
- Turbine building (fire zone TB-1);
- Service water pump house (fire zones SWPH-1, SWPH-3, and SWPH-5.1/5.2);
- 1DB switchgear rooms and heating ventilation and air conditioning (HVAC) rooms (fire zones IB-16, IB-17, IB-22.2);
- Control building cable spreading rooms (fire zones CB-4 and CB-15); and,
- “A,” “B,” and “C” charging pump rooms (fire zones AB-1.5, AB-1.6 and AB-1.7).

b. Findings

No findings of significance were identified.

.2 Annual Fire Drill Inspection

a. Inspection Scope

The inspectors observed the performance of the licensee’s unannounced fire drill on September 21, 2006, to evaluate the readiness of licensee personnel to prevent and fight fires. The fire drill scenario involved a simulated fuel oil fire in the “B” EDG building

(associated with the fuel oil day tank). The inspectors evaluated the readiness of licensee personnel to prevent and fight fires including the following aspects:

- Observe whether turnout clothing and self-contained breathing apparatus (SCBA) equipment were properly worn;
- Determine whether fire hose lines were properly laid out and nozzle pattern simulated being tested prior to entering the fire area of concern;
- Verify that the fire area was entered in a controlled manner;
- Review if sufficient firefighting equipment was brought to the scene by the fire brigade to properly perform their firefighting duties;
- Verify that the fire brigade leader's fire fighting directions were thorough, clear and effective, and that, if necessary, offsite fire team assistance was requested;
- Verify that radio communications with plant operators and between fire brigade members were efficient and effective;
- Confirm that fire brigade members checked for fire victims and fire propagation into applicable plant areas;
- Observe if effective smoke removal operations were simulated;
- Verify that the fire fighting pre-plans were properly utilized and were effective; and,
- Verify that the licensee pre-planned drill scenario was followed, drill objectives met the acceptance criteria, and deficiencies were captured in post drill critiques.

b. Findings

No findings of significance were identified.

1R06 Flood Protection Measures

a. Inspection Scope

The inspectors reviewed external flood protection features associated with risk-significant underground cables to ensure consistency with design requirements, drawings, and the FSAR. The inspectors examined the internal condition of four underground electrical manholes (EMHs) (EMH-9, 10, 11, and 12) related to the switchyard, filtered water, and water treatment system power, while observing licensee personnel conduct manhole predictive and corrective maintenance. The availability and condition of sump pumps, level alarm circuitry, cables, and cable trays subject to submergence was assessed. The inspectors reviewed the licensee's CAP and engineering change request databases to verify that external 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.

## 1R11 Licensed Operator Requalification Program

### .1 Quarterly Review of Licensed Operator Requalification Training Activities

#### a. Inspection Scope

On July 27, 2006, the inspectors observed performance of senior reactor operators and reactor operators on the plant simulator during licensed operator requalification training. Specifically, the inspectors observed an operator remediation training scenario (LOR-SA-017R) involving a reactor coolant pump seal failure, loss of all emergency feedwater, and main steam isolation valve failure to close. The inspectors verified that training included risk-significant operator actions and implementation of emergency classification and the emergency plan. 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 Biennial Review of Licensed Operator Requalification Program

#### a. Inspection Scope

The inspectors reviewed the facility operating history and associated documents in preparation for this inspection. During the week of August 7, 2006, the inspectors reviewed documentation, interviewed licensee personnel, and observed the administration of operating tests associated with the licensee's operator requalification program. Each of the activities performed by the inspectors was done to assess the effectiveness of the licensee in implementing requalification requirements identified in 10 CFR Part 55, "Operators' Licenses." The evaluations were also performed to determine if the licensee effectively implemented operator requalification guidelines established in NUREG-1021, "Operator Licensing Examination Standards for Power Reactors," and Inspection Procedure 71111.11, "Licensed Operator Requalification Program." The inspectors also evaluated the licensee's simulation facility for adequacy for use in operator licensing examinations using ANSI/ANS-3.5-1985, "American National Standard For Nuclear Power Plant Simulators for use in Operator Training and Examination." The inspectors observed two crews during the performance of the operating tests. Documentation reviewed included written examinations, Job Performance Measures (JPMs), simulator scenarios, licensee procedures, on-shift records, simulator modification request records and performance test records, the feedback process, licensed operator qualification records, remediation plans, watchstanding, and medical records. The records were inspected using the criteria listed in Inspection Procedure 71111.11. Documents reviewed during the inspection are listed in the List of Documents Reviewed.

Following the completion of the annual operating tests which ended on August 17, 2006, the inspectors reviewed the overall pass/fail results of the individual JPM operating tests, and the simulator operating tests administered by the licensee during the operator licensing requalification cycle. 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 (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-05-1261, Main steam valve operability test (STP-121.002) caused high flow closure of turbine driven emergency feedwater pump discharge flow control valve, IFV03536; and,
- CER 0-C-06-0730, "C" safeguards chilled water chiller tripped on low oil pressure.

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 2006-27, risk assessment for scheduled switchyard maintenance, pressurizer heater capacity testing, "A" component cooling water heat exchanger flushing, and emergent repair of "A" reactor trip breaker following test failure;
- Work Week 2006-29, risk assessment for scheduled maintenance on "B" control room emergency ventilation system, "B" centrifugal charging pump, and emergent repair of leaking air start valve on the "B" EDG;
- Work Week 2006-33, risk assessment for scheduled maintenance for the "B" main condenser vacuum pump replacement, pre-outage snubber testing, "C" centrifugal charging pump, and intermediate building ventilation system;
- Work Week 2006-35, risk assessment for scheduled maintenance for the "A" train engineered safety features power relays, the "A" EDG, the "A" train SSPS, and emergent repair of the "A" EDG output breaker; and,
- Work Week 2006-37, risk assessment for scheduled maintenance for the "B" EDG, switchyard substation circuitry, safety-related switchgear ventilation system, and the "B" RHR pump.

#### b. Findings

No findings of significance were identified.

### 1R14 Operator Performance During Non-Routine Evolutions and Events

#### a. Inspection Scope

The inspectors evaluated operator initial response and recovery actions for the listed non-routine events to ensure they were appropriate and in accordance with required alarm response, abnormal and emergency procedures. The inspectors also evaluated performance and equipment problems to ensure that they were entered into the CAP.

- July 12, 2006, unexpected trip of "B" main feedwater pump (CER 0-C-06-2235); and,

- July 24, 2006, unexpected partial loss of control room annunciators during lightning storm (CER 0-C-06-2381).

b. Findings

Introduction: A Green non-cited violation (NCV) of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," was identified by the NRC for the licensee's failure to take adequate corrective actions for a previously identified NCV. In March 2005, during a loss of some control room annunciators, the inspectors identified a lack of procedural guidance to address the loss. As corrective actions, procedural guidance was developed. The corrective actions were not thorough as demonstrated by the failure of control room personnel to know that new procedural guidance exists when a partial loss of control room annunciators occurred on July 24, 2006.

Description: On July 24, 2006, lightning strikes during a severe thunderstorm caused several plant equipment problems including rendering numerous control room annunciators inoperable due to a failed annunciator cabinet circuit card. No engineered safety features (ESF) equipment was adversely impacted by the lightning strikes. The operators conducted walkdowns of the main control board (MCB) annunciators to identify the extent of condition and sent operators to locally check associated critical equipment. The operators determined that approximately 25 percent of the MCB annunciators were impacted including some associated with safety-related components. Several annunciator cards were found damaged and were later replaced in order to correct the annunciator deficiencies. At the time of the incident, the operators confirmed that the event did not meet the Emergency Action Level (EAL) limit for an emergency declaration.

During review of the operator response to this event, the inspectors identified that operations personnel had failed to utilize new procedural guidance written specifically to address a loss of control room annunciator event in accordance with OAP-100.5, "Guidelines for Configuration Control and Operation of Plant Equipment," Section 14.3, "Failed Annunciator Evaluation." Based on discussions with licensed operators on-shift during the event and on the oncoming shift, the inspectors determined there was a general lack of knowledge that this specific procedure guidance existed.

A similar event involving a partial loss of MCB annunciators occurred on March 24, 2005, at which time the NRC identified that contrary to the TS requirements of Regulatory Guide 1.33, Revision 2, the licensee had failed to establish procedural guidance for responding to an emergency condition as defined by the licensee's EALs involving a loss of control room annunciators. NRC Inspection Report 05000395/2005002, dated April 19, 2005, documented an NCV (05000395/2005002-01) for the licensee's failure to establish and implement procedures for this type event. The inspectors reviewed CERs 0-C-05-1101 and 0-C-05-1646, related to the licensee's corrective action to address this NCV. The corrective actions involved a revision of OAP-100.5 in March 2006 with specific guidance for responding to a loss of annunciator condition. The inspectors noted that no formal training was prescribed on the procedure change request form nor was any conducted for this procedure change. The licensee

has entered this issue into the corrective action program as CER 0-C-06-2685. The licensee presently plans to develop an abnormal operating procedure which has a formal training review.

Analysis: The inspectors determined that this was a performance deficiency since the corrective actions associated with CERs 0-C-05-1101 and 0-C-05-1646 did not ensure that procedural guidance would be implemented during a subsequent event involving a loss of control room annunciators. Contributing to this was the lack of formal operator training on new procedure direction specifically added for evaluating a loss of annunciator condition. This finding is more than minor because if left uncorrected, it would result in a more significant safety concern if appropriate compensatory actions were not implemented for loss of control room annunciator events. In addition, the finding is associated with the procedure quality attribute of the Mitigating Systems cornerstone and affected the cornerstone objective for ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences, in that, the failure to implement event response procedures could adversely affect the licensee's ability to monitor and control the response of mitigating system equipment. The finding is of very low safety significance (Green) because during the July 24, 2006, loss of annunciator event, operators took reasonable actions to address the condition, there was no actual loss of mitigating system equipment, and no other plant transients occurred during the time period the annunciators were inoperable. The direct cause of this finding involved the cross-cutting area of problem identification and resolution, in that, previous corrective actions were not adequate to ensure that operators were cognizant of, and implemented, procedures for responding to a loss of control room annunciator event.

Enforcement: 10 CFR 50, Appendix B, Criterion XVI, "Corrective Actions," requires, in part, that measures be established to assure that conditions adverse to quality are promptly identified and corrected. In addition, for significant conditions adverse to quality, measures shall assure that the causes of the condition are determined and corrective actions be taken to preclude repetition. Contrary to the above, the licensee failed to take adequate corrective actions in April 2005 for a previous violation involving the failure to maintain and implement procedures for a loss of control room annunciator event, in that, control room personnel failed to be cognizant of the new procedural guidance exists when a partial loss of control room annunciators occurred on July 24, 2006. Because this violation was determined to be of very low safety significance and was placed in the corrective action program as CER 0-C-06-2685, this violation is being treated as a NCV in accordance with Section VI.A.1 of the NRC Enforcement Policy, and is identified as NCV 05000395/2006004-01, Inadequate Corrective Actions Associated with a Previous Violation Involving Failure to Implement Procedures for a Loss of Control Room Annunciator Event.



## 1R15 Operability Evaluations

### a. Inspection Scope

The inspectors reviewed five 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-06-2267, electrical penetration XRP0018 found below minimum allowable pressure;
- CER 0-C-06-2621, the incorrect regulator was installed per ETBT70549 on the turbine driven emergency feedwater steam admission valve, IFV02030-PR1-MS;
- CER 0-C-06-2315, service water pumphouse building flooding calculation disagrees with as-built plant;
- CER 0-C-06-2407, "A" reactor building spray pump peak discharge pressure exceeded surveillance test limit; and,
- CER 0-C-06-3076, four scaffolds near safety-related equipment not constructed in accordance with procedural guidance.

### b. Findings

No findings of significance were identified.

## 1R19 Post-Maintenance Testing

### a. Inspection Scope

For the six 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 0602136, for investigating excessive purge cycles of "C" safeguards chill water system chiller;
- PMT for MWR 0608005, for repair of the "A" reactor trip breaker following a test failure;
- PMT for MWR 0605971, for replacement of the "B" control room emergency ventilation roughing filters;
- PMT for MWR 0608297, for emergent replacement of the air start pilot valve on the "B" EDG;
- PMT for MWRs 0603911, 0605659, 0605938, and 0604210, for scheduled preventive maintenance on the turbine driven emergency feedwater pump and associated valves; and,
- PMT for the quarterly scheduled preventive maintenance associated with the "B" EDG.

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing

a. Inspection Scope

The inspectors observed and/or reviewed the five 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-222.002, "Component Cooling Pump Test" (for "B" Inservice pump testing)

Reactor Coolant System Leakage Tests:

- STP-114.002, "Operational Leakage Test"

Other Surveillance Tests:

- PTP-102.001, "Main Turbine Tests,"
- STP-125.009, "Diesel Generator B 24 Hour Load Test;" and,
- STP-345.037, "Solid State Protection System Actuation Logic and Master Relay Test for Train A."

b. Findings

Introduction: A Green self-revealing NCV of TS 6.8.1.f was identified for failure to follow fire protection surveillance testing procedures resulting in an unexpected TS Limiting Condition for Operation (LCO) entry due to exceeding the allowed room temperature of the control building relay room.

Description: On July 10, 2006, during the performance of surveillance test procedure STP-128.024, "CO<sub>2</sub> System Functional Refueling Test," electrical maintenance personnel misinterpreted the guidance in Step 6.4, which directed the opening of all sliding links on the transformer secondary terminals TB1 and TB2 in various terminal boxes, so that fire dampers would not receive an actuation signal and isolate when the CO<sub>2</sub> system was actuated. As a result of not opening all the required links, when the test actuation signal was generated, the fire dampers in the control building relay room actuated and closed, isolating room ventilation cooling to the area. The relay room, which contains temperature sensitive safety-related electronic mitigating system equipment including the safeguards protection circuitry and 120 volt inverters, eventually exceeded the TS 3.7.9 LCO action limit for room temperature of 83 degrees Fahrenheit. Appropriate actions were taken to open relay room doors, provide alternate ventilation, and open fire dampers to restore the room temperature to within the TS limits in the required eight hours and prior to any abnormal equipment operation due to elevated room temperatures. The licensee entered the issue into their corrective action program as CER 0-C-06-2214. The licensee is considering procedural enhancements and associated training.

Analysis: The failure by electrical maintenance personnel to follow the fire protection surveillance procedure constituted a performance deficiency and a finding. This finding is more than minor because it was associated with the human performance and configuration control attributes of the Mitigating Systems cornerstone and affected the cornerstone objective of ensuring the reliability of systems which respond to initiating events to prevent undesirable consequences, in that, it resulted in an unexpected TS LCO entry and high temperatures in areas of the plant containing temperature sensitive, safety-related electronic equipment which could have been adversely impacted by the elevated temperatures. The finding is of very low safety significance (Green) because the environmental qualification temperatures of the most limiting equipment in the affected area was not exceeded, it did not result in a loss of safety function of one or more trains of mitigating system equipment, and was not potentially risk-significant due to possible external events. The direct cause of this finding is related to the procedural compliance aspect of the cross-cutting area of human performance.

Enforcement: TS 6.8.1.f requires, in part, that written procedures be established, implemented and maintained covering activities associated with the fire protection program, which includes procedures for conducting surveillance testing of fire protection equipment. STP-128.024, "CO<sub>2</sub> System Functional Refueling Test," Revision 9, was written to demonstrate operability of the carbon dioxide fire suppression system in accordance with fire protection procedure (FPP)-024, "Fire Suppression." Step 6.4 of STP-128.024 directed personnel to open all the sliding links on the transformer

secondary terminals TB1 and TB2 in various terminal boxes so that fire dampers would not actuate and close when the CO<sub>2</sub> system was actuated during testing. Contrary to the above, on July 10, 2006, maintenance personnel failed to open all the required links causing all the fire dampers in the control building relay room to close resulting in elevated room temperatures. Because this violation was determined to be of very low safety significance and was placed in the corrective action program as CER 0-C-06-2214, this violation is being treated as a NCV in accordance with Section VI.A.1 of the NRC Enforcement Policy, and is identified as NCV 05000395/2006004-02, Failure to Follow Fire Protection Surveillance Procedure to Prevent Inadvertent Fire Damper Closures and High Temperatures in the Relay Room.

### **Cornerstone: Emergency Preparedness**

#### 1EP6 Drill Evaluation

##### a. Inspection Scope

On September 13, 2006, the inspectors reviewed and observed the performance of an emergency preparedness training drill that involved an earthquake with corresponding reactor coolant pump damage and reactor fuel failure followed by loss of offsite power and an inter-system loss-of-coolant accident. The inspectors assessed emergency procedure usage and verified the licensee properly classified the emergency event and made the required notifications and protective action recommendations in accordance with emergency plan procedures (EPP)-001, "Activation and Implementation of Emergency Plan," EPP-001.2, "Alert," EPP-001.4, "General Emergency," and EPP-002, "Communication and Notification." The inspectors evaluated the adequacy of the licensee's conduct of the drill and critique performance and verified that drill performance issues were captured by the licensee in their CAP.

##### b. Findings

No findings of significance were identified.

## **4. OTHER ACTIVITIES**

#### 4OA1 Performance Indicator (PI) Verification

##### Reactor Safety: Initiating Events, Mitigating Systems, and Barrier Integrity Cornerstones

##### a. Inspection Scope

To verify the accuracy of the data reported for the five PIs 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 a selection of monthly operating reports, station logs, corrective action program documents, Licensee Event Reports (LERs), work week planning schedules, and PI data sheets to verify the basis for reporting each data

element. The inspectors interviewed licensee personnel associated with the PI data collection, evaluation and distribution. In addition, the inspectors reviewed performance results of the surveillance activity (STP-144.02, "Operational Leakage Test") that determined the reactor coolant system leak rate to verify reported data accuracy (see Section 1R22). The inspectors verified data for the period annotated for the following five PIs:

- Unplanned Scrams per 7,000 Critical Hours (Cornerstone: Initiating Events, January 2004 - June 2006);
- Unplanned Scrams with Loss of Normal Heat Removal (Cornerstone: Initiating Events, January 2004 - June 2006);
- Unplanned Power Changes per 7,000 Critical Hours (Cornerstone: Initiating Events, October 2004 - June 2006);
- Safety System Functional Failures (Cornerstone: Mitigating Systems, August 2004 - June 2006); and,
- Reactor Coolant System Leak Rate (Cornerstone: Barrier Integrity, October 2004 - June 2006).

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-06-1393. This CER was associated with licensee efforts to address the unexpected trip of the "B" EDG on high crankcase pressure during routine surveillance testing. The

inspectors assessed whether the licensee adequately addressed all of the applicable causal factors and identified effective corrective actions. Also, the inspectors verified the issue was processed in accordance with SAP-999, "Corrective Action Program."

b. Findings

No findings of significance were identified.

4OA5 Other

- .1 (Closed) LER 05000395/1999014-03: Kaowool Fire Barriers Outside 10 CFR 50 Appendix R Design Basis, Supplement 3.

The inspectors reviewed the subject LER to verify the accuracy of the LER and the appropriateness of the corrective actions. The supplement to this LER provided revision to the scheduled date for completion of the modifications being implemented to address the areas that originally used Kaowool (from December 31, 2005, to December 31, 2006). No new findings of significance were identified. This LER is closed.

- .2 (Closed) LER 05000395/2006001-00: Securing Emergency Recirculation of Control Room Ventilation While Associated Radiation Monitor was Out of Service.

The inspectors reviewed the subject LER and CER 0-C-06-1648 to verify the accuracy of the LER and the appropriateness of the corrective actions. No new findings of significance were identified. This issue was previously discussed in NRC Integrated Inspection Report 05000395/2006003, in that, the operator human error that caused both control room emergency ventilation fans to be secured with the associated control room ventilation radiation monitor RM-A1 out of service was the subject of a licensee-identified NCV of TS 6.8.1.a for failure to follow surveillance testing procedures while calibrating the radiation monitor. This LER is closed.

4OA6 Meetings, Including Exit

Exit Meeting Summary

The inspectors presented the inspection results to Mr. Dan Gatlin and other members of the licensee staff on October 5, 2006. The inspectors confirmed that proprietary information was not provided or examined during the inspection.

4OA7 Licensee-Identified Violation

The following finding of very low safety significance (Green) was identified by the licensee and is a violation of NRC requirements which meets the criteria of Section VI of the NRC Enforcement Policy, NUREG-1600, for being dispositioned as a NCV.

10 CFR 50, Appendix B, Criterion III, "Design Control," requires, in part, that measures shall be established to assure that applicable regulatory requirements and the design basis are correctly translated into procedures and instructions and includes the delineation of acceptance criteria for inspection and tests of safety systems and components. Contrary to the above, on July 18, 2006, the licensee identified that since original plant construction, measures were not established to assure that as-built service water pump house building flood protection features were installed in accordance with design basis flooding specifications. Specifically, in the service water pump discharge valve rooms, fire sealant had been incorrectly placed in the annulus region between each pump's discharge pipe and the surrounding wall preventing drainage of these rooms during a design basis service water pipe break event. In addition, sealant had not been installed in wall penetrations that interconnected each pump's discharge valve room, allowing flood water to enter each room during a break in any single room. Since the service water pump discharge motor operated valves were located in these rooms, they could be submerged by pipe break water as a result of these deficiencies. The licensee's subsequent analysis determined that the service water pump discharge motor operated valves would fail in the open (as-is) position, which would not have prevented the service water system from performing its safety function. This finding is of very low safety significance because the flood design deficiency would not have adversely impacted the service water system during the design basis pipe break event. This issue is documented in the licensee's CAP as CER 0-C-06-2315.

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, Acting Supervisor, Nuclear Licensing  
M. Findlay, 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. Moffit, Manager, Nuclear Operations 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  
R. Sweet, Acting 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

05000395/2006004-01	NCV	Inadequate Corrective Actions Associated with a Previous Violation Involving Failure to Implement Procedures for a Loss of Control Room Annunciator Event (Section 1R14)
05000395/2006004-02	NCV	Failure to Follow Fire Protection Surveillance Procedure to Prevent Inadvertent Fire Damper Closures and High Temperatures in the Relay Room (Section 1R22)

#### Closed

05000395/1999014-03	LER	Kaowool Fire Barriers Outside 10 CFR 50 Appendix R Design Basis (Section 4OA5.1)
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05000395/2006001-00

LER Securing Emergency Recirculation of Control Room  
Ventilation While Associated Radiation Monitor Was Out of  
Service (Section 4OA5.2)

Discussed

None.

**LIST OF DOCUMENTS REVIEWED**

**Section 1R04: Equipment Alignment**

Procedures:

SOP-505, Control Building Ventilation System  
SOP-306, Emergency Diesel Generator  
SOP-115, Residual Heat Removal

**Section 1R11: Licensed Operator Requalification Program**

Procedures:

Nuclear Training Manual (NTM) Appendix II.5A, "Licensed Operator Requalification Program Annual Examination," Revision 7.  
Nuclear Training Manual (NTM) Appendix II.5, "Requalification Program for Licensed Operators and Senior Operators," Revision 9.  
VC Summer Training Simulator Administrative Section IST-1.3, "Simulator Configuration Control," Revision 3.  
OAP-110.2, "Operator Watchstanding Certification and Tracking," Revision 0.

Records:

Badge Access Transaction Reports for Reactivation of Licenses (3)  
Licensed Operator Medical Records (15)  
Feedback Summaries  
Remedial Training Records (5)

Written Examinations Reviewed:

Inspectors reviewed two written examinations that were administered for the 2005 biennial requalification Examinations, Crews A, RO and SRO.  
Weekly Examinations 05-04-1 and 05-04-2.

JPMs:

JPS-056, "Control Room Evacuation (Duties of the NROATC)."  
JPSF-022, "What if Turbine Does Not Trip."  
JPS-067, "Classify Emergency Plan Event."  
JPPF-NRC, "Establish Demineralized Water Alternate Cooling to Charging Pumps," (Failure of Chilled Water Supply).  
JPPF-012A, "Locally Start "A" Emergency D/G During A Loss of Offsite Power."  
JPP-108, "Locally Shed Non-Essential DC Loads."

Simulator Scenarios:

LOR-SA-073R  
LOR-SA-038R  
LOR-SA-052R  
LOR-SA-018R  
LOR-SA-020R

Simulator Performance Testing:

Transient Tests:

100% Unisolable Main Steamline Break, IST-7.5, Revision 12.  
Loss of Coolant Accident, IST-7.4, Revision 13.  
Trip of One Reactor Coolant Pump, IST-7.9, Revision 12.  
Simultaneous Closure of All MSIVs, IST-7.1, Revision 13.  
Saturated Conditions (ECCS Inhibited), IST-7.6, Revision 14.

Normal Tests:

Normal Operations test procedure 100% Power to Hot Standby, IST-2.1, Revision 10.

Malfunction tests:

Loss of Instrument Air, IST-6.1.1.9, Revision 7.  
Steam Generator Safety Valve Fails Open, IST-6.8.10, Revision 4.  
Rods Fail to Move, IST-6.4.1, Revision 5.  
Leak in Charging Line, IST-6.5.12, Revision 6.  
Loss of ESF BUS 1DA, IST-6.6.5.1, Revision 2.  
Failure of ESF Transformer XTF-4, IST-6.6.5.1, Revision 5.  
Failure of ESF Transformer XTF-5, IST-6.6.18.2, Revision 4.  
Loss of 125 VDC Bus 1HA, IST-6.6.7.1, Revision 6.  
Loss of Unit Auxiliary Transformer, IST-6.6.9, Revision 3.  
FW Break between FE-496 and FW Isol Valve 1611 (SGC), IST-6.7.16.1, Revision 4.  
Loss of Service Water System, IST-6.1.4.2, Revision 5.  
Ejected Rod (48 Rods), IST-6.4.5, Revision 5.  
Pressurizer Safety Valve Fails Open, IST-6.11.7, Revision 6.  
Loss of Normal and Emergency Feedwater, IST-6.7.1.2, Revision 7.  
Reactor Trip Breaker Inadvertent Open, IST-6.10.9.1, Revision 7.  
RCS RTD Loop Failure (Cold Leg, Fails low), IST-6.12.8.2, Revision 5.  
RB Spray Pump Failure, IST-6.13.7, Revision 3.

Simulator Deficiency Reports:

SDR05081  
SDR05099  
SDR03131  
SDR05080

**LIST OF ACRONYMS**

CAP	Corrective Action Program
CER	Condition Evaluation Report
CFR	Code of Federal Regulations
EAL	Emergency Action Level
EDG	Emergency Diesel Generator
EMH	Electrical Manhole
EPP	Emergency Plan Procedure
ES	Engineering Services Procedure
ESF	Engineered Safety Features
FSAR	Final Safety Analysis Report
FPP	Fire Protection Procedure
GTP	General Test Procedure
HVAC	Heating, Ventilation, and Air Conditioning
IMC	Inspection Manual Chapter
JPM	Job Performance Measure
LCO	Limiting Condition for Operation
LER	Licensee Event Report
MCB	Main Control Board
MPFF	Maintenance Preventable Functional Failures
MR	Maintenance Rule
MWR	Maintenance Work Request
NCV	Non-Cited Violation
NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission
OAP	Operations Administrative Procedure
OOS	Out-of-Service
PI	Performance Indicator
PMT	Post-Maintenance Testing
PTP	Preventive Test Procedure
RHR	Residual Heat Removal
RTP	Rated Thermal Power
SAP	Station Administrative Procedure
SCBA	Self-Contained Breathing Apparatus
SCE&G	South Carolina Electric and Gas
SDP	Significance Determination Process
SOP	System Operating Procedure
SSC	Structures, Systems, or Components
SSPS	Solid State Protection System
STP	Surveillance Test Procedure
TS	Technical Specification