Nuclear Operating Company
South Texas Project Electric Generating Station P.O. Box 289 Wadsworth, Texas 77483

February 27, 2014
NOC-AE-14003083
File No.: G25
10 CFR 2.202

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

South Texas Project
Unit 1 & 2
Docket Nos. STN 50-498, STN 50-499
2nd Six-Month Status Update of Overall Integrated Plan in Response to Order EA-12-051,
"Reliable Spent Fuel Pool Instrumentation" (TAC Nos. MF0827 and MF0828)

References:

1. NRC Letter, Eric Leeds to Eric Leeds to All Power Reactor Licensees, "Issuance of Order to Modify Licenses with Regard to Requirements for Reliable Spent Fuel Pool Instrumentation," March 12, 2012 (EA-12-051) (ST-AE-NOC-12002271) (ML12054A679)

2. Letter, D. L. Koehl to NRC Document Control Desk, "Overall Integrated Plan Regarding Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)," dated February 28, 2013 (NOC-AE-13002959) (ML13070A006)

3. NRC letter, "South Texas Project, Units 1 and 2 – Request for Additional Information RE: Overall Integrated Plan in Response to Order EA-12-051, "Reliable Spent Fuel Pool Instrumentation" (TAC Nos. MF0827 and MF0828), June 7, 2013 (ML131149A09)

4. Letter, G. T. Powell to NRC Document Control Desk, "Response to Request for Additional Information Regarding the Overall Integrated Plan in Response to Order EA-12-051, "Reliable Spent Fuel Pool Instrumentation" (TAC Nos. MF0827 and MF0828) (ML13190A466)

5. Letter, G. T. Powell to NRC Document Control Desk, Six-Month Status Update of Overall Integrated Plan in Response to Order EA-12-051, "Reliable Spent Fuel Pool Instrumentation" (TAC Nos. MF0827 and MF0828) August 27, 2013 (ML13249A078)

6. NRC Letter, South Texas Project, Units 1 And 2 - 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 Nos. MF0827 AND MF0828), Sept. 19, 2013 (ML13254A210)

A001
NRR

On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued an Order (Reference 1) modifying licenses with regard to requirements for reliable spent fuel pool instrumentation. On February 28, 2013, STP Nuclear Operating Company (STPNOC) submitted an Overall Integrated Plan (Reference 2) in response to the NRC Order. By letter dated June 25, 2013 (Reference 4), STPNOC provided additional information requested by the NRC (References 3 and 6) in regard to our Overall Integrated Plan. The purpose of this letter is to provide our second six-month status of our Overall Integrated Plan pursuant to Section IV, Condition C.2, of Reference 1.

The STPNOC status report is provided in the attachment. The report provides an update of milestone accomplishments required to implement the Order since submittal of the Overall Integrated Plan, including any changes to the compliance method and schedule. This report also provides an update to information requested under Reference 6. Our understanding from the NRC staff who attended the public meeting on February 6, 2014, is that the outstanding information requests from Reference 3 have been superseded by the information requested in Reference 6.

There are no regulatory commitments in this letter.

If there are any questions, please contact Robyn Savage at 361-972-7438.

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

Executed on: February 27, 2014

G. T. Powell
Site Vice President

Attachment: Six Month Status Report for the Implementation of Order Number EA-12-051 - Reliable Spent Fuel Pool Instrumentation

rds

cc:
(paper copy)

Regional Administrator, Region IV
U. S. Nuclear Regulatory Commission
1600 East Lamar Boulevard
Arlington, TX 76011-4511

Balwant K. Singal
Senior Project Manager
U.S. Nuclear Regulatory Commission
One White Flint North (MS 8 B1)
11555 Rockville Pike
Rockville, MD 20852

NRC Resident Inspector
U. S. Nuclear Regulatory Commission
P. O. Box 289, Mail Code: MN116
Wadsworth, TX 77483

Jim Collins
City of Austin
Electric Utility Department
721 Barton Springs Road
Austin, TX 78704

U.S. Nuclear Regulatory Commission
Director, Office of Nuclear Reactor Regulation
One White Flint North (MS 13 H 16M)
11555 Rockville Pike
Rockville, MD 20852-2738

(electronic copy)

A. H. Gutterman, Esquire
Morgan, Lewis & Bockius LLP

Balwant K. Singal
U. S. Nuclear Regulatory Commission

John Ragan
Chris O'Hara
Jim von Suskil
NRG South Texas LP

Kevin Pollo
Richard Peña
L. D. Blaylock
City Public Service

Peter Nemeth
Crain Caton & James, P.C.

C. Mele
City of Austin

Richard A. Ratliff
Texas Department of State Health Services

Robert Free
Texas Department of State Health Services

Six Month Status Report for the Implementation of Order Number EA-12-051 - Reliable Spent Fuel Pool Instrumentation

References:

1. NRC Letter, Eric Leeds to Eric Leeds to All Power Reactor Licensees, "Issuance of Order to Modify Licenses with Regard to Requirements for Reliable Spent Fuel Pool Instrumentation," March 12, 2012 (EA-12-051) (ST-AE-NOC-12002271) (ML12054A679)

2. Letter, D. L. Koehl to NRC Document Control Desk, "Overall Integrated Plan Regarding Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)," dated February 28, 2013 (NOC-AE-13002959) (ML13070A006)

3. NRC letter, "South Texas Project, Units 1 and 2 – Request for Additional Information RE: Overall Integrated Plan in Response to Order EA-12-051, "Reliable Spent Fuel Pool Instrumentation" (TAC Nos. MF0827 and MF0828), June 7, 2013 (ML131149A09)

4. Letter, G. T. Powell to NRC Document Control Desk, "Response to Request for Additional Information Regarding the Overall Integrated Plan in Response to Order EA-12-051, "Reliable Spent Fuel Pool Instrumentation" (TAC Nos. MF0827 and MF0828) (ML13190A466)

5. Letter, G. T. Powell to NRC Document Control Desk, Six-Month Status Update of Overall Integrated Plan in Response to Order EA-12-051, "Reliable Spent Fuel Pool Instrumentation" (TAC Nos. MF0827 and MF0828) August 27, 2013 (ML13249A078)

6. NRC Letter, South Texas Project, Units 1 And 2 - 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 Nos. MF0827 AND MF0828), Sept. 19, 2013 (ML13254A210)

7. NRC Japan Lessons-Learned Project Directorate Interim Staff Guidance JLD-ISG-2012-03, "Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation, Revision 0, August 29, 2012 (ML12221A339)

8. NEI 12-02, Industry Guidance for Compliance with NRC Order EA-12-051, "To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," Revision 1, dated August 2012 (ML122400399)

9. Sandia National Laboratories Document SAND-2008-6851P, "Radiation Hardness Assurance Testing of Microelectronic Devices and Integrated Circuits: Radiation Environments, Physical Mechanisms, and Foundations for Hardness Assurance", Page 20 and Figure 20

10. MIL-STD-883J, "Department of Defense Test Method Standard, Microcircuits"

11. Not used

12. Regulatory Guide 1.209, "Guidelines for Environmental Qualification of Safety-Related Computer – Based Instrumentation and Control Systems in Nuclear Power Plants"

13. IEC 60068-2-30, "Environmental testing – Part 2-30: Tests – Test Db: Damp heat , cyclic (12h + 12h cycle)"

14. EN 60529:2000, "Degrees of Protection Provided by Enclosure (IP Code)"

15. EN 60068-2-6, "Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal)"

16. EN 60068-2-27, "Environmental testing procedures – Part 2:Tests – Test Ea and guidance: Shock"

17. MIL-STD-202G, "Department of Defense Test Method Standard Electronic and Electrical Component Parts"

18. EPRI TR-107330, "Generic Requirements Specification for Qualifying a Commercially Available PLC for Safety-Related Applications in Nuclear Power Plants"

19. IEEE Standard 344-2004, "Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations"

20. STP Calculation No. CC09973, Qualification of Horn & Transmitter Supports for Spent Fuel Pool Level Indicator

21. STP Post Accident Radiation Zone Drawings 9M129A81124 & 9M129A81109#1, #2 (UFSAR Figures 12.3.1-27 and 12.3.1-9)

22. Design Criteria for Equipment Qualification Program 4E019NQ1009 for South Texas Project Nuclear Operating Company

Reference 2 provided the Overall Integrated Plan which the STP Nuclear Operating Company (STPNOC) will implement for Units 1 and 2 to comply with the requirements of NRC Order EA-12-051, "Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation" (Reference 1), NRC Interim Staff Guidance JLD-ISG-2012-003, Revision 0, (Reference 7) and NEI Report 12-02, Revision 1 (Reference 8). This attachment provides an update of milestone accomplishments since submittal of the status update (Reference 5) of the Overall Integrated Plan. This report also provides an update to information requested in Reference 6.

The following status is based on information developed to date. Any changes to the following information that occur after completing and approving the final design for reliable spent fuel pool instrumentation will be provided in the periodic 6-month status reports required by Order EA-12-051.

SIX MONTH STATUS REPORT

ORDER EA-12-051, RELIABLE SPENT FUEL POOL INSTRUMENTATION

STP NUCLEAR OPERATING COMPANY

SOUTH TEXAS PROJECT, UNITS 1 AND 2

DOCKET NOS. 50-498 AND 50-499

1. Introduction

This attachment provides the second update of milestone accomplishments since submittal of the Overall Integrated Plan, including any changes to the compliance method and schedule. As discussed in Reference 1, any changes to the requirements in NRC JLD-ISG-2012-003 or NEI 12-02 may require relief from the requirements and schedule documented in the Overall Integrated Plan.

2. Milestone Accomplishments

STPNOC has selected and entered into a purchase agreement to procure Spent Fuel Pool (SFP) level instruments that, when installed, will meet the criteria designated in the integrated response plan submitted on February 28, 2013.

3. Milestone Schedule Status

There are a few minor changes (***in bold & italics***) to the status of the milestones in the integrated plan that was submitted on February 28, 2013

Unit 1 Milestones are as follows:

- Design/Engineering – September of 2014
- Purchase of instruments & equipment – February of 2015
- Receipt of equipment – June of 2015
- Unit 1 Installation & Functional Testing – October of 2015

Unit 2 Milestones are as follows:

- Design/Engineering – ***March of 2014***
- Purchase of instruments & equipment – ***April*** of 2014
- Receipt of equipment – ***May*** of 2014
- Installation & Functional Testing – ***August of 2014***

4. Changes to Compliance Method

There are no changes to the compliance method as documented in the Overall Integrated Plan, however there was a correction to the information that was provided to the NRC in the first 6 month update (Reference 6). Specifically, in response to RAI 4a we stated "The VEGAPuls 62ER Through Air Radar sensor is similar in form, fit and function to the VEGAPuls 66 that was shock and vibration tested in accordance with MIL-S-901D." Further review determined that the VEGAPuls 66 was shock tested to MIL-S-901D, however, it was vibration tested to MIL-STD-167-1.

5. Open Requests for Additional Information (RAIs)
See responses to information requested in Reference 6 (NRC Interim Staff Evaluation and Request for Additional Information).

NRC RAI #1 (Reference 6)

In its letter dated June 25, 2013, the licensee provided a sketch depicting the waveguide piping for the two redundant channels as 1 in, stainless steel pipes. The NRC staff noted that this sketch depicts the two pipes to be run side by side from the through-the-air horn to the sensor receivers located in the Mechanical Auxiliary Building (MAB), and from there, cabling for the two instrument channels seem to be run side by side to the display units mounted in the Radwaste Control Room. The NRC staff has concerns regarding the routing of these two channels in accordance with the guidance on channel separation as described in NEI 12-02. Additional information is needed to enable the staff to complete its evaluation.

Please provide additional information describing how the proposed arrangement of the waveguides and routing of the cabling between the radar horns and the electronics in the Radwaste Control Room 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.

STPNOC Response:

The following information should provide assurance that STP's plan meets the order:

1. STP's Spent Fuel Pools (SFPs) are located inside safety related buildings, designed to protect against external missiles.
2. Everything mounted above and around the SFP is mounted to seismic 2/1 criteria. That is components and their supporting structures which are not seismic Category I and whose collapse could result in loss of required function of structures, equipment or systems required after a seismic event maintain their integrity against collapse when subjected to a seismic event.
3. Review of internal generated missile calculations shows no concerns for internal missiles from rotating equipment or pressurized bottles on the operating deck of the Spent Fuel Pool.
4. The radar horns are separated on the north end of the SFP by approximately 20 feet.
5. The waveguide piping is physically separated throughout their runs to the sensors inside the Mechanical Auxiliary Building.
6. From the sensors, the cabling will run in separate conduit to the power control panels located inside the Radwaste Control Room.
7. A Heating, Ventilation, and Air Conditioning (HVAC) duct (seismically mounted 2/1) runs along the north wall above both waveguides and provides protection from falling objects as

discussed in the order. There are places along the wall where two different seismically mounted HVAC ducts provide this protection.

8. The approximately 20' of waveguide piping run is separated by 8 ¼" vertically. They are run this close to avoid obstructions and to maintain straight pipe runs. A minimum number of bends in the waveguide piping is required to ensure proper operation.
9. Reasonable protection has been provided against missiles by utilizing the inherent shielding provided by the HVAC duct.
10. Any additional separation would create an obstruction for workers around the pool or would remove a waveguide from beneath the protective HVAC duct.

STPNOC considers the status of this item CLOSED

NRC RAI #2 (Reference 6)

The NRC staff notes that the proposed application of such seismic design criteria appears to be reasonable and addresses the staff-endorsed NEI 12-02 guidance stating that the channel is to be designed to be consistent with the highest seismic or safety classification of the SFP. The licensee's proposed plan, with respect to the seismic design of the mounting, appears to be consistent with NEI 12-02, as endorsed by the ISG. The staff plans to verify the results of the licensee's seismic testing and analysis report when it is completed based on the licensee's response to the following RAI.

Please provide the analyses verifying that the seismic testing of the horn and waveguide assembly and the electronics units, and the analysis of the combined maximum seismic and hydrodynamic forces on the cantilevered portion of the assembly exposed to the potential sloshing effects, show that the SFP instrument design configuration will be maintained during and following the maximum seismic ground motion considered in the design of the SFP structure.

STPNOC Response:

The horn and waveguide assembly and the electronics units were successfully seismically tested in accordance with the requirements of the Institute of Electrical and Electronics Engineers (IEEE) Standard 344-2004 (Reference 19), *(see the response to NRC RAI #10, below for further explanation of this test)*. In addition to the seismic test, an analysis of the combined effects of the seismic and hydrodynamic forces on the cantilevered portion for the assembly exposed to the potential sloshing effects was performed and the results were satisfactory. See Reference 20.

STPNOC considers the status of this item CLOSED

NRC RAI #3 (Reference 6)

The NRC staff has concerns with the licensee's lack of information regarding its analysis of the maximum expected radiological conditions for the Radwaste Control Room that might be considered credible under BDB conditions. The NRC staff is also concerned with the lack of

documentation indicating how it was determined that the electronics can withstand a total integrated dose of $1X10^3$ Rads.

Please provide analysis of the maximum expected radiological conditions (dose rate and total integrated dose) to which the equipment located within the Radwaste Control Room will be exposed. Also, please provide documentation indicating how it was determined that the electronics for this equipment is capable of withstanding a total integrated dose of 1×10^3 Rads. Please discuss the time period over which the analyzed total integrated dose was applied.

STPNOC Response:

Maximum dose rates for the Radwaste Control Room during normal operations is 2.5 mRem/hr; however, normal dose rates are < 1mRem/hr and during a design basis loss of coolant accident is not expected to exceed 5Rem/hr. See Reference 21 for radiation dose references.

The area above and around the pool will be subject to large amounts of radiation in the event that the fuel becomes uncovered. The only parts of the measurement channel in the pool radiation environment are the metallic waveguide and horn, which are not susceptible to the expected levels of radiation. The electronics must be located in an area that is shielded from the direct shine from the fuel, and bounce and scatter effects above the pool. For the purpose of this analysis, the radiation levels in the area do not exceed $1x10^3$ rad., i.e. mild radiation environment.

Dose rates used for testing electronics using MIL-STD-883J, Method 1019.9 (Reference 10) are 50 rad/second or greater. The fact that this standard test does not test for dose rates lower than 50 rad/second, except as explained below, indicates that dose rates that are lower than 50 rad/second are not a concern for electronic devices. At very low dose rates, some electronics that contain bipolar of BiCMOS or mixed-signal devices can be susceptible to Enhanced Low Dose Rate Sensitivity (ELDRS). For these devices MIL-STD-883J, Method 1019.9 also requires testing at low dose rate ≤ 0.01 Rad/second. However, it has been shown in Reference 9 that at dose levels up to $1x10^3$ rad there are no true dose rate effects. Therefore, the total integrated dose estimated for the area where the electronics will be located, low dose rate sensitivity is not a concern.

The integrated dose estimated for the sensor location in Mechanical Auxiliary Building has not yet been determined. When determined, the sensor will be shielded as necessary.

Based on the information in the above references, the electronics in the VEGAPULS 62 ER sensor, displays and power control panel are considered to be qualified for the application at STP.

STPNOC considers the status of this item OPEN

NRC RAI #4 (Reference 6)

The NRC staff has concerns with the licensee's lack of information regarding the ambient temperature in the vicinity where the electronics equipment will be located under normal and worst case postulated conditions.

Please provide information indicating a) whether the 80°C rating for the sensor electronics is a continuous duty rating; and, b) what will be the maximum expected ambient temperature in the room in which the sensor electronics will be located under BDB conditions in which there is no ac power available to run heating ventilation and air conditioning (HVAC) systems?

STPNOC Response:

The 80°C rating of the sensor is a continuous duty rating according to the sensor manufacturer, VEGA. The electronics in the Radwaste Control Room are continuous duty rated 70°C for the indicator and 62°C for power control panel. The Beyond Design Basis (BDB), Extended Loss of AC power (ELAP) event will have no equipment running in the vicinity of the sensor electronics. With no equipment in the rooms running and the doors opened, inside ambient temperature, the will eventually equalize with outside air temperatures. FLEX procedures will be developed to evaluate opening doors, if needed. If you use the accident room temperature of 125°F (52 °C), then there is still adequate margin. NEI 12-06, section 9.2 indicates that many States may experience temperatures in excess of 120°F; using 125°F takes this into account. The power control panel being rated for 62°C will still be qualified for temperatures up to 143.6°F. While we can only look at historical weather data from national weather service, the docketed design base accident temperature identified in the UFSAR Table 3.11-1 for the MAB Radwaste control rooms (Rm. 217) is 125°F (52°C).

STPNOC considers the status of this item CLOSED

NRC RAI #5 (Reference 6)

The NRC staff has concerns with the licensee's lack of information regarding whether the sensor electronics is capable of continuously performing its required functions under this expected humidity condition.

Please provide information indicating the maximum expected relative humidity in the room in which the sensor electronics will be located under DBD conditions, in which there is no ac power available to run HVAC systems, and whether the sensor electronics is capable of continuously performing its required functions under this expected humidity condition.

STPNOC Response:

The expected relative humidity at the electronics location for the ELAP event may be as high as 100%. The sensor has been tested in accordance with IEC 60068-2-30 (Reference 13) which varies the temperature from room temperature to elevated temperature at high humidity

conditions (in this case, from 22°C to 57°C at a constant 96% Relative Humidity) to verify that the test item withstands condensation that can occur due to the changing conditions. The sensor has also been tested to EN 60529:2000 (Reference 14) and is rated IP66/IP68, which signifies totally dust tight housing, protection against string water jets and waves, and protection against prolonged effects of immersion under 0.2 bar pressure. This rating further substantiates the sensor's ability to perform at high humidity conditions including condensing. The VEGADIS 61 indicating and adjustment module and VEGADIS 62 display have housings which are similar to the VEGAPULS 62 ER sensor and are therefore considered to be equally covered by the tests (Reference 13 and 14).

STPNOC considers the status of this item CLOSED

NRC RAI #6 (Reference 6)

The NRC staff notes that the use of MIL-STD-901D is an acceptable method for shock testing. However, the NRC staff has concerns with the licensee's lack of information regarding description of the tests, applied forces, and the operability condition of the sensor after the tests were completed.

Please provide information describing the evaluation of the comparative sensor design, the shock test method, test results, and forces applied to the sensor applicable to its successful tests demonstrating that the referenced previous testing provides an appropriate means to demonstrate reliability of the sensor under the effects of severe shock.

STPNOC Response: (Reference 6)

The VEGAPULS 66 Through Air Radar sensor and PLICSCOM indicating and adjustment module mounted to the sensor were shock tested in accordance with MIL-STD-901D, "Requirements for High-Impact Shock Tests, Shipboard Machinery, Equipment, and Systems," dated March 17, 1989. The test results are considered also applicable to the VEGAPULS 62 ER and PLICSCOM indicating and adjustment module. Differences in construction between the VEGAPULS 66 and VEGAPULS 62 ER are mainly in the smaller size of the VEGAPULS 62 ER. The shape of the housing, its material construction (precision cast stainless steel), the mass and form factor for the electronics modules, the materials and method for mounting the electronics into the sensor housing are the same.

The MIL-S-901D test consisted of a total of nine (9) shock blows, three (3) through each of the three (3) principal axes of the sensor, delivered to the anvil plate of the shock machine. The heights of hammer drop for the shock blows in each axis were one (1) foot, three (3) feet and five (5) feet.

The VEGAPULS 62 ER Through Air Radar sensor has also been shock tested in accordance with EN60068-2-27 (Reference 16) (100g, 6ms), ten (10) shock blows applied along a radial line through the support flange.

STPNOC considers the status of this item CLOSED

NRC RAI #7 (Reference 6)

The NRC staff notes that the use of MIL-STD-167-1 is an acceptable method for vibration testing. However, the staff has concerns with the licensee's lack of information describing the tests, applied forces and their directions and frequency ranges, and the operability condition of the sensor after the tests were completed.

Please provide information describing the evaluation of the comparative sensor design, the vibration test method, test results, and the forces and their frequency ranges and directions applied to the sensor applicable to its successful tests, demonstrating that the referenced previous testing provides an appropriate means to demonstrate reliability of the sensor under the effects of high vibration.

STPNOC Response:

A VEGAPULS 66 Though Air Radar sensor and PLICSCOM indicating and adjustment module mounted to the sensor were successfully vibration tested in accordance with MIL-STD-167-1. The test results are also considered applicable to the VEGAPULS 62 ER and PLICSCOM indicating and adjustment module. Differences in construction between the VEGAPULS 66 and VEGAPULS 62 ER are mainly in the smaller size of the VEGAPULS 62 ER. The shape of the housing, its material construction (precision cast stainless steel), the mass and form factor for the electronics modules, the materials and method for mounting the electronics into the sensor housing are the same.

The vibration test procedure applies to equipment found on Navy ships with conventional shafted propeller propulsion. The test frequencies ranged from 4 Hz to 50 Hz with amplitudes ranging from 0.048" at the low frequencies to 0.006" at the higher frequencies. This procedure is not applicable to high-speed or surface effect ships that are subject to vibrations for high-speed wave slap, which produce vibration amplitudes and frequencies in excess of the levels on conventional Navy ships.

The potential vibration environment around the spent fuel pool and surrounding building structure might contain higher frequencies than were achieved in the testing discussed above. Additional testing of the VEGA PULS 62 ER sensor was performed in accordance with EN 60068-2-6 (Reference 15) Method 204 (except 4g, 200 Hz). This additional testing is considered to provide a stand-alone demonstration of the resistance to vibration of the VEGAPULS 62 ER sensor and further substantiates the results of the MIL-STD-167-1 testing.

STPNOC considers the status of this item CLOSED

NRC RAI #8 (Reference 6)

The NRC staff has concerns with the licensee's lack of information regarding description of the manufacturer's shock and vibration ratings for this equipment and the results of any testing performed by the manufacturer to achieve those ratings. The staff also plans to verify the licensee's comparison of the magnitude of the manufacturer's ratings against postulated plant conditions under design basis events.

Please provide information describing the evaluation of the comparative display panel ratings against postulated plant conditions. Also provide the results of the manufacturer's shock and vibration test methods, test results, and the forces and their frequency ranges and directions applied to the display panel associated with its successful tests.

STPNOC Response: (Reference 6)

The components used in the power control panel are listed in the table below. The table below provides the shock and vibration test and/or analysis for each component.

Component Name	Test standard used	Test levels per manufacturer description
Selector switch	Vibration resistance per IEC 60068-2-6 (Reference 15)	5 gn (f = 2...500Hz)
	Shock per IEC 60068-2-27 (Reference 16)	30 gn for 18 ms half sine wave acceleration 50 gn for 11 ms half sine wave acceleration
Terminal blocks	Not tested, These are considered suitable for use in the in shock and vibration environments based on their previous use in the manufacturer's mobile remote display.	N/A
Power supply	Vibration tested per IEC 60068-2-6 (Reference 15)	Mounting by rail: Random wave, 10-500 Hz, 2G, ea. Along X, Y, Z axes 10 min/cycle, 60 mi
	Shock tested per IEC 60068-2-27 (Reference 16)	Half sine wave, 4G, 22 ms, 3 axes, 6 faces, 3 times for each face
Fuse	Vibration tested per MIL-STD-202G (Reference 17)	Method 204, Test Condition C (Except 5g, 500 Hz)
	Shock tested per MIL-STD-202G (Reference 17)	Method 207 (HI Shock)
Indicating light	Not tested for shock or vibration resistance. Failure of light will not impact instrument operability.	N/A
Control relay	Not tested, mounted on dampener (*See RAI #9 response*)	N/A
Battery	Not tested, mounted on dampener (*See RAI #9 response*)	N/A

Current isolator	Not tested, mounted on dampener (*See RAI #9 response*)	N/A
Readouts –See note below	Test standards as described above (*See RAI #6 and RAI #7 responses*)	Test levels as described in RAI #6 and RAI #7 responses

Note: The VEGA displays will be mounted separately from the power control panel. These displays have the same housing, the same material construction (precision cast stainless steel, and the same materials and method for mounting the electronics into the sensor housing as the VEGAPULS 62 ER that has been shock and vibration tested as discussed in the responses to RAI #6 and RAI #7 above.

STPNOC considers the status of this item CLOSED

NRC RAI #9 (Reference 6)

The NRC staff has concerns with the licensee's lack of information regarding the results of such testing to determine the acceptability of using IEEE 344-2004 as an appropriate means to demonstrate reliability of the display panel under the effects of severe shock and vibration. **Please provide the results of seismic testing per IEEE 344-2004, to demonstrate the reliability of the components within the power control panel with regard to shock and vibration effects.**

STPNOC Response:

Three components that were not shock or vibration tested by the manufacturers were included in a power control panel that was successfully seismically tested in accordance with the requirements of the Institute of Electrical and Electronics Engineers (IEEE) Standard 344-2004, "Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations". The seismic test levels reached peaks of 19g in the x direction, 20g in the y direction, and 21g in the z direction. The test response spectra exceeded 10g at all upper frequencies up to 100 Hz beyond which they were not recorded. The seismic & dynamic evaluations performed during these tests exceed those required for STP design (Reference 22). The levels of acceleration to which the power control panel was exposed are considered to exceed the postulated shock environments at the locations where the power control panel will be mounted, i.e. concrete walls or rigid metal building structures. Likewise, the levels of acceleration to which the power control panel was exposed exceed the postulated vibration amplitudes at the locations where the control panel will be mounted, which are postulated to be minimal since there is no vibration producing machinery in the vicinity. Also, these components are mounted to vibration dampeners to further minimize the transfer of external vibration to these components.

STPNOC considers the status of this item CLOSED

NRC RAI #10 (Reference 6)

The NRC staff notes that the licensee will demonstrate the reliability of the seismic design and installation in accordance with NEI 12-02, as endorsed by the ISG. The licensee's planned approach with respect to the seismic reliability of the instrumentation appears to be consistent NEI 12-02, as endorsed by the ISG. However, the staff plans to verify the results of the licensee's seismic test when it is completed.

Please provide analysis of the seismic testing results and show that the instrument performance reliability, following exposure to simulated seismic conditions representative of the environment to anticipated for the SFP structures at STP, has been adequately demonstrated.

STPNOC Response:

The sensor, indicator, power control panel, horn end of the waveguide, standard pool end and sensor end mounting brackets, and waveguide piping were successfully seismically tested in accordance with the requirements of IEEE Standard 344-2004. The system was monitored for operability before and after the resonance search and seismic tests. The required response spectra used for the five Operating Basis Earthquakes (OBE) and one Safe Shutdown Earthquake (SSE) in the test were taken from EPRI TR-107330, Figure 4-5 (Reference 18). This test level exceeds the building response spectra where the equipment will be located. The standard pool end mounting bracket used in the seismic test differs from the ones that will be used at STP. A separate seismic qualification analysis will be performed on the pool end mounting brackets used at STP. Intermediate mounting brackets for the waveguide piping will be designed in accordance with the site's standard for seismic level 2/1 piping supports.

STPNOC considers the status of this item CLOSED

NRC RAI #11 (Reference 6)

The NRC staff notes that with this arrangement, the loss of one backup power supply will not affect the operation of the independent channel under BDB event conditions. The implementation of such design provisions appears to be consistent with NEI 12-02, as endorsed by the ISG, and the electrical functional performance of each level measurement channel would be considered independent of the other channel. However, the NRC staff plans to verify the final electrical power supply design information when it is provided.

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.

STPNOC Response:

Unit 1 power supplies are provided; however, the power scheme is the same for Unit 2. The power cabinets will be normally powered by 120VAC Lighting Panels LP 13P and 13B.

LP 13P is powered from 480V Motor Control Center (MCC) 1L3. This MCC is powered from 480V Load Center (LC) 1L2. This LC is powered from 13.8 KV Bus 1H.

LP 13B is powered from MCC 1S1. This MCC is powered from 480V LC 1S. LC 1S is powered from 13.8 KV Bus 1H.

While the 13.8 KV buses are the same, on a loss of the bus, the batteries provide the required backup power.

During a loss of normal power, the installed batteries in each cabinet will power the level instrumentation. See the following RAI#12 for more on these batteries.

STPNOC considers the status of this item CLOSED

NRC RAI #12 (Reference 6)

The NRC staff notes that the proposed criteria for sizing of the battery backup appears to be consistent with NEI 12-02, as endorsed by the ISG. However, the staff plans to verify the results of the licensee's calculation for required duty cycle given the final design load of the instrument channel for its installed configuration.

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.

STPNOC Response:

The power control panel contains eight lithium C-cell batteries that provide automatic backup power to the 4 – 20 mA instrument loop when normal 120V AC power is not available. The battery life for a continuous 20 mA discharge rate has been calculated for a range of ambient temperatures. The results of the calculated lifetime at various temperatures are shown in the table below.

Temperature	Lifetime at full voltage @ 20 mA (hours)
-30°C (-22°F)	131
0°C (32°F)	233
25°C (77°F)	330
55°C (131°F)	349
75°C (167°F)	209

The calculated battery backup times above demonstrate that the backup battery has sufficient capacity to support reliable instrument channel operation until off-site resources can be deployed by the mitigating strategies resulting from Order EA-12-049.

STPNOC considers the status of this item CLOSED

NRC RAI #13 (Reference 6)

The NRC staff notes that the estimated instrument channel design accuracies and methodology appear to be sufficient to maintain the instrument channels to within their designed accuracies before significant drift can occur. The NRC staff plans to verify that the licensee's proposed instrument performance is consistent with these estimated accuracy values. Further, the NRC staff plans to verify that the channels will retain these accuracy performance values following a loss of power and subsequent restoration of power.

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.

STPNOC Response:

The instrument accuracy at normal and design basis conditions described in Reference 2 (as amended by References 4 and 5) will be verified by testing the actual waveguide configuration during the factory acceptance testing. Normal conditions testing will include multi-point checks of accuracy at room temperature and humidity using a metal target. BDB conditions will be simulated by injecting steam and water into the waveguide pipe and checking the indicated values. The parameters are stored in a non-volatile memory and are retained following a loss of power and subsequent restoration of power. This ability to retain its accuracy will be tested during the Factory Acceptance Test.

STPNOC considers the status of this item CLOSED

NRC RAI #14 (Reference 6)

The NRC staff has concerns with the lack of information regarding the [sic] about licensee's plans for occupying the display location and how personnel availability will be assured such that on demand display information will be provided without unreasonable delay. Additionally, the staff has concerns regarding how the availability and operability of relied-upon communications will be ensured.

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 we [sic] 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.

STPNOC Response:

The display location is in the location where the MAB Plant Operator performs his normal duties. This operator and other operators will be traversing through this area as it is central to the radiologically controlled area (RCA) of the plant. Numerous emergency operations are performed by Operations personnel in the RCA. There are several ways to access this display location. From the Main Control Room, it will take a person < 5 minutes to access the display. The post-accident radiological & environmental conditions for the worst case design basis accident for the MAB Radwaste Control Rooms (Rm. 217) are < 5 R/hr, 100% humidity, and 125°F as indicated in UFSAR Table 3.11-1. The postulated temperature and humidity rise are expected during an ELAP event as outside and inside temperatures equalize but the radiation levels are elevated beyond what would be expected for this event as no fuel damage is expected; however, it is clearly bounding. Personnel will not be continuously stationed at the display. They would monitor level periodically.

STPNOC considers the status of this item CLOSED

NRC RAI #15 (Reference 6)

The NRC staff has concerns regarding the licensee's lack of information provided to demonstrate that the control room display will be suitably isolated from and not impact the licensee's proposed primary display in the Radwaste Control Room.

Please provide information to demonstrate that the control room display will be suitably isolated from and not impact the licensee's proposed primary display in the Radwaste Control Room.

STPNOC Response:

The Control Room display will be on the Integrated Computer System (ICS). The signal that goes from the Radwaste Control Panel to the ICS is transmitted through a signal isolator, Acromag 633T current isolator. That isolator only transmits a 4-20ma signal. This isolates the input signal from the VEGAPULS 62 ER Sensor from the signal being sent out to the ICS, preventing any adverse interaction.

STPNOC considers the status of this item CLOSED

NRC RAI #16 (Reference 6)

The NRC staff has concerns with the licensee's lack of information regarding the training of personnel for activities such as use of the instrument channels, provision for alternate power, and calibration and surveillance of the SFP instrumentation. Another staff concern is the lack of information on the licensee's approach to training with respect to the SFP instrumentation.

Please describe the activities for which personnel will be trained, such as use of the instrument channels, provision of alternate power, calibration and surveillance. Describe

the approach to training used to identify the population to be trained and determined the initial and continuing elements of the required training for the SFP instrumentation.

STPNOC Response:

The Systematic Approach to Training will be used to determine what training is necessary for this modification. Operations and Maintenance will be trained as a minimum. Details of this training are still to be determined.

STPNOC considers the status of this item OPEN

NRC RAI #17 (Reference 6)

The NRC staff has concerns with the licensee's lack of information about its plans to develop procedures. The staff previously requested this information as RAI-10 in NRC letter dated June 7, 2013. However, based on feedback from licensees, the staff revised this RAI as follows:

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

STPNOC Response:

Progress will be reported in next 6 month update.

STPNOC considers the status of this item OPEN

NRC RAI #18 (Reference 6)

The NRC staff has concerns regarding the feasibility of the licensee's process for in-situ calibration to ensure that the design accuracy will be maintained.

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.

STPNOC Response:

The in-situ calibration process at the SFP location utilizes the capability to rotate the waveguide horn assembly from its normal downward-pointing position so that it can be pointed at a target that is moved along the radar beam path. By placing the moveable target at known distances from the horn, the instrument output can be checked at each target location. In the event that the as found values are not within acceptance criteria, the measurement range can be shifted up or down to calibrate the instrument to within the required tolerance.

STPNOC considers the status of this item CLOSED

NRC RAI #19 (Reference 6)

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 your 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) **A description of how the guidance in NEI 12-02 Section 4.3 regarding compensatory actions for one or both non-functioning channels will be addressed.**

c) **A description of what compensatory actions are planned in the event that one of the instrument channels cannot be restored to functional status within 90 days.**

(This information was previously requested as RAI-11 in NRC letter dated June 7, 2013)

STPNOC Response:

Progress will be reported in next 6 month update.

STPNOC considers the status of this item OPEN

6. **Need for Relief/Relaxation and Basis for the Relief/Relaxation**
   STPNOC expects to comply with the order implementation date and no relief/relaxation is required at this time.

7. **Potential Draft Safety Evaluation Impacts**
   None