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SCE&G®
A SCANA COMPANY

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

ATTN: Document Control Desk

Subject: Virgil C. Summer Nuclear Station (VCSNS) Units 2 and 3 Combined License Application (COLA) - Docket Numbers 52-027 and 52-028 Response to NRC Request for Additional Information (RAI) Letter No. 003

Reference: Letter from Ravindra Joshi (NRC) to Alfred M. Paglia (SCE&G), Request for Additional Information Letter No. 003 Related to SRP Section 15.00.03 for the Virgil C. Summer Nuclear Station Units 2 and 3 Combined License Application, dated October 23, 2008.

The enclosure to this letter provides the South Carolina Electric & Gas Company (SCE&G) response to the RAI items included in the above referenced letter. The enclosure also identifies any associated changes that will be incorporated in a future revision of the VCSNS Units 2 and 3 COLA.

Should you have any questions, please contact Mr. Al Paglia by telephone at (803) 345-4191, or by email at apaglia@scana.com.

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

Executed on this 19th day of November, 2008.

Sincerely,

Ronald B Clary

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General Manager
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AMM/RBC/am

D083
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Enclosure

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**NRC RAI Letter No. 003 Dated October 23, 2008**

**SRP Section: 15.00.03 – Design Basis Accidents Radiological Consequences Analysis for Advanced Light Water Reactors**

Question from Siting and Accident Consequences Branch (RSAC)

**NRC RAI Number: 15.00.03-01**

By letter dated August 14, 2008, NRC informed the AP1000 vendor that an assumption made in evaluating the LOCA DBA for Revision 16 of the AP1000 DCD was not technically justified. Both FSAR Chapter 15 and Section 6.4 of the subject COL application incorporate by reference the design basis accident analyses in Revision 16 of the AP1000 DCD. Provide an evaluation of the LOCA that does not make use of the rejected assumption. Describe any design or siting changes that are intended to compensate for the rejected assumption.

**VCSNS RESPONSE:**

Following the NRC's rejection of the assumptions made in the evaluation of the LOCA in Revision 16 of the AP1000 DCD, Revision 17 of the AP1000 DCD was issued with a reevaluation of the LOCA. This reevaluation does not make use of the rejected assumption, but does include design changes. Revision 17 of the AP1000 DCD will be incorporated by reference in a future revision of the VCSNS COL application. It is anticipated that Chapter 15 and Section 6.4 of the VCSNS COL application FSAR will not need to be revised as a result of this change to Revision 17 of the AP1000 DCD. However, the short-term (accident) $\chi/Q$ values used in the DCD evaluation of the LOCA, and to which the site-specific values are compared in FSAR Table 2.0-201, will require revision. For this reason, VCSNS FSAR Table 2.0-201 will be revised as indicated in Attachment 1 to cite the revised Site Parameter Values from Revision 17 of the AP1000 DCD.

It should be noted that, in addition to the changes in the DCD $\chi/Q$ values, the site-specific $\chi/Q$ values are being revised in VCSNS FSAR Table 2.0-201 to reflect the meteorological data obtained from the meteorological tower constructed for VCSNS Units 2 and 3. A full description and incorporation of the data associated with the new tower will be provided in a future revision of the COL application.

This response is PLANT SPECIFIC.

**ASSOCIATED VCSNS COLA REVISIONS:**

Proposed changes to VCSNS FSAR Table 2.0-201 related to the site $\chi/Q$ values and DCD Revision 17 changes are attached.

**ASSOCIATED ATTACHMENTS:**

FSAR Table 2.0-201, Sheets 4 of 5 and 5 of 5 labeled "Draft Revision 1"

(Sheet 4 of 5)

## Table 2.0-201
## Site Parameters

| DCD Value | | Plant Specific Value | FSAR Section |
|---|---|---|---|
| **Atmospheric Dispersion Values — X/Q[e]** | | | |
| Site boundary (0-2 hr) | ≤5.1~~1.0~~ x $10^{-3}$~~4~~ sec/$m^3$ | 3.72~~2.59~~ x $10^{-4}$ sec/$m^3$ | 2.3.4.2.1.1 |
| Site boundary (annual average) | ≤2.0 x $10^{-5}$ sec/$m^3$ | 6.0~~4.7~~ x $10^{-6}$ sec/$m^3$ routine releases | 2.3.5.2 |
| Low population zone boundary | | | |
| 0–8 hr | ≤2.2~~5.0~~ x $10^{-4}$ sec/$m^3$ | 5.87~~3.87~~ x $10^{-5}$ sec/$m^3$ | 2.3.4.2.1.1 |
| 8–24 hr | ≤1.6~~3.0~~ x $10^{-4}$ sec/$m^3$ | 4.22~~2.81~~ x $10^{-5}$ sec/$m^3$ | |
| 24–96 hr | ≤1.0~~1.5~~ x $10^{-4}$ sec/$m^3$ | 2.07~~1.40~~ x $10^{-5}$ sec/$m^3$ | |
| 96–720 hr | ≤8.0 x $10^{-5}$ sec/$m^3$ | 7.44~~5.30~~ x $10^{-6}$ sec/$m^3$ | |
| **Population Distribution** | | | |
| Exclusion area (site) | 0.5 mi | > 0.5 mi[j] | 2.1.3 |

(a) Maximum and minimum safety values are based on historical data and exclude peaks of less than 2 hours duration.

(b) The maximum and minimum normal values are the 1-percent seasonal exceedance temperature magnitudes. The minimum normal value is the 99-percent seasonal exceedance temperature. The minimum temperature is for the months of December, January, and February in the northern hemisphere. The maximum temperature is for the months of June through September in the northern hemisphere. The 1-percent seasonal exceedance is approximately equivalent to the annual 0.4-percent exceedance. The 99-percent seasonal exceedance is approximately equivalent to the annual 99.6-percent exceedance.~~Maximum and minimum normal values are the 1% exceedance magnitudes.~~

(c) With ground response spectra as given in DCD Figures 3.7.1-1 and 3.7.1-2. Seismic input is defined at finished grade except for sites where the nuclear island is founded on hard rock.

(d) The noncoincident wet bulb temperature is applicable to the cooling tower only.

(e) For AP1000, the terms "site boundary" and "exclusion area boundary" are used interchangeably. Thus, the X/Q specified for the site boundary applies whenever a discussion refers to the exclusion area boundary.

(f) Sites that fall within the hard rock high frequency GMRS given in DCD Figures 3I-1 and 3I-2 are acceptable.

(g) The containment pressure response analysis is based on a conservative set of dry-bulb and wet-bulb temperatures. These results envelop any conditions where the dry-bulb temperature is 115° F or less and wet-bulb temperature of less than or equal to 86.1° F.~~The Maximum temperature of 115° dry bulb/80°F coincident wet bulb is a more limiting condition than the VCSNS Maximum temperature of 105° dry bulb/80.2°F coincident wet bulb condition for all analyses that use these DCD Maximum Safety limits. For analyses, where wet bulb temperature is a more limiting condition, Maximum Safety wet bulb temperature of 85.5°F (noncoincident) is used. Therefore, the site parameter for Maximum Safety temperature of 115° dry bulb/80°F coincident wet bulb is met by the site specific values.~~

(h) Importance factor is not a property of the wind speed.

(i) Figures 2.0-201 and 2.0-202 show a comparison of the VCSNS horizontal and vertical site-specific ground motion response spectra (GMRS) to the hard rock high frequency (HRHF) spectra and the certified seismic design response spectra (CSDRS); see also DCD Figures 3I.1-1 and 3I.1-2. Appendix 3I provides the criteria for addressing potential high frequency sensitive components for plant locations where there is CSDRS exceedance in the high frequency region; the HRHF spectra in Appendix 3I are alternative spectra for evaluation of site specific GMRS in the high frequency region. The VCSNS GMRS were developed at the top of a hypothetical outcrop of competent material at the elevation of the AP1000 basemat as described in Section 2.5.2.5.

(j) The exclusion area is defined as the area within approximately 1 mile of Unit 1 combined with the area 3,390 feet from the center of Units 2 and 3, as shown in Figure 2.1-203.

# Table 2.0-201
# Site Parameters

VCSNS X/Q Values are from Tables 2.3-222 and 2.3-223. These are used for comparison to the DCD values and have not been used for the calculation of control room doses.

**Control Room Atmospheric Dispersion Factors (X/Q) for Accident Dose Analysis**

**X/Q (sec/m$^3$) at HVAC Intake for the Identified Release Points(1)**

| | **Plant Vent or PCS Air Diffuser(3)** | Plant Vent | PCS Air Diffuser | **Ground Level Containment Release Points(4),(8)** | Ground Level Containment Release Points | **PORV and Safety Valve Releases(5)** | PORV and Safety Valve Releases | **Steam Line Break Releases** | Steam Vent | **Fuel Handling Area(6)** | Fuel Building Blowout Panel | Fuel Building Truck Bay Door | **Condenser Air Removal Stack(7)** | Condenser Air Removal Stack |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **DCD** | VCSNS | VCSNS | **DCD** | VCSNS | **DCD** | VCSNS | **DCD** | VCSNS | **DCD** | VCSNS | VCSNS | **DCD** | VCSNS |
| 0 – 2 hours | **3.0E-3** | 1.89~~1.71~~E-03 | 1.63~~1.58~~E-03 | **6.0E-3** | 2.75~~1.06~~E-03 | **2.0E-2** | 1.33~~1.44~~E-02 | **2.4E-2** | 1.51~~1.69~~E-02 | **6.0E-3** | 1.50~~1.44~~E-03 | 1.10~~1.15~~E-03 | **6.0E-3** | 1.58~~1.52~~E-03 |
| 2 – 8 hours | **2.5E-3** | 1.41~~1.23~~E-03 | 1.24~~1.14~~E-03 | **3.64~~.5~~E-3** | 1.70~~1.32~~E-03 | **1.8E-2** | 1.08~~1.23~~E-02 | **2.0E-2** | 1.24~~1.30~~E-02 | **4.0E-3** | 1.13~~9.58~~E-034 | 7.62~~8.05~~E-04 | **4.0E-3** | 1.18~~1.03~~E-03 |
| 8 –24 hours | **1.0E-3** | 4.63~~4.52~~E-04 | 4.51~~4.17~~E-04 | **1.4~~2.0~~E-3** | 6.36~~5.34~~E-04 | **7.0E-3** | 4.86~~4.99~~E-03 | **7.5E-3** | 5.29~~5.59~~E-03 | **2.0E-3** | 4.09~~3.90~~E-04 | 2.83~~3.49~~E-04 | **2.0E-3** | 5.01~~4.16~~E-04 |
| 1 – 4 days | **8.0E-4** | 3.08~~3.00~~E-04 | 3.43~~3.01~~E-04 | **1.8E-3** | 5.82~~3.07~~E-04 | **5.0E-3** | 3.20~~4.60~~E-03 | **5.5E-3** | 3.52~~5.17~~E-03 | **1.5E-3** | 2.54~~2.74~~E-04 | 1.86~~2.42~~E-04 | **1.5E-3** | 3.18~~2.75~~E-04 |
| 4 – 30 days | **6.0E-4** | 2.44~~2.13~~E-04 | 2.61~~2.12~~E-04 | **1.5E-3** | 4.38~~2.76~~E-04 | **4.5E-3** | 2.16~~3.36~~E-03 | **5.0E-3** | 2.46~~3.81~~E-03 | **1.0E-3** | 2.20~~1.88~~E-04 | 1.70~~1.82~~E-04 | **1.0E-3** | 2.60~~2.13~~E-04 |

**X/Q (sec/m$^3$) at Annex Building~~Control Room~~ Door for the Identified Release Points(2)**

| | **Plant Vent or PCS Air Diffuser(3)** | Plant Vent | PCS Air Diffuser | **Ground Level Containment Release Points(4)** | Ground Level Containment Release Points | **PORV and Safety Valve Releases(5)** | PORV and Safety Valve Releases | **Steam Line Break Releases** | Steam Vent | **Fuel Handling Area(6)** | Fuel Building Blowout Panel | Fuel Building Truck Bay Door | **Condenser Air Removal Stack(7)** | Condenser Air Removal Stack |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **DCD** | VCSNS | VCSNS | **DCD** | VCSNS | **DCD** | VCSNS | **DCD** | VCSNS | **DCD** | VCSNS | VCSNS | **DCD** | VCSNS |
| 0 – 2 hours | **1.0E-3** | 4.15~~3.85~~E-04 | 4.22~~3.03~~E-04 | **1.0E-3** | 3.93~~3.70~~E-04 | **4.0E-3** | 9.75~~1.02~~E-034 | **4.0E-3** | 9.28~~9.59~~E-04 | **6.0E-3** | 3.75~~3.61~~E-04 | 3.42~~3.61~~E-04 | **2.0E-2** | 3.85~~3.80~~E-03 |
| 2 – 8 hours | **7.5E-4** | 3.17~~2.75~~E-04 | 3.24~~2.83~~E-04 | **7.5E-4** | 3.25~~2.57~~E-04 | **3.2E-3** | 7.62~~7.29~~E-04 | **3.2E-3** | 7.33~~6.98~~E-04 | **4.0E-3** | 2.96~~2.49~~E-04 | 2.65~~2.33~~E-04 | **1.8E-2** | 3.07~~2.95~~E-03 |
| 8 – 24 hours | **3.5E-4** | 1.07~~1.01~~E-04 | 1.08~~1.05~~E-04 | **3.5E-4** | 1.08~~9.74~~E-045 | **1.2E-3** | 2.43~~2.47~~E-04 | **1.2E-3** | 2.31~~2.41~~E-04 | **2.0E-3** | 1.03~~8.99~~E-045 | 9.46~~8.77~~E-05 | **7.0E-3** | 1.06~~1.05~~E-03 |
| 1 – 4 days | **2.8E-4** | 7.36~~6.81~~E-05 | 8.33~~7.11~~E-05 | **2.8E-4** | 9.02~~6.34~~E-05 | **1.0E-3** | 2.16~~1.84~~E-04 | **1.0E-3** | 2.04~~1.75~~E-04 | **1.5E-3** | 7.43~~6.00~~E-05 | 6.51~~6.00~~E-05 | **5.0E-3** | 9.05~~8.96~~E-04 |
| 4 – 30 days | **2.5E-4** | 5.54~~4.82~~E-05 | 6.10~~4.01~~E-05 | **2.5E-4** | 6.75~~4.36~~E-05 | **8.0E-4** | 1.56~~1.24~~E-04 | **8.0E-4** | 1.50~~1.15~~E-04 | **1.0E-3** | 5.89~~4.27~~E-05 | 5.15~~4.25~~E-05 | **4.5E-3** | 6.68~~5.97~~E-04 |

Notes:

(1). These dispersion factors are to be used 1) for the time period preceding the isolation of the main control room and actuation of the emergency habitability system, 2) for the time after 72 hours when the compressed air supply in the emergency habitability system would be exhausted and outside air would be drawn into the main control room, and 3) for the determination of control room doses when the non-safety ventilation system is assumed to remain operable such that the emergency habitability system is not actuated.

(2). These dispersion factors are to be used when the emergency habitability system is in operation and the only path for outside air to enter the main control room is that due to ingress/egress.

(3). These dispersion factors are used for analysis of the doses due to a postulated small line break outside of containment. The plant vent and PCS air diffuser are potential release paths for other postulated events (loss of-coolant accident, rod ejection accident, and fuel handling accident inside the containment); however, the values are bounded by the dispersion factors for ground level releases.

(4). The listed values represent modeling the containment shell as a diffuse area source, and are used for evaluating the doses in the main control room for a loss-of-coolant accident, for the containment leakage of activity following a rod ejection accident, and for a fuel handling accident occurring inside the containment.

(5). The listed values bound the dispersion factors for releases from the steam line safety & power-operated relief valves. These dispersion factors would be used for evaluating the doses in the main control room for a steam generator tube rupture, a main steam line break, a locked reactor coolant pump rotor, and for the secondary side release from a rod ejection accident.

(6). The listed values bound the dispersion factors for releases from the fuel storage and handling area. The listed values also bound the dispersion factors for releases from the fuel storage area in the event that spent fuel boiling occurs and the fuel building relief panel opens on high temperature. These dispersion factors are used for the fuel handling accident occurring outside containment and for evaluating the impact of releases associated with spent fuel pool boiling.

(7). This release point is included for information only as a potential activity release point. None of the design basis accidental radiological consequences analyses model release from this point.

(8). The LOCA dose analysis models the ground level containment release point HVAC intake atmospheric dispersion factors. Other analyses model more conservative values.