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November 5, 2015
RC-15-0177

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555-0001

Attn: S. A. Williams

Dear Sir / Madam:

Subject: VIRGIL C. SUMMER NUCLEAR STATION (VCSNS) UNIT 1
DOCKET NO. 50-395
OPERATING LICENSE NO. NPF-12
LICENSE AMENDMENT REQUEST – LAR-12-04269
LICENSE BASIS CHANGES IN STEAM GENERATOR TUBE
RUPTURE ANALYSIS RESPONSE TO REQUEST FOR ADDITIONAL
INFORMATION

- References:
1. SCE&G Letter from Thomas D. Gatlin to NRC Document Control Desk, License Amendment Request – LAR-12-04269, "License Basis Changes in Steam Generator Tube Rupture Analysis," dated August 27, 2014 [ML14245A408]
 2. NRC Letter from Shawn A. Williams to Thomas D. Gatlin, "Virgil C. Summer Nuclear Station, Unit No. 1, Request for Additional Information Regarding License Basis Changes in Steam Generator Tube Rupture Analysis (TAC NO. MF4699)," dated September 22, 2015 [ML15261A051]

South Carolina Electric & Gas Company (SCE&G), acting for itself and as agent for South Carolina Public Service Authority pursuant to 10 CFR 50.90, submitted License Amendment Request (LAR) per Reference 1 concerning license basis changes in the steam generator tube rupture analysis. NRC review of this request determined that additional information was required and a request for additional information (RAI) was issued per Reference 2. This submittal's attachment contains SCE&G's response to the RAI dated September 22, 2015.

There are no regulatory commitments associated with this response.

If you have any questions regarding this submittal, please contact Mr. Bruce L. Thompson at (803) 931-5042.

A001
NRR

I certify under penalty of perjury that the foregoing is correct and true.

11-5-2015

Executed on



Thomas D. Gatlin

TS/TDG/wm

Attachment: VCSNS Response to Request for Additional Information

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**VIRGIL C. SUMMER NUCLEAR STATION (VCSNS) UNIT 1
DOCKET NO. 50-395
OPERATING LICENSE NO. NPF-12**

ATTACHMENT

VCSNS RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

The U.S. Nuclear Regulatory Commission (NRC) staff reviewed the Virgil C. Summer Nuclear Station (VCSNS) License Amendment Request (LAR), dated August 27, 2014 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14245A408) and supplements dated October 31, 2014 (ADAMS Accession No. ML14308A075), February 12, 2015 (ADAMS Accession No. ML15055A143), May 12, 2015 (ADAMS Accession No. ML15135A238), and September 10, 2015 (ADAMS Accession No. ML15258A021). The proposed LAR would incorporate supplemental analyses of a steam generator tube rupture accident which explicitly models operator responses and quantifies their impact on the potential for steam generator overflow and offsite and control room doses. The licensee stated that the new transient calculations supplement the VCSNS licensing basis analysis by demonstrating margin to steam generator overflow and providing input to a dose analysis that confirms the licensing basis mass transfer input is conservative.

The NRC staff has determined that the following request for additional information (RAI) is required to complete the review.

ARCB-RAI-1

In letter dated September 10, 2015, the licensee stated that the updated meteorological data was used to derive atmospheric dispersion values at the exclusion area boundary (EAB) and low population zone (LPZ) at certain time intervals using the PAVAN code and included a table of the updated atmospheric dispersion values for the EAB and LPZ. However, the letter did not (1) provide atmospheric dispersion values at the control room that reflect the updated meteorological data, and (2) address the impact of the new updated atmospheric dispersion values on the steam generator tube rupture (SGTR) radiological consequence analysis dose rate results.

Therefore, in order for the NRC staff to assess that the license amendment meets 10 CFR 50.67 and General Design Criteria 19, please provide the atmospheric dispersion values at the control room which reflect the updated meteorological data and provide an evaluation that addresses the impact of the new updated atmospheric dispersion values (EAB, LPZ and control room) on the SGTR radiological consequence analysis dose rate results.

SCE&G Response

(1) The first portion of the request in Reference 1 requests the atmospheric dispersion coefficients (χ/Q) at the control room (CR) based on the most recent (January 1, 2012 through December 31, 2014) meteorological data. Reference 2 had previously provided these coefficients for the same interval at the Exclusion Area Boundary (EAB) and the Low Population Zone (LPZ). These responses are part of the activities initiated by the review of LAR-12-04269 in Reference 3.

The EAB, LPZ, and CR χ/Q values were derived using the 2012-2014 meteorological input data, employing the same assumptions and methods in VCSNS's Alternative Source Term (AST) submittal, as amended, summarized, and approved in Section 3.1.1 of Reference 4.

Table 1 below shows the coefficients for all three areas in the time periods considered in the SGTR dose analysis, and allows for comparison against the values used in the AST submittal in Reference 4. The table shows comparable values between the two data sets, but with the latest EAB and LPZ χ/Q values showing somewhat higher values relative to the AST submittal.

Table 1 2012-2014 Atmospheric Dispersion Coefficients (χ/Q) for Design Basis Accidents (sec/m³)

Time Period	2012-2014 χ/Q (sec/m ³)			Tables 3.1.2 and 3.1.3 of AST SER [Reference 4]		
	EAB	LPZ	CR	EAB	LPZ	CR
0 – 2 hrs	1.25E-4	5.97E-5 ^a	1.50E-3	1.24E-4	5.06E-5 ^a	1.51E-3
2 – 8 hrs	---	---	1.12E-3 ^b	---	---	1.17E-3 ^b
0 – 8 hrs	---	2.91E-5	---	---	2.42E-5	---
8 – 24 hrs	---	2.03E-5	5.24E-4	---	1.68E-5	5.75E-4
1 – 4 days	---	9.30E-6	3.61E-4	---	7.55E-6	4.18E-4
4 – 30 days	---	3.03E-6	2.33E-4	---	2.40E-6	3.10E-4

Table Notes:

- a. 0 to 2 hour LPZ χ/Q is used only for the Fuel Handling Accident
- b. 2 to 8 hour values used for CR only in Main Steam Line Break, SGTR, Locked Rotor Accident, and Control Rod Ejection Accident.

(2) The second portion of the request in Reference 1 requests an impact evaluation of the new atmospheric dispersion values on the doses calculated for the CR, EAB, and LPZ.

As a result of the updated χ/Q values, VCSNS recalculated the dose consequences at these locations for the limiting SGTR scenario, using approved Alternative Source Term (AST) methods. As determined in Section 3.4.4 of Reference 3, the limiting scenario from a dose perspective is what postulates a fixed 30-minute break flow and release duration, utilizing simplified thermal-hydraulic calculations to determine the releases. This scenario reflects the current licensing basis (CLB) SGTR doses in Reference 4 as described in the VCSNS Final Safety Analysis Report (FSAR), Table 15.4-33 (Reference 5).

The dose calculations for the updated χ/Q values employ the same assumptions and methods in VCSNS's Alternative Source Term (AST) submittal, as summarized and approved in Section 3.2.4 of Reference 6, and later amended in Reference 4. Table 2 shows the pre-accident and concurrent iodine spike Total Effective Dose Equivalent (TEDE) values associated with the updated χ/Q s, along with the CLB results. The slightly elevated EAB and LPZ χ/Q s contributed to incremental changes in the concurrent spike values relative to the CLB, but overall the results are comparable with small variances existing between the two sets of data. However, the dose consequences are no longer wholly bounded by the SGTR LAR submittal. While these new values are no longer bounded, they are still well within the acceptance limits specified in 10 CFR 50.67, *Accident Source Term*; Standard Review Plan Chapter 15.0.1, *Radiological Consequence Analyses Using Alternative Source Terms*; and

Regulatory Guide 1.183, *Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors*.

Table 2 Dose Consequence Comparisons (REM)

	Doses for Updated γ/Q			Doses from Table 3.2 of AST SER [Reference 4]		
	EAB (0 – 2 h)	LPZ (0 – 24 h)	CR (0 – 30 d)	EAB (0 – 2 h)	LPZ (0 – 24 h)	CR (0 – 30 d)
Pre-Accident Spike	0.60	0.15	1.09	0.63	0.13	1.18
TEDE Limit	25	25	5	25	25	5
Concurrent Spike	0.25	0.07	0.42	0.22	0.05	0.37
TEDE Limit	2.5	2.5	5	2.5	2.5	5

REFERENCES

1. NRC Letter from S. A. Williams to T. D. Gatlin, "Virgil C. Summer Nuclear Station, Unit No. 1 – Request for Additional Information Regarding License Basis Changes in Steam Generator Tube Rupture Analysis (TAC No. MF4699)," September 22, 2015 [ML15261A051]
2. SCE&G Letter from T. D. Gatlin to S. A. Williams, "License Amendment Request – LAR-12-04269, License Basis Changes in Steam Generator Tube Rupture Analysis, Response to Request for Additional Information," September 10, 2015 [ML15258A021]
3. SCE&G Letter from T. D. Gatlin to NRC Document Control Desk, "License Amendment Request – LAR-12-04269, License Basis Changes in Steam Generator Tube Rupture Analysis," August 27, 2014 [ML14245A408]
4. NRC Letter from E. A. Brown to T. D. Gatlin, "Virgil C. Summer Nuclear Station, Unit No. 1 - Correction Letter Regarding Alternative Source Term Amendment (TAC No. ME8221)(LAR-04-02911)," February 28, 2013 [ML13051A372]
5. VCSNS Nuclear Station Final Safety Analysis Report
6. NRC Letter from R. E. Martin to T. D. Gatlin, "Virgil C. Summer Nuclear Station, Unit No. 1, Issuance of Amendment Regarding Alternative Source Term Implementation (TAC NO. ME0663)," October 4, 2010 [ML102160020]