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

February 28, 2013

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 – CORRECTION LETTER REGARDING ALTERNATIVE SOURCE TERM AMENDMENT (TAC NO. ME8221)(LAR-04-02911)

Dear Mr. Gatlin:

On October 4, 2010, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML102160020) the Nuclear Regulatory Commission (NRC) issued Amendment No. 183 to Renewed Facility Operating License No. NPF-12 for the Virgil C. Summer Nuclear Station, Unit No. 1, in response to your application dated February 17, 2009, as supplemented on June 15, December 1, and December 23, 2009, January 14, and July 16, 2010. The amendment approves the use of an alternative source term (AST) application methodology for analyzing the radiological consequences for six design-basis accidents.

In a letter dated March 13, 2012 (ADAMS Accession No. ML12076A129), South Carolina Electric & Gas Company (the licensee) identified various corrections to the AST safety evaluation. The NRC staff has reviewed the corrections and concluded that the corrections proposed are necessary to accurately reflect information submitted by the licensee. In addition, another correction was needed to address a licensee identified issue. Therefore, attached are corrected pages 6, 27, Tables 3.1.3, 3.2, and 3.2.7 of the October 4, 2010 safety evaluation.

Should you have any questions, please feel free to contact me at (301) 415-2315.

Sincerely,

/RA/

Eva Brown, Senior Project Manager
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-395

Enclosure:
Revised Safety Evaluation pages

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ENCLOSURE

VIRGIL C. SUMMER NUCLEAR STATION, UNIT NO. 1

Revised Pages

3.1.1 EAB and LPZ Atmospheric Dispersion Factors

Section 4.1 of Attachment 2 to the February 17, 2009, LAR stated that the EAB and LPZ $^{X}/_{Q}$ values listed in Table 4.1-1 and used in the AST dose analyses were the current licensing basis values described Section 2.3.4 of the VCSNS FSAR. Section 4.1 further stated that use of the $^{X}/_{Q}$ values previously approved by the NRC staff during the initial facility licensing is acceptable for use in the AST analyses as discussed in RG 1.183, Section 5.3. However, the NRC staff noted that the values listed in Table 4.1-1 were not the same as those in NUREG-0717, "Safety Evaluation Report related to the operation of Virgil C. Summer Nuclear Station, Unit No.1," dated February 1981 (NUDOCS Number 8103030656). Further, it was not clear to NRC staff when the EAB and LPZ $^{X}/_{Q}$ values had become the current licensing basis values. Therefore, NRC staff requested that the licensee cite a reference for NRC approval of the $^{X}/_{Q}$ values used in support of the current LAR.

In the December 23, 2009, response, the licensee provided new EAB and LPZ $^{X}/_{Q}$ values based on the guidance in RG 1.145. The licensee calculated these $^{X}/_{Q}$ values using the PAVAN atmospheric dispersion computer code and the verified July 2003 through June 2006 three-year data set discussed in Section 3.1.1. The data were divided into a relatively large number of wind speed categories at the lower wind speeds to generate the JFD input file. In RIS 2006-04 it states that JFDs used as input to PAVAN should have a large number of wind speed categories at the lower wind speeds in order to produce the best results. Other inputs included EAB and LPZ distances of 1609 and 4828 meters, respectively, a building minimum cross-sectional area of 1740 square meters, and a containment height of 44.8 meters. The release was considered to be ground level.

The licensee also provided a comparison of the new EAB and LPZ $^{X}/_{Q}$ values with the $^{X}/_{Q}$ values provided in the February 17, 2009, LAR and those in NUREG-0717. The December 23, 2009, response noted that the LAR $^{X}/_{Q}$ values were limiting for the EAB and the NUREG-0717 values were limiting for the LPZ, although any combination of the $^{X}/_{Q}$ values would lead to acceptable dose results. The licensee proposed use of the new July 2003 through June 2006 data set, $^{X}/_{Q}$ values in the dose assessment related to the current LAR. This approach would achieve consistency with current, accepted practices and also establish new FSAR EAB and LPZ $^{X}/_{Q}$ values supported by in-house, plant-specific calculations.

The NRC staff qualitatively reviewed the inputs to the PAVAN computer run and found them generally consistent with site configuration drawings and NRC staff practice. The NRC staff also evaluated the resulting atmospheric dispersion estimates by running the PAVAN computer model using the verified July 2003 through 2006 meteorological data set and by deleting the 2005 meteorological data. In both cases, the results were similar to or less limiting than the results obtained by the licensee.

On the basis of this review, the NRC staff finds the new $^{X}/_{Q}$ values listed in Table 3.1.3 of this SE acceptable for use in the EAB and LPZ dose assessments in the current LAR. However, because of the uncertainties discussed in Section 3.1.1 regarding the meteorological data set used to generate these $^{X}/_{Q}$ values, the NRC staff notes that these data may not provide adequate representation of the site for other applications. Therefore, the $^{X}/_{Q}$ values should not be considered acceptable for use in other dose assessments or other meteorological applications without further NRC review and approval.

3.2.7 Control Room Habitability and Modeling

The current VCSNS DBA analyses, as shown in FSAR Chapter 15, do not calculate control room (CR) dose. Therefore, the control room dose model provided in the revised DBA accident analyses that support this AST-based LAR, represents a change in the VCSNS licensing basis.

The licensee's revised analyses credits post-accident isolation with filtered recirculation and pressurization. The CR ventilation system is modeled as providing 1,000 standard cfm (scfm) ± 25 percent of makeup air in normal mode and 980 scfm ± 25 percent of makeup air in emergency mode. As stated by the licensee, this system provides 95 percent filtration of aerosol, elemental, and organic forms of iodine. The licensee assumed that the emergency mode of the CR ventilation system is initiated and available from time equal 0 hours for the LOCA, time equal 0.5 hours for the FHA, MSLB & SGTR and time equal 2 hours for the LRA, & CREA SG release case (the CREA containment release case assumed 0.5 hours). For DBA events that might challenge CR habitability, the new VCSNS design-basis will require the licensee to ensure that the CR ventilation system is placed in the emergency mode within the times assumed in the analyses and that filtration is maintained for the duration of the accident.

Also associated with the emergency mode of the VCSNS CR is a recirculation system that provides a flow rate of 21,250 cfm ± 10 percent (-10 percent was used and is conservative for recirculation flow) and 95 percent filtration of aerosol, elemental, and organic forms of iodine. The total unfiltered inleakage into the VCSNS CR assumed by the licensee was 200 scfm, and then an additional 10 scfm was added for CR ingress and egress, bringing the total to 210 scfm. This value was also assumed for the accident duration.

The licensee has determined that, due to the sensitivity of control room intake flow rate to pressure and temperature, current industry practice indicates that a correction factor should be applied to all flow into their CR. Therefore, each of the aforementioned intake and unfiltered inleakage flows were increased by the licensee-calculated factor of 1.0328; emergency mode makeup flow becomes 1,265 cfm and unfiltered inleakage becomes 243 cfm when the 25percent uncertainty is also conservatively considered. Inclusion of the calculated correction factor in the licensee's analysis yields conservative results and is therefore acceptable to the NRC staff.

The licensee's response to Generic Letter 2003-01, dated November 18, 2005 (Reference 9), indicates that the maximum measured unfiltered inleakage into the VCSNS CR was 41 scfm. Therefore, the modeled unfiltered inleakage value can be viewed as conservative and providing margin for future measurements of control room inleakage.

3.2.8 Summary – Section 3.2

As described above, the NRC staff reviewed the assumptions, inputs, and methods used by the licensee to assess the radiological consequences of the postulated DBA analyses with the proposed TS changes. The NRC staff finds that the licensee used analysis methods and assumptions consistent with the conservative regulatory requirements and guidance identified in Section 2.0. The NRC staff compared the doses estimated by the licensee to the applicable criteria identified in Section 2.0 and finds, with reasonable assurance, that the licensee's estimates of the Control Room, EAB, and LPZ doses will comply with these criteria. The NRC staff further finds reasonable assurance that VCSNS, as modified by this approved license

Table 3.1.2

VCSNS Control Room Atmospheric Dispersion Factors

Design-basis Accident	Source / Receptor	$^{X}/_{Q}$ Values				
		0-2 Hours	2-8 Hours	8-24 Hours	24-96 Hours	96-720 Hours
		sec/m^3	sec/m^3	sec/m^3	sec/m^3	sec/m^3
LOCA, FHA, CREA	Reactor Building Nearest Point to Intake A	1.39E-03	1.17E-03	5.70E-04	4.17E-04	3.00E-04
FHA	Main Plant Vent to Intake B	7.43E-04	5.41E-04	2.75E-04	2.16E-04	1.49E-04
MSLB, SGTR, LRA, CREA	MS SSV A (Reliefs B, C,D,E) to Intake B	1.51E-03	1.17E-03	5.75E-04	4.18E-04	3.10E-04

Table 3.1.3

VCSNS Offsite Atmospheric Dispersion Factors

Offsite Dose Location	$^{X}/_{Q}$ Values				
	0-2 Hours	0-8 Hours	8-24 Hours	24-96 Hours	96-720 Hours
	sec/m^3	sec/m^3	sec/m^3	sec/m^3	sec/m^3
EAB	1.24E-04	----	----	----	----
LPZ	5.06E-05	2.42E-05	1.68E-05	7.55E-06	2.40E-06

Table 3.2

Licensee Calculated Radiological Consequences of Design-basis Accidents

Design-basis Accident	Control Room		[1]EAB		LPZ	
	[2]Total Dose (rem TEDE)	Acceptance Criteria (rem TEDE)	[3]Total Dose (rem TEDE)	Acceptance Criteria (rem TEDE)	[4]Total Dose (rem TEDE)	Acceptance Criteria (rem TEDE)
LOCA	1.01	5.0	1.48	25	0.83	25
FHA						
IC[5]	0.76	5.0	1.30	6.3	0.53	6.3
IFHB[6]	0.41	5.0	1.30	6.3	0.53	6.3
MSLB						
PIS	1.15	5.0	0.60	25	0.14	25
CIS	0.37	5.0	0.24	2.5	0.20	2.5
SGTR						
PIS	1.18	5.0	0.63	25	0.13	25
CIS	0.37	5.0	0.22	2.5	0.05	2.5
LRA	2.43	5.0	0.67	2.5	0.66	2.5
CREA						
Cont.	1.71	5.0	1.31	6.3	1.46	6.3
SG	2.38	5.0	0.77	6.3	0.68	6.3

1 The licensee calculated the EAB dose for the worst 2-hour period of the accident duration.
2 The licensee's control room dose results have been rounded to three significant digit precision.
3 The licensee's EAB dose results have been rounded to three significant digit precision.
4 The licensee's LPZ dose results have been rounded to three significant digit precision.
5 IC refers to the FHA inside containment.
6 IFHB refers to the FHA inside the fuel handling building.

Table 3.2.7

Key Parameters Used in Modeling the Control Room for Design-basis Radiological Consequence Analyses

Parameter	Value
Control Room Volume, ft^3	226,040
Recirculation Flow Rate, cfm	19,125
Assumed Emergency Filtration System Initiation, hours LOCA FHA MSLB SGTR LRA CREA release to the RB CREA SG release	 0 0.5 0.5 0.5 2 0.5 2
Emergency Filtered Intake Flow Rate, cfm	1265
Recirculation Filter Efficiency, percent Elemental Organic Aerosol/Particulate	 95 95 95
Emergency Intake Filter Efficiency, percent Elemental Organic Aerosol/Particulate	 95 95 95
Unfiltered Inleakage, cfm	243
Occupancy Factors 0 – 24 hours 24 – 96 hours 96 – 720 hours	 1.0 0.6 0.4
Breathing Rate, m^3/sec	3.5E-04
Atmospheric Dispersion Factors	Table 3.1.2

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Docket No. 50-395
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