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

February 28, 2014

Mr. Thomas D. Gatlin
Vice President, Nuclear Operations
South Carolina Electric & Gas Company
Virgil C. Summer Nuclear Station
Post Office Box 88, Mail Code 800
Jenkinsville, SC 29065

SUBJECT: VIRGIL C. SUMMER NUCLEAR STATION, UNIT 1 - ISSUANCE OF AMENDMENT TO REVISE TECHNICAL SPECIFICATIONS TO ADOPT TSTF-510 (TAC NO. MF1384)

Dear Mr. Gatlin:

The U.S. Nuclear Regulatory Commission has issued the enclosed Amendment No. 196 to Renewed Facility Operating License No. NPF-12 for the Virgil C. Summer Nuclear Station, Unit 1 (VCSNS), in response to your letter dated April 2, 2013, as supplemented by letter dated May 16, 2013. This amendment would modify TS requirements regarding steam generator tube inspections and reporting as described in TSTF-510, Revision 2, "Revision to Steam Generator Program Inspection Frequencies and Tube Sample Selection."

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

Sincerely,

Shawn Williams

Shawn Williams, 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. 196 to NPF-12
2. Safety Evaluation

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UNITED STATES
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WASHINGTON, D.C. 20555-0001

SOUTH CAROLINA ELECTRIC & GAS COMPANY

SOUTH CAROLINA PUBLIC SERVICE AUTHORITY

DOCKET NO. 50-395

VIRGIL C. SUMMER NUCLEAR STATION, UNIT 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 196
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 April 2, 2013, as supplemented by letter dated May 16, 2013, 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 set forth in 10 CFR Chapter I;

   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 hereby amended by page 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. 196, 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. This amendment is effective as of its date of issuance and shall be implemented within 60 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Robert J. Pascarelli, 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 28, 2014

ATTACHMENT TO LICENSE AMENDMENT NO. 196

TO RENEWED FACILITY OPERATING LICENSE NO. NPF-12

DOCKET NO. 50-395

Replace the following pages of the Renewed Facility Operating 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
NPF-12, Page 3	NPF-12, Page 3
TS	TS
3/4 4-11	3/4 4-11
6-12d	6-12d
6-12e	6-12e
6-12f	6-12f
6-12g	6-12g
6-12h	6-12h
6-16b	6-16b

(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 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 Part 30, 40 and 70 to receive, possess and use at any time 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 P arts 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 perathe 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 Plant

The Technical Specifications contained in Appendix A, as revised through Amendment No. 196 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.

REACTOR COOLANT SYSTEM

3/4.4.5 STEAM GENERATOR TUBE INTEGRITY

LIMITING CONDITION FOR OPERATION

3.4.5 Steam generator tube integrity shall be maintained.

AND

All steam generator tubes satisfying the tube plugging criteria shall be plugged in accordance with the Steam Generator Program.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

The ACTIONS may be entered separately for each steam generator tube.

a. With one or more steam generator tubes satisfying the tube plugging criteria and not plugged in accordance with the Steam Generator Program,

   1. Within 7 days verify tube integrity of the affected tube(s) is maintained until the next refueling outage or steam generator tube inspection, or be in HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours, and

   2. Plug the affected tube(s) in accordance with the Steam Generator Program prior to entering HOT SHUTDOWN following the next refueling outage or steam generator tube inspection.

b. With steam generator tube integrity not maintained, be in HOT STANDBY within 6 hours and in COLD SHUTDOWN within the next 30 hours.

SURVEILLANCE REQUIREMENTS

4.4.5.1 Verify steam generator tube integrity in accordance with the Steam Generator Program.

4.4.5.2 Verify that each inspected steam generator tube that satisfies the tube plugging criteria is plugged in accordance with the Steam Generator Program prior to entering HOT SHUTDOWN following a steam generator tube inspection.

i. Technical Specifications (TS) Bases Control Program

This program provides a means for processing changes to the Bases of these Technical Specifications.

1. Changes to the Bases shall be made under appropriate administrative control and reviews.

2. Licensees may make changes to Bases without prior NRC approval provided the changes do not require either of the following:

   a) A change in the TS incorporated in the license or

   b) A change to the updated FSAR or bases that requires NRC approval pursuant to 10 CFR 50.59.

3. The Bases Control Program shall contain provisions to insure that the Bases are maintained consistent with the FSAR.

4. Proposed changes that meet the criteria of Specification 6.8.4.i.2.b above shall be reviewed and approved prior to implementation. Changes to the Bases implemented without prior NRC approval shall be provided to the NRC on a frequency consistent with 10 CFR 50.71(e).

j. Reactor Coolant Pump Flywheel Inspection Program

This program shall provide for the inspection of each reactor coolant pump flywheel per the recommendations of Regulatory Position C.4.b of Regulatory Guide 1.14, Revision 1, August 1975.

In lieu of Positions C.4.b(1) and C.4.b(2), a qualified in-place UT examination over the volume from the inner bore of the flywheel to the circle one-half of the outer radius or a surface examination (MT and/or PT) of exposed surfaces of the removed flywheels may be conducted at 20 year intervals.

k. Steam Generator Program

A Steam Generator Program shall be established and implemented to ensure that steam generator (SG) tube integrity is maintained. In addition, the Steam Generator Program shall include the following:

1. Provisions for condition monitoring assessments. Condition monitoring assessment means an evaluation of the "as found" condition of the tubing with respect to the performance criteria for structural integrity and accident induced leakage. The "as found" condition refers to the condition of the tubing during a SG inspection outage, as determined from the inservice inspection results or by other means, prior to the plugging of tubes. Condition monitoring assessments shall be conducted during each outage during which the SG tubes are inspected or plugged to confirm that the performance criteria are being met.

2. Performance criteria for SG tube integrity. Steam generator tube integrity shall be maintained by meeting the performance criteria for tube structural integrity, accident induced leakage, and operational leakage.

   a) Structural integrity performance criterion. All inservice SG tubes shall retain structural integrity over the full range of normal operating conditions (including startup, operation in the power range, HOT STANDBY, and cooldown), all anticipated transients included in the design specifications, and design basis accidents. This includes retaining a safety factor of 3.0 (3deltaP) against burst under normal steady state full power operation primary-to-secondary pressure differential and a safety factor of 1.4 against burst applied to the design basis accident primary-to-secondary pressure differentials. Apart from the above requirements, additional loading conditions associated with the design basis accidents, or combination of accidents in accordance with the design and licensing basis, shall also be evaluated to determine if the associated loads contribute significantly to burst or collapse. In the assessment of tube integrity, those loads that do significantly affect burst or collapse shall be determined and assessed in combination with the loads due to pressure with a safety factor of 1.2 on the combined primary loads and 1.0 on axial secondary loads.

   b) Accident induced leakage performance criterion. The primary-to-secondary accident induced leakage rate for any design basis accident, other than a SG tube rupture, shall not exceed the leakage rate assumed in the accident analysis in terms of total leakage rate for all SGs and leakage rate for an individual SG. Accident induced leakage is not to exceed 1 gpm per SG.

   c) The operational leakage performance criterion is specified in LCO 3.4.6.2, "Reactor Coolant System Operational Leakage."

3. Provisions for SG tube plugging criteria. Tubes found by inservice inspection to contain flaws with a depth equal to or exceeding 40% of the nominal tube wall thickness shall be plugged.

4. Provisions for SG tube inspections. Periodic SG tube inspections shall be performed. The number and portions of the tubes inspected and methods of inspection shall be performed with the objective of detecting flaws of any type (e.g., volumetric flaws, axial and circumferential cracks) that may be present along the length of the tube, from tube-to-tubesheet weld at the tube inlet to the tube-to-tubesheet weld at the tube outlet, and that may satisfy the applicable tube plugging criteria. The tube-to-tubesheet weld is not part of the tube. In addition to meeting the requirements of 4.a, 4.b, and 4.c below, the inspection scope, inspection methods and inspection intervals shall be such as to ensure that SG tube integrity is maintained until the next SG inspection. A degradation assessment shall be performed to determine the type and location of flaws to which the tubes may be susceptible and, based on this assessment, to determine which inspection methods need to be employed and at what locations.

a) Inspect 100% of the tubes in each SG during the first refueling outage following SG installation.

b) After the first refueling outage following SG installation, inspect each SG at least every 72 effective full power months or at least every third refueling outage (whichever results in more frequent inspections). In addition, the minimum number of tubes inspected at each scheduled inspection shall be the number of tubes in all SGs divided by the number of SG inspection outages scheduled in each inspection period as defined in 1), 2), 3), and 4) below. If a degradation assessment indicates the potential for a type of degradation to occur at a location not previously inspected with a technique capable of detecting this type of degradation at this location and that may satisfy the applicable tube plugging criteria, the minimum number of locations inspected with such a capable inspection technique during the remainder of the inspection period may be prorated. The fraction of locations to be inspected for this potential type of degradation at this location at the end of the inspection period shall be no less than the ratio of the number of times the SG is scheduled to be inspected in the inspection period after the determination that a new form of degradation could potentially be occurring at this location divided by the total number of times the SG is scheduled to be inspected in the inspection period. Each inspection period defined below may be extended up to 3 effective full power months to include a SG inspection outage in an inspection period and the subsequent inspection period begins at the conclusion of the included SG inspection outage.

1) After the first refueling outage following SG installation, inspect 100% of the tubes during the next 144 effective full power months. This constitutes the first inspection period;

2) During the next 120 effective full power months, inspect 100% of the tubes. This constitutes the second inspection period;

3) During the next 96 effective full power months, inspect 100% of the tubes. This constitutes the third inspection period; and

4) During the remaining life of the SGs, inspect 100% of the tubes every 72 effective full power months. This constitutes the fourth and subsequent inspection periods.

c) If crack indications are found in any SG tube, then the next inspection for each affected and potentially affected SG for the degradation mechanism that caused the crack indication shall not exceed 24 effective full power months or one refueling outage (whichever results in more frequent inspections). If definitive information, such as from examination of a pulled tube, diagnostic non-destructive testing, or engineering evaluation indicates that a crack-like indication is not associated with a crack(s), then the indication need not be treated as a crack.

5. Provisions for monitoring operational primary-to-secondary leakage.

l. Ventilation Filter Testing Program (VFTP)

A program shall be established to implement the following required testing of Engineered Safety Feature (ESF) filter ventilation systems at the frequencies specified in accordance with Regulatory Guide 1.52, Revision 2, and ASME N510-1989.

1. Demonstrate for each of the ESF systems that an inplace test of the high efficiency particulate air (HEPA) filters shows a penetration and system bypass < 0.05% when tested in accordance with Regulatory Guide 1.52, Revision 2, and ASME N510-1989 at the system flowrate specified below ± 10%.

ESF Ventilation System	Flowrate
Control Room Emergency Filtration System	21,270 SCFM
Reactor Building Cooling Units	60,270 ACFM

2. Demonstrate for each of the ESF systems that an inplace test of the charcoal adsorber shows a penetration and system bypass < 0.05% when tested in accordance with Regulatory Guide 1.52, Revision 2, and ASME N510-1989 at the system flowrate specified below ± 10%.

ESF Ventilation System	Flowrate
Control Room Emergency Filtration System	21,270 SCFM

3. Demonstrate for each of the ESF systems that a laboratory test of a sample of the charcoal adsorber, when obtained as described in Regulatory Guide 1.52, Revision 2, shows the methyl iodide penetration less than the value specified below when tested in accordance with ASTM D3803-1989 at a temperature of 30°C (86°F) and the relative humidity specified below.

ESF Ventilation System	Penetration	RH	Face Velocity (fps)
Control Room	<2.5%	70%	0.667

4. Demonstrate for each of the ESF systems that the pressure drop across the combined HEPA filters, the prefilters, and the charcoal adsorbers is less than the value specified below when tested in accordance with Regulatory Guide 1.52, Revision 2, and ASME N510-1989 at the system flowrate specified below ± 10%.

ESF Ventilation System	Delta P	Flowrate
Control Room	<6 in. W.G.	21,270 SCFM
Reactor Building Cooling Units	<3 in. W.G.	60,270 ACFM

The provisions of SR 4.0.2 and SR 4.0.3 are applicable to the VFTP test frequencies.

m. Control Room Envelope Habitability Program

A Control Room Envelope (CRE) Habitability Program shall be established and implemented to ensure that CRE habitability is maintained such that, with an OPERABLE Control Room Emergency Filtration System (CREFS), CRE occupants can control the reactor safely under normal conditions and maintain it in a safe condition following a radiological event, hazardous chemical release, or a smoke challenge. The program shall ensure that adequate radiation protection is provided to permit access and occupancy of the CRE under design basis accident (DBA) conditions without personnel receiving radiation exposures in excess of 5 rem whole body or its equivalent to any part of the body for the duration of the accident. The program shall include the following elements:

1. The definition of the CRE and the CRE boundary.

2. Requirements for maintaining the CRE boundary in its design condition including configuration control and preventive maintenance.

3. Requirements for (i) determining the unfiltered air inleakage past the CRE boundary into the CRE in accordance with the testing methods and at the Frequencies specified in Sections C.1 and C.2 of Regulatory Guide 1.197, "Demonstrating Control Room Envelope Integrity at Nuclear Power Reactors," Revision 0, May 2003, and (ii) assessing CRE habitability at the Frequencies specified in Sections C.1 and C.2 of Regulatory Guide 1.197, Revision 0.

4. Measurement, at designated locations, of the CRE pressure relative to all external areas adjacent to the CRE boundary during the pressurization mode of operation by one train of the CREFS, operating at the flow rate required by the Ventilation Filter Testing Program (VFTP), at a Frequency of 36 months on a STAGGERED TEST BASIS such that one train is tested every 18 months. The results shall be trended and used as part of the 18 month assessment of the CRE boundary.

5. The quantitative limits on unfiltered air inleakage into the CRE. These limits shall be stated in a manner to allow direct comparison to the unfiltered air inleakage measured by the testing described in paragraph 6.8.4.m.3. The unfiltered air inleakage limit for radiological challenges is the inleakage flow rate assumed in the licensing basis analyses of DBA consequences. Unfiltered air inleakage limits for hazardous chemicals must ensure that exposure of CRE occupants to these hazards will be within the assumptions in the licensing basis.

6. The provisions of SR 4.0.2 are applicable to the Frequencies for assessing CRE habitability, determining CRE unfiltered inleakage, and measuring CRE pressure and assessing the CRE boundary as required by paragraphs 6.8.4.m.3 and 6.8.4.m.4, respectively.

STEAM GENERATOR TUBE INSPECTION REPORT

6.9.1.12 A report shall be submitted within 180 days after the initial entry into MODE 4 following completion of an inspection performed in accordance with Specification 6.8.4.k. The report shall include:

a. The scope of inspections performed on each SG,

b. Degradation mechanisms found,

c. Nondestructive examination techniques utilized for each degradation mechanism,

d. Location, orientation (if linear), and measured sizes (if available) of service induced indications,

e. Number of tubes plugged during the inspection outage for each degradation mechanism,

f. The number and percentage of tubes plugged to date, and the effective plugging percentage in each steam generator, and

g. The results of condition monitoring, including the results of tube pulls and in-situ testing.

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WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 196 TO

RENEWED FACILITY OPERATING LICENSE NO. NPF-12

SOUTH CAROLINA ELECTRIC & GAS COMPANY

SOUTH CAROLINA PUBLIC SERVICE AUTHORITY

VIRGIL C. SUMMER NUCLEAR STATION, UNIT 1

DOCKET NO. 50-395

1.0 INTRODUCTION

By application dated April 2, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession Number ML13095A106) as supplemented by letter dated May 16, 2013 (ADAMS Accession No. ML13140A009), South Carolina Electric & Gas Company (SCE&G, the licensee) proposed changes to the Technical Specifications (TS) for the Virgil C. Summer Nuclear Station, Unit 1 (VCSNS). Per the application, the proposed amendment would modify TS requirements regarding steam generator tube inspections and reporting as described in TSTF-510, Revision 2, "Revision to Steam Generator Program Inspection Frequencies and Tube Sample Selection," and as published in the *Federal Register* Notice of Availability, dated October 27, 2011 (76 FR 66763).

The letter further states, "the proposed change revises TS 3.4.5, "Steam Generator Tube Integrity," TS 6.8.4.k, "Steam Generator Program," and TS 6.9.1.12, "Steam Generator Tube Inspection Report." The proposed changes are needed to address implementation issues associated with the inspection periods, and address other administrative changes and clarifications." The licensee's supplemental letter provided additional information needed to support acceptance of its application.

The current Standard Technical Specifications (STS) requirements in the above specifications were established in May 2005 with the U.S. Nuclear Regulatory Commission (NRC) staff's approval of Technical Specifications Task Force (TSTF) traveler TSTF-449, Revision 4, "Steam Generator Tube Integrity," (NRC *Federal Register* Notice of Availability [70 FR 24126]). The TSTF-449 changes to the STS incorporated a new, largely performance-based approach for ensuring the integrity of the steam generator tubes is maintained. The performance-based requirements were supplemented by prescriptive requirements relating to tube inspections and tube repair limits to ensure that conditions adverse to quality are detected and corrected on a timely basis. As of September 2007, the TSTF-449, Revision 4, changes were adopted in the plant TS for all Pressurized Water Reactors (PWRs).

The proposed changes in TSTF-510, Revision 2, reflect licensees' early implementation experience with respect to the TSTF-449, Revision 4.

TSTF-510 characterizes the changes as editorial corrections, changes, and clarifications intended to improve internal consistency, consistency with implementing industry documents, and usability without changing the intent of the requirements. The proposed changes are an improvement to the existing steam generator inspection requirements and continue to provide assurance that the plant licensing basis will be maintained between steam generator inspections.

2.0 REGULATORY EVALUATION

The steam generator tubes in PWRs have a number of important safety functions. These tubes are an integral part of the Reactor Coolant Pressure Boundary (RCPB) and, as such, are relied upon to maintain primary system pressure and inventory. As part of the RCPB, the steam generator tubes are unique in that they are also relied upon as a heat transfer surface between the primary and secondary systems such that residual heat can be removed from the primary system and are relied upon to isolate the radioactive fission products in the primary coolant from the secondary system. In addition, the steam generator tubes are relied upon to maintain their integrity to be consistent with the containment objectives of preventing uncontrolled fission product release under conditions resulting from core damage during severe accidents.

10 CFR 50.36, "Technical Specifications," establishes the requirements related to the content of the TS. Pursuant to 10 CFR 50.36, TSs are required to include items in the following categories related to this issue: Limiting Conditions for Operation (LCOs), Surveillance Requirements (SRs), and administrative controls. LCOs, SRs and administrative controls in the VCSNS TS relevant to steam generator tube integrity are in TS 3/4.4.5, "Steam Generator Tube Integrity," TS 6.8.4.k "Steam Generator Program," and TS 6.9.1.12, "Steam Generator Tube Inspection Report."

10 CFR 50.36(c)(5) defines administrative controls as "the provisions relating to organization and management, procedures, recordkeeping, review and audit, and reporting necessary to assure the operation of the facility in a safe manner." Programs established by the licensee to operate the facility in a safe manner, including the Steam Generator Program, are listed in the administrative controls section of the TS. Summer's Steam Generator Program is defined in TS sections as stated above.

Specification 6.8.4.k requires that a Steam Generator Program be established and implemented to ensure that steam generator tube integrity is maintained. Steam generator tube integrity is maintained by meeting the performance criteria specified in TS 6.8.4.k.2 for structural and leakage integrity, consistent with the plant design and licensing basis. Specification 6.8.4.k.1 requires that a condition monitoring assessment be performed during each outage in which the steam generator tubes are inspected, to confirm that the performance criteria are being met. Specification 6.8.4.k.4 includes provisions regarding the scope, frequency, and methods of steam generator tube inspections. These provisions require that the inspections be performed with the objective of detecting flaws of any type that: (1) may be present along the length of a tube, from the tube-to-tubesheet weld at the tube inlet to the tube-to-tubesheet weld at the tube outlet; and (2) may satisfy the applicable tube plugging criteria.

The applicable tube plugging criteria, specified in TS 6.8.4.k.3, are that tubes found during inservice inspections to contain flaws with a depth equal to or exceeding 40 percent of the

nominal tube wall thickness shall be plugged, unless the tubes are permitted to remain in service through application of the alternate plugging criteria provided in TS 6.8.4.k.3.

3.0 TECHNICAL EVALUATION

3.1 The NRC staff's request for Supplement information:

During the NRC staff's acceptance review, the staff identified a need for additional information necessary to enable the staff to make an independent assessment regarding the acceptability of the licensee's proposed amendment. Specifically, the NRC staff's letter dated May 15, 2013, (ADAMS Accession No. ML13122A136) requested the licensee to provide, (a) plant-specific confirmation of the steam generator tube material type of the VCNS steam generators, and (b) a discussion on its steam generators related General Design Criteria. The licensee provided a response to the staff's concern in supplement dated May 16, 2013 (ADAMS Accession No. ML13140A009).

3.2 Optional Changes and Variations as provided by the Licensee in the April 3, 2013 Letter

SCE&G is not proposing any technical variations or deviations from the TS changes described in TSTF-510, Revision 2, or the applicable parts of the NRC staff's Model Safety Evaluation. However, SCE&G is proposing the following administrative variations from the TS changes described in TSTF-510, Revision 2.

VCSNS, Unit 1, TS numbering system is different than the STS NUREG-1431 Revision 4.0 on which TSTF-510 was based. Specifically, the "Steam Generator Program" in the VCSNS, Unit 1, TS is numbered 6.8.4.k rather than 5.5.9, the "Steam Generator Tube Integrity" TS is numbered 3/4.4.5 rather than 3.4.20, and the "Steam Generator Tube Inspection Report" is numbered 6.9.1.12 rather than 5.5.9. These differences are administrative and do not affect the applicability of TSTF-510 to the VCSNS and the TS numbering scheme.

Within Section 4.0 of TSTF-510 Revision 2, there are three versions for adjusting the inspection sample based on tube material (one each for 600MA tubing, 600TT tubing, and 690TT tubing) which contain the following statement:

> "If a degradation assessment indicates the potential for a type of degradation to occur at a location not previously inspected with a technique capable of detecting this type of degradation at this location and that may satisfy the applicable tube repair criteria, the minimum number of locations inspected with such a capable inspection technique during the remainder of the inspection period may be prorated."

The underlined phrase above should state "tube plugging [or repair] criteria," consistent with the other changes made in TSTF-510-A revision 2. This administrative error was identified in a February NRC-TSTF meeting and documented in a letter from the TSTF to the NRC dated March 28, 2012 (TSTF letter No. 12-09). SCE&G is changing the phrase to "tube plugging criteria" as reflected in this amendment request, Attachment 2 titled "Insert - A." This change is administrative and should not result in this application being removed from the Consolidated Line Item Improvement Process (CLIIP).

3.3 Each proposed change along with the licensee's applicable variations to the TS is described individually below, followed by the NRC staff's assessment of the change.

3.3.1 TS 6.8.4.k: "Steam Generator Program"

Proposed Change: The last sentence of the introductory paragraph currently states: "In addition, the Steam Generator Program shall include the following provisions: . . ." The change would delete the word "provisions" such that the sentence would state: "In addition, the Steam Generator Program shall include the following: . . ." The basis for this change is that subsequent paragraphs in TS 6.8.4.k start with "Provisions for ..." and the word "provisions" in the introductory paragraph is duplicative.

Staff Assessment: The NRC staff has reviewed the proposed change and agrees that the word, "provisions" in the introductory paragraph is duplicative. The NRC staff concurs that the change is administrative in nature, and therefore is acceptable.

3.3.2 Paragraph 6.8.4.k.2.a): "Structural integrity performance criterion"

The first sentence currently states:

> All inservice SG tubes shall retain structural integrity over the full range of normal operating conditions (including startup, operation in the power range, HOT STANDBY, and cooldown and all anticipated transients included in the design specification) and design basis accidents.

Proposed Change: Revise the sentence as follows:

> All in-service SG tubes shall retain structural integrity over the full range of normal operating conditions (including startup, operation in the power range, HOT STANDBY, and cool down), all anticipated transients included in the design specification, and design-basis accidents.

The basis for the change is that this sentence inappropriately includes anticipated transients in the description of normal operating conditions.

Staff Assessment: The NRC staff agrees the current wording is incorrect and that anticipated transients should be differentiated from normal operating conditions. Therefore, the NRC staff finds the change acceptable.

3.3.3. Paragraph 6.8.4.k.3: "Provisions for SG tube repair criteria," Paragraph 6.8.4.k.4, "Provisions for SG tube inspections," and LCO 3.4.5, "Steam Generator Tube Integrity"

Proposed Change: Change all references from "tube repair criteria" to "tube plugging criteria." This change is intended to be consistent with the treatment of steam generator tube repair throughout Specification 6.8.4.k.

Staff Assessment: The NRC staff finds that the proposed change provides a more accurate label of the criteria and, therefore, adds clarity to the specification. This is because one of two actions

must be taken when the criteria are exceeded. One action is to remove the tube from service by plugging the tube at both tube ends. Per the application, the licensee has elected to adopt the change to "tube plugging" in accordance with TSTF-510, Revision 2, in all applicable places in the TS. The proposed change provides a more accurate description of the response to tube degradation, adding clarity to the specification. Therefore, the NRC staff finds the change acceptable.

3.3.4 Paragraph 6.8.4.k.4: "Provisions for SG tube inspections"

Proposed Change: Change the term "An assessment of degradation" to "A degradation assessment" to be consistent with the terminology used in industry program documents.

Staff Assessment: The NRC staff agrees that the terminology should be consistent and finds the change acceptable.

3.3.5 Paragraph 6.8.4.k.4.a

Proposed change: The paragraph currently states: "Inspect 100% of the tubes in each SG during the first refueling outage following SG replacement." The change would replace "SG replacement" with "SG installation." The basis for the change is that it will allow the Steam Generator Program to apply to both existing plants and new plants.

Staff Assessment: The NRC staff finds that the change involves no change in the inspection requirement, is generic terminology from plant to plant, and is acceptable.

3.3.6 Change to Paragraph 6.8.4.k.4.b

The paragraph currently states:

> Inspect 100% of the tubes at sequential periods of 144, 108, 72 and thereafter, 60 effective full power months. The first sequential period shall be considered to begin after the first inservice inspection of the SGs. In addition, inspect 50% of the tubes by the refueling outage nearest the midpoint of the period and the remaining 50% by the refueling outage nearest the end of the period. No SG shall operate for more than 72 effective full power months or three refueling outages (whichever is less) without being inspected.

Proposed Change: Revise paragraph 6.8.4.k.4.b as follows:

> After the first refueling outage following SG installation, inspect each SG at least every 72 effective full power months or at least every third refueling outage (whichever results in more frequent inspections). In addition, the minimum number of tubes inspected at each scheduled inspection shall be the number of tubes in all SGs divided by the number of SG inspection outages scheduled in each inspection period as defined in 1), 2), 3), and 4) below. If a degradation assessment indicates the potential for a type of degradation to occur at a location not previously inspected with a technique capable of detecting this type of degradation at this location and that may satisfy the applicable tube plugging criteria, the minimum number of locations inspected with such a capable inspection technique during the remainder of the inspection period may be prorated. The fraction of locations to be inspected for this potential type of degradation at this location at the end of the inspection

period shall be no less than the ratio of the number of times the SG is scheduled to be inspected in the inspection period after the determination that a new form of degradation could potentially be occurring at this location divided by the total number of times the SG is scheduled to be inspected in the inspection period. Each inspection period defined below may be extended up to 3 effective full power months to include a SG inspection outage in an inspection period and the subsequent inspection period begins at the conclusion of the included SG inspection outage.

1) After the first refueling outage following SG installation, inspect 100% of the tubes during the next 144 effective full power months. This constitutes the first inspection period;

2) During the next 120 effective full power months, inspect 100% of the tubes. This constitutes the second inspection period;

3) During the next 96 effective full power months, inspect 100% of the tubes. This constitutes the third inspection period; and

4) During the remaining life of the SGs, inspect 100% of the tubes every 72 effective full power months. This constitutes the fourth and subsequent inspection periods.

Staff Assessment: Paragraph 6.8.4.k.4.b in its current form and with the proposed changes is similar for each of the tube alloy types used in domestic steam generators, but with differences that reflect the improved resistance of alloy 690 TT to stress corrosion cracking relative to both alloy 600 MA and alloy 600 TT. These differences include progressively larger maximum inspection interval requirements and sequential inspection periods (during which 100% of the tubes must be inspected) for alloy 600 MA, 600 TT, and alloy 690 TT tubes, respectively. In addition, because of the longer maximum inspection intervals allowed for 690 TT tubes, paragraph 6.8.4.k.4.b includes a restriction on the distribution of sampling over each sequential inspection period for 690 TT tubes that is not included for alloy 600 MA tubes.

As provided in the supplement dated May 16, 2013, the VCSNS steam generators tubing material is thermally heat treated Alloy 690 (690 TT). For steam generators with alloy 690 TT tubing, the licensee proposes to move the first two sentences of paragraph 6.8.4.k.4.b to the end of the paragraph and make editorial changes to improve clarity. The NRC staff finds these changes to be of a clarifying nature, not changing the current intent of these two sentences. However, the LAR also includes three changes to when inspections are performed as follows:

The second inspection period would be revised from 108 to 120 EFPM.

The third inspection period would be revised from 72 to 96 EFPM.

The fourth and subsequent inspection periods would be revised from 60 to 72 EFPM.

With respect to these proposed changes to the inspection periods in paragraph 6.8.4.k.4.b for alloy 690 TT tubing, the first inspection period would remain unchanged at 144 EFPM. The second and third inspection periods would be revised from 108 and 72 EFPM, respectively, to 120 and 96 EFPM, respectively. The fourth and subsequent inspection periods would be revised from 60 EFPM to 72 EFPM. The licensee characterizes these changes as marginal increases for consistency with typical fuel cycle lengths that better accommodate the scheduling of inspections.

The NRC staff observes that this is clearly the case for plants operating with 18- or 36-month inspection intervals (one or two fuel cycles, respectively). With these intervals, the last scheduled inspection during the first inspection period would coincide with the end of the first, third, and subsequent inspection periods. The NRC staff finds that for plants operating with 54-month inspection intervals (three fuel cycles); the end of each inspection period will not generally coincide with a scheduled inspection outage.

For plants operating with 18- or 36-month inspection intervals, the proposed changes would generally increase the number of inspections in each of the third and subsequent inspection periods by up to one additional inspection. This could reduce the required average minimum sample size during these periods. For plants operating with 54-month inspection intervals, the proposed changes will usually have no effect on the required average minimum sample size during these periods. However, inspection sample sizes will continue to be subject to paragraph 6.8.4.k.4.b which states that in addition to meeting the requirements of paragraph 6.8.4.k.4.a, b, and c, the inspection scope, inspection methods, and inspection intervals shall be such as to ensure steam generator tube integrity is maintained until the next scheduled inspection. Therefore, the NRC staff concludes that with the proposed changes to the length of the second and subsequent inspection periods, compliance with the Steam Generator Program requirements in Specification 6.8.4.k will continue to ensure both adequate inspection scopes and tube integrity.

For each inspection period, paragraph 6.8.4.k.4.b currently requires that at least 50 percent of the tubes be inspected by the refueling outage nearest to the mid-point of the inspection period and the remaining 50 percent by the refueling outage nearest the end of the inspection period. The NRC staff notes that if there are not an equal number of inspections in the first half and second half of the inspection period, the average minimum sampling requirement may be markedly different for inspections in the first half of the inspection period compared to those in the second half, even when there are uniform intervals between each inspection. For example, a plant in the second (120 EFPM) inspection period with a scheduled 36-month interval (two fuel cycles) between each inspection would currently be required to inspect 50 percent of the tubes by the refueling outage nearest the midpoint of the inspection which would be the third refueling outage in the period, six months before the mid-point (assuming an inspection was performed at the very end of the 144 EPFM inspection period). However, since no inspection is scheduled for that outage, then the full 50 percent sample must be performed during the inspection scheduled for the second refueling outage in the period. Two inspections would be scheduled to occur in the second half of the inspection period, at 72 and 108 months into the inspection period. Thus, the current sampling requirement could be satisfied by performing a 25 percent sample during each of these inspections or other combinations of sampling (e.g., 10 percent during one and 40 percent in the other) totaling 50 percent. The NRC staff finds there is no basis to require the minimum initial sample size to vary so much from inspection to inspection. The licensee proposes to revise this requirement such that the minimum sample size for a given inspection in a given inspection period is 100 percent divided by the number of scheduled inspections during that inspection period. For the above example, the proposed change would result in a uniform initial minimum sample size of 33.3 percent for each of the three scheduled inspections during the inspection period. The NRC staff concludes this proposed revision to be an improvement to the existing requirement since it provides a more consistent minimum initial sampling requirement.

The proposed third and fourth sentences to paragraph 6.8.4.k.4.b address the possibility that a degradation assessment in accordance with paragraph 6.8.4.k indicates the tubing may be

susceptible to a type of degradation at a location not previously inspected with a technique capable of detecting that type of degradation at that location. For example, new information from another similar plant becomes available indicating the potential for circumferential cracking at a specific location on the tube. Previous degradation assessments had not identified the potential for this type of degradation at this location. Thus, previous inspections of this location had not been performed with a technique capable of detecting circumferential cracks. However, now that the potential for circumferential cracking has been identified at this location, paragraph 6.8.4.k requires a method of inspection to be performed with the objective of detecting circumferential cracks which may be present at this location and that may satisfy the applicable tube repair criteria. Suppose this inspection is performed for the first time during the third of four steam generator inspections scheduled for the 144 EFPM inspection period. Paragraph 6.8.4.k.4 currently does not specifically state whether this location needs to be 100 percent inspected by the end of the 144 EFPM inspection period, or whether a prorated approach may be taken. The NRC staff addressed this question in Issue 1 of NRC Regulatory Information Summary (RIS) 2009-04, "Steam Generator Tube Inspection Requirements," dated April 3, 2009 (ADAMS Accession No. ML083470557), as follows:

> Issue 1: A licensee may identify a new potential degradation mechanism after the first inspection in a sequential period. If this occurs, what are the expectations concerning the scope of examinations for this new potential degradation mechanism for the remainder of the period (e.g., do 100 percent of the tubes have to be inspected by the end of the period or can the sample be prorated for the remaining part of the period)?
>
> [NRC Staff Position:] The TS contain requirements that are a mixture of prescriptive and performance-based elements. STS TS 5.5.9.d (Summer's TS 6.8.4.k.4) of these requirements indicates that the inspection scope, inspection methods, and inspection intervals shall be sufficient to ensure that steam generator tube integrity is maintained until the next steam generator inspection. Paragraph "d" is a performance-based element because it describes the goal of the inspections but does not specify how to achieve the goal. However, paragraph "d.2" is a prescriptive element because it specifies that the licensee must inspect 100 percent of the tubes at specified periods.
>
> If an assessment of degradation performed after the first inspection in a sequential period results in a licensee concluding that a new degradation mechanism (not anticipated during the prior inspections in that period) may potentially occur, the scope of inspections in the remaining portion of the period should be sufficient to ensure steam generator tube integrity for the period between inspections.

In addition, to satisfy the prescriptive requirements of STS TS 5.5.9.d.2 (Summer's TS 6.8.4.k.4.b) that the licensee must inspect 100 percent of the tubes within a specified period, a prorated sample for the remaining portion of the period is appropriate for this potentially new degradation mechanism. This prorated sample should be such that if the licensee had implemented it at the beginning of the period, the TS requirement for the 100 percent inspection in the entire period (for this degradation mechanism) would have been met. A prorated sample is appropriate because (1) the licensee would have performed the prior inspections in this sequential period consistently with the requirements, and (2) the scope of inspections must be sufficient to ensure that the licensee maintains steam generator tube integrity for the period between inspections.

The NRC staff finds that proposed sentences 3 and 4 clarify the existing requirement consistent with the NRC staff's position from RIS 2009-04 indented above and are, therefore, acceptable.

The proposed fifth sentence to allow extension of the inspection periods by up to an additional 3 EFPM potentially impacts the average tube inspection sample size to be implemented during a given inspection in that period. For example, if four steam generator inspections are scheduled to occur within the nominal 144 EFPM period, the minimum sample size for each of the four inspections could average as little as 25 percent of the tube population. If a fifth inspection can be included within the period by extending the period by 3 EFPM, then the minimum sample size for each of the five inspections could average as little as 20 percent of the tube population. The proposed fifth sentence does not impact the required frequency of steam generator inspection.

Required tube inspection sample sizes are also subject to the performance-based requirement in paragraph TS 6.8.4.k.4, which states, in part, that in addition to meeting the requirements of paragraph TS 6.8.4.k 4.b, "the inspection scope, inspection methods, and inspection intervals shall be such as to ensure that SG tube integrity is maintained until the next scheduled SG inspection." This requirement remains unchanged under the proposal. The NRC staff concludes the proposed fifth sentence involves only a relatively minor relaxation to the existing sampling requirements in paragraph TS 6.8.4.k.4.b. However, the performance-based requirements in TS 6.8.4.k 4 ensure that adequate inspection sampling will be performed to ensure tube integrity is maintained. The NRC staff concludes that adding the proposed fifth sentence to paragraph TS 6.8.4.k.4.b is acceptable.

Finally, the first sentence of the proposed revision to paragraph TS 6.8.4.k.4.b replaces the last sentence of the current paragraph TS 6.8.4.k.4.b. This sentence establishes the minimum allowable steam generator inspection frequency as at least every 72 EFPM or at least every third refueling outage (whichever results in more frequent inspections). This minimum inspection frequency is unchanged from the current sentence. The NRC staff finds that the wording changes in the sentence are of an editorial and clarifying nature and are not material, such that the current intent of the requirement is unchanged. Thus, the NRC staff concludes the first sentence of proposed paragraph TS 6.8.4.k.4.b is acceptable.

3.3.7 Change to Paragraph 6.8.4.k.4.c

The first sentence of paragraph 6.8.4.k.4.c currently states:

> If crack indications are found in any SG tube, then the next inspection for each SG for the degradation mechanism that caused the crack indication shall not exceed 24 effective full power months or one refueling outage (whichever is less).

Proposed Change: Revise this sentence as follows:

> If crack indications are found in portions of the SG tube not excluded above, then the next inspection for each affected and potentially affected SG for the degradation mechanism that caused the crack indication shall not exceed 24 effective full power months or one refueling outage (whichever results in more frequent inspections).

The proposed change is replacing the words "for each SG" with the words "for each affected and potentially affected SG." The licensee states that the existing wording can be misinterpreted. The

licensee further states that the intention is that those steam generators that are affected and those steam generators that are potentially affected must be inspected for the degradation mechanism that caused the crack indication. However, some licensees have questioned whether the current reference to "each SG" requires only the steam generators that are affected to be inspected for the degradation mechanism. The proposed revision is intended to clarify the intent of the requirement.

Staff Assessment: Paragraph 6.8.4.k.4.b permits steam generator inspection intervals to extend over multiple fuel cycles for steam generators with alloy 600 TT, assuming that such intervals can be implemented while ensuring tube integrity is maintained in accordance with paragraph 6.8.4.k.4. However, stress-corrosion cracks may not become detectable by inspection until the crack depth approaches the tube repair limit. In addition, stress-corrosion cracks may exhibit high growth rates. For these reasons, once cracks have been found in any steam generator tube, paragraph 6.8.4.k.4.b restricts the allowable interval to the next scheduled inspection to 24 EFPM or one refueling outage (whichever results in more frequent inspections). The intent of this requirement is that it applies to the affected steam generator and to any other steam generator which may be potentially affected by the degradation mechanism that caused the known crack(s).

For example, a root cause analysis in response to the initial finding of one or more cracks might reveal that the crack(s) are associated with a manufacturing anomaly which causes locally high residual stress which in turn caused the early initiation of cracks at the affected locations. If it can be established that the extent of condition of the manufacturing anomaly applies only to one steam generator and not the others, then the NRC staff agrees that only the affected steam generator needs to be inspected within 24 EFPM or one refueling cycle in accordance with paragraph 6.8.4.k.4.c. The next scheduled inspections of the other steam generators will continue to be subject to all other provisions of paragraph 6.8.4.k.4. The NRC staff finds the proposed change to paragraph 6.8.4.k.4.c acceptable because it clarifies the intent of the paragraph.

3.3.8 Specification 6.9.1.12, "Steam Generator Tube Inspection Report"

This specification lists items a. through g. to be included in a report which shall be submitted within 180 days after the initial entry into MODE 4 following completion of an inspection performed in accordance with the Specification 6.8.4.k, "Steam Generator Program."

Proposed Change: Item b. currently reads: "Active degradation mechanisms found..." to be revised to read: "Degradation mechanisms found..."

Item e. currently reads: "Number of tubes plugged during the inspection outage for each active degradation mechanism..." to be revised to read: "Number of tubes plugged during the inspection outage for each degradation mechanism..."

Item f. currently reads: "Total number and percentage of tubes plugged to date..." to be revised to read: "The number and percentage of tubes plugged to date, and the effective plugging percentage in each steam generator..."

Staff Assessment: This proposal would delete the word "Active" in items b. and e. above. Thus, all degradation mechanisms found, whether deemed to be active or not, would now be reportable. The NRC staff finds the proposed change acceptable. The proposed change to item f. is an

editorial change that does not materially change the reporting requirements. The NRC staff finds this change acceptable.

The licensee's application dated April 2, 2013, also included revised TS Bases pages to be implemented with the associated TS changes. These pages were provided for information only and will be revised in accordance with the Licensee's Technical Specification Bases Control Program.

4.0 STATE CONSULTATION

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

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes 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 amendment involves 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 amendment involves no significant hazards consideration, and there has been no public comment on such finding (78 FR 38083, June 25, 2013). Accordingly, the amendment meets 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 amendment.

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) there is reasonable assurance that 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.

Principal Contributors:
R. P. Grover, NRR/DSS/STSB

Date: February 28, 2014

February 28, 2014

Mr. Thomas D. Gatlin
Vice President, Nuclear Operations
South Carolina Electric & Gas Company
Virgil C. Summer Nuclear Station
Post Office Box 88, Mail Code 800
Jenkinsville, SC 29065

SUBJECT: VIRGIL C. SUMMER NUCLEAR STATION, UNIT 1 - ISSUANCE OF AMENDMENT TO REVISE TECHNICAL SPECIFICATIONS TO ADOPT TSTF-510 (TAC NO. MF1384)

Dear Mr. Gatlin:

The U.S. Nuclear Regulatory Commission has issued the enclosed Amendment No. 196 to Renewed Facility Operating License No. NPF-12 for the Virgil C. Summer Nuclear Station, Unit 1 (VCSNS), in response to your letter dated April 2, 2013, as supplemented by letter dated May 16, 2013. This amendment would modify TS requirements regarding steam generator tube inspections and reporting as described in TSTF-510, Revision 2, "Revision to Steam Generator Program Inspection Frequencies and Tube Sample Selection."

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

Sincerely,
/RA/

Shawn Williams, 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. 196 to NPF-12
2. Safety Evaluation

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ADAMS Accession No. ML14010A182 *By memo dated

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DATE	2/6/14	2/6/14	1/7/14	2/25/14
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DATE	2/27/14	2/28/14		

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