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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. 050

Reference: 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.

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.

The confirmatory evaluations to support the final response to RAI 02.03.02-3 will be completed and a supplemental response will be provided by July 31, 2009.

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 20th day of July, 2009.

Sincerely,

Ronald B Clary

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AMM/RBC/am

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NRO

Enclosure

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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: 02.03.02-1

10 CFR 52.79(a)(1)(iii) states, in part, that the COL application must contain the meteorological characteristics of the proposed site with appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area and with sufficient margin for the limited accuracy, quantity, and time in which the historical data have been accumulated.

FSAR Section 2.3.2.2.4, "Temperature," states that "Extreme maximum temperatures recorded in the vicinity of the site for Units 2 and 3 have ranged from 106 °F to 111 °F." This range of temperature measurements, which are reiterated in FSAR Table 2.3-203, exceed the maximum safety dry bulb site characteristic value of 105.1 °F listed in FSAR Table 2.0-201 and described in FSAR Section 2.3.1.5, "Design Basis Dry and Wet Bulb Temperatures." Please revise the FSAR to explain this apparent discrepancy.

VCSNS RESPONSE:

The range of 106°F to 111°F listed in the extreme temperatures of FSAR comes from the National Weather Service (NWS) Cooperative Observer Program (COOP) minimum and maximum temperatures measured at Chester 1NW and Camden 3W, respectively. Maximum and minimum values from COOP sites represent sub-hourly time periods. As defined in the AP1000 DCD, the maximum/minimum safety temperatures are defined as values excluding peaks of less than 2-hour duration. Because COOP stations such as Chester 1NW and Camden 3W do not collect sequential hourly data, it is not possible to meet the DCD definition from "daily" maximum and minimum temperatures collected at these COOP stations. The nearest first order station that has the "hourly" data available to produce the 2-hour duration requirement is at the Columbia Metropolitan Airport in Columbia, South Carolina. Based on the DCD definition, the maximum "safety" temperature from Columbia is 105.1°F which is lower than the DCD value of 115°F.

Chester 1NW and Camden 3W COOP stations are located about 30 and 38 miles away from the SCE&G plant site, respectively; while Columbia Metropolitan Airport is located about 26 miles from the plant site. Using the maximum safety temperature from Columbia Metropolitan Airport is reasonable because of its close proximity to the site and because it can be directly compared to the corresponding DCD value due to the collection of hourly data.

This response is PLANT SPECIFIC.

ASSOCIATED VCSNS COLA REVISIONS:

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

Add the following sentences to the end of the fourth paragraph of FSAR Subsection 2.3.2.2.4:

Maximum and minimum values from COOP and first-order stations represent sub-hourly time periods. As defined in the AP1000 DCD, the maximum/minimum safety temperatures are defined as values excluding peaks of less than 2-hour duration. Because the maximum and minimum values are not sequential 2-hour duration hourly data they are not used for comparison to site characteristic values in Table 2.0-201.

ASSOCIATED ATTACHMENTS:

None

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: 02.03.02-2

Please describe the assumptions and provide a copy of the input/output files used to execute the Seasonal/Annual Cooling Tower Impact (SACTI) computer code for estimating the impacts from fogging, icing, and drift deposition from the operation of the reactor service water (RWS) system mechanical draft cooling towers.

VCSNS RESPONSE:

Westinghouse has not performed a SACTI analysis for determining the impact of the AP1000 Service Water System (SWS) cooling tower operation on its own assigned Defense in Depth (DID) / Regulatory Treatment of Non-Safety Systems (RTNSS) functions, or on the ability of other equipment potentially exposed to the cooling tower plume to satisfy other safety-related, DID, or RTNSS functions. The AP1000 site plan was developed to optimize protection against environmental effects for important safety-related and DID / RTNSS equipment located in the yard, within the bounding values of standard site conditions described in Table 2-1 of the DCD, and with realistic locations of key plant components.

The SWS cooling tower has been positioned on the standard AP1000 site plan at a location and in a position that provides acceptable hydraulic performance for the SWS design. This positioning attempts to reduce or eliminate the potential for plume interference effects on same-unit and adjacent-unit components and systems that are important to safety or provide specific RTNSS or DID functions.

__Plume Interference Effects between Adjacent AP1000 Units on the Same Site__

The minimum distance between the SWS cooling towers of two adjacent AP1000 units built on the same site will be on the order of 800 feet (distance between VCSNS Units 2 and 3 is approximately 900 feet). For these cooling towers, prospective suppliers have indicated that a separation of no more than 200 – 300 feet is generally sufficient to eliminate concern for plume effects on nearby structures and components. Therefore, no significant interference effects are anticipated between the SWS cooling tower plume of one AP1000 unit and the safety-related, DID, or RTNSS components of its adjacent unit, under any possible atmospheric or environmental conditions.

__Plume Interference Effects on Same-Unit Components__

The design heat duty for the SWS cooling tower is approximately 30% greater than the actual heat duty expected at the beginning of plant cooldown. The cooling tower approach temperature at design heat duty is also increased by 0.5°F to provide additional margin to further reduce the effect of plume interference between cells of the same tower during conditions where both cells are in operation. The most limiting site environmental conditions for plume interference will be at the maximum normal wet bulb temperature, with the plant at the beginning of cooldown. The air exhaust velocity from the SWS cooling tower cells is on the order of 1400 ft/m, which is sufficient to ensure that the plume will rise away from the air intakes of either of the two cells in the tower, except under the most turbulent wind conditions. In this case, significant mixing will take place and the increase in effective wet bulb temperature caused by the plume at the cooling tower air inlets will be minimal.

Therefore, plume interference between the two adjacent cells will be limited in extent and would cause only a very slight increase in the cold water temperature (SWS return flow to the CCS heat exchanger). The cooling capacity of the SWS might be reduced slightly by this temperature increase, but the reduction would be well within the available heat duty margin built into the cooling tower, and therefore the SWS would continue to satisfy its own DID and RTNSS requirements. Lower wet bulb temperature conditions, or lesser heat loads, will result in even more margin in available SWS cooling capacity and eliminate the potential for any deleterious performance effects of the tower plume upon its own operation.

For very low temperature conditions, the SWS cooling towers are operated in a bypass mode to control the cold water temperature returning to the CCS heat exchanger. This mode reduces the amount of SWS flow that is directed through the tower distribution header. The tower evaporation rate is significantly reduced under these conditions, which further reduces the potential magnitude of the impact of the SWS cooling tower plume on other components.

Effect of Plume Impingement on Other Same-Plant Components

Other components located in the vicinity of the cooling towers that have safety-related, DID, or RTNSS functions that could be affected by plume impingement are as follows: the containment cooling system air intakes, the VBS air intake on the auxiliary building roof, the two air-cooled chillers located adjacent to the VBS air intake, and the diesel generator building.

The only safety-related system which could potentially be exposed to plume impingement from operation of the SWS cooling tower is the passive containment cooling system, which has containment air intakes and exhaust chimney located near the top of the containment building. However, the containment building is over 300 feet away laterally from the nearest of the two cooling tower cells, which assures sufficient mixing between the exhaust plume and the surrounding air to essentially eliminate any meaningful increase in wet bulb or dry bulb temperature above local ambient values.

Recent analyses of containment cooling system performance with substantially increased site wet bulb temperature and design maximum dry bulb temperature demonstrated that there was essentially no impact on the containment pressure reached with the value of site environmental parameters at these unrealistically high conditions. Therefore, no detriment to containment cooling performance is anticipated as a result of SWS cooling tower plume impingement on the containment during high temperature, humid conditions. For very low site temperatures where icing conditions are possible in the plume, the effect of plume impingement would be to improve containment performance due to the additional enthalpy absorbed by sublimation of ice crystals entrained in the air flowing upward along the heated containment shell to the exhaust stack.

The diesel generator building is located over 500 feet laterally from the SWS cooling towers, and is shielded from direct plume impingement by the bulk of the turbine building. Any plume produced would dissipate almost entirely before it could reach the diesel generator building and affect the performance of the diesel generators.

The DID system components that are located approximately 300 radial feet away from the SWS cooling tower are the VBS air intake and the two air-cooled chillers that supply refrigeration for the low capacity chilled water system. Both are located on the roof of the auxiliary building directly above the control room. This location on the roof of the auxiliary building is shielded by the higher turbine building structure from direct impingement by the cooling tower plume. The plume must maintain its general configuration as it rises over the turbine building roof and then drops back down over the far end of the turbine building, or it must flow in a curved path around the end of the turbine building, before it can be inducted directly into the VBS air intake or impinge upon the chiller condenser coils. Either of these scenarios is highly unlikely.

Possible impacts on the VBS air intake that might affect its ability to provide cooling to the main control room, electrical equipment rooms, and battery rooms are expected to be most significant at the maximum temperature and humidity conditions expected at the site. In the case where the humidity and temperature of the air entering the VBS through the roof intake is increased as a result of plume impingement, there will be only a small effect on the system's performance. The total amount of air brought into the system from outside is less than 10% of the air circulating within the system. The VBS is designed with 15% more HVAC cooling capacity than required to service the system's loads; therefore, the introduction of high temperature, humid air from the intake into the system will not reduce its capability below that needed for the system to perform its DID function. For very low temperature, icing conditions, the effect on the system would be to possibly cause icing of the VBS intake louvers. These louvers, however, are designed to pass the required total system airflow; as noted earlier, normal airflow is at most 10% of the system total. Since the louver design must take into account atmospherically-produced icing conditions (e.g., freezing rain) which would be much more extreme than any icing produced by the SWS cooling tower plume, VBS intake airflow will not be affected by any significant amount and the system can be relied upon to perform its DID function.

The air-cooled chillers are not affected by increased wet bulb temperature; only increases in dry bulb temperature could affect their performance. Since they are sized with significant margin in refrigeration capacity, small increases in local dry bulb temperature that might be caused by impingement of the cooling tower plume will not affect their performance in a manner that could challenge their capability to perform their DID function.

This analysis demonstrates that there could be no substantive impacts on the performance of safety-related, DID, or RTNSS systems that might conceivably be exposed to impingement by the plume produced by the AP1000 SWS cooling tower.

This response is PLANT SPECIFIC.

ASSOCIATED VCSNS COLA REVISIONS:

No COLA changes have been identified as a result of this response.

ASSOCIATED ATTACHMENTS:

None

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 RESPONSE:

As stated in FSAR 2.3.2.4, VCSNS Units 2 and 3 use mechanical draft cooling towers as a means of heat dissipation during normal operation. 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 also addressed in the Environmental Report and their impacts are concluded to be small.

A minor error in the original detailed analyses conducted to obtain the conclusions described above was discovered during a review of the material. To address this error these analyses are being re-evaluated to confirm the original conclusions are not impacted. Based on the re-review conducted to date, the conclusions are not expected to be impacted.

This RAI response will be supplemented (July 31, 2009) to document the conclusions of the re-evaluation when the analysis is finalized.

This response is PLANT SPECIFIC.

ASSOCIATED VCSNS COLA REVISIONS:

The requested FSAR changes will be provided in the supplemental RAI response.

ASSOCIATED ATTACHMENTS:

None