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U.S. Nuclear Regulatory Commission
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Washington, DC 20555

Virgil C. Summer Nuclear Station (VCSNS) Units 2 and 3
Combined License Nos. NPF-93 and NPF-94
Docket Nos. 52-027 & 52-028

Subject: South Carolina Electric & Gas Company (SCE&G) Virgil C. Summer Nuclear Station Units 2&3 Response to Nuclear Regulatory Commission (NRC) Bulletin 2012-01, "Design Vulnerability in Electric Power System," Issued November 5, 2014 (Accession Number ML14246A167)

- Reference:
1. NRC Bulletin 2012-01: "Design Vulnerability in Electric Power System" Dated July 27, 2012 (Accession Number ML12074A115)
 2. 10 CFR 50.55a(h)(3), "Safety Systems"
 3. Appendix A to 10 CFR Part 50, General Design Criteria for Nuclear Power Plants (GDC) 17: Electric Power Systems
 4. Virgil C. Summer Nuclear Station (VCSNS) Units 2&3 Response to Nuclear Regulatory Commission (NRC) Bulletin 2012-01: "Design Vulnerability in Electric Power System" Dated October 25, 2012 (Accession Number ML12305A040) NND-12-0513
 5. Virgil C. Summer Nuclear Station Units 2 and 3: Request for Additional Information Regarding Response to Bulletin 2012-01, "Design Vulnerability in Electric Power System" Dated January 2, 2014 (Accession Number ML14002A445)
 6. VCSNS Units 2&3 Response to Nuclear Regulatory Commission (NRC) Request for Additional Information Regarding Response to Bulletin 2012-01, "Design Vulnerability in Electric Power System" Dated February 17, 2014 (Accession Number ML14051A694) NND-14-0080
 7. NRC Letter Regarding "Bulletin 2012-01, Design Vulnerability in Electric Power System" Dated November 5, 2014 (Accession Number ML14246A167)

IE76
D083
NRO

D. McNamee
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Designated Original

8. NRC Regulatory Guide 1.206, Section C.I.8 "Electrical Power to Combined License Applications for Nuclear Power Plants (LWR Edition)" Dated June 2007 (Accession Number ML070630012)
9. Virgil C. Summer Nuclear Station (VCSNA) 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. 014, Dated February 17, 2009, NND-09-0025
10. NUREG-1793, Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design, Initial Report dated September 30, 2004 (Accession Number ML043570339)

On July 27, 2012 the NRC issued Bulletin 2012-01: "Design Vulnerability in Electric Power System" (Reference 1) to all holders of operating licenses and combined licenses for nuclear power reactors, except those who have permanently ceased operation and have certified that fuel has been removed from the reactor vessel.

In Reference 1, the NRC required Virgil C. Summer Nuclear Station (VCSNS) Units 2 and 3 to confirm compliance with 10 CFR 50.55a(h)(3) (Reference 2) and General Design Criterion (GDC) 17 in Appendix A to 10 CFR Part 50 (Reference 3), and to address two issues related to the electric power system within 90 days of issuance.

South Carolina Electric & Gas Company (SCE&G) responded to Reference 1 in VCS letter NND-12-0513 dated October 25, 2012, "Response to Nuclear Regulatory Commission (NRC) Bulletin 2012-01: Design Vulnerability in Electric Power System" (Reference 4). Reference 4 included a confirmation of compliance with References 2 and 3, with a basis for those affirmations, a response to both issues identified in Reference 1, including each sub part, and a detailed evaluation of compliance with Reference 3.

The NRC staff identified that additional information was needed to continue portions of the Reference 4 review and on January 2, 2014, the NRC issued to VCS "Virgil C. Summer Nuclear Station Units 2 and 3: Request for Additional Information Regarding Response to Bulletin 2012-01, Design Vulnerability in Electric Power System" (Reference 5).

Virgil C. Summer Nuclear Station (VCSNS) Units 2 & 3 responded to Reference 5 in VCS letter NND-14-0080 dated February 17, 2014, Response to Nuclear Regulatory Commission (NRC) Request for Additional Information Regarding Response to Bulletin 2012-01, "Design Vulnerability in Electric Power System" (Reference 6). Reference 6 included a detailed response to the issues identified in Reference 5 and a confirmation of compliance with References 2 and 3, with a basis for those affirmations.

A NRC public meeting was held on October 30, 2014 with SNC and SCE&G to discuss the SNC and SCE&G responses to the bulletin and give SNC and SCE&G an opportunity to clarify previously submitted information. As a result of this meeting, the NRC staff issued NRC Letter dated November 5, 2014, regarding "Bulletin 2012-01, Design Vulnerability In Electric Power System" (Reference 7).

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The VCS response to Reference 7 is contained in Enclosure 1. There are two regulatory commitments contained in Enclosure 2.

Should you have any questions, please contact Mr. Justin R. Bouknight by telephone at (803) 941-9828, or by email at justin.bouknight@scana.com.

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

Executed on this 29th day of January, 2015.

Sincerely,



April Rice
Manager, Nuclear Licensing
New Nuclear Deployment

MHK/ARR/mhk

Enclosure 1: Response to NRC Letter Regarding Bulletin 2012-01, Design Vulnerability In Electric Power System

Enclosure 2: List of Regulatory Commitments

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South Carolina Electric & Gas Company
Virgil C. Summer Nuclear Station Units 2 and 3

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Enclosure 1

Response to NRC Letter Regarding
Bulletin 2012-01, Design Vulnerability In Electric Power System

(This enclosure contains four pages including this cover page)

The Open Phase event failure is not a safety concern for the AP1000 plant as confirmed by NRC staff in the October 30, 2014 public meeting. The issue in question is the AP1000 design's compliance to the last paragraph of GDC 17. The last paragraph reads as follows:

"Provisions shall be included to minimize the probability of losing electric power from any of the remaining supplies as a result of, or coincident with, the loss of power generated by the nuclear power unit, the loss of power from the transmission network, or the loss of power from the onsite electric power supplies."

In NRC Letter dated November 5, 2014, regarding "Bulletin 2012-01, Design Vulnerability In Electric Power System" (Reference 7), the NRC staff asserts that the AP1000 design is not in compliance with GDC 17 during an Open Phase event. To support this conclusion, the NRC presented an interpretation of the last paragraph of GDC 17.

Starting in the last paragraph on the first page of the NRC Letter (Reference 7), the NRC staff states:

"The VEGP and VCSNS designs incorporate by reference, with certain departures, the AP1000 standard design. The staff's focus on the issue raised in the Bulletin in regard to passive plants such as the AP1000, as is the staff focus for all plants, has been compliance with the requirements in GDC 17. The staff recognizes that a partial exemption from the GDC 17 requirement for a second offsite circuit is part of the AP1000 certified design and, hence, part of the licensing bases for VEGP Units 3 and 4 and VCSNS Units 2 and 3. Thus the AP1000 design is not required to have a second offsite power supply circuit. The exemption, however, applies only to one of the two offsite circuits that the GDC requires. GDC 17 still requires the remaining offsite circuit to supply electric power to the onsite distribution system. GDC 17 requires that this offsite power source be designed to minimize, to the extent practical, the likelihood of its failure under normal, abnormal, and accident conditions. "

Per Regulatory Guide 1.206, Section C.I.8 (Reference 8), and historically, the last paragraph of GDC 17 has been properly applied to grid stability analysis. The third paragraph of Regulatory Guide 1.206, Subsection C.I.8.2.2 states:

"The applicant should provide the results of steady-state and transient stability analyses to demonstrate compliance with the final paragraph of GDC 17. The results of the grid stability analysis should show that loss of the largest single supply to the grid does not result in the complete loss of preferred power. The analysis should also consider the loss, as a result of a single event, of the largest generation capacity being supplied to the grid, removal of the largest load from the grid, or loss of the most critical transmission line. In determining the most critical transmission line, the applicant should consider lines that use a common tower to be a single line. This could be the total output of the station, the largest station on the grid, or possibly several large stations if these use a common transmission tower, transformer, or breaker in a remote switchyard or substation. For passive designs, the analysis should show that the single designated offsite circuit from the transmission network is not degraded as a result of the above contingencies. In addition, the grid analyses should verify that the grid remains stable for a minimum of 3 seconds following a turbine trip to support assumptions made in safety analyses for PWR passive designs."

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Enclosure 1

Response to NRC Letter Regarding Bulletin 2012-01, Design Vulnerability In Electric Power System

Regulatory Guide 1.206 requires the licensee to show that the loss of the largest single supply to the grid (i.e., generation unit or transmission line) does not result in the complete loss of preferred power in order to demonstrate compliance to the final paragraph of GDC 17.

VCS letter NND-09-0025 dated February 17, 2009 (Reference 9) provided the VCS response to Request for Additional Information Letter No. 014. This letter transmitted Requests for Additional Information (RAI) 08.02-1 through 08.02-8 which dealt primarily with the single offsite circuit, transmission network, and switchyards. NRC RAI 08.02-3 specifically states:

“The final paragraph of GDC 17 requires, in part, provisions to minimize the probability of the loss of power from the transmission network given a loss of the power generated by the nuclear power unit(s).”

The responses to these RAIs provided information on the grid stability study, environmental considerations in the design of the offsite power structure, and Failure Modes and Effects Analysis to show how the probability of cascading failures of power sources is minimized. It is important to note that the Open Phase event is a component failure which would be enveloped by this analysis if it causes the loss of a power source such as a generation unit or transmission line. Detection of Open Phase Condition does not “minimize the probability of losing electric power.” The robust design of the offsite system as described by Grid Stability Studies minimizes the probability of losing power.

Starting in the middle of the first paragraph on the second page of the NRC Letter (Reference 7), the NRC staff states:

Furthermore, Section 8.2.3 of the AP1000 design control document (DCD) states that “the nonsafety-related ac power system is designed such that plant auxiliaries can be powered from the grid under all modes of operation.” Therefore, the AP1000 onsite ac power distribution system can be powered from the offsite circuit in all modes of operation, including during a safe shutdown, and the offsite circuit serves a defense-in-depth function for maintaining reactor safety.

Section 8.2.3 of the AP1000 design control document (DCD) states:

“the nonsafety-related ac power system is designed such that plant auxiliaries can be powered from the grid under all modes of operation.”

However, the Open Phase event is not a mode of operation but a component failure. In the AP1000 design the Open Phase event is the failure of a non-safety component which has no effect on safety related functions. The offsite circuit is not safety-related, and the AP1000 does not attribute a defense-in-depth function to the offsite circuit for maintaining reactor safety.

VCS maintains that based on the discussion above, as well as previous Bulletin 2012-01 and RAI responses, it has been shown that the AP1000 design is in compliance with GDC 17. As stated by the NRC staff in Section 8.2.3.2, “Conformance to Criteria (Part Exemption from GDC 17 for AC Offsite Power Sources)” of the Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design (Reference 10):

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Enclosure 1

Response to NRC Letter Regarding Bulletin 2012-01, Design Vulnerability In Electric Power System

“The underlying purpose of the requirement of GDC 17 to provide two offsite power sources to the plant is to ensure sufficient power to accomplish safety functions. The AP1000 design does not rely on power from the offsite system to accomplish safety functions, and therefore, the underlying purpose of the rule is met.”

As concurred with by the NRC staff, the Open Phase event is not a safety concern for the AP1000 design. VCS recognizes, while not a safety concern, this event has been identified through VCS's Operational Experience (OE) program as a significant industry event. VCS will perform the necessary analysis and implement any subsequent modifications to ensure that operations personnel can adequately detect an open phase condition and that the detection should alarm in the main control room. The target dates for any modifications are projected to be performed by the end of the second refueling outage for each unit as stated in Enclosure 2.

South Carolina Electric & Gas Company
Virgil C. Summer Nuclear Station Units 2 and 3

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Enclosure 2

List of Regulatory Commitments

(This enclosure contains two pages including this cover page)

List of Regulatory Commitments

The following table identifies those actions committed to by South Carolina Electric and Gas in this submittal. Any other statements are provided for information purposes and are not considered to be regulatory commitments. Please direct questions regarding these commitments to April Rice at (803) 941-9858.

REGULATORY COMMITMENTS	DUE DATE/EVENT
1. VCSNS Unit 2 will perform the necessary analysis and implement any subsequent modifications to ensure that operations personnel can adequately detect an open condition and that the detection should alarm in the main control room.	By the end of the VCSNS Unit 2 second maintenance/refueling outage.
2. VCSNS Unit 3 will perform the necessary analysis and implement any subsequent modifications to ensure that operations personnel can adequately detect an open condition and that the detection should alarm in the main control room.	By the end of the VCSNS Unit 3 second maintenance/refueling outage.