

Charles R. Pierce
Regulatory Affairs Director

Southern Nuclear
Operating Company, Inc.
40 Inverness Center Parkway
Post Office Box 1295
Birmingham, AL 35201

Tel 205.992.7872
Fax 205.992.7601



DEC 01 2014

Docket No.: 50-425

NL-14-1745

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555-0001

Vogtle Electric Generating Plant – Unit 2
Completion of Required Action by NRC Order EA-12-051
Reliable Spent Fuel Pool Level Instrumentation

Ladies and Gentlemen:

On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued Order EA-12-051, *Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation*, to Southern Nuclear Operating Company (SNC). This Order was effective immediately and directed the Vogtle Electric Generating Plant (VEGP) Units 1 and 2 to install reliable spent fuel pool instrumentation as outlined in Attachment 2 of the Order. This letter, along with its enclosures, provides the notification required by Item IV.C.3 of the Order that full compliance with the requirements described in Attachment 2 of the Order has been achieved for VEGP Unit 2.

This letter contains no new NRC commitments. If you have any questions, please contact John Giddens at 205.992.7924.

Mr. C. R. Pierce states he is the Regulatory Affairs Director for Southern Nuclear Operating Company, is authorized to execute this oath on behalf of Southern Nuclear Operating Company and, to the best of his knowledge and belief, the facts set forth in this letter are true.

Respectfully submitted,

A handwritten signature in black ink that reads "C. R. Pierce".

C. R. Pierce
Regulatory Affairs Director

CRP/JMG/TWS

Sworn to and subscribed before me this 1 day of December, 2014.

A handwritten signature in black ink that reads "Laurea L. Crump".
Notary Public

My commission expires: 10-8-2017



Enclosures: 1. Compliance with Order EA-12-051
2. NRC Requests for Information

cc: Southern Nuclear Operating Company
Mr. S. E. Kuczynski, Chairman, President & CEO
Mr. D. G. Bost, Executive Vice President & Chief Nuclear Officer
Mr. D. R. Madison, Vice President – Fleet Operations
Mr. B. L. Ivey, Vice President – Regulatory Affairs
Mr. M. D. Meier, Vice President – Regulatory Affairs
Mr. B. K. Taber, Vice President – Vogtle
Mr. B. J. Adams, Vice President – Engineering
Mr. G. W. Gunn, Regulatory Affairs Manager – Vogtle 1 & 2 (Acting)
RType: CVC7000

U. S. Nuclear Regulatory Commission
Mr. V. M. McCree, Regional Administrator
Mr. R. E. Martin, NRR Senior Project Manager – Vogtle 1 & 2
Mr. L. M. Cain, Senior Resident Inspector – Vogtle 1 & 2

State of Georgia
Mr. J. H. Turner, Director Environmental Protection Division

Vogtle Electric Generating Plant – Unit 2
Completion of Required Action by NRC Order EA-12-051
Reliable Spent Fuel Pool Level Instrumentation

Enclosure 1

Compliance with Order EA-12-051

BACKGROUND

On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued Order EA-12-051, *Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation* (Reference 2), to Southern Nuclear Operating Company (SNC). This Order was effective immediately and directed the Vogtle Electric Generating Plant (VEGP) - Units 1 and 2 to install reliable spent fuel pool instrumentation as outlined in Attachment 2 of the Order. The information provided herein documents full compliance for VEGP Unit 2 in response to the Order.

COMPLIANCE

Vogtle Electric Generating Plant has installed two independent full scale level monitors on the Unit 2 Spent Fuel Pool (SFP) in response to Reference 2.

In accordance with SNC letter dated February 27, 2013 (Reference 1), VEGP fully expected compliance with Reference 2 would coincide with implementation of Order EA-12-049, *Order to Modify Licenses with Regard to Mitigation Strategies for Beyond-Design-Bases External Events* (Reference 3). By letter dated April 14, 2014, *Relaxation of Certain Schedule Requirements for Order EA-12-049* (Reference 11), the NRC granted schedule relief for VEGP implementation of Reference 3. As a result, equipment required by Reference 3 is not currently available as originally planned for compliance with Reference 2. Specifically, the portable FLEX diesel generators for compliance with Item 1.6 of Attachment 2 to Reference 3 are not available to provide backup power to the spent fuel pool instrumentation as originally intended for compliance with Reference 2. Upon completion of the modifications required by Reference 3, the portable FLEX diesel generators will provide backup power supply for the spent fuel pool instrumentation as originally planned. In the interim, a backup power supply, including procedures for its use, is provided for compliance with the requirements of Reference 2.

Following SNC submittal of the VEGP Overall Integrated Plan (Reference 1), the NRC provided its interim staff evaluation and requested additional information necessary for completion of the review (Reference 9). The requested information previously provided to the NRC is included in Enclosure 2.

IDENTIFICATION OF LEVELS OF REQUIRED MONITORING - COMPLETE

VEGP-Unit 2 has identified the three required levels for monitoring SFP level in compliance with Order EA-12-051. Until Order EA-12-049 is fully implemented, current plant procedures conservatively direct Operations personnel to maintain SFP above the level that is adequate to support operation of the normal fuel pool cooling system using current makeup capabilities. Once Order EA-12-049 is fully implemented, Operations procedures will be updated to integrate the full capability of the SFP level indication system.

INSTRUMENT DESIGNED FEATURES - COMPLETE

The design of the instruments installed at VEGP Unit 2 complies with the requirements specified in Reference 2 and described in NEI 12-02, *Industry Guidance for Compliance with NRC Order EA-12-051*. The instruments have been installed in accordance with the station design control process.

The instruments are arranged to provide reasonable protection against missiles. The instruments are mounted to retain design configuration during and following the maximum expected ground motion. The instruments are designed to be reliable at expected environmental and radiological conditions including extended periods when the SFP is at saturation. The instruments are independent of each other and have separate and diverse power supplies. The instruments are designed to maintain their designed accuracy following a power interruption and to allow routine testing and calibration.

The SFP instrument display is readily accessible during postulated events and allows level information to be promptly available to decision makers.

PROGRAM FEATURES - COMPLETE

Training for VEGP Unit 2 is complete and was performed in accordance with an accepted training process (Systematic Approach to Training) as recommended in NEI 12-02, Section 4.1.

Operating and maintenance procedures for VEGP Unit 2 have been developed and integrated with existing procedures. Procedures have been verified and are available for use in accordance with the site procedure control program.

Site processes have been established to ensure the instruments are maintained at their design accuracy.

MILESTONE SCHEDULE – ITEMS COMPLETE

| VEGP Unit 2 Milestone | Completion Date |
|--|------------------------|
| Submit 20 Day Letter Acknowledging Receipt of Order | March 27, 2012 |
| Submit Overall Integrated Plan | February 27, 2013 |
| Unit 2 - Refueling Outage | April 2013 |
| 1 st 6 Month Update | August 2013 |
| 2 nd 6 Month Update | February 2014 |
| Instrument Design Complete: | May 2014 |
| Receipt of Unit 2 SFP Instrument Channel | June 2014 |
| 3 rd 6 Month Update | August 2014 |
| Complete Functional Test of Unit 2 SFPI | 3Q 2014 |
| Procedures and Training Complete | September 5, 2014 |
| Unit 2 - Refueling Outage / Implementation Complete | October 2014 |

Based on the above, the requirements of Order EA-12-051 have been achieved for VEGP Unit 2. A summary of VEGP Unit 2 compliance with the Order is provided as follows:

COMPLIANCE ELEMENTS SUMMARY

In accordance with NRC Order EA-12-051, VEGP shall have a reliable indication of the water level in associated spent fuel storage pools capable of supporting identification of the following pool water level conditions by trained personnel:

- (1) level that is adequate to support operation of the normal fuel pool cooling system,**
- (2) level that is adequate to provide substantial radiation shielding for a person standing on the spent fuel pool operating deck, and**
- (3) level where fuel remains covered and actions to implement make-up water addition should no longer be deferred.**

The VEGP Unit 2 Spent Fuel Pool Level Indication System (SFPLIS) is capable of measuring SFP level from the top of the fuel racks to one foot below the top of the SFP. A visual aid is included with the SFPLIS display units which indicates the three key SFP levels required by the Order.

1. In accordance with NRC Order EA-12-051, the spent fuel pool level instrumentation shall include the following design features:

- a. Instruments: The instrumentation shall consist of a permanent, fixed primary instrument channel and a backup instrument channel. The backup instrument channel may be fixed or portable.**

Two independent level detectors have been permanently installed in the Unit 2 SFP. The level detectors are redundant and either may be used as the primary device with the other acting as the backup device.

- b. Arrangement: The spent fuel pool level instrument channels shall be arranged in a manner that provides reasonable protection of the level indication function against missiles that may result from damage to the structure over the spent fuel pool. This protection may be provided by locating the primary instrument channel and fixed portions of the backup instrument channel, if applicable, to maintain instrument channel separation within the spent fuel pool area, and to utilize inherent shielding from missiles provided by existing recesses and corners in the spent fuel pool structure.**

The detectors are located in opposing sides of the SFP, separated by a distance greater than the shortest length of a side of the pool, which provides reasonable protection of the level indicating function against missiles that may result from damage to the structure over the SFP.

- c. Mounting: Installed instrument channel equipment within the spent fuel pool shall be mounted to retain its design configuration during and following the maximum seismic ground motion considered in the design of the spent fuel pool structure.**

The sensing elements, detectors and display units are seismically qualified and mounted, consistent with the VEGP Unit 2 licensing bases.

- d. Qualification: The primary and backup instrument channels shall be reliable at temperature, humidity, and radiation levels consistent with the spent fuel pool water at saturation conditions for an extended period. This reliability shall be established through use of an augmented quality assurance process (e.g., a process similar to that applied to the site fire protection program).**

The sensing elements located in the Fuel Handling Building (FHB) are designed and constructed to be reliable at temperature, humidity, and radiation levels consistent with the SFP water at saturation conditions for an extended period. Westinghouse, supplier of the SFPLIS, has qualified the equipment through a quality assurance process.

- e. Independence: The primary instrument channel shall be independent of the backup instrument channel.**

The two instrumentation channels are independent. No equipment is shared between the two channels. Each channel has independent conduit runs and the conduit runs inside the FHB have been routed to provide adequate channel separation.

- f. Power supplies: Permanently installed instrumentation channels shall each be powered by a separate power supply. Permanently installed and portable instrumentation channels shall provide for power connections from sources independent of the plant ac and dc power distribution systems, such as portable generators or replaceable batteries. Onsite generators used as an alternate power source and replaceable batteries used for instrument channel power shall have sufficient capacity to maintain the level indication function until offsite resource availability is reasonably assured.**

The instrumentation channels are each powered from separate uninterruptible power supplies (UPS). The UPS for each channel is capable of powering the instrument for greater than 24 hours. Onsite portable generators will be used to supply power to the instruments should an extended loss of AC power occur. The 24 hour battery life is sufficient time to obtain a portable generator and connect to the SFPLIS. The site acceptance test confirmed the ability of the batteries to power the channels for 24 hours.

Interim backup power to the VEGP Unit 2 SFPLIS is provided in accordance with the requirements of the Order as follows:

- i. Two 1kW propane generators are available for supplying backup power to the SFPLIS. One generator has sufficient capacity to supply both instrument channels.
- ii. One of the two portable generators is stored in a robust seismic structure (Equipment Building Room EQB-116).
- iii. Three 20-pound propane tanks are stored in diverse locations throughout the plant site consistent with the reasonable protection requirements of Reference 3 and described in NEI 12-06 . Procedures have been developed for connecting and use of the portable generator to supply backup power to the SFPLIS in the event of an extended loss of AC power.

- iv. The Operations Curriculum Review Committee (CRC) determined that formal training is not required. Skill of the craft and instructions provided in approved procedures are adequate to monitor displays and to supply backup power if needed. Current events training of Operations personnel has been conducted to familiarize them with the location of the displays and the procedures associated with this new system.
- v. A Standing Order has been established in the interim for use of any portable generator in lieu of the FLEX portable diesel generator. The Standing Order will expire upon completion of the modifications required by Reference 3.
- vi. Preventive Maintenance Procedures are in place for maintaining and testing the portable generators. These procedures require that periodic load tests be performed.
- vii. A timed validation of the generator hook-up and operation has been completed.

g. Accuracy: The instrument channels shall maintain their designed accuracy following a power interruption or change in power source without recalibration.

The channels are designed to maintain accuracy following a power interruption. This feature was confirmed during the site acceptance test.

h. Testing: The instrument channel design shall provide for routine testing and calibration.

The channels are designed for routine testing and calibration. These features were confirmed during the site acceptance test.

i. Display: Trained personnel shall be able to monitor the spent fuel pool water level from the control room, alternate shutdown panel, or other appropriate and accessible location. The display shall provide on-demand or continuous indication of spent fuel pool water level.

The displays provide continuous level indication and are easily accessible by operators. The transmitters and display units are located in the Control Building Level 1B train electrical chase, CB-R126.

2. In accordance with NRC Order EA-12-051, the spent fuel pool instrumentation shall be maintained available and reliable through appropriate development and implementation of the following programs:

a. Training: Personnel shall be trained in the use and the provision of alternate power to the primary and backup instrument channels.

The Systematic Approach to Training process has been used to evaluate and develop personnel training for the SFPLIS.

I&C Technicians: The CRC determined that current task training is adequate to support maintenance and calibration of the new level detection system. Accordingly, no additional training is required.

Operations: CRC determined that formal training is not required. Skill of the craft and instructions within approved procedures are adequate to monitor displays and to supply backup power, if needed. Current events training of Operations personnel was conducted to familiarize them with the location of the displays and the procedures associated with this new system.

b. Procedures: Procedures shall be established and maintained for the testing, calibration, and use of the primary and backup spent fuel pool instrument channels.

The following procedures have been either updated or created for testing, calibration and use of the SFPLIS:

- 18030-C Loss of Spent Fuel Cooling
Added new SFPLIS channels for monitoring SFP level in a Beyond Design Basis Event.
- 19100-C ECA-0.0 Loss of All AC Power
Added directions to initiate SFP level monitoring level per 18030-C.
- 11883-2 Radwaste Rounds Sheets
Added weekly check/comparison of SFPLIS level displays with the SFP ruler level and check of battery alarms.
- 23981-2 Spent Fuel Pool Level Indication System 2L-5330 Channel Calibration
New procedure which provides instructions for calibration of new SFPLIS and UPS alarm response.
- 23982-2 Spent Fuel Pool Level Indication System 2L-5331 Channel Calibration
New procedure which provides instructions for calibration of new SFPLIS and UPS alarm response.
- 16005-C 1kW FLEX Generator
New procedure developed to provide instructions for operation, surveillance, and preventive maintenance of the portable propane generator.

c. Testing and Calibration: Processes shall be established and maintained for scheduling and implementing necessary testing and calibration of the primary and backup spent fuel pool level instrument channels to maintain the instrument channels at the design accuracy.

The following have been established for the 1kW FLEX Generator and SFPLIS channels:

- 16005-301 - 1kW FLEX Generator Surveillance
- A2800R5001 - 1kW FLEX Generator Preventive Maintenance
- 23981-201 - SFPLIS Channel 2L-5330 Calibration
- 23981-202 - SFPLIS Channel 2L-5331 Calibration

UPS Battery replacement will be based on periodic testing of the batteries in accordance with calibration procedures 23981-2 and 23982-2 described in Item 2b above.

REFERENCES

The following references support the VEGP Unit 2 compliance with the requirements of Order EA-12-051:

1. SNC letter NL-13-0173, *Vogtle Electric Generating Plant Units 1 and 2 Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Reliable Spent Fuel Pool Instrumentation (Order EA-12-051)*, dated February 27, 2013.
2. NRC Order EA-12-051, *Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation*, dated March 12, 2012.
3. NRC Order EA-12-049, *Order to Modify Licenses with Regard to Mitigation Strategies for Beyond-Design-Bases External Events*, dated March 12, 2012.
4. SNC letter NL-12-0620, *Answer to the March 12, 2012 Commission Order Modifying License with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)*, dated March 27, 2012.
5. SNC letter NL-12-2152, *Vogtle Electric Generating Plant – Units 1 and 2 Initial Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)*, dated October 23, 2012.
6. NRC letter, *Vogtle Electric Generating Plant - Request for Additional Information Regarding Overall Integrated Plan for Reliable Spent Fuel Pool Instrumentation (Order EA-12-051)*, dated June 18, 2013.
7. SNC letter NL-13-1460, *Vogtle Electric Generating Plant – Units 1 and 2 Response to Request for Additional Information Regarding Overall Integrated Plan for Reliable Spent Fuel Pool Instrumentation (Order EA-12-051)*, dated July 17, 2013.
8. SNC letter NL-13-1767, *Vogtle Electric Generating Plant – Units 1 and 2, First Six-Month Status Report of Implementation of the Requirements of the Commission Order with Regard to Reliable Spent Fuel Pool Instrumentation (Order EA-12-051)*, dated August 27, 2013.
9. NRC letter, *Interim Staff Evaluation and Request for Additional Information – Vogtle Electric Generating Plant Units 1 and 2 Regarding Overall Integrated Plan (OIP) for Reliable Spent Fuel Pool Instrumentation (Order EA-12-051)*, dated November 4, 2013.
10. SNC letter NL-14-0185, *Vogtle Electric Generating Plant – Units 1 and 2, Second Six-Month Status Report of Implementation of the Requirements of the Commission Order with Regard to Reliable Spent Fuel Pool Instrumentation (Order EA-12-051)*, dated February 26, 2014.
11. NRC Letter, *Relaxation of Certain Schedule Requirements for Order EA-12-049*, dated April 14, 2014.
12. SNC letter NL-14-1111, *Vogtle Electric Generating Plant – Units 1 and 2, Third Six-Month Status Report of the Implementation of the Requirements for Commission Order with Regard to Reliable Spent Fuel Pool Instrumentation (Order EA-12-051)*, dated August 26, 2014.

Vogtle Electric Generating Plant – Unit 2
Completion of Required Action by NRC Order EA-12-051
Reliable Spent Fuel Pool Level Instrumentation

Enclosure 2

NRC Requests for Information

The information provided below is generally a culmination of the material previously shared with the NRC on March 25, 2014 and June 29, 2014 in response to the NRC letter, *Interim Staff Evaluation and Request for Additional Information – Vogtle Electric Generating Plant Units 1 and 2 Regarding Overall Integrated Plan (OIP) for Reliable Spent Fuel Pool Instrumentation (Order EA-12-051)*, dated November 4, 2013. Some information has been updated and/or revised.

NRC RAI 1:

Please identify the final SFP level instrumentation measurement range.

SNC Response to RA1:

The intended SFP level instrumentation measurement range is 219'-0" to 194'-6" (+/- 1 ft. of the top of the fuel rack, consistent with NEI 12-02).

NRC RAI 2:

Please provide additional information describing how the proposed arrangement of the guided wave radar and routing of the cabling between the radar probe and the electronics in the unspecified location meets the Order requirement to arrange the SFP level instrument channels 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.

SNC Response to RA2:

A plan view sketch of the SFP area is provided as Figure 1 (Page E2-9). The sketch depicts the placement of the primary and alternate level sensors, and the routing of cables that extend toward the location of the electronics. Physical separation of the primary and alternate channels to the extent practicable and comparable to the short side of the pool, is used to provide reasonable protection of the level indication function against missiles that may result from the damage to the structure over the SFP.

NRC RAI 3:

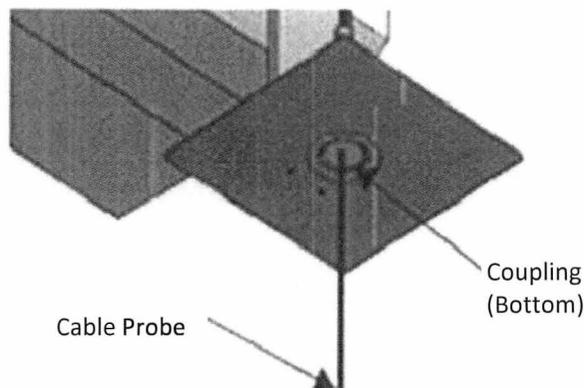
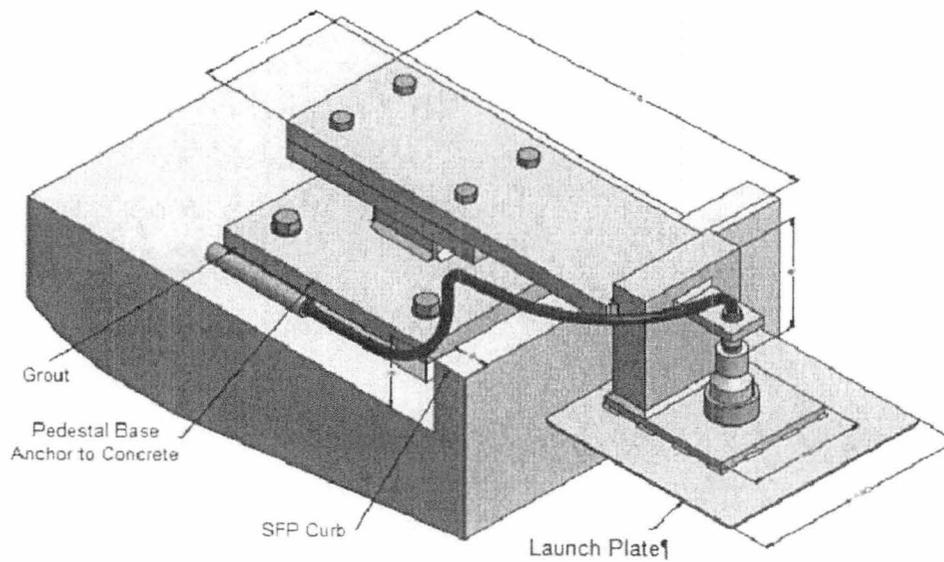
Please provide the following:

- a) 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 probe assembly. Indicate in a schematic the portions of the level sensor that will serve as points of attachment for mechanical/mounting or electrical connections.
- b) A description of the manner by which the mechanical connections will attach the level instrument to permanent SFP structures so as to support the level sensor assembly.

SNC Response to RA3:

- a) The mounting bracket will be attached to the SFP concrete floor utilizing expansion-type concrete anchor bolts. The level sensor consists of a stranded stainless steel cable level probe that is threaded on the top end. The probe attaches (threads) into a coupling that is secured to the mounting bracket launch plate and extends down into the pool. The attachment to the signal cable is via a coaxial connection on the top side of the launch plate coupling.

The simplified drawing below shows a representation of the attachment of the probe and the sensor cable to the mounting bracket (launch plate), and mounting bracket attachment to the SFP structure.



- b) The level sensor (probe) is designed to be attached near its upper end to the mounting bracket, as described in the response to RAI 3a above. The mounting bracket will be attached to the SFP concrete floor utilizing expansion-type concrete anchor bolts. The mounting bracket to the SFP structure concrete floor anchorage is designed to meet the requirements of the Vogtle design and licensing basis for Seismic Category I components including seismic loads, static weight loads and hydrodynamic loads.

NRC RAI 4:

Please provide the analyses used to verify the design criteria and methodology for seismic testing of the SFP instrumentation and the electronics units, including, design basis maximum seismic loads and the hydrodynamic loads that could result from pool sloshing or other effects that could accompany such seismic forces.

SNC Response to RAI 4:

The analyses used to verify the design criteria and methodology for seismic testing of the SFP instrumentation and the electronics units, including, design basis maximum seismic loads and the hydrodynamic loads that could result from pool sloshing or other effects that could accompany such seismic forces are provided in the Attachment to this enclosure.

NRC RAI 5:

For each of the mounting attachments required to attach SFP Level equipment to plant structures, please describe the design inputs, and the methodology that was used to qualify the structural integrity of the affected structures/equipment.

SNC Response to RAI 5:

The design inputs, and the methodology that was used to qualify the structural integrity of the affected structures/equipment for each of the mounting attachments required to attach SFP Level equipment to plant structures are provided in the Attachment to this Enclosure.

NRC RAI 6:

Please provide the following:

A description of the testing and/or analyses that will be conducted to provide assurance that the equipment will perform reliably under the worst-case credible design basis loading at the location where the equipment will be mounted. Include a discussion of this seismic reliability demonstration as it applies to a) the level sensor mounted in the SFP area, and b) any control boxes, electronics, or read-out and re-transmitting devices that will be employed to convey the level information from the level sensor to the plant operators or emergency responders.

- a) A description of the specific method or combination of methods that will be used to confirm the reliability of the permanently installed equipment such that following a seismic event the instrument will maintain its required accuracy.

Enclosure 2 to NL-14-1745
Vogtle Electric Generating Plant – Unit 2
Responses to NRC Requests for Information

SNC Response to RAI 6:

The information used to confirm the reliability of the permanently installed equipment such that following a seismic event the instrument will maintain its required accuracy is provided in the Attachment to this Enclosure.

NRC RAI 7:

Please provide the results for the selected methods, tests and analyses used to demonstrate the qualification and reliability of the installed equipment in accordance with the Order requirements.

SNC Response to RAI 7:

The results for the selected methods, tests and analyses used to demonstrate the qualification and reliability of the installed equipment in accordance with the Order requirements are provided in the Attachment to this Enclosure.

NRC RAI 8:

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

SNC Response to RAI 8:

The VEGP Unit 2 Primary Channel Electronics Enclosure (2NCPSFP01) is located in the Control Building Bravo Cable Chase (R-126) on EI. 220'. Power is provided from 2NLP29 (Emergency "A" Train) Lighting Distribution Panel from spare single pole 20A circuit breaker number 12.

The VEGP Unit 2 Alternate Channel Electronics Enclosure (2NCPSFP02) is located in the Control Building Bravo Cable Chase (R-126) on EI. 220'. Power is provided from 2NLP32 (Emergency "B" Train) Lighting Distribution Panel from spare single pole 20A circuit breaker number 12.

NRC RAI 9:

Please provide the results of the calculation depicting the battery backup duty cycle requirements demonstrating that its capacity is sufficient to maintain the level indication function until offsite resource availability is reasonably assured.

SNC Response to RAI 9:

The results of the calculation depicting the battery backup duty cycle requirements demonstrating that its capacity is sufficient to maintain the level indication function until offsite resource availability is reasonably assured are provided in the Attachment to this Enclosure.

NRC RAI 10:

Please provide analysis verifying that the proposed instrument performance is consistent with these estimated accuracy normal and BDB values. Please demonstrate that the channels will retain these accuracy performance values following a loss of power and subsequent restoration of power.

SNC Response to RAI 10:

Analysis verifying that the proposed instrument performance is consistent with these estimated accuracy normal and BDB values along with demonstration that the channels will retain these accuracy performance values following a loss of power and subsequent restoration of power is provided in the Attachment to this Enclosure.

NRC RAI 11:

Please provide the following:

- a) The specific location for the primary and backup instrument channel displays.
- b) For any SFP level instrumentation displays located outside the main control room, please describe the evaluation used to validate that the display location 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, please 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.

SNC Response to RAI 11:

- a) See Figure 2 (Page E2-10) for SFPLIS equipment location sketches.
The proposed location of the display panels for VEGP Unit 2 is in room R-126 of the Control Building. The proposed location of the display panels for Vogtle Unit 1 is in room R-152 of the Control Building.
- b) The locations described in response to RAI 11(a) have been evaluated considering the accident conditions described in NEI 12-02 and NEI 12-06, using design inputs from Westinghouse, existing Station Blackout evaluations and NUMARC-8700, *Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors*, dated November 20, 1987.

Enclosure 2 to NL-14-1745
Vogtle Electric Generating Plant – Unit 2
Responses to NRC Requests for Information

The results of the evaluation performed, to determine accessibility of the SFPLI displays following an ELAP event, indicate the displays can be accessed without unreasonable delay and without placing station personnel at undue risk with regards to temperature, humidity, and radiation levels.

The selected location of the display panels for Vogtle Unit 2 in room R-126 of the Control Building is approximately 180 feet from the West exit of the Control Room. The selected location of the display panels for Vogtle Unit 1 in room R-152 of the Control Building is approximately 100 feet from the East exit of the Control Room. Using a conservative walking pace of 1 mph, the Vogtle Unit 1 and Unit 2 display locations will require less than 10 minutes to access the display location, perform local function and return to the Control Room. Validation performed determined the actual time for Vogtle Unit 2 is 3.5 minutes. With the displays located outside the Radiation Controlled Area, the substantial structures between the SFP and the pathway to the display, combined with the short transit duration, personnel traveling the pathways shown in Figure 2 will not require heroic means with the SFP at Level 3 or above.

The display location remains habitable considering the minimal time required to access the displays, distance from the SFP, substantial structures, and the lack of heat producing equipment within the room during accident conditions. Both locations will allow for prompt, non-heroic access to the displays from the Control Room.

SNC intends to periodically monitor the display at one to two hour intervals during accident conditions.

NRC RAI 12:

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

SNC Response to RAI 12:

Procedures have been developed to ensure these objectives:

| <u>Procedure</u> | <u>Objectives to be achieved</u> |
|-------------------------|---|
| 1) System Rounds | Weekly rounds are performed to confirm the SFPLIS agrees with the local level indication, that the SFPLIS channels are in agreement and that there are no battery alarms. |
| 2) Calibration and Test | To verify that the system is within the specified accuracy, is functioning as designed, and is appropriately indicating SFP water level. |

Enclosure 2 to NL-14-1745
Vogtle Electric Generating Plant – Unit 2
Responses to NRC Requests for Information

- | | |
|----------------|---|
| 3) Maintenance | To establish and define scheduled and preventive maintenance requirements and activities necessary to minimize the possibility of system interruption. |
| 4) Repair | Work orders will be generated if repairs are necessary using the vendor manual as the basis for the work order. |
| 5) Operation | To provide sufficient instructions for operation and use of the system plant operation staff. |
| 6) Responses | 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. Until Order EA-12-049 is fully implemented, current plant procedures conservatively direct Operations personnel to maintain SFP above the level that is adequate to support operation of the normal fuel pool cooling system using current makeup capabilities. Once Order EA-12-049 is fully implemented, Operations procedures will be updated to integrate the full capability of the SFP level indication system. |

NRC RAI 13:

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.

SNC Response to RAI 13:

- a) While the SFP is operating within design basis and at normal level, the indicators will be compared to fixed marks within the SFP by visual observation to confirm indicated level weekly. The periodic calibration verification will be performed within 60 days of a refueling outage considering normal testing scheduling allowances (e.g., 25%). Calibration verification will not be required to be performed more than once per 12 months. These calibration requirements are consistent with the guidance provided in NEI 12-02 section 4.3. Periodic calibration verification procedures will be in place based on information provided by Westinghouse in

Enclosure 2 to NL-14-1745
Vogtle Electric Generating Plant – Unit 2
Responses to NRC Requests for Information

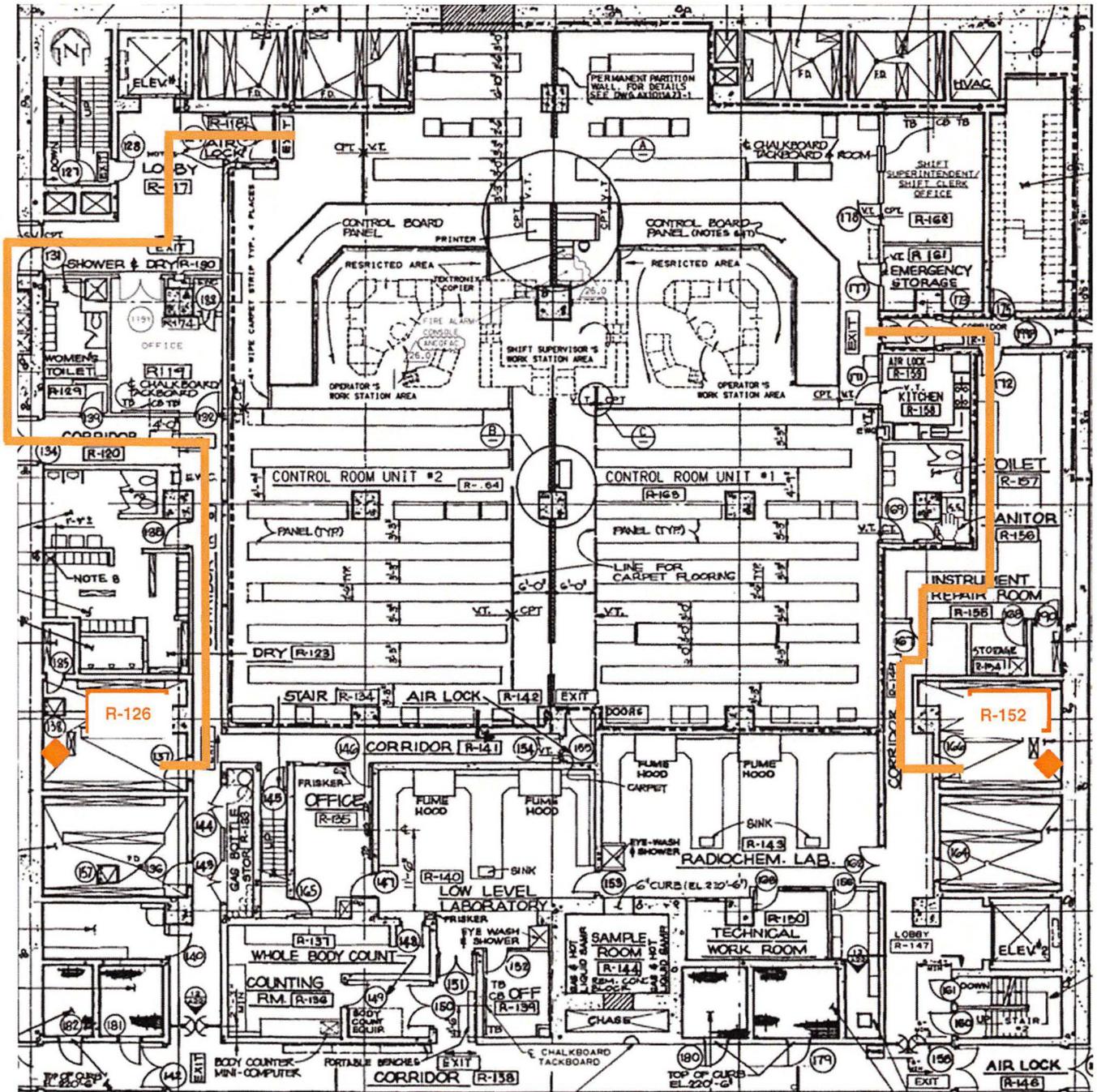
WNA-TP-04709-GEN, "Spent Fuel Pool Instrumentation System Calibration Procedure." Preventive maintenance procedures to include tests, inspection and periodic replacement of the backup batteries will be developed based on recommendation from Westinghouse.

- b) A Condition Report will be initiated and addressed through the SNC's Corrective Action Program and the out of service (OOS) condition will be tracked in accordance with procedure NMP-OS-019-013. Provisions associated with out of service (OOS) or non-functional equipment including allowed outage times and compensatory actions are consistent with the guidance provided in Section 4.3 of NEI 12-02. If one OOS channel cannot be restored to service within 90 days, appropriate compensatory actions, including the use of alternate suitable equipment, will be taken. If both channels become OOS, actions would be initiated within 24 hours to restore one of the channels to operable status and to implements appropriate compensatory actions, including the use of alternate suitable equipment and/or supplemental personnel, within 72 hours.
- c) Additionally, if both channels are OOS, a Condition Report will be initiated and addressed through the SNC's Corrective Action Program and the OOS condition will be tracked in accordance with procedure NMP-OS-019-013. SNC will maintain sufficient spare parts for the SFPIS, taking into account the lead time and availability of spare parts, in order to expedite maintenance activities, when necessary, to provide assurance that a channel can be restored to service within 90 days.

Enclosure 2 to NL-14-1745
Vogtle Electric Generating Plant – Unit 2
Responses to NRC Requests for Information

Figure 2

Sketch on section from drawing:
AX1D11A04-4



Enclosure 2 to NL-14-1745
Vogtle Electric Generating Plant – Unit 2
Responses to NRC Requests for Information

Attachment – Design Requirements for Structural Integrity and Reliability

| # | Topic | Parameter Summary | Westinghouse Reference Document # | Additional Comment | Test or Analysis Results |
|---|--|---|---|--|-----------------------------------|
| 1 | Design Specification | SFPIS Requirements derived from References 1, 2, & 3 | WNA-DS-02957-GEN | Contains technical SFPIS requirements based on NRC order, NEI guidance, and the ISG listed above. | N/A |
| 2 | Test Strategy | Per Requirements. | WNA-PT-00188-GEN | Strategy for performing the testing and verification of the SFPIS and pool-side bracket. | N/A |
| 3 | Environmental qualification for electronics enclosure with Display | 50° F to 140° F, 0 to 95% RH TID ≤ 1E03 R γ normal (outside SFP area) TID ≤ 1E03 R γ abnormal (outside SFP area) | EQ-QR-269, Rev. 2 and WNA-TR-03149-GEN for all conditions. | Results are summarized in EQ-QR-269, Rev. 2 and WNA-TR-03149-GEN. Radiation Aging verification summarized in Section 5 of WNA-TR-03149-GEN. | Test passed conditions described. |
| 4 | Environmental Testing for Level Sensor components | 50 ° F to 212° F and 100% humidity | EQ-QR-269, Rev. 2 | Testing summarized in Section 5.7. | Passed |

Enclosure 2 to NL-14-1745
Vogtle Electric Generating Plant – Unit 2
Responses to NRC Requests for Information

| # | Topic | Parameter Summary | Westinghouse Reference Document # | Additional Comment | Test or Analysis Results |
|---|--|--|--|--|--------------------------|
| | in SFP area – Saturated Steam & Radiation | 1E03 R γ normal (SFP area) | WNA-TR-03149-GEN | Thermal Aging & radiation aging verification summarized in Sections 4.1 and 5 (entire system) of WNA-TR-03149-GEN. | Passed |
| | | 1E07 R γ BDB (SFP area) | EQ-QR-269, Rev. 2 | Additional radiation aging testing documented in Section 5.3. | Passed |
| 5 | Environmental Testing for Level Sensor Electronics Housing – outside SFP | 50 ^o F to 140 ^o F, 0 to 95% RH | EQ-QR-269, Rev. 2 | Testing summarized in Section 5.5. | Passed |
| | | 100% RH | WNA-TR-03149-GEN | 100% humidity addressed in Section 7.5. | Passed |
| | | TID \leq 1E03 R γ normal (outside SFP area) TID \leq 1E03 R γ abnormal (outside SFP area) | WNA-TR-03149-GEN | Radiation Aging verification summarized in Section 5. | Passed |
| 6 | Thermal & Radiation Aging – organic components in SFP area | 1E03 R γ normal (SFP area) | EQ-QR-269, Rev. 2 and WNA-TR-03149-GEN | Thermal Aging & radiation aging verification summarized in Sections 4.1 and 5 (entire system) of WNA-TR-03149-GEN. | Passed |

Enclosure 2 to NL-14-1745
Vogtle Electric Generating Plant – Unit 2
Responses to NRC Requests for Information

| # | Topic | Parameter Summary | Westinghouse Reference Document # | Additional Comment | Test or Analysis Results |
|---|----------------------------|--|--------------------------------------|--|---------------------------|
| | | 1E07 R γ BDB (SFP area) | EQ-QR-269, Rev. 2 | Additional radiation aging testing documented in Section 5.3. | Passed |
| 7 | Basis for Dose Requirement | <u>SFP Normal Conditions:</u> 1E03 R γ TID (above pool) 1E09 R γ TID (1' above fuel rack) <u>SFP BDBE Conditions:</u> 1E07 R γ TID (above pool) < 1E07 R γ TID (1' above fuel rack) | LTR-SFPIS-13-35 and WNA-DS-02957-GEN | Explanation of Basis for Radiation Dose Requirement (includes the clarification of production equivalency of electronics enclosure used for Seismic and EMC Testing) | Passed for all conditions |
| 8 | Seismic Qualification | Per Spectra in WNA-DS-02957-GEN | EQ-QR-269, Rev. 2 | Documented in Section 5.4. | Passed |
| | | | WNA-TR-03149-GEN | WNA-TR-03149-GEN provides high level summary of the pool-side bracket analysis and optional RTD. | Passed |

Enclosure 2 to NL-14-1745
Vogtle Electric Generating Plant – Unit 2
Responses to NRC Requests for Information

| # | Topic | Parameter Summary | Westinghouse Reference Document # | Additional Comment | Test or Analysis Results |
|----|---|---|-----------------------------------|---|--------------------------|
| | | | EQ-QR-269, Rev. 2 | Seismic Pull test for new connectors documented in Section 4.4. | Passed |
| 9 | Sloshing | N/A | LTR-SEE-II-13-47 | Calculation to demonstrate that probe will not be sloshed out of the SFP. | Passed |
| | | | WNA-TR-03149-GEN | Sloshing is also addressed in Section 7.2. | Passed |
| 10 | Spent Fuel Pool Instrumentation System Functionality Test Procedure | Acceptance Criteria for Performance during EQ testing | WNA-TP-04613-GEN | Test procedure used to demonstrate that SFPIS meet its operational and accuracy requirements during Equipment Qualification Testing programs. | See applicable EQ test. |
| 11 | Boron Build-Up | Per requirement in WNA-DS-02957-GEN | WNA-TR-03149-GEN | Boron build up demonstrated through Integrated Functional Test (IFT). | Passed |
| 12 | Pool-side Bracket Seismic Analysis | N/A | CN-PEUS-14-7, Rev. 1 | Also includes hydrodynamic forces, as appropriate. | Passed |
| 13 | Additional Brackets (Sensor Electronics and Electronics Enclosure) | N/A | WNA-DS-02957-GEN | Weights provided to licensees for their own evaluation. | N/A |
| 14 | Shock & Vibration | WNA-DS-02957-GEN | WNA-TR-03149-GEN | Section 7 provides rationale and summary of RTD. | N/A |

Enclosure 2 to NL-14-1745
Vogtle Electric Generating Plant – Unit 2
Responses to NRC Requests for Information

| # | Topic | Parameter Summary | Westinghouse Reference Document # | Additional Comment | Test or Analysis Results |
|----|---|---|-----------------------------------|--|--|
| 15 | Requirements Traceability Matrix | Maps Requirements to documentation / evidence that Requirement is met | WNA-VR-00408-GEN, Rev. 1 | The RTM maps the requirements of the NRC order, NEI guidance, ISG to the applicable technical requirements in the SFPIS design specification and maps the design specification requirements to the documentation demonstrating the requirement is met. | Complete |
| 16 | Westinghouse Factory Acceptance Test, including testing of dead-zones | IFT Functional Requirements from WNA-DS-02957-GEN | WNA-TP-04752-GEN | The Integrated Functional Test (IFT) demonstrates functionality of the full system for each customer's FAT, which includes calibration of each channel. | Pilot IFT executed/passed Vogtle functional checks executed/ passed |
| | | 12" dead-zone at top of probe 4" dead-zone at bottom of probe | WNA-TP-04752-GEN | Dead-zone tests are in Section 9.6.2. | N/A |
| 17 | Channel Accuracy | +/- 3 inches per WNA-DS-02957-GEN | WNA-CN-00301-GEN | Channel accuracy from measurement to display. | Passed |

Enclosure 2 to NL-14-1745
Vogtle Electric Generating Plant – Unit 2
Responses to NRC Requests for Information

| # | Topic | Parameter Summary | Westinghouse Reference Document # | Additional Comment | Test or Analysis Results |
|----|---|--|-----------------------------------|---|--------------------------|
| 18 | Power Consumption | 3 day battery life (minimum) 0.257 Amps power consumption | WNA-CN-00300-GEN | N/A | Passed |
| 19 | Technical Manual | N/A | WNA-GO-00127-GEN | Information and instructions for Operation, Installation, use, etc. are included here. | N/A |
| 20 | Calibration | Routine Testing/calibration verification and Calibration method | WNA-TP-04709-GEN | Also, includes preventative maintenance actions such as those for Boron buildup and cable probe inspection. | N/A |
| 21 | Failure Modes and Effects Analysis (FMEA) | N/A | WNA-AR-00377-GEN | Addresses mitigations for the potential failure modes of the system. | N/A |
| 22 | Emissions Testing | RG 1.180 R1 test conditions | EQ-QR-269, Rev. 2 | Documented in Section 5.6. | Passed |

References:

- 1) ML12056A044, NRC Order EA-12-051, "ORDER MODIFYING LICENSES WITH REGARD TO RELIABLE SPENT FUEL POOL INSTRUMENTATION," Nuclear Regulatory Commission, March 12, 2012.
- 2) ML12240A307, NEI 12-02 (Revision 1), "Industry Guidance for Compliance with NRC Order EA-12-051, "To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation" August, 2012.
- 3) ML12221A339, Revision 0, JLD-ISG-2012-03, "Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation", August 29, 2012, Nuclear Regulatory Commission Japan Lessons-Learned Project Directorate.

Enclosure 2 to NL-14-1745
Vogtle Electric Generating Plant – Unit 2
Responses to NRC Requests for Information

- 4) Westinghouse Proprietary Document, WNA-DS-02957-GEN, “Spent Fuel Pool Instrumentation System (SFPIS) Standard Product System Design Specification,” Revision 4 reviewed by NRC in April 2014; current revision is Revision 4.
- 5) Westinghouse Proprietary Document, WNA-PT-00188-GEN, “Spent Fuel Pool Instrumentation System (SFPIS) Standard Product Test Strategy,” Revision 1 reviewed by NRC in February 2014; NRC did not review in April; current revision is Revision 3.
- 6) Westinghouse Proprietary Document, EQ-QR-269, “Design Verification Testing Summary Report for the Spent Fuel Pool Instrumentation,” Revision 1 reviewed by NRC in April 2014; current revision is Revision 2.
- 7) Westinghouse Proprietary Document, WNA-TR-03149-GEN, “SFPIS Standard Product Final Summary Design Verification Report,” Revision 1 reviewed by NRC in April 2014; current revision is Revision 1.
- 8) Westinghouse Proprietary Document, LTR-SFPIS-13-35, “SFPIS: Basis for Dose Requirement and Clarification of Production Equivalency of Electronics Enclosure Used for Seismic Testing,” Revision 0 reviewed by the NRC in February 2014; NRC did not review in April; current revision is Revision 1.
- 9) Westinghouse Proprietary Document, LTR-SEE-II-13-47, “Determination if the Proposed Spent Fuel Pool Level Instrumentation can be Sloshed out of the Spent Fuel Pool during a Seismic Event,” Revision 0 reviewed by the NRC in February 2014; NRC did not review in April; current revision is Revision 0.
- 10) Westinghouse Proprietary Document, WNA-TP-04613-GEN, “Spent Fuel Pool Instrumentation System Functionality Test Procedure,” Revision 5 reviewed by the NRC in February 2014; NRC did not review in April; current revision is Revision 5.
- 11) Westinghouse Proprietary Document, CN-PEUS-14-7, “Seismic Analysis of the SFP Mounting Bracket at Farley Nuclear Plant and Vogtle Electric Generating Station,” Revision 1; not reviewed by the NRC.
- 12) Westinghouse Proprietary Document, WNA-VR-00408-GEN, “Spent Fuel Pool Instrumentation System Requirement Traceability Matrix,” Revision 0 reviewed by the NRC in April 2014; current revision is Revision 1.
- 13) Westinghouse Proprietary Document, WNA-TP-04752-GEN, “Spent Fuel Pool Instrumentation System Standard Product Integrated Functional Test Procedure,” Revision 1 reviewed by the NRC in February 2014; NRC did not review in April; current revision is Revision 2.
- 14) Westinghouse Proprietary Document, WNA-CN-00301-GEN, “Spent Fuel Pool Instrumentation System Channel Accuracy Analysis,” Revision 0 reviewed by the NRC in February 2014; NRC did not review in April; current revision is Revision 2.
- 15) Westinghouse Proprietary Document, WNA-CN-00300-GEN, “Spent Fuel Pool Instrumentation System Power Consumption Calculation,” Revision 0 reviewed by the NRC in February 2014; NRC did not review in April; current revision is Revision 0.
- 16) Westinghouse Proprietary Document, WNA-GO-00127-GEN, “Spent Fuel Pool Instrumentation System Standard Product Technical Manual,” Revision 1 reviewed by the NRC in April 2014; current revision is Revision 3.
- 17) Westinghouse Proprietary Document, WNA-TP-04709-GEN, “Spent Fuel Pool Instrumentation System Calibration Procedure,” Revision 3 was reviewed by the NRC in February 2014; NRC did not review in April; current revision is Revision 4.
- 18) Westinghouse Proprietary Document, WNA-AR-00377-GEN, “Spent Fuel Pool Instrumentation System Failure Modes and Effect Analysis,” Revision 2 was reviewed by the NRC in February 2014; NRC did not review in April; current revision is Revision 4.