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SCE&G®
A SCANA COMPANY

July 30, 2009
NND-09-0213

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 Supplemental Response to NRC Request for Additional Information (RAI) Letter No. 050.

References: 1) Letter from Chandu P. Patel (NRC) to Alfred M. Paglia (SCE&G), Request for Additional Information Letter No. 050 Related to SRP Section 02.03.02 for the Virgil C. Summer Nuclear Station Units 2 and 3 Combined License Application, dated June 19, 2009.

2) Letter from Ronald B. Clary (SCE&G) to the Document Control Desk (NRC), Response to NRC Request for Additional Information (RAI) Letter No. 050, dated July 20, 2009.

The enclosure to this letter provides the South Carolina Electric & Gas Company (SCE&G) supplemental response to NRC RAI item 02.03.02-3 initially included in the above referenced letter from SCE&G to the NRC. The enclosure also identifies any associated changes that will be incorporated in a future revision of the VCSNS Units 2 and 3 COLA.

The supplemental information contained in the files on the enclosed CD is provided to support the NRC's review of the VCSNS Units 2 and 3 COLA, but does not comply with the requirements for electronic submissions as stated in NRC Guidance Document, "Guidance for Electronic Submissions to the NRC," dated October 29, 2008. The NRC staff requested that these files be provided in their native format as required for utilization in the software employed to support the COLA review. Formatting the data to comply with the guidance on electronic submissions would not serve the request to provide these files in their native formats.

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

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NRO

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

Executed on this 30th day of July, 2009.

Sincerely,

Ronald B Clary

Ronald B. Clary
General Manager
New Nuclear Deployment

AMM/RBC/am

Enclosures

c (without attachment):
Luis A. Reyes
John Zeiler
Stephen A. Byrne
Ronald B. Clary
Bill McCall
William M. Cherry
Randolph R. Mahan
Kathryn M. Sutton
Amy M. Monroe
Courtney W. Smyth
John J. DeBlasio
Grayson Young

c (with attachments):
Chandu P. Patel
FileNet

NRC RAI Letter No. 050 Dated June 19, 2009

SRP Section: 02.03.02 – Local Meteorology

Question from Siting and Accident Consequences Branch (RSAC)

NRC RAI Number: 02.03.02-3

SRP 2.3.2 review procedures 3c and 3d state, in part, that the impact of plant heat and moisture sources on plant design and operation should be determined. In FSAR Section 2.3.2.4, "Potential Influence of the Plant and Its Facilities on Local Meteorology", please discuss:

1. The effects of salt and moisture deposition from the cooling tower on electrical transmission lines and other electrical equipment, including transformers and the switchyard.

2. The potential for the cooling towers to increase the temperature and humidity at the HVAC intakes.

VCSNS SUPPLEMENTAL RESPONSE:

The VCSNS Units 2 and 3 circulating water system (CWS) cooling towers were evaluated for the effects of salt and moisture deposition and potential to increase the temperature and humidity at the HVAC intakes,. The CWS cooling towers were evaluated as wet circular mechanical induced-draft (non-plume abated) cooling towers approximately 70 feet in height and 274 feet in diameter. Each unit has two cooling towers located to the southeast (based on True North) of the power block area with all four towers aligned on a common north-south axis as depicted in FSAR Figure 1.1-202. Weather data utilized for the analysis was obtained from Columbia, South Carolina for the period 2006-2008 since it was determined to be representative of the site location due to the proximity to the plant site.

Electronic Seasonal/Annual Cooling Tower Impact (SACTI) input/output files are provided on CD as an attachment to this RAI response.

1. <u>**Effects of Salt and Moisture Deposition**</u>

The potential impacts due to salt deposition, water deposition, fogging, and icing from operation of the VCSNS Units 2 and 3 CWS cooling towers were assessed using the SACTI computer code.

Salt Deposition

The following assumptions were made in the SACTI model for the CWS cooling towers:

1) Drift loss is 0.005%, which was used to add a degree of conservatism to the analysis.

2) Total dissolved solids concentration of the cooling water is 65 ppm, 4 cycles concentration.

Salt deposition from evaporative cooling towers has the potential to build up on bushings of electrical equipment such as the VCSNS Units 2 and 3 transformers, switchyard equipment, or transmission lines. The SACTI results indicate that a maximum salt-deposition rate of 0.0001 – 0.0003 mg/cm^2-month can be anticipated at the VCSNS Units 2 and 3 switchyard during the winter and summer months. Several months of buildup at this rate would be needed before such deposits would accumulate to 0.03 mg/cm^2, which is the lower end of the "Light Contamination Level" range defined by the applicable IEEE standard (Reference 1). Due to the cooling tower location with respect to prevailing wind directions and natural wash off from local precipitation, total deposits are not expected to reach a level requiring mitigation. Based on the above, cooling tower plume generated salt deposits from VCSNS Units 2 and 3 cooling towers are not expected to adversely affect any electrical equipment at the VCSNS site.

Moisture

Added humidity and potential moisture impacts due to CWS cooling tower operation is predicted by the hours of fogging and icing produced by each tower as determined in the SACTI analysis. The following conditions were used in the analysis:

1) Total airflow for the CWS cooling tower is considered.

2) The CWS cooling tower is modeled as one cell with a combined flow rate of all fans.

No fogging at the VCSNS site due to cooling tower operation is predicted for the CWS cooling towers. The HVAC intakes, onsite transmission lines, switchyard equipment, and transformers are designed for outdoor operations which include environmental conditions such as rain, fog and snow. The maximum water deposition in the VCSNS Units 2 and 3 switchyards from the cooling towers provides an additional 0.00045 inches/month of precipitation, which is four orders of magnitude smaller than the lowest normal monthly precipitation (greater than 2.8 inches/month, see FSAR Subsection 2.3.2.2.6.). Therefore the impact from the cooling tower plumes is not expected to have an adverse affect on plant equipment. The SACTI analysis predicts no icing will occur.

2. **Potential to Increase Temperature and Humidity at HVAC Intakes**

The evaluation of the CWS cooling tower was based on the following conditions:

1) CWS cooling tower height is 21.3 m (70 ft).

2) The highest HVAC air intake height is that of the control room intake which is approximately 19.9 m (65 ft).

3) Exhaust plume temperatures of the CWS cooling towers is no greater than 41.3°C (106.3°F).

The VCSNS Units 2 and 3 site maximum historically observed value for ambient design dry-bulb temperature is 41.1°C (106°F). Operation of the control building HVAC system maintains the control room habitability area within the temperature range specified in DCD Subsection 9.4.1.1.2. The maximum and minimum outside air safety temperature conditions, shown in DCD Chapter 2, Table 2-1, show the limiting outside air design condition dry bulb temperature for the control room HVAC intakes is 46.1°C (115°F).

A cooling tower plume would need to raise the local ambient temperature associated with the surrounding air mass at the control room HVAC intakes by about 5°C (9°F) to exceed the design value. Since the cooling tower plume is not hot enough to exceed the HVAC design temperature, the cooling tower plume does not adversely impact the control room HVAC.

Cooling tower plume virtual temperature (temperature represented by both temperature and moisture contributions to buoyancy) is higher than the historically observed ambient air temperatures, so buoyancy causes the plume to rise under low wind conditions. High wind conditions that could direct a plume towards the HVAC intakes would result in rapid air dispersion and mixing that cools the plume. The VCSNS Units 2 and 3 control room HVAC intakes are at a lower elevation than the exhaust plumes of the CWS cooling towers. The control room HVAC intakes for VCSNS Units 2 and 3 are located approximately 280.4 meters (920 feet) and 365.8 meters (1,200 ft) to the west-northwest and west, respectively, from the northernmost CWS cooling tower. Results of the SACTI analysis show that the plume height did not go below the top of the cooling tower. Because of the rise of the thermal plume from the towers, it is not expected there will be any rise in local ambient air temperature at intakes for the control room HVAC.

Similarly, the exhausts from the cooling towers are not expected to affect local ambient air temperatures near VCSNS Units 2 and 3 electrical equipment, including the transformers and switchyard equipment, since they are at lower elevations located at a greater distance away than the VCSNS Units 2 and 3 main control room HVAC intakes. As with the HVAC intakes, high wind conditions that could direct a plume towards the outdoor electrical equipment would result in rapid air dispersion and mixing that cools the plume. Based on the above, thermal exhaust from the cooling towers will not adversely impact VCSNS Units 2 and 3 electrical equipment due to increases in surrounding ambient air temperature.

References for the Response:

1. Institute of Electrical and Electronics Engineers, Std C57.19.100-1995 (R2003), "IEEE Guide for Application of Power Apparatus Bushings," April 26, 2004.

This response is PLANT SPECIFIC.

ASSOCIATED VCSNS COLA REVISIONS:

The following FSAR changes will be made in a future revision of the COLA.

The 4th paragraph in Subsection 2.3.2.4 of the FSAR will be revised as follows:

Units 2 and 3 use mechanical draft cooling towers as a means of heat dissipation during normal operation (see Subsection 1.2.2). Potential meteorological effects due to the operation of these cooling towers could include enhanced ground-level fogging and icing, cloud shadowing and precipitation enhancement, and increased ground-level humidity. These effects and other potential related environmental impacts (*e.g.,* solids deposition, visible plume formation, transport, and extent)~~ are addressed in detail in ER Subsections 5.3.3.1 and 5.3.3.2.~~have been evaluated. Salt deposition in the switchyards is expected to be low, with natural wash off removing accumulation before adversely impacting operations of the electrical equipment. Water deposition would occur at a rate that is several orders of magnitude below the measured precipitation rates at Columbia (FSAR Reference 213). The thermal plume would have a higher virtual temperature (temperature that represents both temperature and moisture contributions to buoyancy) than the maximum historically observed temperature value or ambient temperature. This would cause the plume to rise away from the control room HVAC intakes and switchyard electrical equipment due to buoyancy, except in high wind situations. In high winds, turbulence would cause enough mixing to prevent any adverse effects.

Revise the last paragraph in Subsection 2.3.2.2.7 as follows:

There is no ~~E~~enhancement of naturally occurring fog conditions due to operation of the mechanical draft cooling towers associated with Units 2 and 3 because of the buoyancy of the thermal plume~~ is addressed in ER Subsection 5.3.3.1~~.

ASSOCIATED ATTACHMENTS:

Attached CD containing SACTI input/output files in their native format.