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RC-14-0141

U. S. Nuclear Regulatory Commission  
Document Control Desk  
Washington, DC 20555-0001

Dear Sir / Madam:

Subject: VIRGIL C. SUMMER NUCLEAR STATION (VCSNS) UNIT 1  
DOCKET NO. 50-395  
OPERATING LICENSE NO. NPF-12  
SOUTH CAROLINA ELECTRIC & GAS COMPANY (SCE&G) THIRD  
6-MONTH STATUS REPORT OF ORDER EA-12-051, ORDER MODIFYING  
LICENSES WITH REGARD TO REQUIREMENTS FOR RELIABLE SPENT  
FUEL POOL INSTRUMENTATION

- References:
1. NRC Order Number EA-12-051, "Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," dated March 12, 2012 [ML12054A682]
  2. SCE&G's Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)," dated February 28, 2013 RC-13-0031 [ML13063A099]

On March 12, 2012, the Nuclear Regulatory Commission issued an order (Reference 1) to South Carolina Electric & Gas Company (SCE&G). Reference 1 was immediately effective and directs SCE&G to have a reliable indication of the water level in associated spent fuel storage pools.

Reference 1 requires submission of a 6-month status report following the submittal of the Overall Integrated Plan (Reference 2). The purpose of this letter is to provide the third 6-month status report pursuant to Section IV, Condition C.2, of Reference 1. SCE&G developed an Overall Integrated Plan (Reference 2), documenting the requirements to install reliable spent fuel pool level instrumentation, in response to Reference 1. Attachment I provides the third 6-month status report of milestone accomplishments since the submittal of the Overall Integrated Plan. This update includes any changes to the compliance method, schedule, or need for relief/relaxation and the basis.

This letter contains no new regulatory commitments. If you have any questions regarding this report, please contact Mr. Bruce L. Thompson at (803) 931-5042.

ADD  
NRR

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

8/28/14  
Executed on

Thomas D. Gatlin  
Thomas D. Gatlin

BJD/TDG/ts

Attachment:

South Carolina Electric & Gas (SCE&G)'s Third 6-Month Status Report of Order  
EA-12-051, Order Modifying Licenses with Regard to Requirements for Reliable Spent  
Fuel Pool Instrumentation

c: K. B. Marsh  
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File (815.07)  
PRSF (RC-14-0141)

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**VIRGIL C. SUMMER NUCLEAR STATION (VCSNS) UNIT 1**

**ATTACHMENT**

**SOUTH CAROLINA ELECTRIC & GAS COMPANY (SCE&G) THIRD 6-MONTH STATUS  
REPORT OF ORDER EA-12-051, ORDER MODIFYING LICENSES WITH REGARD TO  
REQUIREMENTS FOR RELIABLE SPENT FUEL POOL INSTRUMENTATION**

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**1. Introduction**

SCE&G developed an Overall Integrated Plan (Reference 2) and first six-month status report (Reference 5), documenting the requirements to install reliable spent fuel pool level instrumentation (SFPLI), in response to Reference 1. This attachment provides an update of milestone accomplishments since submittal of the Overall Integrated Plan, including any changes to the compliance method, schedule, or need for relief/relaxation and the basis.

**2. Milestone Accomplishments**

The following milestone(s) in section 3 have been completed since the development of the Overall Integrated Plan (Reference 2), and are current as of August 18, 2014.

**3. Milestone Schedule Status**

The following provides an update to milestone schedule to support the Overall Integrated Plan. This section provides the activity status of each item, and the expected completion date. The target completion dates are planning dates subject to change as design and implementation details are developed.

The revised milestone target completion dates do not impact the order implementation date.

<b>Milestone</b>	<b>Target Completion Date</b>	<b>Activity Status</b>	<b>Revised Target Completion Date</b>
Submit 60 Day Status Report	Oct 2012	Complete	
Submit Overall Integrated Plan	Feb 2013	Complete	
Submit Response to RAIs on Overall Integrated Plan	Aug 2013	Complete	
Submit Response to RAIs on Overall Integrated Plan	Oct 2014	In Progress	
<b>Submit 6 Month Updates:</b>			

<b>Milestone</b>	<b>Target Completion Date</b>	<b>Activity Status</b>	<b>Revised Target Completion Date</b>
Update 1	Aug 2013	Complete	
Update 2	Feb 2014	Complete	
Update 3	Aug 2014	Complete	
Update 4	Feb 2015	Not Started	
Update 5	Aug 2015	Not Started	
Update 6	Feb 2016	Not Started	
<b>Modifications:</b>			
Modification Development	Jan 2014	In Progress	January 2015
Complete Procurement of Instrumentation Package	Jun 2013	Completed	
Complete Engineering and Design	Jul 2014	In Progress	January 2015
Commence Implementation	Oct 2014	Not Started	March 2015
Unit 1 Implementation Outage	Oct 2015	Not Started	
<b>Procedures:</b>			
Complete Procedures Development	Feb 2015	Not Started	
<b>Training:</b>			
Develop Training Plan	Feb 2015	In Progress	
Training Complete	Aug 2015	Not Started	

#### **4. Changes to Compliance Method**

There is one change to the compliance method as documented in the Overall Integrated Plan (OIP) (Reference 2). The backup channel of the spent fuel pool level monitoring system will be

a permanently installed channel instead of the portable channel described in the OIP. The details of this change were provided in the station response to the Request for Additional Information (RAI) (References 3 and 6)

#### **5. Need for Relief/Relaxation and Basis for the Relief/Relaxation**

SCE&G expects to comply with the order implementation date and no relief/relaxation is required at this time.

#### **6. Open Items from Overall Integrated Plan and Draft Safety Evaluation**

Public meetings were held on November 26, 2013 and February 6, 2014 to discuss reliable spent fuel pool level instrumentation RAIs based on binning (References 8, 9, and 10). The two bins are: generic RAIs to be answered by the vendor and plant specific. VCSNS will provide a response to all RAIs by October 31, 2014. Below is an update on plant specific RAIs listed in reference 7.

##### **RAI #1**

**Please provide additional information describing how the design of shielding for the SFP level instrumentation meets the requirement of the Order to arrange the instruments in a manner that provides reasonable protection of the level indication function against missiles that may result from damage to the structure over the SFP. Also, describe plans for protecting any equipment mounted outside the buildings from the effects of tornado driven missiles, freezing, elevated temperature, humidity, flooding, and other BDB conditions.**

##### **SCE&G Update**

This RAI is part of the detailed seismic design. Final walkdowns were completed the week of August 8, 2014 with SCE&G and AREVA. Now that the walkdowns have been completed, the instrumentation isometric drawings will be finalized and approved. The final mounting details for the equipment will begin once the isometric drawings are finalized.

##### **RAI #2**

**Please provide the following:**

- a) The design criteria to be used to estimate the total loading on the mounting device(s), including static weight loads and dynamic loads. Describe the methodology to be used to estimate the total loading, inclusive of design basis maximum seismic loads and the hydrodynamic loads that could result from pool sloshing or other effects that could accompany such seismic forces.**
- b) A description of the manner in which the level sensor (and stilling well, if appropriate) will be attached to the refueling floor and/or other support structures for each planned point of attachment of the sensing waveguide assembly. Indicate in a schematic the portions of the level sensor waveguide that will serve as points of attachment for mechanical/mounting or electrical connections.**

- c) A description of the manner by which the mechanical connections will attach the level instrument to permanent SFP wall or floor structures so as to support the waveguide level sensor assembly.**

#### **SCE&G Update**

This RAI is part of the detailed seismic design. Final walkdowns were completed the week of August 8, 2014 with SCE&G and AREVA. Now that the walkdowns have been completed, the instrumentation isometric drawings will be finalized and approved. The final mounting details for the equipment will begin once the isometric drawings are finalized.

#### **RAI#4**

**For each of the mounting attachments required to fasten SFP level equipment to plant structures, please describe the design inputs, and the methodology that will be used to qualify the structural integrity of the affected structures/equipment.**

#### **SCE&G Update**

The SFP level indication equipment is being purchased Quality Related per VCSNS Specification SP-1000. VCSNS Specification SP-1000 requires the SFPL indication equipment to operate at a temperature of 212 degrees Fahrenheit, operate in a boiling water or steam environment at 100% humidity, operate at an elevation of at least 150 meters above sea level, and in radiological conditions for a normal refueling quantity of freshly discarded (100 hours) fuel with the SFP water level 3, as described in NEI 12-02. The instrument channel reliability under seismic conditions will be established using the methodology in NEI 12-02 Revision 1 Section 3 and will meet the intent of interim staff guidance for reliable spent fuel pool instrumentation in NRC JLD-ISG-2012-03, Revision 0. The instrument channel design basis seismic conditions will correspond to the VCSNS Safe Shutdown Earthquake in structure response spectra from SP-702 at the locations of the components of the instrument channel. The adequacy of the seismic design and installation will comply with the applicable guidance in IEEE Standard 344-2004 Sections 7, 8, 9, and 10. The instrumentation will also meet the shock qualifications of NEI 12-02 and MIL-S-901D.

#### **RAI #5**

**Please provide analysis of the maximum expected radiological conditions (dose rate and total integrated dose) to which the equipment located within the FH building exterior wall and the auxiliary building stairwell will be exposed. Also, provide documentation indicating how it was determined the electronics for this equipment is capable of withstanding a total integrated dose of  $1 \times 10^3$  Rads. Discuss the time period over which the analyzed total integrated dose was applied.**

#### **SCE&G Update**

The first part of this RAI will be provided in generic vendor meetings.

The second part of this RAI response is in progress, no new update.

**RAI #7**

**Please provide information indicating the maximum expected relative humidity in the rooms in which the system electronics will be located under BDB conditions, with no AC power available to run HVAC systems, and whether the sensor electronics are capable of continuously performing required functions under this expected humidity condition.**

**SCE&G Update**

RAI response is in progress. The maximum humidity postulated for the spent fuel pool area is 100 percent relative humidity, saturated steam. The radar sensor electronics will be located outside of the spent fuel pool room in an area away from the steam atmosphere. The waveguide pipe can tolerate condensation formation on the inner wall surface, provided condensate pooling does not occur within the waveguide pipe. Condensate pooling is prevented by installing a weep hole(s) at the low point(s) in the wave guide pipe. VCSNS is still determining Beyond Design Basis (BDB) conditions for the Fuel Handling Building exterior wall and the auxiliary building stairwell. Additional test information for the equipment will be provided by the vendor per VCSNS Specification SP-1000.

**RAI #11**

**Please provide an evaluation of the seismic testing results to show that the instrument performance reliability, following exposure to simulated seismic conditions representative of the environment anticipated for the SFP structures at Virgil C. Summer Nuclear Station has been adequately demonstrated. Include information describing the design inputs and methodology used in any analyses of the mounting of electronic equipment onto plant structures, as requested in RAI #4 above.**

**SCE&G Update**

The first part of this RAI will be provided in generic vendor meetings.

VCSNS Specification SP-1000 requires the design inputs for equipment related to instrument channel reliability under seismic conditions be established using the methodology in NEI 12-02 Revision 1 Section 3. These design inputs will meet the intent of interim staff guidance for reliable spent fuel pool instrumentation in NRC JLD-ISG-2012-03, Revision 0. The instrument channel design basis seismic conditions will correspond to the VCSNS Safe Shutdown Earthquake in structure response spectra from SP-702 at the locations of the components of the instrument channel.

**RAI #12**

**Please provide the final configuration of the power supply source for each channel so the staff may conclude the two channels are independent from a power supply assignment perspective.**

**SCE&G Update**

This RAI is part of the detailed seismic design. Final walkdowns were completed the week of August 8, 2014 with SCE&G and AREVA. Now that the walkdowns have been completed, the instrumentation isometric drawings will be finalized and approved. VCSNS is waiting on the

vendor to provide the final configuration of the primary and backup power sources for each channel. These channels will be independently fed with their own DC power sources.

**RAI# 15**

**Please provide a description of the in-situ calibration process at the SFP location that will result in the channel calibration being maintained at its design accuracy.**

**SCE&G Update**

RAI response is in progress.

**RAI #16**

**Please describe the evaluation used to validate the display locations can be accessed without unreasonable delay following a BDB event. Include the time available for personnel to access the display as credited in the evaluation, as well as the actual time (e.g., based on walk-throughs) that it will take for personnel to access the display. Additionally, include a description of the radiological and environmental conditions on the paths personnel might take. Describe whether the display location remains habitable for radiological, heat and humidity, and other environmental conditions following a BDB event. Describe whether personnel are continuously stationed at the display or monitor the display periodically.**

**SCE&G Update**

RAI response is in progress.

**RAI #17**

**Please provide a list of the procedures addressing operation (both normal and abnormal response), calibration, test, maintenance, and inspection that will be developed for use of the SFP instrumentation. Include a brief description of the specific technical objectives to be achieved within each procedure.**



### **SCE&G Update**

Appropriate quality assurance measures will be selected for the SFP instrumentation as required by Order EA-12-051, consistent with Appendix A-1 of NEI 12-02 and similar to those imposed by Regulatory Guide 1.155. Site procedures will be developed for system inspection, calibration and test, maintenance, repair, operation, and normal and abnormal responses, in accordance with VCSNS procedure controls. The development of the following procedures has not started:

<u>Procedure</u>	<u>Objectives to be achieved</u>
1) System Inspection	To verify that system components are in place, complete, and in the correct configuration, and that the sensor probe is free of significant deposits of crystallized boric acid.
2) Calibration and Test	To verify that the system is within the specified accuracy, is functioning as designed, and is appropriately indicating SEP water level.
3) Maintenance	To establish and define scheduled and preventive maintenance requirements and activities necessary to minimize the possibility of system interruption.
4) Repair	To specify troubleshooting steps and component repair and replacement activities in the event of system malfunction.
5) Operation	To provide sufficient instructions for operation and use of the system by plant operation staff.
6) Response	To define the actions to be taken upon observation of system level indications, including actions to be taken at the levels defined in NEI 12-02.

**RAI #18**

**Please provide the following:**

- a) Further information describing the maintenance and testing program the licensee will establish and implement to ensure that regular testing and calibration is performed and verified by inspection and audit to demonstrate conformance with design and system readiness requirements. Please include a description of the plans for ensuring that necessary channel checks, functional tests, periodic calibration, and maintenance will be conducted for the level measurement system and its supporting equipment.**
- b) Information describing compensatory actions when both channels are out-of order, and the implementation procedures.**
- c) Additional information describing expedited and compensatory actions in the maintenance procedure to address when one of the instrument channels cannot be restored to functional status within 90 days.**

**SCE&G Update**

RAI response is in progress.

**7. Potential Draft Safety Evaluation Impacts**

There are no potential impacts to the Draft Safety Evaluation identified at this time.

## 8. References

The following references support the updates to the Overall Integrated Plan described in this attachment.

1. NRC Order Number EA-12-051, " Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, " dated March 12, 2012
2. SCE&G's Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)," dated February 28, 2013 (RC-13-0031)
3. Robert E. Martin to Thomas D. Gatlin Letter : Virgil C. Summer Nuclear Station, Unit 1- Request for Additional Information Regarding Overall Integrated Plan for Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051) (TAC NO. MF1173) dated July 29, 2013
4. SCE&G's Second 6-Month Status Report of Order EA-12-051, Order Modifying Licenses with Regard to Requirements for Reliable Spent Fuel Pool Instrumentation, dated February 28, 2014 (RC-14-0031)
5. SCE&G's 6-Month Status Report of Order EA-12-051, Order Modifying Licenses with Regard to Requirements for Reliable Spent Fuel Pool Instrumentation, dated August 28, 2013 (RC-13-0117)
6. Virgil C. Summer Nuclear Station, Unit 1 Response to Request for Additional Information Regarding Overall Integrated Plan for Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051) (TAC NO. MF1173) dated August 28, 2013 (RC-13-0119)
7. Shawn Williams to Thomas D. Gatlin Letter : Virgil C. Summer Nuclear Station, Unit 1- Interim Staff Evaluation and Request for Additional Information Regarding the Overall Integrated Plan for Implementation of Order EA-12-051, Reliable Spent Fuel Pool Instrumentation (TAC NO. MF1173) dated December 5, 2013
8. NRC (Nuclear Regulatory Commission 2013) *Public Meeting on Reliable Spent Fuel Pool Instrumentation—Staff Evaluations of Licensee Plans for Addressing Order EA-12-051, November 26, 2013* Rockville, MD: NRC
9. NEI (Nuclear Energy Institute 2013) *Spent Fuel Pool Instrumentation Order (EA-12-051) RAIs Binning Nov. 26, 2013* Washington, DC: NEI
10. NRC (Nuclear Regulatory Commission 2013) *Public Meeting on Reliable Spent Fuel Pool Instrumentation—Staff Evaluations of Licensee Plans for Addressing Order EA-12-051, February 6, 2014* Rockville, MD: NRC
11. SCE&G's Virgil C. Summer Nuclear Station (VCSNS) Unit 1 Specification for Fukushima (FLEX) SFP Level Instrumentation System SP-1000, Revision 1 dated February 4, 2014