UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

February 22, 2012

Mr. Thomas D. Gatlin
Vice President, Nuclear Operations
South Carolina Electric & Gas Company
Virgil C. Summer Nuclear Station
Post Office Box 88
Jenkinsville, SC 29065

SUBJECT: VIRGIL C. SUMMER NUCLEAR STATION, UNIT NO. 1, ISSUANCE OF AMENDMENT REGARDING REACTOR COOLANT SYSTEM LEAKAGE DETECTION SYSTEMS (TAC NO. ME6332)

Dear Mr. Gatlin:

The U.S. Nuclear Regulatory Commission has issued the enclosed Amendment No. 186 to Renewed Facility Operating License No. NPF-12 for the Virgil C. Summer Nuclear Station (VCSNS), Unit No. 1 in response to your letter dated May 2, 2011 (Agencywide Documents Access and Management System Accession No. ML11124A123). This amendment revised the VCSNS Technical Specification (TS) 3.4.6.1, "RCS [Reactor Coolant System] Leakage Detection Systems," to define a new time limit for restoring inoperable RCS leakage detection instrumentation to operable status, establish alternate methods of monitoring RCS leakage when monitors are inoperable, and to reflect the requested changes and more accurately reflect the contents of the facility design bases related to the operability of the RCS leakage detection instrumentation.

A copy of the related Safety Evaluation is enclosed. Notice of Issuance will be included in the Commission's Biweekly *Federal Register* notice.

Sincerely,

R Martin

Robert E. Martin, Senior Project Manager
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-395

Enclosures:
1. Amendment No. 186 to NPF-12
2. Safety Evaluation

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SOUTH CAROLINA ELECTRIC & GAS COMPANY

SOUTH CAROLINA PUBLIC SERVICE AUTHORITY

DOCKET NO. 50-395

VIRGIL C. SUMMER NUCLEAR STATION, UNIT NO. 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 186
Renewed License No. NPF-12

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by South Carolina Electric & Gas Company (the licensee), dated May 2, 2011, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications, as indicated in the attachment to this license amendment; and paragraph 2.C.(2) of Renewed Facility Operating License No. NPF-12 is hereby amended to read as follows:

   (2) Technical Specifications and Environmental Protection Plan

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 186 , and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the license. South Carolina Electric & Gas Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This amendment is effective as of its date of issuance and shall be implemented within 120 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Nancy L. Salgado

Nancy Salgado, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to Renewed Facility
Operating License No. NPF-12
and the Technical Specifications

Date of Issuance: February 22, 2012

ATTACHMENT TO LICENSE AMENDMENT NO. 186

TO RENEWED FACILITY OPERATING LICENSE NO. NPF-12

DOCKET NO. 50-395

Replace the following pages of the License and Appendix "A" Technical Specifications with the enclosed pages as indicated. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove Pages	Insert Pages
License	License
License No. NPF-12, page 3	License No. NPF-12, page 3
TS	TS
3/4 4-18	3/4 4-18
3/4 4-18a	3/4 4-18a

(3) SCE&G, pursuant to the Act and 10 CFR Part 70, to receive, possess and use at any time special nuclear material as reactor fuel, in accordance with the limitations for storage and amounts required for reactor operation, as described in the Final Safety Analysis Report, as amended through Amendment No. 33;

(4) SCE&G, pursuant to the Act and 10 CFR Parts 30, 40 and 70 to receive, possess and use at any time any byproduct, source and special nuclear material as sealed neutron sources for reactor startup, sealed neutron sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required;

(5) SCE&G, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess and use in amounts as required any byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus of components; and

(6) SCE&G, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to possess, but not separate, such byproduct and special nuclear materials as my be produced by the operation of the facility.

C. This renewed license shall be deemed to contain, and is subject to, the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I and is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

SCE&G is authorized to operate the facility at reactor core power levels not in excess of 2900 megawatts thermal in accordance with the conditions specified herein and in Attachment 1 to this renewed license. The preoccupation tests, startup tests and other items identified in Attachment 1 to this renewed license shall be completed as specified. Attachment 1 is hereby incorporated into this renewed license.

(2) Technical Specifications and Environmental Protection Plan

The technical Specifications contained in Appendix A, as revised through Amendment No. 186 and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the renewed license. South Carolina Electric & Gas Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3/4.4.6 REACTOR COOLANT SYSTEM LEAKAGE

LEAKAGE DETECTION SYSTEMS

LIMITING CONDITION FOR OPERATION

3.4.6.1 The following Reactor Coolant System leakage detection systems shall be OPERABLE:

a. One reactor building sump level,

b. One reactor building atmosphere radioactivity monitor (gaseous or particulate), and

c. One reactor building cooling unit condensate flow rate monitor.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

a. With the reactor building sump level monitor inoperable, perform surveillance requirement 4.4.6.2.1.d (Reactor Coolant System water inventory balance) at least once per 24 hours[1] and restore the required reactor building sump level monitor to OPERABLE status within 30 days; otherwise be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With the required reactor building atmosphere radioactivity monitor inoperable, analyze grab samples of the containment atmosphere at least once per 24 hours or perform surveillance requirement 4.4.6.2.1.d (Reactor Coolant System water inventory balance) at least once per 24 hours[1] and restore the required reactor building atmosphere radioactivity monitor to OPERABLE status or verify the reactor building cooling unit condensate flow rate monitor is OPERABLE within 30 days; otherwise be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

c. With the reactor building cooling unit condensate flow rate monitor inoperable, perform a CHANNEL CHECK of the required reactor building atmosphere radioactivity monitor at least once per 8 hours or perform surveillance requirement 4.4.6.2.1.d (Reactor Coolant System water inventory balance) at least once per 24 hours[1]; otherwise be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

d. With the reactor building sump level monitor and the reactor building cooling unit condensate flow rate monitor inoperable and with the reactor building atmosphere gaseous radioactivity monitor being the only remaining OPERABLE leakage

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[1] Not required to be performed/completed until 12 hours after establishment of steady state operation.

LIMITING CONDITION FOR OPERATION

ACTION: (Continued)

detection monitor, analyze grab samples of the containment atmosphere at least once per 12 hours and restore the required reactor building sump level monitor or the reactor building cooling unit condensate flow rate monitor to OPERABLE status within 7 days; otherwise be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

e. With the required reactor building atmosphere radioactivity monitor and the reactor building cooling unit condensate flow rate monitor inoperable, restore the required reactor building atmosphere radioactivity monitor or the reactor building air cooler condensate flow rate monitor to OPERABLE status within 30 days; otherwise be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

f. With all required monitoring systems inoperable, enter LCO 3.0.3 immediately.

SURVEILLANCE REQUIREMENTS

4.4.6.1 The leakage detection systems shall be demonstrated OPERABLE by:

a. Reactor building atmosphere particulate monitoring system-performance of CHANNEL CHECK, CHANNEL CALIBRATION and ANALOG CHANNEL OPERATIONAL TEST at the frequencies specified in Table 4.3-3,

b. Reactor building sump level-performance of CHANNEL CALIBRATION at least once per 18 months,

c. Reactor building atmosphere gaseous radioactivity monitoring system-performance of CHANNEL CHECK, CHANNEL CALIBRATION, AND ANALOG CHANNEL OPERATIONAL TEST at the frequencies specified is Table 4.3-3,

d. Reactor building cooling unit condensate flow detector-performance of CHANNEL CALIBRATION at least once per 18 months.

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(1) Not required to be performed/completed until 12 hours after establishment of steady state operation.

UNITED STATES
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO

AMENDMENT NO. 186 TO RENEWED FACILITY OPERATING LICENSE NO. NPF-12

SOUTH CAROLINA ELECTRIC & GAS COMPANY

SOUTH CAROLINA PUBLIC SERVICE AUTHORITY

VIRGIL C. SUMMER NUCLEAR STATION, UNIT NO. 1

DOCKET NO. 50-395

1.0 INTRODUCTION

By letter dated, May 2, 2011, South Carolina Electric & Gas Company (SCE&G, the licensee) proposed changes to the Technical Specifications (TSs) for the Virgil C. Summer Nuclear Station, Unit No. 1 (VCSNS). The proposed changes revise the TSs to define a new time limit for restoring inoperable reactor coolant system (RCS) leakage detection instrumentation to operable status, establish alternate methods of monitoring RCS leakage when one or more required monitors are inoperable, and make TS Bases changes which reflect the contents of the facility design basis related to operability of the RCS leakage detection instrumentation.

The licensee utilized the Nuclear Regulatory Commission (NRC)-approved Revision 3 to TS Task Force (TSTF) Standard Technical Specification (STS) Change Traveler, TSTF-513, "Revise PWR (pressurized water reactor) Operability Requirements and Actions for RCS Leakage Instrumentation," in preparing its application The availability of this TS improvement was announced in the *Federal Register* (FR) on January 3, 2011 (76 FR 189), as part of the consolidated line-item improvement process (CLIIP).

2.0 REGULATORY EVALUATION

The NRC's regulatory requirements related to the content of the TSs are contained in Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Section 50.36. Paragraph (c)(2)(i) of 10 CFR 50.36 states that limiting conditions for operation (LCOs) are the lowest functional capability or performance levels of equipment required for safe operation of the facility. Paragraph (c)(2)(ii) of 10 CFR 50.36 lists four criteria for determining whether particular items are required to be included in the TS LCOs. The first criterion applies to installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary (RCPB). As described in the FR Notice associated with this regulation (60 FR 36953, July 19, 1995), the scope of TS includes two general classes of technical matters: (1) those related to prevention of accidents, and (2) those related to mitigation of the consequences of accidents. Criterion 1 addresses systems and process variables that alert the operator to a situation when accident initiation is more likely, and supports the first of these two general classes of technical matters which are included in the TSs. As specified in

paragraph (c)(2)(i) of 10 CFR 50.36, when an LCO of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the TSs until the condition can be met.

The NRC's guidance for the format and content of the PWR TSs can be found in NUREG-1431, Revision 3.0, "Standard Technical Specifications Westinghouse Plants." STS 3.4.15, "RCS Leakage Detection Instrumentation," contains the guidance specific to the RCS leakage detection instrumentation for PWRs. The STS Bases provide a summary statement of the reasons for the STS.

The Bases for STS 3.4.15 contained in NUREG-1431, Revision 3.0, provide background information, the applicable safety analyses, a description of the LCO, the applicability for the RCS leakage detection instrumentation TS, and describe the Actions and Surveillance Requirements. The TS Bases provide the purpose or reason for the TSs which are derived from the analyses and evaluation included in the safety analysis report, and for these specifications the RCS leakage detection instrumentation design assumptions and licensing basis for the plant.

As stated in NRC Information Notice (IN) 2005-24, "Nonconservatism in Leakage Detection Sensitivity," (Agencywide Documents Access and Management System (ADAMS) Accession No. ML051780073), the reactor coolant activity assumptions for containment atmosphere gaseous radioactivity monitors may be nonconservative. This means the monitors may not be able to detect a one gallon per minute (gpm) leak within 1 hour under all likely operating conditions.

The issue described in IN 2005-24 has raised questions regarding the operability requirements for containment atmosphere gaseous radioactivity monitors. TSTF-513, Revision 3, revises the TS Bases to reflect the proposed TS changes and more accurately describe the contents of the facility design basis related to operability of the RCS leakage detection instrumentation. Part of the TS Bases changes revise the specified safety function of the RCS leakage detection monitors to specify the required instrument sensitivity level. In addition, TSTF-513, Revision 3, includes revisions to TS Actions for RCS leakage detection instrumentation to establish limits for operation during conditions of reduced monitoring sensitivity because of inoperable RCS leakage detection instrumentation.

The regulation at 10 CFR Part 50, Appendix A, General Design Criterion (GDC) 30, "Quality of Reactor Coolant Pressure Boundary," requires means for detecting and, to the extent practical, identifying the location of the source of RCS leakage. Regulatory Guide (RG) 1.45, Revision 0, "Reactor Coolant Pressure Boundary Leakage Detection Systems," May 1973, describes acceptable methods of implementing the GDC 30 requirements with regard to the selection of leakage detection systems for the RCPB.

RG 1.45, Revision 0, Regulatory Position C.2, states that, "Leakage to the primary reactor containment from unidentified sources should be collected and the flow rate monitored with an accuracy of one gallon per minute (gpm) or better."

RG 1.45, Revision 0, Regulatory Position C.3 states, "At least three separate detection methods should be employed and two of these methods should be (1) sump level and flow monitoring and (2) airborne particulate radioactivity monitoring. The third method may be selected from the following: a. monitoring of condensate flow rate from air coolers, and b. monitoring of airborne

gaseous radioactivity. Humidity, temperature, or pressure monitoring of the containment atmosphere should be considered as alarms or indirect indication of leakage to the containment."

RG 1.45, Revision 0, Regulatory Position C.5 states, "The sensitivity and response time of each leakage detection system in regulatory position 3. above employed for unidentified leakage should be adequate to detect a leakage rate, or its equivalent, of one gpm in less than one hour."

RG 1.45, Revision 0, states, "In analyzing the sensitivity of leak detection systems using airborne particulate or gaseous radioactivity, a realistic primary coolant radioactivity concentration assumption should be used. The expected values used in the plant environmental report would be acceptable." The appropriate sensitivity of a plant's containment atmosphere gaseous radioactivity monitors is dependent on the design assumptions and the plant-specific licensing basis as described in the plant's final safety analysis report (FSAR). The NRC staff's approval of the use of expected primary coolant radioactivity concentration values used in the environmental report creates a potential licensing conflict when a licensee is able to achieve and maintain primary coolant radioactivity concentration values lower than the value assumed in the environmental report.

RG 1.45, Revision 1, "Guidance on Monitoring and Responding to Reactor Coolant System Leakage," was issued in May 2008. RG 1.45, Revision 1, describes methods for implementing GDC 30 requirements that are different from those in RG 1.45, Revision 0, and was developed and issued to support new reactor licensing. Revision 1 allows that having two TS leakage detection methods capable of detecting a one gpm leak within 1 hour provides adequate leakage detection capability from a safety perspective. It recommends that other potential indicators (including the gaseous radiation monitors) be maintained even though they may not have the same detection capability. These indicators, in effect, provide additional defense-in-depth.

The regulation in GDC 4 of Appendix A to 10 CFR Part 50, "Environmental and dynamic effects design bases," requires structures, systems, and components important to safety to be designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including loss-of-coolant accidents. GDC 4 allows the use of leak before break (LBB) technology to exclude dynamic effects of pipe ruptures in the design bases when analyses reviewed and approved by the Commission demonstrate that the probability of fluid system piping rupture is extremely low under conditions consistent with the design basis for the piping.

VCSNS compliance with GDC 30 is discussed in VCSNS updated FSAR (UFSAR) Section 3.1.2.4, "Fluid Systems." With respect to RCS leakage detection, VCSNS UFSAR Section 3.1.2.4 states:

> Criterion 30 – Quality of Reactor Coolant Pressure Boundary
>
> Components which are part of the reactor coolant pressure boundary shall be designed, fabricated, erected, and tested to the highest quality standards practical. Means shall be provided for detecting and, to the extent practical, identifying the location of the source of reactor coolant leakage.

Discussion

Reactor coolant pressure boundary components are designed, fabricated, inspected and tested in conformance with the ASME [American Society of Mechanical Engineers] Code, Section III. All components are classified in accordance with ANS [American Nuclear Society] N18.2[1] and are accorded the quality measures appropriate to the classification. The design bases and evaluations of reactor coolant pressure boundary components are discussed in Chapter 5.

As discussed in VCSNS UFSAR Section 5.2.7, leakage detection system instrumentation sensitivity is 1 gpm or less. Response time of less than 1 hour is consistent with the requirements of GDC 30 as described in RG 1.45. Sufficient range overlap and multiple instruments ensure shorter overall response time for leakage detection. VCSNS's USFAR Section 5.2.7, "Reactor Coolant Pressure Boundary Leakage Detection Systems," states:

> Leakage detection system instrumentation sensitivity is 1 gpm or less. Response time of less than 1 hour is consistent with the requirements of General Design Criterion 30.

3.0 TECHNICAL EVALUATION

The VCSNS TSs are based on the previous Westinghouse STS contained in NUREG-0452, "Standard Technical Specifications for Pressurized Water Reactors." In adopting the changes to the TSs included in TSTF-513, Revision 3, which are based on the STSs contained in NUREG-1431, "Standard Technical Specifications – Westinghouse Plants", the licensee proposed to revise the requirements for the reactor coolant system leakage detection system given in VCSNS TS 3.4.6.1 to conform more closely to the format of STS 3.4.15, "RCS Leakage Detection Instrumentation."

3.1 Changes to VCSNS TS 3.4.6.1 LCO

The current VCSNS TS 3.4.6.1 LCO states:

> 3.4.6.1 The following Reactor Coolant System leakage detection systems shall be OPERABLE:
>
> a. A reactor building atmosphere particulate radioactivity monitoring system,
>
> b. The reactor building sump level, and
>
> c. Either the reactor building cooling unit condensate flow rate or a reactor building atmosphere gaseous radioactivity monitoring system.

The change proposed to the TS 3.4.6.1 LCO would state:

> 3.4.6.1 The following Reactor Coolant System leakage detection systems shall be OPERABLE:
>
> a. One reactor building sump level,

b. One reactor building atmosphere radioactivity monitor (gaseous or particulate), and

c. One reactor building cooling unit condensate flow monitor.

The licensee stated:

> The VCSNS TS 3.4.6.1 LCO requirements were revised to separate the operability requirements for the reactor building atmosphere gaseous radioactivity monitor from the reactor building cooling unit condensate flow rate monitor. This change ensures one of the most sensitive RCS leakage detectors, the reactor building condensate flow rate monitor, is required operable independent from the operability of the reactor building gaseous radioactivity monitor. Furthermore, consistent with the STS, the reactor building atmosphere gaseous and particulate monitors were linked in a single LCO requirement such that either the gaseous or the particulate monitor could meet the LCO requirement.

The proposed change results in an LCO with more diverse leakage detection requirements than before. The proposed change also makes the VCSNS LCO requirement consistent with the corresponding STS requirement. Therefore, the NRC staff has determined that the proposed changes to the LCO are acceptable.

3.2 Changes to VCSNS TS 3.4.6.1 Actions

The current VCSNS TS 3.4.6.1 Action statement states:

> With only two of the above required leakage detection systems OPERABLE, operation may continue for up to 30 days provided grab samples of the containment atmosphere are obtained and analyzed at least once per 24 hours when the required gaseous or particulate radioactive monitoring system is inoperable; otherwise, be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

The change proposed to the TS 3.4.6.1 Action statement would state:

a. With the reactor building sump level monitor inoperable, perform surveillance requirement 4.4.6.2.1.d (Reactor Coolant System water inventory balance) at least once per 24 hours[(1)] and restore the required reactor building sump level monitor to OPERABLE status within 30 days; otherwise be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With the required reactor building atmosphere radioactivity monitor inoperable, analyze grab samples of the containment atmosphere at least once per 24 hours or perform surveillance requirement 4.4.6.2.1.d (Reactor Coolant System water inventory balance) at least once per 24 hours[(1)] and restore the required reactor building atmosphere radioactivity monitor to OPERABLE status or verify the reactor building cooling unit condensate flow rate monitor is OPERABLE within 30 days; otherwise be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

c. With the reactor building cooling unit condensate flow rate monitor inoperable, perform a CHANNEL CHECK of the required reactor building atmosphere radioactivity monitor at least once per 8 hours or perform surveillance requirement 4.4.6.2.1.d (Reactor Coolant System water inventory balance) at least once per 24 hours[(1)]; otherwise be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

d. With the reactor building sump level monitor and the reactor building cooling unit condensate flow rate monitor inoperable and with the reactor building atmosphere gaseous radioactivity monitor being the only remaining OPERABLE leakage detection monitor, analyze grab samples of the containment atmosphere at least once per 12 hours and restore the required reactor building sump level monitor or the reactor building cooling unit condensate flow rate monitor to OPERABLE status within 7 days; otherwise be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

e. With the required reactor building atmosphere radioactivity monitor and the reactor building cooling unit condensate flow rate monitor inoperable, restore the required reactor building atmosphere radioactivity monitor or the reactor building air cooler condensate flow rate monitor to OPERABLE status within 30 days; otherwise be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

f. With all required monitoring systems inoperable, enter LCO 3.0.3 immediately.

[footnote:] (1) Not required to be performed/completed until 12 hours after establishment of steady state operation.

The licensee provided the following justification for the proposed changes:

With the addition of the TSTF-513 Action Condition "D," STS 3.4.15 has a total of seven Action Conditions identifying various inoperable leakage detection systems and one Condition providing the common shutdown Actions.

The changes proposed to the VCSNS TS 3.4.6.1 Action would replace the current single Action with multiple Actions containing more appropriate compensatory Actions and conform more closely to the Action Conditions in STS 3.4.15. The following discussions compare the STS 3.4.15 Action Conditions to the proposed changes to the VCSNS TS 3.4.6.1 Action.

1. STS 3.4.15 Action Condition "A" addresses an inoperable containment sump monitor and requires the performance of SR 3.4.13.1 once per 24 hours and that the containment sump monitor be restored to operable status in 30 days. SR 3.4.13.1 requires that RCS operational LEAKAGE be verified within limits by performance of RCS water inventory balance. The performance of SR 3.4.13.1 is modified by a note that allows 12 hours after establishment of steady state operation before the SR is required.

Proposed VCSNS TS 3.4.6.1 Action "a" also addresses an inoperable reactor building sump level monitor. The proposed VCSNS Action "a" requires the performance of surveillance requirement 4.4.6.2.1.d (RCS water inventory balance) at least once per 24 hours and that the reactor building sump level monitor be restored to operable status within 30 days; otherwise be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. The requirement to perform surveillance requirement 4.4.6.2.1.d is modified by note (1) that allows 12 hours after establishment of steady state operation before the SR is required.

2. STS 3.4.15 Action Condition "B" addresses the required containment atmosphere radioactivity monitor inoperable (i.e., either the gaseous or the particulate). The STS Action Condition requires that grab samples of the containment atmosphere be analyzed once per 24 hours or that SR 3.4.13.1 be performed once per 24 hours. SR 3.4.13.1 requires that RCS operational LEAKAGE be verified within limits by performance of RCS water inventory balance. The performance of SR 3.4.13.1 is modified by a note that allows 12 hours after establishment of steady state operation before the SR is required. Additionally, STS Action Condition "B" requires that the required containment atmosphere radioactivity monitor be restored to operable status in 30 days. The STS Action Condition "B" also contains a bracketed (i.e., plant specific) action applicable in lieu of restoring the required radioactivity monitor to operable status. This alternate Action requires verification that the containment air cooler condensate flow rate monitor is operable within 30 days. The alternate Action would be applicable for plants that have an LCO requirement for a containment air cooler condensate flow rate monitor to be operable.

Proposed VCSNS TS 3.4.6.1 Action "b" also addresses the required containment atmosphere radioactivity monitor inoperable (i.e., either the gaseous or the particulate). The VCSNS Action "b" requires that grab samples of the containment atmosphere be analyzed at least once per 24 hours or that surveillance requirement 4.4.6.2.1.d (RCS water inventory balance) be performed at least once per 24 hours and that the reactor building atmosphere radioactivity monitor be restored to operable status within 30 days or verify that the reactor building cooling unit condensate flow rate monitor is operable within 30 days; otherwise be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. The requirement to perform surveillance requirement 4.4.6.2.1.d is modified by note (1) that allows 12 hours after establishment of steady state operation before the SR is required. The STS bracketed alternate Action, which allows the verification of containment air cooler condensate flow rate monitor operability in lieu of restoring the required radioactivity monitor to operable status, is included in the VCSNS TS 3.4.6.1 Action "b." The change to the VCSNS LCO is proposed to revise the current LCO requirement for the reactor building cooling unit condensate flow rate or a reactor building atmosphere gaseous radioactivity monitoring system to be operable. The revised VCSNS LCO would require an operable reactor building cooling unit condensate flow rate monitor independent of any other monitor. Therefore, the bracketed STS alternate Action to verify the condensate flow monitor operable in lieu of restoring the radioactivity monitor to operable status applies to the proposed VCSNS TS 3.4.6.1 Actions.

3. STS 3.4.15 Action Condition "C" addresses an inoperable containment air cooler condensate flow rate monitor. The STS Action requires that SR 3.4.15.1 be performed once per 8 hours or that SR 3.4.13.1 be performed once per 24 hours. SR 3.4.15.1 requires a Channel Check of the required containment atmosphere radioactivity monitor (gaseous or particulate). SR 3.4.13.1 requires that RCS operational LEAKAGE be verified within limits by performance of RCS water inventory balance. The performance of SR 3.4.13.1 is modified by a note that allows 12 hours after establishment of steady state operation before the SR is required. STS Action Condition "C" is bracketed (i.e., plant-specific) applicable to plants that have a separate requirement for an operable containment air cooler condensate flow rate monitor. This is consistent with the bracketed STS 3.4.15 LCO item "C."

Proposed VCSNS TS 3.4.6.1 Action "c" also addresses an inoperable reactor building cooling unit condensate flow rate monitor. The TS 3.4.6.1 Actions require that a Channel Check of the required reactor building radioactivity monitor be performed at least every 8 hours or that surveillance requirement 4.4.6.2.1.d (RCS water inventory balance) be performed at least once per 24 hours; otherwise be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. The requirement to perform surveillance requirement 4.4.6.2.1.d is modified by note (1) that allows 12 hours after establishment of steady state operation before the SR is required. The changes to the LCO resulted in the VCSNS reactor building cooling unit condensate flow rate monitor being made a separate line item in the LCO. Therefore, this STS Action Condition is applicable to VCSNS. The TS 3.4.6.1 Action "c" directly specifies a Channel Check instead of referencing a surveillance number. This deviation from the STS is proposed to simplify the Action requirement as the applicable Channel Check surveillance requirement is part of a Table in the instrumentation section of the TS and is not as simple to reference as the STS in this Action.

4. STS 3.4.15 Action Condition "D" (added by TSTF-513) addresses an inoperable Containment sump monitor and an inoperable containment air cooler condensate flow rate monitor. The Action Condition is modified by a Note that states the Condition is only applicable when the containment atmosphere gaseous radiation monitor is the only operable monitor. The Actions require that grab samples of the containment atmosphere be analyzed once per 12 hours and that the containment sump monitor or the containment air cooler condensate flow rate monitor be restored to operable status in 7 days. The references in this Action Condition to the containment air cooler condensate flow rate monitor are bracketed (i.e., plant-specific).

Proposed VCSNS TS 3.4.6.1 Action "d" also addresses an inoperable reactor building sump level monitor and an inoperable reactor building cooling unit condensate flow rate monitor and with the reactor building atmosphere gaseous radioactivity monitor being the only operable monitor. The TS 3.4.6.1 Actions require that grab samples of the containment atmosphere be analyzed at least once per 12 hours and that the reactor building sump level monitor or the reactor building cooling unit condensate flow rate monitor be restored to operable status

within 7 days; otherwise be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. The STS Action bracketed reference to the condensate flow rate monitor is incorporated into the VCSNS Action "d." Due to the changes proposed to the VCSNS TS 3.4.6.1 LCO, described in Section 3.1 above, the reactor building cooling unit condensate flow rate monitor is listed as a separate line item in the LCO which allows it to be included as a restoration option in the proposed TS 3.4.6.1 Action "d." In addition, the STS Action Condition contains a Note specifying that the Condition is only applicable when the containment atmosphere gaseous radiation monitor is the only operable monitor. Consistent with the typical format of NUREG 0452 TS, a similar note is not used in the proposed VCSNS TS 3.4.6.1 Action. Instead the intent of the STS Note is written directly in the proposed VCSNS Action as one of the conditions of the Action.

5. STS Action Condition "E" addresses an inoperable required containment atmosphere radioactivity monitor and an inoperable containment air cooler condensate flow rate monitor. The STS Actions require that the required containment atmosphere radioactivity monitor or the containment air cooler condensate flow rate monitor be restored to operable status within 30 days. The entire STS Action Condition "E" is bracketed for plant-specific adoption. This Action Condition would be applicable where both the containment air cooler condensate flow rate monitor and a containment atmosphere radioactivity monitor are required operable to meet the requirements of the LCO.

Proposed VCSNS TS 3.4.6.1 Action "e" also addresses an inoperable required reactor building atmosphere radioactivity monitor and an inoperable reactor building cooling unit condensate flow rate monitor. The proposed VCSNS TS 3.4.6.1 Actions also require that the required reactor building atmosphere radioactivity monitor or the reactor building air cooler condensate flow rate monitor be restored to operable status within 30 days; otherwise be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. As the VCSNS TS 3.4.6.1 requires both these monitors to be operable, the bracketed STS Action Condition is applicable to VCSNS.

6. STS 3.4.15 Action Condition "F" provides the common shutdown requirements for all the above STS Actions. Each Action in TS based on NUREG-0452 typically includes the applicable shutdown Actions. The VCSNS TS Actions are based on NUREG-0452 and contain the applicable shutdown requirements which are the same as the corresponding requirements of the STS. Therefore, in order to maintain internal consistency within the VCSNS TS, STS 3.4.15 Action Condition "F" is not used in the proposed VCSNS TS Actions.

7. STS Action Condition "G" addresses the condition when all required monitors are inoperable. This Action requires entry into LCO 3.0.3 immediately. This type of Action is typically used in the STS when the combination of Actions, if applied concurrently, would allow for all LCO required equipment to be inoperable. STS Action Condition "G" is necessary as the STS 3.4.15 Actions, if applied concurrently, would allow all the required monitors to be inoperable. Therefore, STS Condition "G" is necessary to address the condition where a complete loss of

monitoring function may exist. LCO 3.0.3 contains the appropriate shutdown requirements.

Proposed VCSNS TS 3.4.6.1 Action "f" also addresses the condition when all required monitors are inoperable and requires entry into LCO 3.0.3 immediately. The addition of this STS Action to the VCSNS TS is necessary as the revised Actions of VCSNS TS 3.4.6.1 will allow multiple leakage detection monitors to be inoperable concurrently. As in the STS, VCSNS LCO 3.0.3 provides the appropriate shutdown Actions for this condition.

The above proposed changes to VCSNS TS 3.4.6.1 conforms the VCSNS TS more closely to the LCO and Action Conditions of STS 3.4.15, "RCS Leakage Detection Instrumentation." The NRC staff has determined that these changes are consistent with the intent of STS 3.4.15 and TSTF-513.

The licensee proposed adding a new Action "d" to TS 3.4.6.1. The new Action "d" would be applicable when the containment atmosphere gaseous radioactivity monitor is the only operable RCS leakage detection monitor. This new Action is necessary because improved fuel integrity and the resulting lower primary coolant radioactivity concentration affects a plant's containment atmosphere gaseous radioactivity monitor to a greater extent than other monitors. The proposed new Action "d" requires the licensee to analyze grab samples of the containment atmosphere once per 12 hours and restore the required containment sump monitor to operable status within 7 days, or analyze grab samples of the containment atmosphere once per 12 hours and restore the containment air cooler condensate flow rate monitor to operable status within 7 days. These actions are in addition to the proposed Action "a", which requires performing an RCS mass balance at least once per 24 hours.

The NRC staff determined that the proposed Action "d" is more restrictive than the current requirement, because the current Action that would apply to the situation when the containment atmosphere gaseous radioactivity monitor is the only operable RCS leakage detection monitor would allow the licensee 30 days to restore the inoperable monitors to operable status. The proposed Actions are adequate because the grab samples combined with the more frequent RCS mass balances will provide an alternate method of monitoring RCS leakage when the containment atmosphere gaseous radioactivity monitor is the only operable RCS leakage detection monitor and the 12-hour interval is sufficient to detect increasing RCS leakage long before a piping flaw could progress to a catastrophic failure of the primary RCPB. Allowing 7 days to restore another RCS leakage monitor to operable status is reasonable given the diverse methods employed in the Required Actions to detect an RCS leak and the low probability of a large RCS leak during this period. Proposed Action "d" is conservative relative to the STS, sufficiently alerts the operating staff, provides a comparable ability to detect RCS leakage, and provides time intervals that are reasonable. Therefore, the NRC staff determined that proposed Action "d" provides an adequate assurance of safety when judged against regulatory standards. Certain ASME Code Class 1 piping systems in VCSNS have been approved by the NRC for LBB. The basic concept of LBB is that certain piping material has sufficient fracture toughness (i.e., ductility) to resist rapid flaw propagation; thereby minimizing the probability of a pipe rupture. The licensee has evaluated postulated flaws in RCS loop piping and determined the piping has sufficient fracture toughness that the postulated flaw would not lead to pipe rupture and potential damage to adjacent safety-related systems, structures and components before the plant could be placed in a safe, shutdown condition. The NRC staff has previously reviewed and approved these

plant-specific LBB analyses. Before remotely approaching a pipe rupture, the postulated flaw would lead to limited but detectable leakage, which would be identified by the leak detection systems in time for the operator to take action. The NRC staff previously addressed concerns that LBB depends on erroneous leak rate measurements in the final rulemaking for use of LBB technology. In addressing the concerns, it was noted that:

> One criterion for application of leak-before-break is that postulated flaw sizes be large enough so that the leakage is about ten times the leak detection capability, and that this flaw be stable even if earthquake loads are applied to the pipe in addition to the normal operating loads. This margin of a factor of ten is more than ample to account for uncertainties in both leakage rate calculations and leak detection capabilities. Furthermore, additional sensitivity studies reported by Lawrence Livermore National Laboratory in NUREG/CR-2189, dated September 1981, entitled "Probability of Pipe Fracture in the Primary Coolant Loop of a PWR Plant" indicate that even in the absence of leak detection, the probability of pipe ruptures in PWR primary coolant loop piping is sufficiently low to warrant exclusion of these events from the design basis. (51 FR 12502-01)

The proposed actions for inoperable RCS leakage detection instrumentation maintain sufficient continuity, redundancy, and diversity of leakage detection capability that an extremely low probability of undetected leakage leading to pipe rupture is maintained. This extremely low probability of pipe rupture continues to satisfy the basis for acceptability of LBB in GDC 4.

The associated TS Bases submitted with the licensee's proposed revision for TS 3.4.6.1 reflect the proposed TS changes and more accurately describe the contents of the facility design basis related to operability of the RCS leakage detection instrumentation and reflect the proposed TS changes. The proposed TS Bases changes related to the operability of the RCS leakage detection instrumentation are acceptable because they provide background information, the applicable safety analyses, a description of the limiting condition for operation, and the applicability for the RCS leakage detection instrumentation TSs and are consistent with the design basis of the facility. These instruments satisfy Criterion 1 of 10 CFR 50.36(c)(2)(ii) in that they are installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the RCPB.

The NRC staff evaluated the licensee's proposed changes against the applicable regulatory requirements and against the STSs contained in TSTF-513, Revision 3. The NRC staff determined that all the proposed changes afford adequate assurance of safety when judged against current regulatory standards. Therefore, the NRC staff finds the proposed changes acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the South Carolina State official was notified of the proposed issuance of the amendment. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding (76 FR 40941). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

7.0 REFERENCES

1. Virgil C. Summer Nuclear Station Unit 1, License Amendment Request to adopt Technical Specification Task Force Traveler TSTF-513, Revision 3 "Revise PWR Operability Requirements and Actions for RCS Leakage," May 2, 2011 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML11124A123)

2. Submittal of TSTF-513, Revision 3 (ADAMS Accession No. ML102360355)

3. FR Notice, Notice of Availability published on January 3, 2011 (ADAMS Accession No. ML101340267)

Principal Contributor: M. Singletary

Date: February 22, 2012

February 22, 2012

Mr. Thomas D. Gatlin
Vice President, Nuclear Operations
South Carolina Electric & Gas Company
Virgil C. Summer Nuclear Station
Post Office Box 88
Jenkinsville, SC 29065

SUBJECT: VIRGIL C. SUMMER NUCLEAR STATION, UNIT NO. 1, ISSUANCE OF AMENDMENT REGARDING REACTOR COOLANT SYSTEM LEAKAGE DETECTION SYSTEMS (TAC NO. ME6332)

Dear Mr. Gatlin:

The U.S. Nuclear Regulatory Commission has issued the enclosed Amendment No. 186 to Renewed Facility Operating License No. NPF-12 for the Virgil C. Summer Nuclear Station (VCSNS), Unit No. 1 in response to your letter dated May 2, 2011 (Agencywide Documents Access and Management System Accession No. ML11124A123). This amendment revised the VCSNS Technical Specification (TS) 3.4.6.1, "RCS [Reactor Coolant System] Leakage Detection Systems," to define a new time limit for restoring inoperable RCS leakage detection instrumentation to operable status, establish alternate methods of monitoring RCS leakage when monitors are inoperable, and to reflect the requested changes and more accurately reflect the contents of the facility design bases related to the operability of the RCS leakage detection instrumentation.

A copy of the related Safety Evaluation is enclosed. Notice of Issuance will be included in the Commission's Biweekly *Federal Register* notice.

Sincerely,

/RA/

Robert E. Martin, Senior Project Manager
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-395

Enclosures:
1. Amendment No. 186 to NPF-12
2. Safety Evaluation

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