



March 30, 2017  
RC-17-0032

ATTN: Document Control Desk  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Dear Sir / Madam:

Subject: VIRGIL C. SUMMER NUCLEAR STATION (VCSNS) UNIT 1  
DOCKET NO. 50-395  
OPERATING LICENSE NO. NPF-12  
SPENT FUEL POOL EVALUATION SUPPLEMENTAL REPORT, RESPONSE  
TO NRC REQUEST FOR INFORMATION PURSUANT TO 10 CFR 50.54(f)  
REGARDING RECOMMENDATION 2.1 OF THE NEAR-TERM TASK FORCE  
REVIEW OF INSIGHTS FROM THE FUKUSHIMA DAI-ICHI ACCIDENT

- References:
1. NRC Letter, Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident, dated March 12, 2012 [ML12053A340]
  2. NRC Letter, Final Determination of Licensee Seismic Probabilistic Risk Assessments Under the Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendation 2.1 "Seismic" of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident, dated October 27, 2015 [ML15194A015]
  3. NEI Letter, transmits EPRI 3002007148 for NRC endorsement, dated February 23, 2016 [ML16055A017]
  4. EPRI 3002007148, Seismic Evaluation Guidance Spent Fuel Pool Integrity Evaluation, February 2016
  5. NRC Letter, provides endorsement of EPRI 3002007148, dated March 17, 2016 [ML15350A158]
  6. EPRI 1025287, Seismic Evaluation Guidance, Screening, Prioritization and Implementation Details [SPID] for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic, February 2013
  7. NRC Letter, Virgil C. Summer Nuclear Station, Unit 1 - Staff Assessment of Information provided Pursuant to Title 10 of the Code of Federal Regulations Part 50, Section 50.54(f), Seismic Hazard Reevaluations for Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident, dated July 20, 2015 [ML15194A055]
  8. SCE&G Letter, South Carolina Electric & Gas (SCE&G) Seismic Hazard and Screening Report (CEUS Sites), Response to NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident, dated March 26, 2014 [ML14092A250]

9. SCE&G Letter, South Carolina Electric & Gas (SCE&G) Response to NRC Request for Additional information Associated with Near-Term Task Force Recommendation 2.1, Seismic Re-evaluations, dated November 12, 2014 [ML14318A314]

10. SCE&G Letter, Response to NRC Request for Additional Information Regarding Seismic Evaluations Related to Southeastern Catalog Changes, dated April 28, 2015 [ML15124A596]

On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued a Request for Information per 10 CFR 50.54(f) (Reference 1) to all power reactor licensees. Enclosure 1, Item (9) of the 50.54(f) letter requested addressees to provide limited scope spent fuel pool (SFP) evaluations. By letter dated October 27, 2015 (Reference 2), the NRC transmitted final seismic information request tables, which instructed VCSNS Unit 1 to conduct a limited scope SFP Evaluation. By Reference 3, Nuclear Energy Institute (NEI) submitted an Electric Power Research Institute (EPRI) report entitled, Seismic Evaluation Guidance Spent Fuel Pool Integrity Evaluation (EPRI 3002007148) (Reference 4) for NRC review and endorsement. NRC endorsement was provided by Reference 5.

EPRI 3002007148 provides criteria for evaluating the seismic adequacy of a SFP to the reevaluated ground motion response spectrum (GMRS) hazard levels. This report supplements the guidance in the Seismic Evaluation Guidance, Screening, Prioritization and Implementation Details (SPID) (Reference 6), for plants where the GMRS peak spectral acceleration is less than or equal to 0.8g. Section 3.3 of EPRI 3002007148 lists the parameters to be verified confirming the results of the report are applicable to VCSNS Unit 1, and that the VCSNS Unit 1 SFP is seismically adequate in accordance with NTTF 2.1 Seismic evaluation criteria.

The 50.54(f) letter requested that, in conjunction with the response to NTTF Recommendation 2.1, a seismic evaluation be made of the SFP. More specifically, plants were asked to consider "all seismically induced failures that can lead to draining of the SFP." Such an evaluation would be needed for any plant in which the ground motion response spectrum (GMRS) exceeds the safe shutdown earthquake (SSE) in the 1 to 10 Hz frequency range. The staff confirmed through References 2 and 7 that the GMRS exceeds the SSE and concluded that a SFP evaluation is merited for the Virgil C. Summer Nuclear Station (VCSNS) Unit 1. By letter dated March 17, 2016 [Reference 5], the staff determined that EPRI 3002007148 was an acceptable approach for performing SFP evaluations for plants where the peak spectral acceleration is less than or equal to 0.8g.

The following Spent Fuel Pool Seismic Evaluation Report lists the criteria from Section 3.3 of EPRI 3002007148 along with data for VCSNS Unit 1 that confirms applicability of the EPRI 3002007148 criteria and confirms that the SFP is seismically adequate and can retain adequate water inventory for 72 hours in accordance with NTTF 2.1 Seismic evaluation criteria.

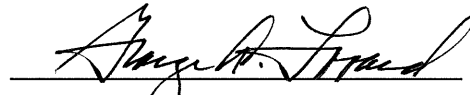
This letter contains no new Regulatory Commitments and no revision to existing Regulatory Commitments.

Should you have any questions regarding this submittal, please contact Bruce L. Thompson at (803) 931-5042.

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

3/30/17

Executed on



George A. Lippard

TS/GAL/wm

Attachment: Site-Specific Spent Fuel Pool Criteria for Virgil C. Summer Nuclear Station Unit 1

c: K. B. Marsh  
S. A. Byrne  
J. B. Archie  
N. S. Carns  
J. H. Hamilton  
S. M. Shealy  
W. M. Cherry  
C. Haney  
S. A. Williams  
F. G. Vega  
NRC Resident Inspector  
K. M. Sutton  
NSRC  
RTS (CR-12-01097)  
File (815.07)  
PRSF (RC-17-0032)

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**SOUTH CAROLINA ELECTRIC & GAS COMPANY (SCE&G)**

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

**DOCKET NO. 50-395**

**OPERATING LICENSE NO. NPF-12**

**ATTACHMENT**

**SITE-SPECIFIC SPENT FUEL POOL CRITERIA FOR VIRGIL C. SUMMER NUCLEAR  
STATION UNIT 1**

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**Document No: 13C4188-RPT-005**  
**Revision 0**

**March 2017**

## **Spent Fuel Pool Seismic Evaluation Report for V.C. Summer Nuclear Station Unit 1**

Prepared for:


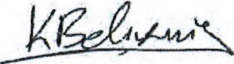

*Westinghouse Electric Company*  
1000 Westinghouse Drive  
Pittsburgh, PA 16066, USA

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*Stevenson & Associates - A JENSEN HUGHES Company*  
275 Mishawum Road, Suite 200  
Woburn, MA 01801

[www.vecsa.com](http://www.vecsa.com) Phone: 781-932-9580 Fax: 781-933-4428

**REVISION RECORD**

| <u>Initial Issue (Rev. 0)</u> |   | <u>Date</u> |
|-------------------------------|---|-------------|
| Prepared by:                  | <br>_____<br>John J. O'Sullivan, P.E.<br>Senior Consultant | 3/3/2017    |
| Reviewed by:                  | <br>_____<br>Konstantinos V. Belivanis<br>Engineer III     | 3/3/2017    |
| Reviewed by:                  | <br>_____<br>Todd C. Radford<br>Principal Engineer IV      | 3/3/2017    |

**TABLE OF CONTENTS**

|  |    |
|--|----|
| 1. INTRODUCTION.....                       | 4  |
| 2. BACKGROUND.....                         | 5  |
| 2.1 PLANT DESCRIPTION.....                 | 5  |
| 2.2 SEISMIC DATA.....                      | 5  |
| 3. ASSUMPTIONS.....                        | 7  |
| 4. METHODOLOGY.....                        | 8  |
| 5. ANALYSIS.....                           | 9  |
| 5.1 RELEVANT DESIGN INFORMATION.....       | 9  |
| 5.2 APPLICATION OF SCREENING CRITERIA..... | 11 |
| 5.3 SUPPLEMENTAL ANALYSIS.....             | 12 |
| 6. CONCLUSION.....                         | 13 |
| 7. REFERENCES.....                         | 14 |

## 1. INTRODUCTION

This report presents the seismic evaluation of the V.C. Summer Nuclear Station Unit 1 Spent Fuel Pool. The evaluation methodology of EPRI report 3002007148 [1] is applied.

The evaluation is performed to support response to the Nuclear Regulatory Commission (NRC) 50.54(f) letter [4] requesting that plants perform several seismic evaluations using updated site-specific seismic hazards. The primary guidance for performing those evaluations is provided in EPRI 1025287, *Seismic Evaluation Guidance, Screening, Prioritization and Implementation Details (SPID) for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic* [2]. For the Spent Fuel Pool (SFP), the NRC 50.54(f) letter requested that evaluations be performed to consider all seismically induced failures that could lead to draining of the SFP.

Section 7 of the SPID [2] describes an approach for performing the requested SFP drain-down evaluations. EPRI 3002007148 provides supplemental guidance for performing the SFP evaluations identified in the SPID and provides a simplified SFP evaluation method that is applicable to sites with low-to-moderate seismic ground motions. The methodology of EPRI 3002007148 was found to be acceptable by the NRC [5].

The simplified method involves applying screening criteria to confirm that plant parameters are enveloped by those considered in EPRI 3002007148. The screening criteria are listed in EPRI 3002007148 Section 3.3.



## **2. BACKGROUND**

### **2.1 PLANT DESCRIPTION**

The plant description is per the Final Safety Analysis Report (FSAR) [8]. V.C. Summer Nuclear Station Unit (VCSNS) Unit 1 employs a Westinghouse 3-loop pressurized water reactor (PWR). The Spent Fuel Pool (SFP) is in the Fuel Handling Building (FB), which is an independent structure adjacent to the Reactor Building and the Auxiliary Building. The FB has a steel frame superstructure founded on a reinforced concrete substructure. The building has 2 main floor levels and a roof. It is approximately 120 feet long by 68 feet wide. The lowest level of the structure is approximately 23 feet below grade. The roof is approximately 76 feet above grade. The FB is separated from other buildings by space to prevent load transfer during a seismic event.

### **2.2 SEISMIC DATA**

The site-specific ground motion response spectrum (GMRS) was reported in a March 26, 2014 SCE&G letter [6] to the NRC. By NRC letter dated July 20, 2015 [7] the NRC staff found the information suitable for use in the Near-Term Task Force Recommendation 2.1 50.54(f) evaluations.

The site-specific GMRS is shown in Figure 2-1. The GMRS peak spectral acceleration (5% damping) is 0.784g. The effective peak ground acceleration (PGA) for the GMRS is taken to be the spectral value at 100 Hz and is 0.368g.

The design basis safe shutdown earthquake (SSE) ground response spectrum is also shown in Figure 2-1. The SSE data is per FSAR Figure 2.5-40. The PGA for the SSE is 0.15g.

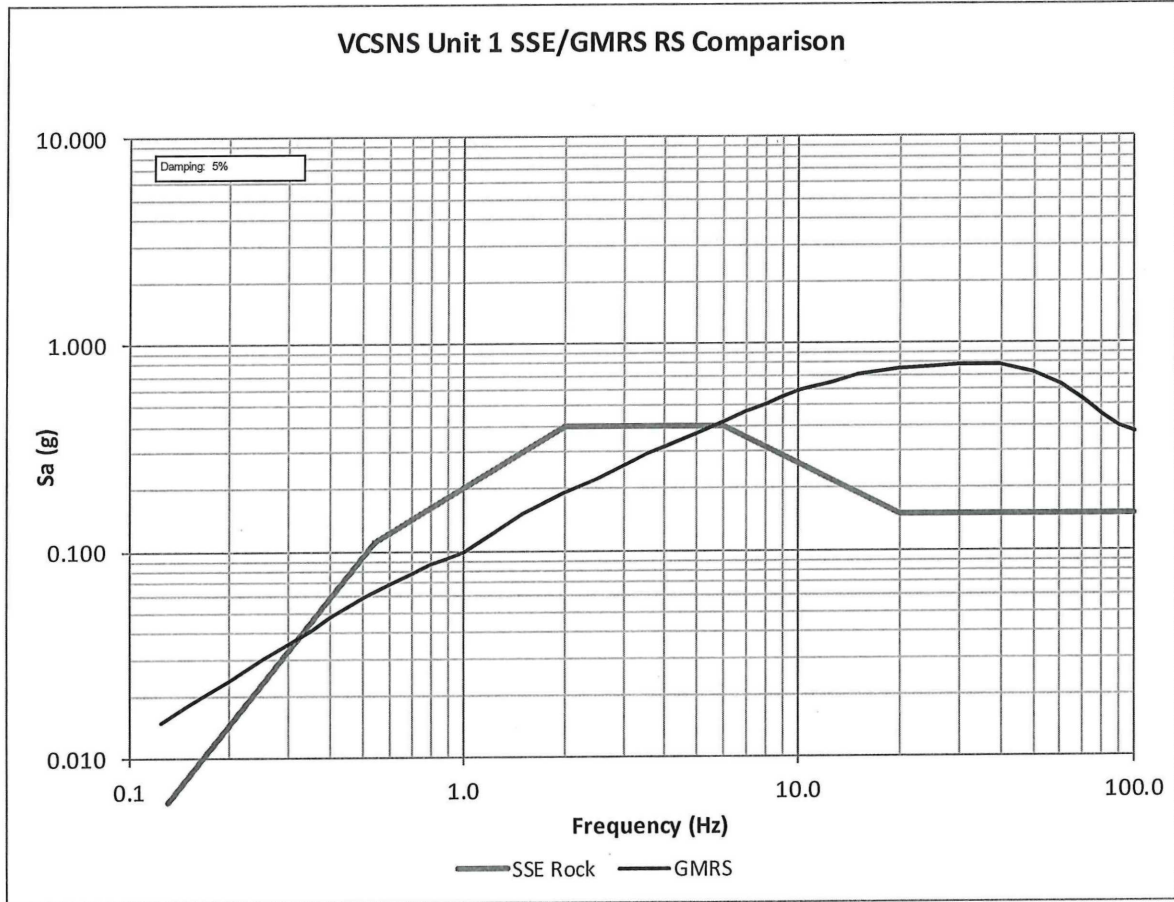


Figure 2-1: Plot of horizontal ground response spectra, 5% damping



### **3. ASSUMPTIONS**

There are no assumptions requiring verification.

#### 4. METHODOLOGY

The simplified evaluation method of EPRI 3002007148 is applied by performing the screening checks listed in Section 3.3 of that document. The screening checks are divided into three areas and are listed below.

##### Site Parameters

1. The site-specific GMRS peak spectral acceleration at any frequency should be less than or equal to 0.8g.

##### Structural Parameters

1. The structure housing the SFP should be designed using an SSE with a peak ground acceleration (PGA) of at least 0.1g.
2. The structural load path to the SFP should consist of some combination of reinforced concrete shear wall elements, reinforced concrete frame elements, post-tensioned concrete elements and/or structural steel frame elements.
3. The SFP structure should be included in the Civil Inspection Program performed in accordance with Maintenance Rule.

##### Non-Structural Parameters

1. To confirm applicability of the piping evaluation in 3002007148 Section 3.2, piping attached to the SFP up to the first valve should have been evaluated for the SSE.
2. Anti-siphoning devices should be installed on any piping that could lead to siphoning water from the SFP. In addition, for any cases where active anti-siphoning devices are attached to 2-inch or smaller piping and have extremely large extended operators, the valves should be walked down to confirm adequate lateral support.
3. To confirm applicability of the sloshing evaluation in 3002007148 Section 3.2, the maximum SFP horizontal dimension (length or width) should be less than 125 ft, the SFP depth should be greater than 36 ft, and the GMRS peak  $S_a$  should be  $<0.1g$  at frequencies equal to or less than 0.3 Hz.
4. To confirm applicability of the evaporation loss evaluation in 3002007148 Section 3.2, the SFP surface area should be greater than 500 ft<sup>2</sup> and the licensed reactor core thermal power should be less than 4,000 MWt per unit.

**5. ANALYSIS**

**5.1 RELEVANT DESIGN INFORMATION**

**5.1.1 SFP Size and Plant Rating**

| <u>Item</u>     | <u>Data Sources</u>  | <u>Data</u>  |
|-----------------|--|--|
| SFP size        | SFP liner drawings [11]: E-515-101, E-515-102, E-515-103, E-515-104, E-515-105 | SFP clear dimensions (to exposed liner faces unless noted otherwise) are:<br><br>Width: 28 feet<br>Length: 39 feet<br>Depth: 40' 4" to top of walls<br><br>Top of wall: Elevation 463' 0"<br>Bottom of pool: 422' 8" |
| SFP water level | FSAR Section 9.1.2.2   | Normal SFP water elevation: 461' 6"<br><br>Corresponding normal water depth: 38' 10"   |
| Plant rating    | FSAR Section 1.1.4   | Licensed Power Level: 2900 MWT   |

**5.1.2 SFP Structural Design & Maintenance**

| <u>Item</u>   | <u>Data Sources</u>  | <u>Data</u>   |
|---------------|--|---|
| SFP structure | FSAR Section 3.8<br><br>SFP concrete drawings [10]: E-415-081, E-415-082, E-415-083, E-415-084, E-415-085, E-415-086, E-415-087, E-415-088<br><br>SFP liner drawing: E-515-101 | SFP is formed from reinforced concrete walls and floors that are integral parts of the FB concrete substructure. The walls and bottom slab are lined with ¼" thick stainless steel plates. The nominal thickness of walls and the bottom slab is 6 feet including the liner. The tops of the pool walls are aligned with the FB 463' floor slab.<br><br>The SFP west wall is part of the FB basement outer wall and partially bears against soil (nominal site grade elevation is 435'). The FB floor slabs at elevations 436' and 463' provide horizontal bracing to the SFP north and south walls. The foundation system for the FB consists of a concrete foundation mat formed by the bottom of the SFP and fuel cask pit. The mat is stepped up at the railroad bay. The mat is supported by reinforced concrete piers which extend to the fill concrete adjacent to the Reactor and Auxiliary Buildings and by reinforced concrete caissons which extend to competent rock on the north and east sides of the FB. |

|                            |                             |  |
|----------------------------|-----------------------------|--|
| SFP seismic classification | FSAR Section 3.8            | The SFP is housed in the Fuel Handling Building. Per FSAR Table 3.2-2 the Fuel Handling Building is a Seismic Category I structure and has been designed for the site SSE. |
| SFP maintenance            | Plant procedure ES-0437 [9] | VCS Procedure ES-437 implements the Maintenance Rule Structural Inspections Program. The SFP is included in the inspection of the Fuel Handling Building.                  |

### 5.1.3 SFP Attached Piping

| Item                            | Data Sources   | Data  |
|---------------------------------|--|---|
| SFP piping penetrations         | SFP liner drawings: E-515-101, E-515-102, E-515-103, E-515-104, E-515-105<br><br>Piping diagram [12] D-302-651 | Per E-515 drawings, SFP walls are shown in sections 22-22, 23-23, 24-24, 25-25. Penetrations are in north & south walls as follows:<br><br><u>North wall (22-22)</u><br>Eight 8.5” holes for 6” pipe<br>Four 4.5” holes for 2” pipe<br><br><u>South wall (23-23)</u><br>Eight 8.5” holes for 6” pipe<br><br>Penetration centerlines are at Elev. 460’ 3”.<br><br>See also Note 1 below. |
| Piping diagram and design class | Piping diagram D-302-651   | Attached piping to 1 <sup>st</sup> valve is Safety Class 2b.<br><br>See also Notes 1, 2 below.  |
| Anti-siphoning                  | Piping diagram D-302-651   | Passive ½” diameter anti-siphoning holes are located in attached piping.  |

Note 1 Per FSAR Table 3.2-1 Safety Class 2b piping is Seismic Category I and therefore is designed for the SSE. Portions of the Spent Fuel Cooling Demineralizer piping are Non-nuclear safety (NNS) class, but these portions are beyond and isolated by closed Safety Class 2b valves.

Note 2 Piping meets criteria for screening but also all attached piping enters at or above the 460’ 3” elevation. Piping entry location ensures no significant loss of pool inventory for any pipe break scenario.

**5.2 APPLICATION OF SCREENING CRITERIA**

| Criterion  | Evaluation  |
|--|---|
| <b>Site Parameters</b>   |   |
| <p>1. The site-specific GMRS peak spectral acceleration at any frequency should be less than or equal to 0.8g.</p>   | <p>The site-specific GMRS is reported in Reference [6] and accepted by the NRC by Reference [7]. The site-specific GMRS peak spectral acceleration is 0.784g (&lt; 0.8g).</p> <p>Per the above, the 0.8g site parameter criterion is met.</p>   |
| <b>Structural Parameters</b>   |   |
| <p>1. The structure housing the SFP should be designed using an SSE with a peak ground acceleration (PGA) of at least 0.1g.</p>  | <p>The SFP is housed in the Fuel Handling Building. Per the FSAR [8] Section 3.2, the Fuel Handling Building is a Seismic Category I structure and has been designed for the site SSE. Per FSAR Section 2.5, the site SSE has a PGA of 0.15g (&gt;0.1g).</p> <p>Per the above, the 0.1g SSE criterion is met.</p>                         |
| <p>2. The structural load path to the SFP should consist of some combination of reinforced concrete shear wall elements, reinforced concrete frame elements, post-tensioned concrete elements and/or structural steel frame elements.</p>  | <p>Per the Reference [10] concrete drawings, the SFP load path consists of reinforced concrete shear walls with a reinforced concrete slab bottom supported directly on the building pile foundation. The configuration is typical for a PWR per EPRI 3002007148 Section 3.1.1.</p> <p>Per the above, the load path criterion is met.</p> |
| <p>3. The SFP structure should be included in the Civil Inspection Program performed in accordance with Maintenance Rule.</p>  | <p>VCS Procedure ES-0437 [9] implements the Maintenance Rule Structural Inspections Program. The SFP is included in the inspection of the Fuel Handling Building.</p> <p>Per the above, the inspection criterion is met.</p>  |
| <b>Non-Structural Parameters</b>   |   |
| <p>1. To confirm applicability of the piping evaluation in Section 3.2 of EPRI 3002007148, piping attached to the SFP up to the first valve should have been evaluated for the SSE.</p>  | <p>Per the Reference [12] piping diagram and FSAR Section 3.2, piping attached to the SFP up to the first valve is Safety Class 2b and Seismic Category I. Per the seismic category, this piping was evaluated for the SSE.</p> <p>Per the above, the attached piping criterion is met.</p>   |
| <p>2. Anti-siphoning devices should be installed on any piping that could lead to siphoning water from the SFP. In addition, for any cases where active anti-siphoning devices are attached to 2-inch or smaller piping and have extremely large extended operators, the valves should be walked down to confirm adequate lateral support.</p> | <p>Per the Reference [12] piping diagram, passive anti-siphoning holes are present in attached piping that could lead to siphoning of water. There are no active anti-siphoning devices.</p> <p>Per the above, the anti-siphoning criterion is met.</p>   |

| Criterion  | Evaluation   |
|--|--|
| <p>3. To confirm applicability of the sloshing evaluation in Section 3.2 of EPRI 3002007148, the maximum SFP horizontal dimension (length or width) should be less than 125 ft., the SFP depth should be greater than 36 ft., and the GMRS peak Sa should be &lt;0.1g at frequencies equal to or less than 0.3 Hz.</p> | <p>Per the Reference [11] liner drawings, the plan dimensions of the SFP are 28 feet wide by 39 feet long. The maximum SFP horizontal dimension is 39 feet (&lt; 125 feet). Per FSAR Section 9.1.2.2 the normal SFP water depth is 38' 10" (&gt; 36 feet).</p> <p>Per the site specific GMRS reported in Reference [6], the GMRS peak spectral acceleration at frequencies equal to or less than 0.3 Hertz is 0.036g (&lt; 0.1g).</p> <p>Per the above, the sloshing criterion is met.</p> |
| <p>4. To confirm applicability of the evaporation loss evaluation in Section 3.2 of EPRI 3002007148, the SFP surface area should be greater than 500 ft<sup>2</sup> and the licensed reactor core thermal power should be less than 4,000 MWt per unit.</p>  | <p>The plan dimensions of the SFP are described in Non-structural Criterion 3 above. The SFP surface area is (28*39) ft<sup>2</sup> = 1,092 ft<sup>2</sup> (&gt; 500 ft<sup>2</sup>).</p> <p>Per FSAR Section 1.1.4 the plant thermal power rating is 2900 MWt (&lt; 4,000 MWt).</p> <p>Per the above, the evaporation loss criterion is met.</p>  |

### 5.3 SUPPLEMENTAL ANALYSIS

Supplemental analysis was performed to verify SFP structural integrity for the site-specific GMRS. S&A calculation 13C4188-CAL-036 [13] documents a high-confidence of low probability of failure (HCLPF) capacity evaluation for the SFP reinforced concrete structure. Criteria and methods for HCLPF evaluation are per EPRI NP-6041-SL [3]. The analysis accounts for potential amplification associated with the FB pile foundation and follows the dynamic analysis example in EPRI technical report 3002009564 [14]. EPRI 3002009564 guidance was developed for sites where the GMRS spectral acceleration exceeds 0.8g and has been accepted by the NRC [15].

The results of 13C4188-CAL-036 are summarized below. The results verify SFP structural integrity is acceptable and thereby confirms the EPRI 3003007148 screening evaluation results.

| Supplemental Analysis Result                                | SFP Verification   |
|---|--|
| <p>SFP structural integrity HCLPF:</p> <p>HCLPF = 0.59g</p> | <p>HCLPF capacity exceeds the GMRS PGA of 0.368g (acceptable).</p> |



## 6. CONCLUSION

Seismic evaluation of the V.C. Summer Nuclear Station Unit 1 Spent Fuel Pool (SFP) was performed. The evaluation supports response to the NRC 50.54(f) letter requesting that plants perform several seismic evaluations using updated site-specific seismic hazards. For the SFP, the NRC 50.54(f) letter requested that evaluations be performed to consider all seismically induced failures that could lead to draining of the SFP.

Following industry practice, the evaluation methodology of EPRI report 3002007148 was applied. Supplemental analysis was performed to verify SFP structural integrity is acceptable for site-specific conditions.

The evaluation herein confirms applicability of the EPRI 3002007148 criteria and confirms that the SFP is seismically adequate.

## 7. REFERENCES

- | <b>No.</b> | <b>Description</b>   |
|------------|--|
| 1          | EPRI Report 3002007148, Seismic Evaluation Guidance Spent Fuel Pool Integrity Evaluation, February 2016.   |
| 2          | EPRI Report 1025287, Seismic Evaluation Guidance Screening, Prioritization and Implementation Details (SPID) for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic, February 2013.  |
| 3          | EPRI Report NP-6041-SL Rev. 1, “A Methodology for Assessment of Nuclear Power Plant Seismic Margin”, August 1991.  |
| 4          | NRC Letter, Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-Ichi Accident, dated March 12, 2012. (ADAMS Accession Number ML12053A340).   |
| 5          | NRC Letter, “Endorsement of Electric Power Research Institute Report 3002007148, Seismic Evaluation Guidance: Spent Fuel Pool Integrity Evaluation”, dated March 17, 2016. (ADAMS Accession Number ML15350A158).   |
| 6          | SCE&G Correspondence RC-14-0048, “Virgil C. Summer Nuclear Station (VCSNS) Unit 1 Docket No. 50-395 Operating License No. NPF-12 South Carolina Electric & Gas (SCE&G) Seismic Hazard and Screening Report (CEUS sites), Response to NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-Ichi Accident” RC-14-0048, March 26, 2014. (ADAMS Accession Number ML14092A250).   |
| 7          | NRC Letter, “Virgil C. Summer Nuclear Station, Unit 1 - Staff Assessment of Information Provided Pursuant to Title 10 of the Code of Federal Regulations Part 50, Section 50.54(f), Seismic Hazard Reevaluations Relating to Recommendation 2.1 of The Near-Term Task Force Review of Insights from the Fukushima Dai-Ichi Accident (TAC No. MF3831)”, July 20, 2015. (ADAMS Accession Number ML15194A055).  |
| 8          | Virgil C. Summer Nuclear Station, Final Safety Analysis Report, dated October 2016.  |
| 9          | VCSNS Engineering Services Procedure ES-0437 Revision 1, Inspections for Maintenance Rule – Structures.  |
| 10         | VCSNS drawings, SFP concrete structure:<br>E-415-081 Rev. 4, Fuel Handling Building Miscellaneous Wall Elevations Concrete Outline.<br>E-415-082 Rev. 2, Fuel Handling Building Miscellaneous Wall Elevations Reinforcement Placing.<br>E-415-083 Rev. 4, Fuel Handling Building Miscellaneous Wall Elevations Concrete Outline.<br>E-415-084 Rev. 3, Fuel Handling Building Miscellaneous Wall Elevations Reinforcement Placing.<br>E-415-085 Rev. 4, Fuel Handling Building Miscellaneous Wall Elevations Concrete Outline.<br>E-415-086 Rev. 4, Fuel Handling Building Miscellaneous Wall Elevations Reinforcement Placing.<br>E-415-087 Rev. 1, Fuel Handling Building Miscellaneous Wall Elevations Sections and Details.<br>E-415-088 Rev. 3, Fuel Handling Building Miscellaneous Wall Elevations Sections and Details. |

- 11 VCSNS drawings, SFP liner:
  - E-515-101 Rev. 7, Fuel Handling Building Liner Plate Plan, Sections and Details.
  - E-515-102 Rev. 4, Fuel Handling Building Liner Plate Sections and Details.
  - E-515-103 Rev. 3, Liner Plate Sections, Details and Elevations.
  - E-515-104 Rev. 5, Fuel Handling Building Liner Plate Sections, Details, and Elevations.
  - E-515-105 Rev. 5, Fuel Handling Building Liner Plate Sections, Details, and Elevations.
- 12 VCSNS piping system flow diagram, D-302-651 Rev. 43, Spent Fuel Pool Cooling.
- 13 S&A calculation 13C4188-CAL-036 Rev. 0, HCLPF Seismic Capacity Evaluation for Spent Fuel Pool.
- 14 EPRI, Seismic Evaluation Guidance Spent Fuel Pool Integrity Evaluation, Technical Report, 3002009564, January 2017.
- 15 NRC Letter, "Endorsement of Electric Power Research Institute Report 3002009564, Seismic Evaluation Guidance: Spent Fuel Pool Integrity Evaluation", dated February 28, 2017. (ADAMS Accession Number ML17034A408).