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July 12, 2016

NND-16-0273

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Document Control Desk
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: Request for Additional Information – Commission-Approved Simulator

- References:
- (1) Letter NND-16-0109, Request for a Commission-Approved Simulation Facility, dated April 21, 2016
 - (2) Request for Additional Information Letter No. 02 Related to Summer Commission-Approved Simulation Facility for Virgil C. Summer Nuclear Station Units 2 and 3 Combined Licenses (TAC No. RQ0441), dated July 11, 2016

On April 21, 2016, South Carolina Electric & Gas Company (SCE&G) submitted a request for a Commission-Approved Simulation Facility (CAS) for Virgil C. Summer Nuclear Station (VCS) Units 2 and 3 (Reference 1), pursuant to 10 CFR 55.46(b). On July 11, 2016, the Nuclear Regulatory Commission (NRC) provided a Request for Additional Information (RAI) related to the CAS request (Reference 2). The enclosure to this letter provides a response to the RAI.

This letter makes no regulatory commitments.

Should you have any questions regarding this information, please contact me at (803) 941-9858, or by email at arice@scana.com.

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

Executed on this 12th day of July, 2016.

Sincerely,

A handwritten signature in black ink, appearing to read "April Rice". The signature is written in a cursive style with a large initial "A" and "R".

April R. Rice
Manager, Nuclear Licensing

AR/gs

Enclosure

c: Paul Kallan
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South Carolina Electric & Gas Company
Virgil C. Summer Nuclear Station (VCS) Units 2 and 3

NND-16-0273

Enclosure

Request for a Commission-Approved Simulation Facility –
Response to a Request for Additional Information

Request for Additional Information 02

Issue Date: 07/11/2016

Application Title: Virgil C. Summer Nuclear Station, Units 2 and 3

Operating Company: South Carolina Electric and Gas Company

Docket No. 52-027 and 52-028

Review Section: 13.02.01 - Reactor Operator Requalification Program; Reactor Operator Training

Application Section:

QUESTIONS

13.02.01-4

Information in the CAS Request Letter:

Section 3.0, "Maintenance of Simulator Fidelity," of Enclosure 3, "Description of the Performance Tests for the Simulation Facility and Results of the Tests - 10 CFR 55.46(b)(1)(ii)" of the letter from R.A. Jones, Vice President, New Nuclear Operations, SCE&G to NRC, Subject: South Carolina Electric & Gas Company, Virgil C. Summer Nuclear Station Units 2 and 3, Request for a Commission-Approved Simulation Facility, dated April 21, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16112A256), states the following:

"The NRC documented an inspection of the VCS Units 2 and 3 simulation facility on May 21, 2015. The inspection included a review of SCE&G's programs and processes related to continued assurance of simulator fidelity in accordance with 10 CFR 55.46(d). The inspection yielded no findings of significance and determined that SCE&G's programs to assure continued simulator fidelity were adequate (Reference 1)."

The NRC staff reviewed Reference 1, which is NRC Simulation Facility Inspection Report 05200027/2015301, 05200028/2015301, dated May 21, 2015 (ADAMS Accession No. ML15142A657). The staff did not find a conclusion in the inspection report that "SCE&G's programs to assure continued simulator fidelity were adequate." The inspection report documented the following issues:

1. Section 1P01.b.1.(a), "Steady-State Test Results," documents that the NRC inspectors reviewed a sample of the results from steady-state tests that SCE&G performed to meet the requirements of ANSI/ANS-3.5-1998, "Nuclear Power Plant Simulators for Use in Operator Training and Examination," Section 4.1.3.1, "Steady-State Operation." The report states,

"The inspectors found that the licensee had identified: (1) the 75% power steady state test resulted in a required parameter, Power Range Nuclear Instrumentation (PRNI) readings, that was high out-of-tolerance for the entire test, and (2) the 50% power steady state test had a required parameter, Pressurizer level, that was low out-of-tolerance for the entire test. **The inspectors identified that for both cases, the facility had marked the test results as "satisfactory." The licensee had identified other parameters that were out-of-tolerance for these two tests and had generated SDR VC-1501-10 to document these other parameters; however, SDR VC-1501-10 did not identify either the PRNI reading or the Pressurizer level reading that were**

outside the required tolerances during the test performance. The inspectors questioned the licensee's overall evaluation of these test results, and why an SDR had not been generated for the Pressurizer level and PRNI parameters being out-of-tolerance. The licensee entered this issue into their corrective action program as part of CR-NND-15-00380. As a corrective action, the licensee re-performed the 50% and the 75% steady-state tests with corrected initial conditions for PRNI readings and Pressurizer level, as appropriate. During the performance of these tests, PRNI readings and Pressurizer level were observed to remain within the specified tolerance bands during the entire test run time. The other parameters associated with SDR VC-1501-10 were again observed to be out-of-tolerance during the test. After the inspectors questioned the overall evaluation of the test results again, the licensee re-performed the 50% and 75% steady-state tests an additional time, with initial conditions for the parameters associated with SDR VC-1501-10 matching the reference unit data spreadsheet that had been provided by the reactor vendor. These tests resulted in all required parameters meeting the required tolerances as specified in the ANSI/ANS-3.5 standard." [emphasis added to the problems this RAI is concerned with]

2. Section 1P01.b.3(a), "Licensee Identification of Diverging Trends in Test Data," documents that the NRC inspectors reviewed a sample of the results from transient tests that SCE&G performed to meet the requirements of ANSI/ANS-3.5-1998, "Nuclear Power Plant Simulators for Use in Operator Training and Examination," Section 4.4.3.1, "Simulator Operability Testing." The report states, "The inspectors identified multiple instances (five malfunction tests and four transient tests) where the licensee documented diverging trends in test results, e.g., the response of certain 2A simulator parameters did not correspond in direction to the response of the same parameters on the 2B simulator for the same test. **All of these tests, identified by the inspectors, were evaluated by the licensee as satisfactory, and no SDR(s) had been generated. The inspectors questioned why SDRs were not needed for the diverging test parameters. The licensee entered this issue into their corrective action program as one of the issues of CR-NND-15-00380.** As a corrective action, the licensee performed an extent-of-condition review of their simulation facility test records and generated six new SDRs (VC-1502-10 through -15) as a result of this review. The licensee further evaluated these six issues by performing training needs analyses. The licensee's corrective action program will continue to evaluate the actions that will be needed to fully resolve each SDR associated with these issues. The inspectors' initial assessment of the licensee's process and actions on these six SDRs was that the licensee was taking acceptable actions to correct the identified deficiencies." [emphasis added to the problems this RAI is concerned with]

The inspection report documents issues with SCE&G's implementation of test controls during simulator performance testing and review of test results in addition to simulator fidelity issues.

Questions:

- 1. Explain how the Summer staff reached a conclusion that the NRC inspection determined that SCE&G's programs to assure continued simulator fidelity were adequate when the report contained problems associated with test control and results analysis.**

SCE&G RESPONSE:

NRC Simulation Facility Inspection Report 05200027/2015301, 05200028/2015301, dated May 21, 2015 (ADAMS Accession No. ML15142A657), Section 1P01.b.3, states:

3. Simulation Facility Programs for Assurance of Continued Simulator Fidelity

(a) Licensee Identification of Diverging Trends in Test Data. ANSI/ANS-3.5-1998 section B1.2 states that the acceptance criteria for the 11 transient tests required by section B3 (for PWRs) is as listed in section 4.1.4 of the standard. Section 4.1.4 of the standard also provides acceptance criteria for malfunction tests. Licensee procedure VC2-IST-0001, "V.C. Summer Training Simulator Annual and Core Cycle Testing – Unit 2A/B," section 6.4.3 gave the same required acceptance criteria for transient tests as is listed in the ANSI/ANS-3.5 standard. Specifically, Section 6.4.3.a. of VC2-IST-0001 stated: "Any observable change in simulator parameters corresponds in direction to the change expected from actual or best estimate response of the reference unit to the malfunction." Licensee procedure VC2-IST-0002, "V.C. Summer Training Simulator Malfunction Testing – Unit 2A/B," section 6.1.2 gave the same acceptance criteria for malfunction tests as listed in the ANSI/ANS-3.5 standard. Specifically, Section 6.1.2.b stated: "Any observable change in simulator parameters corresponds in direction to the change expected from actual or best estimate response of the reference unit to the malfunction." The inspectors identified multiple instances (five malfunction tests and four transient tests) where the licensee documented diverging trends in test results, e.g., the response of certain 2A simulator parameters did not correspond in direction to the response of the same parameters on the 2B simulator for the same test. All of these tests, identified by the inspectors, were evaluated by the licensee as satisfactory, and no SDR(s) had been generated. The inspectors questioned why SDRs were not needed for the diverging test parameters.

The licensee entered this issue into their corrective action program as one of the issues of CR-NND-15-00380. As a corrective action, the licensee performed an extent-of-condition review of their simulation facility test records and generated six new SDRs (VC-1502-10 through -15) as a result of this review. The licensee further evaluated these six issues by performing training needs analyses.

The licensee's corrective action program will continue to evaluate the actions that will be needed to fully resolve each SDR associated with these issues. The inspectors' initial assessment of the licensee's process and actions on these six SDRs was that the licensee was taking acceptable actions to correct the identified deficiencies. [Underline emphasis added.]

(b) Preliminary Review of Issues Identified via Integrated System Validation Testing. Integrated System Validation (ISV) is a process used to establish the adequacy of the Human Factor Engineering (HFE) design using 'person-in-the-loop tests' in dynamic simulated plant conditions at the reactor vendor simulation facility. The purpose of ISV is to validate the adequacy of the HFE design rather than to validate and develop design input. ITAAC 3.2.00.01c.i for the ISV for VCS had not yet been completed. However, IP 41502 section 02.02.b.6(a) allowed for parallel performance of the inspection procedure before the ITAAC for the ISV was completed primarily because the licensee entered the known preliminary results, which are normally treated as a draft information, into the SDR process.

Based on the preliminary results of the ISV at the reactor vendor's remote simulation facility, approximately 15 "priority 1" or high priority human factor engineering deficiencies (HEDs) were identified and communicated to the licensee. In order to evaluate and assess the impact of these preliminary HEDs on simulator performance, operator training, and operator evaluations, the licensee generated SDRs, where appropriate, and conducted training needs analyses on all issues that resulted in generation of an SDR. The inspectors reviewed 11 SDRs and 11 training needs analyses related to the "priority 1" HEDs associated with the preliminary ISV results. The licensee further entered these HEDs in the corrective action program as CR-NND-15-00557 and CR-NND-15-00558.

The licensee will continue to evaluate/assess the impact of identified HEDs on operator training, and will continue to implement additional corrective actions, in order to fully resolve all of the HEDs identified via the ISV process. However, the inspectors determined that the licensee had appropriately entered the 15 "priority 1" HEDs into their programs and initiated corrective actions, including both changes associated with the conduct of operator training and "other than training" solutions. [Underline emphasis added.]

Furthermore, the inspection report states:

. . . the inspectors completed the following IP 41502 inspection requirements: 02.02.b.1.(a) through (d), 02.02.b.4.(a) through (c), 02.02.b.5, 02.02.b.6(c) and (d). [Underline emphasis added.]

IP 41502 Section 02.02.b.6(c), states:

- (c) Verify that the facility licensee has a configuration management control process in place to maintain the fidelity of the plant-referenced simulator. Assess simulator discrepancies and the safety impact of any negative training caused by these discrepancies. Verify simulator discrepancies are assessed per the configuration management control process and entered into the licensee's simulator corrective action program*

Although there was no explicit statement of adequacy made in the inspection report, the statements cited from Inspection Report Section 1P01.b.3 above, in conjunction with completion of IP 41502 Section 02.02.b.6(c) with no findings (as documented in the inspection report), led VCS to conclude that the NRC had

determined that the VCS simulation facility programs for assurance of continued simulator fidelity were adequate.

2. Describe actions that SCE&G has taken to ensure that:

- (a) **the correct set of initial conditions are established when conducting simulator performance testing in accordance with ANSI/ANS-3.5-1998, and**

SCE&G RESPONSE:

To address the concerns regarding the initial conditions for steady state testing identified in 1P01.b.1(a), simulator test procedure VC2-IST-0001, "V.C. Summer Training Simulator Annual and Core Cycle Testing – Unit 2A/B," was modified to provide additional guidance to test conductors in establishing the initial conditions for steady state performance testing.

The guidance in VC2-IST-0001, Revision 2, directs the test conductor to maintain "operator controlled parameters matched as closely as possible to the reference data" and that "Instruments [be] calibrated as required." Should any acceptance criteria not be met, the procedure directs the test conductor generate a Simulator Discrepancy Report (SDR). This procedure change was reviewed with the simulator staff, discussed in a simulator oversight group meeting, and has been implemented.

Procedural adherence and use of the SDR tracking system ensures that correct initial conditions are used and that problems identified during the testing are addressed.

- (b) **when test results do not meet the acceptance criteria contained in ANSI/ANS-3.5-1998, tests are marked as "unsatisfactory" and corrective actions are taken.**

SCE&G RESPONSE:

As directed by procedures, the SDR (Simulator Discrepancy Report) is used to identify simulator problems during testing or use. The SDR is also used to direct corrective actions to address simulator problems.

Condition Report CR-15-00380 resulted in modifications to simulator testing procedures (VC2-IST-0001, "V.C. Summer Training Simulator Annual and Core Cycle Testing – Unit 2A/B," and VC2-IST-0002, "V.C. Summer Training Simulator Malfunction Testing – Unit 2A/B") requiring that "If any acceptance criteria are not met an SDR shall be generated." This procedure change was reviewed with the simulator staff, discussed in a simulator oversight group meeting, and has been implemented.