NEXTera ENERGY SEABROOK

August 27, 2015
SBK-L-15138
Docket No. 50-443

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

Seabrook Station

NextEra Energy Seabrook, LLC's Fifth Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)

References:

1. NRC Order Number EA-12-051, Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, March 12, 2012 (ML12056A044)
2. NRC Interim Staff Guidance JLD-ISG-2012-03, Compliance with Order EA-12-051, Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, Revision 0, August 29, 2012 (ML12221A339)
3. 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, August 2012
4. NextEra Energy Seabrook, LLC Initial Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, (Order Number EA-12-051), October 26, 2012 (ML12311A012)
5. NextEra Energy Seabrook, LLC Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, (Order Number EA-12-051), February 26, 2013 (ML13063A439)
6. NextEra Energy Seabrook, LLC, First Six Month Status Report for the Implementation of Order EA-12-051, Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, August 28, 2013 9ADAMS Accession No. ML13247A177).
7. Seabrook Station, Unit 1 - Interim Staff Evaluation and Request for Additional Information Regarding the Overall Integrated Plan for Implementation of Order EA-12-051, Reliable Spent Fuel Pool Instrumentation (TAC No. MF0837), December 4, 2013 (ADAMS Accession No. ML13267A388).

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8. NextEra Energy Seabrook, LLC, Second Six Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, February 27, 2014 (ADAMS Accession No. ML14064A189).
9. NextEra Energy Seabrook, LLC, Third Six Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, August 24, 2014 (ADAMS Accession No. ML14246A192).
10. NextEra Energy Seabrook, LLC, Fourth Six Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, February 27, 2014 (ADAMS Accession No. ML15068A007).

On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued an order (Reference 1) to NextEra Energy Seabrook, LLC (NextEra). Reference 1 was immediately effective and directs NextEra to install reliable spent fuel pool level instrumentation. Specific requirements are outlined in Attachment 2 of Reference 1.

Reference 1 required submission of an initial status report 60 days following issuance of the final interim staff guidance (Reference 2) and an overall integrated plan pursuant to Section IV, Condition C. Reference 2 endorses industry guidance document NEI 12-02, Revision 1 (Reference 3) with clarifications and exceptions identified in Reference 2. Reference 4 provided the NextEra initial status report regarding mitigation strategies. Reference 5 provided the NextEra overall integrated plan. Reference 6 provided NextEra's first six-month status report. In Reference 7, the NRC requested additional information to enable the continued technical review of the NextEra Energy Seabrook Overall Integrated Plan (OIP). Reference 8 provided an update of milestone accomplishments since the last status report, including changes to the compliance method, schedule, or need for relief and the basis, if any. It also provided responses to the Reference 7 request for additional information to the extent possible. Reference 9 provided the third update of milestone accomplishments and also included answers to the request for additional information. Reference 10 provided the fourth update of milestone accomplishments.

The attachment to this letter provides the fifth six-month status update of milestone accomplishments since the last status report, including changes to the compliance method, schedule, or need for relief and the basis, if any.

This letter contains no new regulatory commitments.

If you have any questions regarding this report, please contact Mr. Michael Ossing, Licensing Manager, at (603) 773-7512.

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

Executed on August 27, 2015.

Sincerely,

NextEra Energy Seabrook, LLC

Dean Curtland
Site Vice President

Attachment

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Attachment to SBK-L-15138

NextEra Energy Seabrook, LLC's Fifth Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)

4.0 CHANGES TO COMPLIANCE METHOD

The Order includes the following requirement:

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.

NEI 12-02 guidance on this requirement states that:

The intent of the arrangement requirement is to specify reasonable separation and missile protection requirements for permanently installed instrumentation used to meet this order. Separation and shielding can help minimize the probability that damage due to an explosion or extreme natural phenomena (e.g., wind-driven missiles) will render fixed channels of SFP instrumentation unavailable. However, the intent of this requirement is not to constrain the design of the SFP instrumentation channels to the extent that it unduly impairs reliability, operability, or maintainability of the instrumentation. To the extent practical, the SFP instrumentation channels should not impair the ability to accomplish normal SFP operations and associated support activities, nor other activities that take place on the SFP deck. Installation of the SFP instrument channels shall be consistent with the plant specific SFP design requirements. Channel separation should be maintained by locating the installed sensors in different places in the SFP area. If practical, examples of sensor location arrangements are

- *on opposite sides or corners of the pool area,*
- *separated by a distance comparable to the shortest length of a side of the pool,*
- *in recesses of the pool to maximize the inherent missile protection provided by the pool walls,*
- *cask decontamination pits and fuel transfer tube areas, or*
- *next to or connected to structures that are securely connected to the side of the pool (e.g., a new fuel elevator) which may provide some protection from falling debris or missiles.*

The Overall Integrated Plan for Seabrook Station stated that the primary and backup instrument channel sensors for monitoring Spent Fuel Pool level for Seabrook Station would be located in the northwest and southwest corners of the Spent Fuel Pool (SFP) with the signal cable routed in rigid steel conduit to the adjacent west wall of the Fuel Storage Building (FSB). Each conduit would be routed on its own separate independent series of seismically qualified supports to level transmitters located in the Containment Enclosure Building (CEB) using Class 1E type separation as currently assumed in the plant design basis. The plan also noted that the corners of the SFP would provide inherent missile protection for the level sensor probes in the pool.

Subsequently, a detailed field review of the plan has identified several implementation concerns with this plan. Installation of the sensor mounting brackets would require removal of 1/2 inch steel plates that were installed during plant construction to form the non-pool side of the curb that supports the stainless SFP liner. These plates are recessed into the Fuel Handling Machine (FHM) rail pockets and their removal would be very difficult.

The process of removing the plates also presents risk for potential damage to the SFP curb, loss of FME and personnel safety concerns due the limited work space next to the pool. The final design will also result in limited clearance (~1-1/2 inch) between the sensor mounting brackets and the frame of the FHM. Considering these concerns, alternative locations for SFP level sensor mounting have been evaluated. Based on current activities for SFP operations, and considering the physical limitations for mounting the sensor bracket and sensor signal cable access, the west side of the SFP is considered to be the preferred mounting location for both the primary and backup instrument channel sensors.

This submittal also documents minor revisions to previous NextEra responses to Nuclear Regulatory Commission (NRC) requests for additional information regarding the Overall Integrated Plan for Implementation of Order EA-12-051, Reliable Spent Fuel Pool Instrumentation. These include:

1. Revised acceptance criteria for channel checks. The level displayed by the SFPIS channels will be verified every 24 hours as part of Nuclear System Operator (NSO) rounds. This verification will compare level readings from the SFPIS channels (1-SF-LI-2616/ 1-SF-LI-2617) to the existing control room SFP level indication (1-SF-LI-2607). Channel maintenance including channel calibration(s) will be initiated if the deviation between indicated level readings exceeds the bounding uncertainty of SFP level readings between the existing SFP level indicators (1-SF-LI-2607, +/- 2 in.) and the new SFPIS indicators (+/- 3 in). Channel maintenance and/ or channel calibration shall be initiated if the deviation between indicated level readings exceeds 3.0 inches between the new SFPIS indicators or 2.0 inches between the new SFPIS indicator and the existing 1-SF-LI-2607 indicator.
2. Provided clarification on the Westinghouse established unmeasurable zones (instrument sensitivity bands) of the sensor probe for the SFPIS. The instrument sensitivity band at the top of the probe is 12 inches. Therefore, the SFP level instrument upper range will be at least 15 inches above Level 1 (Elev. 23 ft,. 4 in.) to account for the upper instrument sensitivity band and instrument loop uncertainty. The instrument sensitivity band at the bottom of the probe is 4 inches. The established elevation for Level 3 (Elev. (-) 6 in) will not need to be affected to provide additional margin for instrument sensitivity band and uncertainty. An indicated level on either the primary or backup instrument channel of greater than plant elevation (-) 0 ft., 6 in will assure that the fuel remains covered.
3. Revised the pool side bracket design to support relocation as described above.
4. Revised responses to address requests for addition information during the 2015 NRC FLEX Audit.

5. Incorporated the following description of procedures that are being developed to maintain the system:

PM	TITLE	FREQ
SF-L-2616-CAL-1	TRAIN A SPENT FUEL POOL LEVEL (BDB) CALIBRATION	1 Year
SF-L-2616-BR-1	TRN A SFP LEVEL 1-SF-CP-300-A BATTERY REPLACEMENT	3 Year
SF-L-2616-MAN-1	TRN A SFP LVL XMTR 1-SF-LIT-2616 REPLACEMENT	7 Year
SF-L-2616-MAN-2	TRN A SFP LVL PWR SUPPLY 1-SF-UQ-2616 REPLACEMENT	10 Year
SF-L-2617-CAL-1	TRAIN B SPENT FUEL POOL LEVEL (BDB) CALIBRATION	1 Year
SF-L-2617-BR-1	TRN B SFP LEVEL 1-SF-CP-300-B BATTERY REPLACEMENT	3 Year
SF-L-2617-MAN-1	TRN B SFP LVL XMTR 1-SF-LIT-2617 REPLACEMENT	7 Year
SF-L-2617-MAN-2	TRN B SFP LVL PWR SUPPLY 1-SF-UQ-2617 REPLACEMENT	10 Year

The following high level FSGs will direct operators to monitor SFP level using SFPIS:

FSG-0.0, Extended Loss of All AC Power with SEPS
FSG-0.1, Extended Loss of All AC Power without SEPS
FSG-5, Initial Assessment and FLEX Equipment Staging
FSG-11, Alternate SFP Makeup and Cooling
FSG-14, Extended Loss of All AC Power while Plant Shutdown

When SFP level cannot be maintained greater than 23 feet above the top of the racks the FSG procedures direct operators to implement FSG-11, Alternate SFP Makeup and Cooling.

FSG-5, Initial Assessment and FLEX Equipment Staging, will provide methods to establish portable ventilation in the CEVA area when area temperature is greater than 130°F.

FSG-5, Attachment G, Restore Miscellaneous Lighting and Pipe Chase Ventilation Power, will provide an alternate power source to SFPIS.

The following Operating Procedures will also be revised to address alignment of the SFPIS for operation.

OS1014.01, Spent Fuel Cleanup and Cooling System Fill and Vent (system lineup)
OS1046.58, MCC-515 Maintenance Procedure
OS1046.65, MCC-615 Maintenance Procedure

5.0 NEED FOR RELIEF/ RELAXATION AND BASIS

Consistent with the requirements of Order EA-12-051 (Reference 8) and the guidance in NEI 12-02 (Reference 5), the six month reports will also delineate progress made, any proposed changes in compliance methods, updates to the schedule, and if needed, requests for relief and their bases.

Evaluation of the alternate mounting locations considered FHM clearance, potential impact of bracket mounting on the attachment structure, access and maintainability of the level sensors and the impact that the location would have on normal SFP operations and support activities.

The review also considered the potential for adjacent equipment and structure over the SFP to impact functionality of the sensors during a Beyond Design Basis External Event (BDBEE).

The evaluation considered alternate mounting locations on the east and west sides of the SFP. The north and south sides of the SFP were not considered to be viable locations for sensor mounting since the FHM traverses the entire length of the SFP which presents the clearance and curb concerns noted above. The east side of the SFP contains the fuel transfer gate, two fuel pool lighting fixtures, two embedded SFP purification system skimmer intakes, 10 inch SFP cooling system discharge piping and 4 inch SFP filter system return piping, and a permanent storage location for one of the fuel handling tools. This side of the SFP is also used as the personnel access point and work area for SFP operations including: spotting during fuel movements, inspection camera access, Operator access for transfer gate manipulation and inspections, transfer canal inspections, and temporary storage location for radioactive wastes prior to survey and removal by Health Physics personnel. The west side of the SFP contains two SFP purification system skimmer intakes, two fuel pool lighting fixtures and the sensor for the existing SFP level instrumentation (1-SF-LE-2607). This side of the SFP is also used as the personnel access point for maintenance of the existing pool level instrumentation and cleaning of two of the skimmer intake basket filters.

Based on current activities for SFP operations, and considering the physical limitations for mounting the sensor bracket and sensor signal cable access, the west side of the SFP is considered to be the preferred mounting location for both the primary and backup instrument channel sensors. However, due to the interferences described above, e.g., the FHM rails on the north and south walls, the various appurtenances, equipment and access on the east wall and the skimmers inboard of the FHM rails on the west wall, sensor mounting will be on the west wall, physically separated by approximately 18 ft, 2 in. on center as shown on the attached sketches (Enclosure 3).

This configuration is considered to be in compliance with the requirements of references (1), (2) and (3) based on the following:

1. The FSB is a seismic Category I reinforced concrete structure designed and constructed to meet the requirements of Seabrook UFSAR §3.8.4, Reinforced concrete is designed and constructed per the American Concrete Institute code, ACI 318-71. Steel framing within the structure is designed and constructed to the requirements of the American Institute of Steel Construction code, AISC Specification for the Design, Fabrication and Erection of Structural Steel for Building, 1969 Edition. Concrete walls are a minimum of 24 inches thick concrete with a minimum compressive strength of 3000 psi. No block or concrete masonry partitions are utilized in any Category I structure at Seabrook Station. The FSB superstructure is constructed of concrete walls and roof. The building is capable of withstanding the effects of extreme natural phenomena, including earthquake, tornado, hurricanes, and floods.

2. The SFP is constructed of concrete walls having a minimum thickness of 6 feet and a 4'-10" thick concrete floor. For leak tightness, the inside surface of the SFP is lined with stainless steel plates 3/16" thick on the walls and 1/4" thick on the floor.

3. Structural integrity qualification of the Category I FSB for actual and postulated loads imposed by equipment mounted to the structure is addressed by local analysis of the attachment mechanism. Concrete anchors are used for attachment to the structure. Embedded concrete anchor allowable loads are based on the anchor failing before the concrete. Thus the embedded anchor design assures that the concrete structure maintains its local structural integrity.

4. The effect of the actual and postulated loads on the global building structural integrity is a matter of comparison of the additional load to the generic design loads for the structure. Generic design loads, as described in the structural design criteria, are used to account for undefined loads. Additional loads that exceed the generic design loads warrant an evaluation of the affected structural elements. Loads that exceed the generic design loads are not expected for the sensor mounting bracket installations. The design inputs for the attachment connection are the weight of the component, the method of attachment, the local seismic response of the building, plus any other pertinent loads per UFSAR §3.8.4.3, *Loads and Loading Combinations*.

5. Simple static analyses will be used to evaluate the support attachment design. This conservative analysis methodology will use peak acceleration in each of three orthogonal directions obtained from the building amplified response spectra. Those accelerations are increased by 50% to account for multi-modal response (multiplied by 1.5). Attachment loads are calculated in each of the three directions. Then loads are combined by square root sum of the squares (SRSS), and then combined with dead weight loads and compared with allowable loads. Alternatively, the stiffness of the component and support may be computed and the frequency of the first mode of vibration estimated. Should the frequency fall in the rigid range of the response spectra, then the zero period accelerations of the three orthogonal directions may be used for the static analysis described above.

Since the FSB is a Seismic Category I structure, all equipment mountings within this building are designed to remain anchored during and following a seismic event. This design provides reasonable assurance that missiles will not be generated during a BDBEE by equipment located in the areas adjacent to the alternate sensor mounting locations on the west side of the SFP (Ref. Enclosure 3). Physical separation of the SFP level sensors and instrument channel cables to the extent practicable will also be used to provide protection against missiles that may result from unexpected damage to adjacent seismically installed structures or components. Physical separation will be maintained using Class 1E type separation. The separation will be achieved through mounting to safety class structures, use of independent Seismic Category I supports and raceways, and physical distance between the channel sensors, sensor cabling, electronic enclosures and equipment mounted in the SFP or stored next to the SFP in accordance with the design criteria described in UFSAR §8.3.1.4, "Independence of Redundant Systems," UFSAR Appendix 8A, "Attachment C to AEC Letter Dated December 14, 1973, Physical Independence of Electric Systems," and UFSAR Table 8.3-10, "Electrical Cable and Raceway Separation Criteria." All SFP level instrument sensor equipment located in the FSB will be seismically qualified and installed to maintain the Class 1E separation criteria currently assumed in the plant design basis.

6.0 REQUESTS FOR ADDITIONAL INFORMATION

The NRC staff determined that additional information was required to enable the continued technical review of the NextEra Overall Integrated Plan (OIP). Tables 1 and 2 provide a summary of the status of responses to the Request for Additional Information (RAIs) and subsequent NRC questions that were received on December 4, 2013 (Reference 10). Enclosures 1, 2 and 3 summarize the design, support the responses in the tables and include the design requirements for the Westinghouse supplied level monitoring equipment with reference applicable Westinghouse qualification documentation. Required changes to RAI responses that result from changes in details developed since the previous submittal as discussed above have been incorporated into the tables for this submittal.

Summary of RAI Status

Open RAIs	Status
RAI-1 - Levels	Complete, Reference 11
RAI-2 - Arrangement	Complete, Reference 11
RAI-3 a, b, c – Mounting	Complete, Table 2
RAI-4 – Mounting	Complete, Table 2
RAI-5 - Mounting	Complete, Reference 11
RAI-6 a, b, c – Qualification	Complete, Table 2
RAI-7 – Qualification	Complete, Table 2
RAI-8 – Independence	Complete, Table 2
RAI-9 – Power Supply	Complete, Table 2
RAI-10 – Accuracy	Complete, Table 2
RAI-11 – Testing and Calibration	Complete, Table 2
RAI-12 – Display	Complete, Table 2
RAI-13	Complete, Reference 11
RAI-14	Complete, Reference 11
RAI-15 – Testing and Calibration	Complete, Table 2

References

1. NRC Electronic Mail to NextEra Energy Seabrook, LLC, "Draft Requests for Additional Information Regarding the Seabrook Overall Integrated Plan for Reliable SFP Instrumentation, dated July 18, 2013 (ADAMS Accession No. ML13217A166).

2. NextEra Energy Seabrook, LLC's Overall Integrated Plan in Response to March 12, 2012 Commission Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051), dated February 26, 2013 (ADAMS Accession No. ML13063A439)

3. NextEra Energy Seabrook, LLC's Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049), dated February 22, 2013 (ADAMS Accession No. ML13063A438)

4. NRC JLD-ISG-2012-03, Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation, Revision 0, August 29, 2012.

5. 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, August 2012.

6. NEI 12-06, Diverse and Flexible Coping Strategies (FLEX) Implementation Guide, Revision 0, August 2012.

7. Seabrook Calculation C-S-1-24606, "Spent Fuel Pool Level for Reliable Pump Suction," Revision 00.

8. NRC Order EA-12-051, "Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," dated March 12, 2012 (ADAMS Accession No ML12056A044).

9. NextEra Energy Seabrook, LLC, First Six Month Status Report for the Implementation of Order EA-12-051, "Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation ," dated August 28, 2013 (ADAMS Accession No. ML13247A177).

10. Seabrook Station, Unit 1 - Interim Staff Evaluation and Request for Additional Information Regarding the Overall Integrated Plan for Implementation of Order EA-12-051, Reliable Spent Fuel Pool Instrumentation (TAC No. MF0837), Dated December 4, 2013 (ADAMS Accession No. ML13267A388).

11. ML14064A189, NextEra Seabrook, LLC, Second Six-Month Status Report I Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, dated February 27, 2014.

12. ML14246A192, NextEra Energy Seabrook, LLC's Third Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051), dated August 24, 2014.

Table 1		
RAI No.	NRC QUESTION	LICENSEE RESPONSE
RAI 1	*The OIP states, in part, that:* *Level 1 is the level adequate to support operation of the normal fuel pool cooling system - Based on preliminary calculation, the low level limit for reliable SFP cooling system operation corresponds to an elevation of approximately 22 ft., 6 in. This level is based on a preliminary calculation that assumes mitigating effects by the installed suction strainer on vortexing. The actual effect of the strainer on this level will be determined during the engineering and design phase of the project.* *For the purposes of this submittal the minimum level that will be adequate to support normal fuel pool cooling system operation, as indicated on either the primary or backup instrument channel, is assumed to correspond to a plant elevation of 22 ft., 6 in.* *Level 2 is adequate to provide substantial radiation shielding for a person standing on the spent fuel pool operating deck - Indicated level on either the primary or backup instrument channel of greater than an elevation of 10 ft., 9.5 in will provide substantial radiation shielding for a person standing on the SFP operating deck. This elevation is approximately 13 feet above the top of the spent fuel positioned in the pool (Nominal Elev. (-) 1 ft., 5-3/4 in.). With 13 feet of water above the highest fuel element position, the calculated dose rate at the surface of the SFP is less than 2.5 mrem/hr (Reference 10, Section 12.3.2.1.c). This monitoring level ensures there is adequate water level to provide substantial radiation shielding for personnel to respond to Beyond-Design-Basis External Events including the initiation of SFP makeup strategies that would require access to the Fuel Storage Building (FSB).*	**NextEra Response RAI-1.a** Enclosure 1 contains an elevation view of the proposed arrangement for the portions of the instrument channel consisting of permanent measurement channel equipment. In addition, the datum values for the Levels 1, 2 and 3 are depicted based on assumed sensitivity and instrument loop accuracy. For Level 1, the two points described in the NEI 12-02 guidance are; the level at which reliable suction loss occurs due to uncovering of the coolant inlet pipe, weir or vacuum breaker (depending on the design), or the level at which the water height, assuming saturated conditions, above the centerline of the cooling pump suction provides the required net positive suction head specified by the pump manufacturer or engineering analysis. To determine the higher of the two levels the following was taken into consideration: (1) The level at which reliable suction loss occurs due to uncovering the coolant inlet pipe or any weirs or vacuum breakers associated with suction loss. This level was established based on nominal suction strainer inlet elevation and conservative estimate for the onset of vortexing. The actual effect of the strainer on this level has been formally determined by calculation C-S-1-24606, "Spent Fuel Pool Level for Reliable Pump Suction," (Reference 36). The elevation for reliable pump suction is plant elevation 23 ft., 4 inches. (2) The level at which the normal spent fuel pool cooling pumps lose required NPSH assuming saturated conditions in the pool. Reference 36 demonstrates that the point of zero NPSH margin is 22 ft., 4 inches of plant elevation. With the spent fuel pool at 212 degrees F, saturated conditions, the NPSHA is approximately 11.2 ft. The NPSHR for the pump is 10 ft. at 212 degrees F. This results in a ratio of NPSHA/NPSHR value of approximately 1.12. Therefore, the NPSHA is greater than the NPSHR at saturated conditions.. The higher of the above points is the level where the inlet strainer will lose suction (Item (1) above). Therefore, Level 1 has been revised to elevation 23 ft., 4 inches for both the primary and backup instrumentation. The SFP level instrument upper range will be at least 12 inches above Level 1 to account for upper instrument sensitivity band and instrument loop uncertainty. From a practical perspective, the upper range capability will extend even higher (e.g. above normal operating level). Level 3 has also been revised to provide margin for the instrument sensitivity band and uncertainty. For the purposes of this submittal level on either the primary or backup instrument channel that corresponds to a plant elevation of greater than (-) 0 ft., 6 in will assure that the fuel remains covered. **NextEra Response RAI-1.b**

Table 1		
RAI No.	NRC QUESTION	LICENSEE RESPONSE
	Level 3 is where fuel remains covered - Indicated level on either the primary or backup instrument channel of greater than Elevation (-)1 foot. This is the nominal water level approximately 6 in. above the top of the fuel racks. This monitoring level will assure the maximum range of level information is available to the plant Operators and emergency response personnel. This level is also assumed to be the minimum level that assures that adequate water level remains above the top of the stored fuel seated in the SFP (nominal elevation of (-)2 ft., 2.5 in.). *Please provide the following:* *a) For level 1, specify how the identified elevation represents the HIGHER of the two points described in the NEI 12-02 guidance for this level.* *b) A clearly labeled sketch depicting the elevation view of the proposed typical mounting arrangement for the portions of instrument channel consisting of permanent measurement channel equipment (e.g., fixed level sensors and/or stilling wells, and mounting brackets). Indicate on this sketch the datum values representing Level 1, Level 2, and Level 3 as well as the top of the fuel racks. Indicate on this sketch the portion of the level sensor measurement range that is sensitive to measurement of the fuel pool level, with respect to the Level 1, Level 2, and Level 3 datum points.*	Enclosure 1 contains an elevation view of the proposed arrangement for the portions of the instrument channel consisting of permanent measurement channel equipment. In addition, the datum values for the Levels 1, 2 and 3 are depicted as well as the assumed accuracy of the equipment. Westinghouse has established that the accuracy for the SFPIS will be +/- 3.0 inches (Reference 22). Westinghouse has also established the unmeasurable zones (instrument sensitivity bands) of the sensor probe. The instrument sensitivity band at the top of the probe will be 12 inches. Therefore, the SFP level instrument upper range will be set to a value that is at least 15 inches above Level 1 to account for the upper instrument sensitivity band and instrument loop uncertainty. The instrument sensitivity band at the bottom of the probe will be 4 inches. The instrument lower range will be set to a value that is at least 7 inches below Level 3 (Plant Elev. (-) 0 ft., 6 in) to account for the instrument sensitivity band and uncertainty. A level on either the primary or backup instrument channel that corresponds to Plant Elev. (-) 0 ft., 6 in will assure that the fuel in the pool remains covered.
RAI 2.	*The OIP states, in part, that;*	Enclosure 3 contains plan views of the proposed arrangement for the portions of the instrument channel consisting of

Table 1		
RAI No.	**NRC QUESTION**	**LICENSEE RESPONSE**
	The Spent Fuel Pool Level (SFP) Instrumentation for each channel will consist of a level sensing probe suspended in the SFP, a signal conditioning processor module, level indicator and a backup battery system. Redundant Train A and Train B cables will be routed from the Fuel Storage Building (FSB) through the Containment Enclosure Ventilation Area (CEVA) and into the Primary Auxiliary Building (PAB) to connect each probe to a signal conditioning processor module. The signal processor module is a panel-mounted instrument that has a display screen showing a numerical read out of SFP level as a continuous indication (i.e., remote Indication). The signal conditioning processor module for each channel will be mounted in a separate stainless steel enclosure located in the PAB so that the instruments will not be subject to the radiation, high temperature and high humidity conditions that could result from postulated loss of water inventory in the SFP. The primary operator indication and backup battery systems will be provided in the Train A and Train B Essential Switchgear Rooms (Elev. 21 ft., 6 in.) located in the Control Building. *Please modify the sketch in Figure 1 or provide a marked-up plant drawing of the plan view of the SFP area, depicting the SFP inside dimensions, the planned locations/placement of the primary and back-up SFP level sensors, and the proposed routing of the cables that will extend from the sensors toward the location of the local electronics cabinets and read-out/display devices in the main control room or alternate accessible location.*	permanent measurement channel equipment. As requested the enclosure depicts the inside dimensions of the SFP, planned placement of the primary and backup level sensors in the SFP and the proposed routing of cables that will connect the sensors to the level transmitters. The location of the signal conditioning processor module (level Transmitter) for each channel has been revised from the Primary Auxiliary Building to the Containment Enclosure Building. The planned location of the UPS/ remote display in the Train A and Train B Essential switchgear Rooms is also provided.
RAI 3.	*The OIP states, in part, that;*	

Table 1		
RAI No.	NRC QUESTION	LICENSEE RESPONSE
	Equipment mounting will be Seismic Category I in accordance with guidelines of Regulatory Guide 1.29. Installed equipment will be seismically qualified to withstand the maximum seismic ground motion considered in the design of the plant area in which it will be installed. *Where the collapse of components would adversely affect the performance of the SFP level instrumentation, the components will be supported to withstand seismic loading or isolated from the systems or components by Seismic Category I boundary restraints.* *Please provide the following:* *a) The design criteria that will be used to estimate the total loading on the mounting device(s), including static weight loads and dynamic loads. Describe the methodology that will be used to estimate the total loading, inclusive of design basis maximum seismic loads and the hydrodynamic loads that could result from pool sloshing or other effects that could accompany such seismic forces.* *b) A description of the manner in which the level sensor (and stilling well, if appropriate) will be attached to the refueling floor and/or other support structures for each planned point of attachment of the 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.* *c) 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.*	Question for RAI 3a, 3b, and 3c are addressed in the response to NRC questions included in Table 2.
RAI 4.	*The OIP states, in part, that;* *Components of the instrument channels will be*	Question for RAI 4a, 4b, and 4c are addressed in the response to NRC questions included in Table 2.

Table 1		
RAI No.	**NRC QUESTION**	**LICENSEE RESPONSE**
	qualified for shock and vibration using one or more of the following methods... *The effects of postulated seismic events on installed instrument channel components (with the exception of battery chargers and replaceable batteries), will be verified to ensure that the equipment design and installation is robust.* *Applicable components of the instrument channels will be qualified by the manufacturer (or otherwise tested) for seismic effects at response levels commensurate with the equipment mounting location. Instrument channel qualification will be based on the guidance provided in Sections 7, 8, 9, and 10 of IEEE Standard 344-2004, IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations, or a substantially similar industrial standard.* *In addition, any of the below may also be used to provide additional assurance that the equipment will perform as designed during and following a seismic event:* • *Review of operating history for component used in environments with significant vibration, such as for portable hand-held devices or devices used in transportation applications. The effects of low frequency, high acceleration will be included in the qualification as discussed above. Vibration qualification will be inclusive of methods that demonstrate the effects of seismic motion imparted to the components at the location of installation.* • *Demonstration that devices are substantially similar in design to equipment that has been previously tested for seismic effects in accordance with the plant design basis at the*	

Table 1		
RAI No.	**NRC QUESTION**	**LICENSEE RESPONSE**
	location where the instrument is to be installed (g- levels and frequency ranges). *In addition, pool mounted equipment will be qualified for submergence, providing protection from wave and seismic related disturbances during and after a seismic event.* *Please provide the following:* *a) A description of the specific method or combination of methods you intend to apply to demonstrate the reliability of the permanently installed equipment under Beyond- Design-Basis (BDB) ambient temperature, humidity, shock, vibration, and radiation conditions* *b) 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.* *c) 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*	

Table 1		
RAI No.	NRC QUESTION	LICENSEE RESPONSE
	required accuracy.	
RAI 5.	*The OIP states, in part, that;* *The backup instrument channel will be redundant to, and independent of, the primary instrument channel. Independence will be obtained through separation of the sensors, indication, backup battery power supplies, associated cabling and channel power feeds. Power sources to each channel will be from a different Class 1E plant bus (Train A and Train B).* *Please provide the following:* *a) A description of how the two channels of the proposed level measurement system in each pool meet this requirement so that the potential for a common cause event to adversely affect both channels is minimized to the extent practicable.* *b) Further information describing the design and installation of each level measurement system, consisting of level sensor electronics, cabling, and readout devices. Please address how independence of these components of the primary and back-up channels is achieved through the application of independent power sources, physical and spatial separation, independence of signals sent to the location(s) of the readout devices, and the independence of the displays.*	**NextEra Response RAI-5.a** The permanently installed primary and backup instrument channels are redundant and will be installed independent of each other with respect to physical separation and electrical power sources. The physical and electrical separation will minimize the potential for a common cause event to adversely affect both channels. Each channel will consist of a level sensor, Level Transmitter and a Uninterruptible Power Supply (UPS) with remote level display. The level transmitters, one per channel, will be mounted in separate locations within the Containment Enclosure Building (CEVA) using independent seismically qualified supports. A vendor supplied cable will be independently run from each SFP sensor to the appropriate level transmitter. The vendor cables will be routed in dedicated rigid steel conduits that will be installed from each SFP sensor locations to the west wall of the SFP building, head south to the existing cable tray block outs, exit through the block outs to the transmitters location located in CEVA. Each conduit will be installed on its own separate independent series of seismically qualified supports (i.e. "A" train and "B" train supports) maintaining maximum physical separation between the primary and backup channel routings. The spatial separation of the transmitters and associated conduits will minimize the potential for a common cause event in the SFP area to adversely affecting both channels. The primary and backup channel UPS/ Remote Indication Enclosures, which includes the remote displays, will be located in the "A" and "B" train Essential Switchgear Rooms, one channel in each room. The Essential Switchgear Rooms are separated by physical barriers that assure train separation that preserves the independence of redundant Class 1E plant electrical systems to prevent the occurrence of a common failure mode. From the transmitter locations in CEVA, new plant cables will be installed in the existing seismically qualified "A" and "B" train tray systems to the remote indication enclosures (UPS/ Remote Indicator) located in the "A" and "B" train Essential Switchgear Rooms. Rigid steel conduit will also be installed in each switchgear room from the enclosure to the tray system. All conduit and trays for the routing of the cabling will be seismically qualified and capable of carrying safety related Class 1E circuits. The primary level channel will be powered from the120VAC distribution panel for MCC 615 (Train B). MCC 615 is located in the train B Essential Switchgear Room. The backup level channel will be powered from 120VAC distribution panel for MCC 515 (Train A). MCC 515 is located in the train A Essential Switchgear Room. These panels are physically separated from each other and will be normally powered from independent emergency diesel backed power supplies

Table 1		
RAI No.	**NRC QUESTION**	**LICENSEE RESPONSE**
		which serve to minimize the potential for a common cause event to affect both channels. In the event that the primary or backup power source from these panels is unavailable the channel UPS will automatically swap from 120VAC to the battery backup power supply. The Overall Integrated Plan for Seabrook Station stated that the primary and backup instrument channel sensors for monitoring Spent Fuel Pool level for Seabrook Station would be located in the northwest and southwest corners of the Spent Fuel Pool (SFP) with the signal cable routed in rigid steel conduit to the adjacent west wall of the Fuel Storage Building (FSB). Each conduit would be routed on its own separate independent series of seismically qualified supports to level transmitters located in the Containment Enclosure Building (CEB) using Class 1E type separation as currently assumed in the plant design basis. The plan also noted that the corners of the SFP would provide inherent missile protection for the level sensor probes in the pool. Subsequently, a detailed review of the plan has identified several implementation concerns. Installation of the sensor mounting brackets would require removal of 1/2 inch steel plates that were installed during plant construction to form the non-pool side of the curb that supports the stainless SFP liner. These plates are recessed into the Fuel Handling Machine (FHM) rail pockets. Removal of the plates will be very difficult and the process of removing the plates presents risk for potential damage to the SFP curb. Removal of the plates also presents potential FME and personnel safety concerns due the limited work space next to the pool. The final design will also result in limited clearance (~1-1/2 inch) between the sensor mounting brackets and the frame of the FHM. Considering these concerns, alternative locations for SFP level sensor mounting are being considered and evaluated. Evaluation of the alternate mounting locations considered FHM clearance, potential impact of bracket mounting on the attachment structure, access and maintainability of the level sensors and the impact that the location would have on normal SFP operations and support activities. The review also considered the potential for adjacent equipment and structure over the SFP to impact functionality of the sensors during a Beyond Design Basis External Event (BDBEE). The evaluation considered alternate mounting locations on the east and west sides of the SFP. The north and south sides of the SFP were not considered to be viable locations for sensor mounting since the FHM traverses the entire length of the SFP which presents the clearance and curb concerns noted above. The east side of the SFP contains the fuel transfer gate, two fuel pool lighting fixtures, two embedded SFP purification system skimmer intakes, 10 inch SFP cooling system discharge piping and 4 inch SFP filter system return piping, and a permanent storage location for one of the fuel handling tools. This side of the SFP is also used as the personnel access point and work area for SFP operations including: spotting during fuel movements, inspection camera access, Operator access for transfer gate manipulation and inspections, transfer canal inspections, and temporary storage location for radioactive wastes prior to survey and removal by Health Physics personnel. The west side of the SFP contains two SFP purification system skimmer intakes, two fuel pool lighting fixtures and the sensor for the existing SFP level instrumentation (1-SF-LE-2607). This side of the SFP is also used as the personnel access point for maintenance of the existing pool level instrumentation and cleaning of two of the skimmer intake basket filters.

Table 1		
RAI No.	NRC QUESTION	LICENSEE RESPONSE
		Based on current activities for SFP operations, and considering the physical limitations for mounting the sensor bracket and sensor signal cable access, the west side of the SFP is considered to be the preferred mounting location for both the primary and backup instrument channel sensors. However, due to the interferences described above, e.g., the FHM rails on the north and south walls, the various appurtenances, equipment and access on the east wall and the skimmers inboard of the FHM rails on the west wall, sensor mounting will be on the west wall, physically separated by approximately 18"-6" on center as shown in Enclosure 3. This configuration is considered to be in compliance with the requirements of references 1, 2 and 3 based on the following: 1. The FSB is a seismic Category I reinforced concrete structure designed and constructed to meet the requirements of Seabrook UFSAR §3.8.4, Reinforced concrete is designed and constructed per the American Concrete Institute code, ACI 318-71. Steel framing within the structure is designed and constructed to the requirements of the American Institute of Steel Construction code, AISC Specification for the Design, Fabrication and Erection of Structural Steel for Building, 1969 Edition. Concrete walls are a minimum of 24 inches thick concrete with a minimum compressive strength of 3000 psi. 2. No block or concrete masonry partitions are utilized in any Category I structure at Seabrook Station. The FSB superstructure is constructed of concrete walls and roof. The building is capable of withstanding the effects of extreme natural phenomena, including earthquake, tornado, hurricanes, and floods. 3. The SFP is constructed of concrete walls having a minimum thickness of 6 feet and a 4'-10" thick concrete floor. For leak tightness, the inside surface of the SFP is lined with stainless steel plates 3/16" thick on the walls and 1/4" thick on the floor. 4. Structural integrity qualification of the Category I FSB for actual and postulated loads imposed by equipment mounted to the structure is addressed by local analysis of the attachment mechanism. Concrete anchors are used for attachment to the structure. Embedded concrete anchor allowable loads are based on the anchor failing before the concrete. Thus the embedded anchor design assures that the concrete structure maintains its local structural integrity. 5. The effect of the actual and postulated loads on the global building structural integrity is a matter of comparison of the additional load to the generic design loads for the structure. Generic design loads, as described in the structural design criteria, are used to account for undefined loads. Additional loads that exceed the generic design loads warrant an evaluation of the affected structural elements. Loads that exceed the generic design loads are not expected for the sensor mounting bracket installations. The design inputs for the attachment connection are the weight of the component, the method of attachment, the local seismic response of the building, plus any other pertinent loads per UFSAR §3.8.4.3, *Loads and Loading Combinations*. 6. Simple static analyses will be used to evaluate the support attachment design. This conservative analysis methodology will use peak acceleration in each of three orthogonal directions obtained from the building amplified

Table 1		
RAI No.	NRC QUESTION	LICENSEE RESPONSE
		response spectra. Those accelerations are increased by 50% to account for multi-modal response (multiplied by 1.5). Attachment loads are calculated in each of the three directions. Then loads are combined by square root sum of the squares (SRSS), and then combined with dead weight loads and compared with allowable loads. Alternatively, the stiffness of the component and support may be computed and the frequency of the first mode of vibration estimated. Should the frequency fall in the rigid range of the response spectra, then the zero period accelerations of the three orthogonal directions may be used for the static analysis described above. \ Since the FSB is a Seismic Category I structure, all equipment mountings within this building are designed to remain anchored during and following a seismic event. This design provides reasonable assurance that missiles will not be generated during a BDBEE by equipment located in the areas adjacent to the alternate sensor mounting locations on the west side of the SFP (Ref. Attachment A). Physical separation of the SFP level sensors and instrument channel cables to the extent practicable will also be used to provide protection against missiles that may result from unexpected damage to adjacent seismically installed structures or components. Physical separation will be maintained using Class 1E type separation. The separation will be achieved through mounting to safety class structures, use of independent Seismic Category I supports and raceways, and physical distance between the channel sensors, sensor cabling, electronic enclosures and equipment mounted in the SFP or stored next to the SFP in accordance with the design criteria described in UFSAR §8.3.1.4, "Independence of Redundant Systems," UFSAR Appendix 8A, "Attachment C to AEC Letter Dated December 14, 1973, Physical Independence of Electric Systems," and UFSAR Table 8.3-10, "Electrical Cable and Raceway Separation Criteria." All SFP level instrument sensor equipment located in the FSB will be seismically qualified and installed to maintain the Class 1E separation criteria currently assumed in the plant design basis. **NextEra Response RAI-5.b** Two completely redundant, independent and permanently installed SFP level measurement channels, both from the same supplier are being provided. Each channel utilizes guided wave radar (GWR) technology which uses the principle of time domain reflectometry to detect SFP water level. Each level measurement channel will consist of a stainless steel sensor cable probe suspended in the SFP from a bracket attached to the operating deck at the side of the pool, a level transmitter located in an adjacent area (CEVA) and a Uninterruptible Power Supply (UPS) with remote level display. Physical and spatial separation will be included in the design as described in the NextEra response to RAI-5.a above. Each level measurement channel will be powered by an independent Emergency Diesel backed power source. The primary level channel will be powered from the120VAC distribution panel for MCC 615 (train B). The backup level channel will be powered from 120VAC distribution panel for MCC 515 (Train A).

Table 1		
RAI No.	**NRC QUESTION**	**LICENSEE RESPONSE**
		The primary level channel signals between the level probe, transmitter and level processor cabinet are entirely independent and separated from the backup level channel as described in the NextEra response to RAI-5.a above.
RAI 6.	*The OIP states, in part, that* *The primary and backup instrument channels will be powered from redundant dedicated batteries and local battery chargers. The battery chargers will normally be supplied 120 V AC power from redundant Class 1E distribution panels (Train A and Train B) that are sequenced and powered by the Emergency Diesel Generators or the Supplemental Emergency Power System (SEPS) on loss of off-site power (LOOP) events. If the normal Class 1E power supply to a channel is not available, the dedicated battery supply will automatically power the instrument channel. A minimum battery life of* *72 hours will be provided for each channel.* *The design will include the capability to isolate the normal Class 1E power supply to each channel by opening the feeder breaker within the Class 1E distribution panel. The Class 1E distribution panels that will be used for this application are located in the Essential Train A and Train B Switchgear Rooms.* *The minimum battery life of 72 hours will be sufficient to assure that the SFP level instrumentation will provide reliable level indication until off-site resources can be*	**NextEra Response RAI-6.a** The primary and backup channels will be powered from independent Emergency diesel backed power distribution system. The primary level channel will be powered from the120VAC distribution panel for MCC 615 (Train B). MCC 615 is located in the Train B Essential Switchgear Room and is normally powered from Unit Substation 61. The backup level channel will be powered from 120VAC distribution panel for MCC 515 (Train A). MCC 515 is located in the train A Essential Switchgear Room and is normally powered from Unit Substation 51. The A and B Train Essential Switchgear Rooms are physically separated from each other by reinforced concrete wall(s). On a loss of offsite power MCC 615 and MCC 515 are powered from separate independent Emergency Diesel Generators. In the event that the primary or backup power source from these panels is unavailable the respective channel UPS will also automatically swap from 120VAC to battery backup power supply. **NextEra Response RAI-6.b** Battery sizing will be in accordance with IEEE 485-2010 (Refer to reference 23). The design criteria for each channel will assume continuous level measurement system operation for at least 72 hours following a loss of the normal ac power source. Westinghouse calculation of system power consumption will be based on the specified values listed in component manufacturer specifications. Margin will be added to the battery sizing calculations, following guidelines of IEEE 485-2010, Section 6.2.2. The specified 72 hour battery mission time will provide ample margin to allow the implementation of Phase II FLEX actions as described in section IX of the overall integrated implementation plan for Seabrook. The 72 hour battery life will be tested and verified during the Factory Acceptance Test or Site Acceptance Test prior to final acceptance of the system.

Table 1		
RAI No.	NRC QUESTION	LICENSEE RESPONSE
	deployed by the mitigating strategies resulting from Order EA-12-049. As part of the mitigating strategies for Order EA-12-049 (Reference 2), it is assumed that one channel of the SFP level instrumentation will be repowered by the SEPS approximately 10 minutes into the event if the emergency diesel generators are not available. Off-site resources (personnel, equipment, etc.) will begin to arriving at the station approximately hour 6 into the event and full staffing is expected within 24 hours. Requested portable equipment that will be connected to repower the redundant vital plant bus, including the power feed to the redundant SFP level monitoring instrument channel, is assumed to arrive at the site from the Regional Response Center (RRC) approximately 24 hours into the event. *Long term coping strategies will include repowering of the redundant SFP level monitoring instrument channel and SFP cooling equipment approximately 36 hours into the event.* *Please provide the following:* *a) A description of the electrical AC power sources and capacities for the primary and backup channels.* *b) If the level measurement channels are to be powered through a battery system (either directly or through an Uninterruptible Power Supply (UPS)), please provide the design criteria that will be applied to size the battery in a manner that ensures, with margin, that the channel will be available to run reliably and continuously following the onset of the*	

Table 1		
RAI No.	NRC QUESTION	LICENSEE RESPONSE
	BDB event for the minimum duration needed, consistent with the plant mitigation strategies for BDB external events (Order EA-12-049).	
RAI 7.	*The OIP states, in part, that* *The instrument channels will be designed such that they will maintain their design accuracy following a power interruption or change in power source without recalibration. Channel accuracy will consider SFP conditions, e.g., saturated water, steam environment, or concentrated borated water.* *Additionally, instrument channel accuracy will be sufficient to allow trained personnel to determine when the actual level exceeds the key spent fuel pool water levels (Levels 1, 2 and 3) without conflicting or ambiguous indication. The accuracy will be within the resolution requirements of Figure 1 of NEI 12-02.* *Please provide the following:* *a) An estimate of the expected instrument channel accuracy performance (e.g., in % of span) under both a) normal SFP level conditions (approximately Level 1 or higher) and b) at the BDB conditions (i.e., radiation, temperature, humidity, post-seismic and post- shock conditions) that would be present if the SFP level were at the Level 2 and Level 3 datum points.* *b) A description of the methodology that will be used for determining the maximum allowed deviation from the instrument channel design*	RAI 7a and 7b are addressed in the response to NRC questions included in Table 2. The following is a summary of the Table 2 responses: The Westinghouse documents WNA-CN-00301-GEN (Reference 22) and WNA-DS-02957-GEN (Reference 34) describe the channel accuracy under both (a) normal SFP level conditions and (b) at the Beyond Design Basis (BDB) conditions that would be present if SFP level were at Level 2 and Level 3 datum points. The overall channel accuracy for the SFPIS level indication was established by Westinghouse based on individual component accuracies using statistical square root sum of the squares (SRSS) methodology as stated in ISA RP67.04.02-2010, "Methodologies for the Determination of Setpoints for Nuclear Safety Related Instrumentation." Each instrument channel will be accurate to within +/- 3 inches during normal spent fuel pool level conditions. The instrument channels will retain this accuracy during and following a BDBE. This accuracy is within the ±1 foot channel accuracy requirements of the Order. The level displayed by the SFPIS channels will be verified every 24 hours as part of Nuclear System Operator (NSO) rounds. This verification will compare level readings from the SFPIS channels (1-SF-LI-2616/ 1-SF-LI-2617) to the existing control room SFP level indication (1-SF-LI-2607). Channel maintenance including channel calibration(s) will be initiated if the deviation between indicated level readings exceeds the bounding uncertainty of SFP level readings between the existing SFP level indicators (1-SF-LI-2607, +/- 2 in.) and the new SFPIS indicators (+/- 3 in). Channel maintenance and/ or channel calibration shall be initiated if the deviation between indicated level readings exceeds 3.0 inches between the new SFPIS indicators or 2.0 inches between the new SFPIS indicator and the existing 1-SF-LI-2607 indicator.

Table 1		
RAI No.	NRC QUESTION	LICENSEE RESPONSE
	accuracy that will be employed under normal operating conditions as an acceptance criterion for a calibration procedure to flag to operators and to technicians that the channel requires adjustment to within the normal condition design accuracy.	
RAI 8.	*The OIP states, in part, that;* *Instrument channel design will provide for routine testing and calibration consistent with Order EA-12-051 and the guidance in NEI 12-02. Instrument channel testing and calibration will be performed using existing plant work control processes. Details for testing and calibration will be determined during the engineering and design phase of the project.* *Please provide the following:* *a) A description of the capability and provisions the proposed level sensing equipment will have to enable periodic testing and calibration, including how this capability enables the equipment to be tested in-situ.* *b) A description of how such testing and calibration will enable the conduct of regular channel checks of each independent channel against the other, and against any other permanently-installed SFP level instrumentation.*	RAI 8a, 8b, 8c and 8d are addressed in the response to NRC questions included in Table 2.

Table 1		
RAI No.	NRC QUESTION	LICENSEE RESPONSE
	c) A description of how calibration tests and functional checks will be performed and the frequency at which they will be conducted. Discuss how these surveillances will be incorporated into the plant surveillance program. d) A description of what preventative maintenance tasks are required to be performed during normal operation, and the planned maximum surveillance interval that is necessary to ensure that the channels are fully conditioned to accurately and reliably perform their functions when needed.	
RAI 9.	*The OIP states, in part, that* *The location for primary and backup SFP level indication will be accessible during and following an event. The Operator indication (Primary and Backup indication) will be provided in the Train A and Train B Essential Switchgear Rooms (Elev. 21 ft., 6 in.) which are located in the Seismic Category I Control Building. The Train A and Train B Essential Switchgear Rooms are in close proximity to the main Control Room and Emergency Planning Technical Support Center located on elevation 75 ft of the Control Building. The location of the primary and backup indication is:* • *Promptly accessible to the appropriate plant staff giving appropriate consideration to various drain down scenarios,* • *Outside of the FSB, e.g., an appropriate distance from the radiological sources resulting from an event impacting the SFP,* • *Inside a seismic category I structure providing protection against adverse weather and*	**NextEra Response RAI 9.a** Local and remote Spent Fuel Pool (SFP) wide range level instrument displays will be provided for each level measurement channel (Primary and backup). The displays will be located in areas outside of the area surrounding the SFP floor. A local display will be located on the front of the primary and backup level transmitters located in the Containment Enclosure Ventilation Area (Ref. Enclosure 3). The CEVA is adjacent to the Spent Fuel Building (SFP) and has multiple access routes through the Seismic Category I Primary Auxiliary Building (PAB) which is normally accessed through the Radiation Protection Checkpoint. Alternate routes into the PAB and CEVA are provided through doors P418 and EM414 (~ Elev. 25 ft.). These doors provide access from the exterior of the PAB and are normally locked. Door EM 414 provides access into the Main Steam Feedwater Pipe Chase and/ or RCA Tunnel. Door P418 provides direct access to the 25 ft. elevation of the PAB. Normal access into the CEVA is provided through door P415 which located on the south east corner of the 25 ft elevation of the PAB. An alternate access route into CEVA is provided from the West Main Steam and Feedwater Pipe Chase stairwell through door EM409 (Elev. 21 ft., 6 in.). The level transmitters and associated displays will be physically protected from the environmental and radiological conditions that could result from a beyond design basis (BDB) event by a reinforced concrete walls that separate the CEVA from the SFB. Remote Spent Fuel Pool (SFP) wide range level instrument displays will also be located in the Train A and Train B Essential Switchgear Rooms (Elev. 21 ft., 6 in.) contained in the Seismic Category I Control Building (Ref. Enclosure 3, one remote indicator per Train). The Train A and Train B Essential Switchgear Rooms are in close proximity to the main Control Room and Emergency Planning Technical Support Center which are located on Elevation 75 ft of the Control Building. The remote level

Table 1		
RAI No.	NRC QUESTION	LICENSEE RESPONSE
	• *outside of any high radiation areas during normal operation.* *Please provide the following:* *a) Since the backup display location is not in the main control room, provide a description of the display location that addresses primary and alternate access route evaluation, continuous habitability at display location(s), continual resource availability for personnel responsible to promptly read displays, and provisions for verbal communications with decision makers for the various SFP drain down scenarios and external events.* *b) The reasons justifying why the locations selected will enable the information from these instruments to be considered "promptly accessible". Include consideration of various drain-down scenarios.*	displays will be physically protected from the environmental and radiological conditions that could result from a beyond design basis (BDB) event by a reinforced concrete walls that separate the Essential Switchgear Rooms from the PAB and SFB. This area will be accessible and continuously habitable following a beyond design basis event. Multiple routes are available to access the Essential Switchgear Rooms from the Control Building. The normal route from the Main Control Room is provided by door C300. This door provides access into the Turbine Building where stair cases TBST1, TBST2, TBST3 and TBST4 provide alternate routes to door C102 on the 21 ft., 6 in. elevation. Door C102 provides access from the Turbine Building into the Train A Emergency Switchgear Room. From the Train A Emergency Switchgear Room, doors C105 or C109 provide access directly into the Train B Emergency Switchgear Room. An alternate access path into the Train B Emergency Switchgear Rooms is provided from the Main Control Room via an enclosed Seismic Category I stairwell (Stairwell CBST2). Door C312 provides access from the Main control room into the 75 ft elevation of the stairwell. Door C118 provides direct access from the 21 ft, 6 in elevation of the stairwell into the Train B Emergency Switchgear room. From the Train B Emergency Switchgear room, doors C105 or C109 provide direct access into the Train A Emergency Switchgear room. Stairwell CBST2 can also be accessed from outside of the control building via door C119 (Elev. 21 ft., 6 in.). The minimum shift complement following a beyond design basis event will initially consist of the staffing positions noted below. Primary and secondary responders from the Offsite Emergency Response Organization would augment this staff within 60 minutes of a declared Alert level emergency condition if it is safe to access the plant. If it is unsafe to access the plant, the primary and secondary responders from the offsite Emergency Response Organization will report to the Alternate Technical Support Center/ Operation Support Center located at the Emergency Operations Facility in Portsmouth, New Hampshire. Staff from the Alternate Technical Support Center/ Operation Support Center will be dispatched to the plant when safe access routes are established. Shift Manager Unit Supervisor Work Control Supervisor Two Control Room Operators Five Nuclear Systems Operator Firefighter Chemistry Technician Health Physics Technician Hand held radios, satellite phones, person to person contact or the plant PBX phone system are communication systems that will be available for transmitting the information. **NextEra Response RAI-9.b**

Table 1

RAI No.	NRC QUESTION	LICENSEE RESPONSE
		The information from the SFP level instrument is promptly accessible for various drain-down scenarios and external events based on the reasons specified in RAI 9a above.
RAI 10.	*The OIP states, in part, that* *Procedures will be developed using guidelines and vendor instructions to address the maintenance, operation, and abnormal response issues associated with the new SFP instrumentation.* *Procedures will address a strategy to ensure SFP water level addition is initiated at an appropriate time consistent with implementation of NEI 12-06, Diverse and Flexible Coping Strategies (FLEX) Implementation Guide and EA-12-049, Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events.* *Please provide the following:* *a) A list of the operating (both normal and abnormal response) procedures, calibration/test procedures, maintenance procedures, and inspection procedures that will be developed for use of the SFP instrumentation in a manner that addresses the order requirements.*	<u>NextEra Response RAI-10.a, b</u> The modification review process will be used to ensure all necessary procedures are developed for maintaining and operating the spent fuel level instruments after installation. These procedures will be developed in accordance with NextEra procedural controls. The objectives of each procedural area are described below: <u>Inspection, Calibration and Testing</u> - Guidance on the performance of periodic visual inspections, as well intrusive testing, to ensure that each SFP channel is operating and indicating level within its design accuracy. <u>Preventative Maintenance</u> - Guidance on scheduling of, and performing, appropriate preventative maintenance activities necessary to maintain the instruments in a reliable condition. <u>Maintenance</u> - To specify troubleshooting and repair activities necessary to address system malfunctions. <u>Programmatic Controls</u> - Guidance on actions to be taken if one or more channels is out of service. <u>System Operations</u> - To provide instructions for operation and use of the system by plant staff. <u>Response to inadequate levels</u> - Action to be taken on observations of levels below normal level will be addressed in Site off normal procedures and /or FLEX Support Guidelines. Westinghouse calibration procedure WNA-TP-04709-GEN (Reference 25) describes the capabilities and provisions for periodic testing and calibration of the SFPIS, including in-situ testing. Seabrook utilized the methodology described in the Westinghouse calibration procedure for the functional channel checks at the pool side bracket and channel calibrations. The following procedures have been developed to maintain the system:

Table 1		
RAI No.	**NRC QUESTION**	**LICENSEE RESPONSE**
	b) A brief description of the specific technical objectives to be achieved within each procedure. If your plan incorporates the use of portable spent fuel level monitoring components, please include a description of the objectives to be achieved with regard to the storage location and provisions for installation of the portable components when needed.	(see PM table below) The following high level FSGs will direct operators to monitor SFP level using SFPIS: FSG-0.0, Extended Loss of All AC Power with SEPS FSG-0.1, Extended Loss of All AC Power without SEPS FSG-5, Initial Assessment and FLEX Equipment Staging FSG-11, Alternate SFP Makeup and Cooling FSG-14, Extended Loss of All AC Power while Plant Shutdown When SFP level cannot be maintained greater than 23 feet above the top of the racks the FSG procedures direct operators to implement FSG-11, Alternate SFP Makeup and Cooling. FSG-5, Initial Assessment and FLEX Equipment Staging, will provides methods to establish portable ventilation in the CEVA area when area temperature is greater than 130°F. FSG-5, Attachment G, Restore Miscellaneous Lighting and Pipe Chase Ventilation Power, will provide an alternate power source to SFPIS. The following Operating Procedures will also be revised to address alignment of the SFPIS for operation. OS1014.01, Spent Fuel Cleanup and Cooling System Fill and Vent (system lineup) OS1046.58, MCC-515 Maintenance Procedure OS1046.65, MCC-615 Maintenance Procedure
RAI 11.	*The OIP sates, in part, that*	**NextEra Response RAI-11.a,b,c** a) Seabrook will establish and implement procedures for control and oversight of SFPIS maintenance and testing.

PM	TITLE	FREQ
SF-L-2616-CAL-1	TRAIN A SPENT FUEL POOL LEVEL (BDB) CALIBRATION	1 Year
SF-L-2616-BR-1	TRN A SFP LEVEL 1-SF-CP-300-A BATTERY REPLACEMENT	3 Year
SF-L-2616-MAN-1	TRN A SFP LVL XMTR 1-SF-LIT-2616 REPLACEMENT	7 Year
SF-L-2616-MAN-2	TRN A SFP LVL PWR SUPPLY 1-SF-UQ-2616 REPLACEMENT	10 Year
SF-L-2617-CAL-1	TRAIN B SPENT FUEL POOL LEVEL (BDB) CALIBRATION	1 Year
SF-L-2617-BR-1	TRN B SFP LEVEL 1-SF-CP-300-B BATTERY REPLACEMENT	3 Year
SF-L-2617-MAN-1	TRN B SFP LVL XMTR 1-SF-LIT-2617 REPLACEMENT	7 Year
SF-L-2617-MAN-2	TRN B SFP LVL PWR SUPPLY 1-SF-UQ-2617 REPLACEMENT	10 Year

Table 1		
RAI No.	NRC QUESTION	LICENSEE RESPONSE
	Processes will 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. Testing and calibration of the instrumentation will be consistent with vendor recommendations and any other documented basis. Calibration will be specific to the mounted instruments and indicators. *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. 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 the compensatory actions to be taken in the event that one of the instrument channels cannot be restored to functional status within 90 days.*	The new procedure(s) will include requirements for all necessary tests to be performed, frequency of testing, acceptance criteria, and requirements for inspection and audit of test performance and results. Westinghouse calibration procedure for the functional channel checks at the pool side bracket and channel calibrations. The following procedures have been developed to maintain the system: (see PM table below) b) Seabrook will implement measures to minimize the possibility of either the primary or backup channel being out of service for any extended period. Sufficient spare components and materials will be maintained in plant inventory to enable timely repair or replacement of defective components. Seabrook will follow the NEI 12-02 guidance with regard to the time periods when one or more channels may be out of service. Planned compensatory actions for unlikely extended out-of-service events are summarized as follows: (see channel table below) Note 1: If channel restoration is not expected to be completed within 90 days initiate compensatory action. Note 2: Initiate an evaluation in accordance with the corrective action program. The evaluation shall initiate compensatory actions to implement an alternate method of monitoring and schedule required actions for restoring the instrumentation channel(s) to functional status.

PM	TITLE	FREQ
SF-L-2616-CAL-1	TRAIN A SPENT FUEL POOL LEVEL (BDB) CALIBRATION	1 Year
SF-L-2616-BR-1	TRN A SFP LEVEL 1-SF-CP-300-A BATTERY REPLACEMENT	3 Year
SF-L-2616-MAN-1	TRN A SFP LVL XMTR 1-SF-LIT-2616 REPLACEMENT	7 Year
SF-L-2616-MAN-2	TRN A SFP LVL PWR SUPPLY 1-SF-UQ-2616 REPLACEMENT	10 Year
SF-L-2617-CAL-1	TRAIN B SPENT FUEL POOL LEVEL (BDB) CALIBRATION	1 Year
SF-L-2617-BR-1	TRN B SFP LEVEL 1-SF-CP-300-B BATTERY REPLACEMENT	3 Year
SF-L-2617-MAN-1	TRN B SFP LVL XMTR 1-SF-LIT-2617 REPLACEMENT	7 Year
SF-L-2617-MAN-2	TRN B SFP LVL PWR SUPPLY 1-SF-UQ-2617 REPLACEMENT	10 Year

# Channel(s) Out-of-service	Required Restoration Action	Compensatory action
1	Initiate actions to restore channel to functional status within 90 days. (Note 1)	Implement actions in accordance with Note 2.
2	Initiate action to restore at least one channel to functional status within 24 hours.	Implement actions in accordance with Note 2 within 72 hours.

Table 1		
RAI No.	NRC QUESTION	LICENSEE RESPONSE
		c) If a channel is non-functional, a corrective action document will be initiated and actions taken to correct the deficiency within 90 days as described in NEI 12-02. The technology selected for level instrumentation is easily replaceable as components are passive and modular. Sufficient spares will be available on-site. As the spent fuel pool level instrumentation required by the Order (EA-12-051) is to be coordinated with FLEX actions, equipment unavailability actions will be similar to NEI 12-06, Section 11.5, Item 2. Specifically, if the equipment becomes unavailable such that the site capability (e.g., 2 channels) is not maintained, Seabrook will initiate actions within 24 hours to restore the capability and implement compensatory measures (e.g., use of alternate suitable equipment or supplemental personnel) within 72 hours to monitor pool levels.

Table 2		
Question No.	NRC QUESTION	LICENSEE RESPONSE
1.	**Please provide the final elevation for Level 3 and an updated sketch of the SFP elevation view with the SFP levels, if applicable.**	<u>NextEra Response Question 1</u> *Westinghouse has established that the accuracy for the SFPIS will be +/- 3.0 inches. Westinghouse has also established the unmeasurable zones (instrument sensitivity bands) of the sensor probe for the SFPIS. The instrument sensitivity band at the top of the probe is 12 inches. Therefore, the SFP level instrument upper range will be at least 15 inches above Level 1 (Elev. 23 ft,. 4 in.) to account for the upper instrument sensitivity band and instrument loop uncertainty. The instrument sensitivity band at the bottom of the probe is 4 inches. The established elevation for Level 3 will not need to be affected to provide additional margin for instrument sensitivity band and uncertainty. The plant elevation for level 3 ((-) 0 ft., 6 in.) provides approximately 1 foot of water above the top of the racks seated in the spent fuel pool. An indicated level on either the primary or backup instrument channel of greater than plant elevation (-) 0 ft., 6 in will assure that the fuel remains covered.* *Enclosure 1 contains an elevation view of the sensor probe arrangement. The datum values for Levels 1, 2 and 3, and the top and bottom instrument sensitivity bands for the SFPIS probe are provided.*
2.	**Please provide additional information describing how the proposed arrangement of the waveguides and routing of the cabling between the FSB through the CEB and into the PAB 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.**	<u>NextEra Response Question 2</u> *Enclosure 3 contains plan views of the proposed arrangement for the portions of the instrument channel consisting of permanently mounted measurement equipment. The enclosure depicts the inside dimensions of the SFP, planned placement of the primary and backup level sensors in the SFP and the proposed routing of cables that will connect the sensors to the level transmitters, and the level transmitters to the remote enclosure. The signal conditioning processor module (level Transmitter) for each channel will be located in the Containment Enclosure Building. The planned locations for the primary and backup UPS/ remote display enclosures that will be mounted in the Train A and Train B Essential switchgear Rooms are also provided. Cabling between the level transmitters and the UPS/ remote display enclosures will be routed through existing seismic category I raceways in the Primary Auxiliary Building to the Essential Switchgear Rooms.* *Since the Spent Fuel Building (SFB), Containment Enclosure Building (CEB), Primary Auxiliary Building (PAB) and Essential Switchgear Rooms are seismic category I structures, all equipment mountings within these buildings are designed to remain anchored during or following a seismic event. Class 1E type physical separation as currently assumed in the plant design basis will also be used to provide reasonable protection against missiles that may result from unexpected damage to structures over the SFPIS equipment. Each conduit/ cable will be routed on its own separate independent series of seismically qualified supports.*

Table 2		
Question No.	NRC QUESTION	LICENSEE RESPONSE
		The Overall Integrated Plan for Seabrook Station stated that the primary and backup instrument channel sensors for monitoring Spent Fuel Pool level would be located in the northwest and southwest corners of the Spent Fuel Pool (SFP) with the signal cable routed in rigid steel conduit to the adjacent west wall of the Fuel Storage Building (FSB). The plan also noted that the corners of the SFP would provide inherent missile protection for the level sensor probes in the pool. *Subsequently, a detailed review of the plan has identified several implementation concerns. Installation of the sensor mounting brackets would require removal of 1/2 inch steel plates that were installed during plant construction to form the non-pool side of the curb that supports the stainless SFP liner (Ref. Attachment B). These plates are recessed into the Fuel Handling Machine (FHM) rail pockets. Removal of the plates will be very difficult and the process of removing the plates presents risk for potential damage to the SFP curb. Removal of the plates also presents potential FME and personnel safety concerns due the limited work space next to the pool. The final design will also result in limited clearance (~1-1/2 inch) between the sensor mounting brackets and the frame of the FHM. Considering these concerns, alternative locations for SFP level sensor mounting are being considered and evaluated.* *Evaluation of the alternate mounting locations considered FHM clearance, potential impact of bracket mounting on the attachment structure, access and maintainability of the level sensors and the impact that the location would have on normal SFP operations and support activities. The review also considered the potential for adjacent equipment and structure over the SFP to impact functionality of the sensors during a Beyond Design Basis External Event (BDBEE).* *The evaluation considered alternate mounting locations on the east and west sides of the SFP. The north and south sides of the SFP were not considered to be viable locations for sensor mounting since the FHM traverses the entire length of the SFP which presents the clearance and curb concerns noted above. The east side of the SFP contains the fuel transfer gate, two fuel pool lighting fixtures, two embedded SFP purification system skimmer intakes, 10 inch SFP cooling system discharge piping and 4 inch SFP filter system return piping, and a permanent storage location for one of the fuel handling tools. This side of the SFP is also used as the personnel access point and work area for SFP operations including: spotting during fuel movements, inspection camera access, Operator access for transfer gate manipulation and inspections, transfer canal inspections, and temporary storage location for radioactive wastes prior to survey and removal by Health Physics personnel. The west side of the SFP contains two SFP purification system skimmer intakes, three fuel pool lighting fixtures and the sensor for the existing SFP level instrumentation (1-SF-LE-2607). This side of the SFP is also used as the personnel access point for maintenance of the existing pool level instrumentation and cleaning of two of the skimmer intake basket filters.* *Based on current activities for SFP operations, and considering the physical limitations for mounting the sensor bracket and sensor signal cable access, the west side of the SFP is considered to be the preferred mounting location for both the primary and backup instrument channel sensors. However, due to the interferences described above (FHM rails on the north and south walls, the various appurtenances, equipment and access on the east wall and the skimmers inboard of the FHM rails on the west wall) sensor mounting will be on the west wall, physically separated by approximately 18 feet (min.) on center as shown in Enclosure 3.*

Table 2		
Question No.	NRC QUESTION	LICENSEE RESPONSE
		This configuration is considered to be in compliance with the requirements of references 1, 2 and 3 based on the following: 1. *The FSB is a seismic Category I reinforced concrete structure designed and constructed to meet the requirements of Seabrook UFSAR §3.8.4, Reinforced concrete is designed and constructed per the American Concrete Institute code, ACI 318-71* *Steel framing within the structure is designed and constructed to the requirements of the American Institute of Steel Construction code, AISC Specification for the Design, Fabrication and Erection of Structural Steel for Building, 1969 Edition. Concrete walls are a minimum of 24 inches thick concrete with a minimum compressive strength of 3000 psi. No block or concrete masonry partitions are utilized in any Category I structure at Seabrook Station. The FSB superstructure is constructed of concrete walls and roof. The building is capable of withstanding the effects of extreme natural phenomena, including earthquake, tornado, hurricanes, and floods.* 2. *The SFP is constructed of concrete walls having a minimum thickness of 6 feet and a 4'-10" thick concrete floor. For leak tightness, the inside surface of the SFP is lined with stainless steel plates 3/16" thick on the walls and 1/4" thick on the floor.* 3. *Structural integrity qualification of the Category I FSB for actual and postulated loads imposed by equipment mounted to the structure is addressed by local analysis of the attachment mechanism. Concrete anchors are used for attachment to the structure. Embedded concrete anchor allowable loads are based on the anchor failing before the concrete. Thus the embedded anchor design assures that the concrete structure maintains its local structural integrity.* 4. *The effect of the actual and postulated loads on the global building structural integrity is a matter of comparison of the additional load to the generic design loads for the structure. Generic design loads, as described in the structural design criteria, are used to account for undefined loads. Additional loads that exceed the generic design loads warrant an evaluation of the affected structural elements. Loads that exceed the generic design loads are not expected for the sensor mounting bracket installations. The design inputs for the attachment connection are the weight of the component, the method of attachment, the local seismic response of the building, plus any other pertinent loads per UFSAR §3.8.4.3, Loads and Loading Combinations.* 5. *Simple static analyses will be used to evaluate the support attachment design. This conservative analysis methodology will use peak acceleration in each of three orthogonal directions obtained from the building amplified response spectra. Those accelerations are increased by 50% to account for multi-modal response (multiplied by 1.5). Attachment loads are calculated in each of the three directions. Then loads are combined by square root sum of the squares (SRSS), and then combined with dead weight loads and compared with allowable loads. Alternatively, the stiffness of the component and support may be computed and the frequency of the first mode of vibration estimated. Should the frequency fall in the rigid range of the response spectra, then the zero period accelerations of the three orthogonal directions may be used for the static analysis described above.*

Table 2		
Question No.	NRC QUESTION	LICENSEE RESPONSE
		Since the FSB is a Seismic Category I structure, all equipment mountings within this building are designed to remain anchored during and following a seismic event. This design provides reasonable assurance that missiles will not be generated during a BDBEE by equipment located in the areas adjacent to the alternate sensor mounting locations on the west side of the SFP (Ref. Enclosure 3). *Physical separation of the SFP level sensors and instrument channel cables in the Fuel storage Building to the extent practicable will also be used to provide protection against missiles that may result from unexpected damage to adjacent seismically installed structures or components.* *Physical separation will be maintained using Class 1E type separation. The separation will be achieved through mounting to safety class structures, use of independent Seismic Category I supports and raceways, and physical distance between the channel sensors, sensor cabling, electronic enclosures and equipment mounted in the SFP or stored next to the SFP in accordance with the design criteria described in UFSAR §8.3.1.4, "Independence of Redundant Systems," UFSAR Appendix 8A, "Attachment C to AEC Letter Dated December 14, 1973, Physical Independence of Electric Systems," and UFSAR Table 8.3-10, "Electrical Cable and Raceway Separation Criteria." All SFP level instrument sensor equipment located in the FSB will be seismically qualified and installed to maintain the Class 1E separation criteria currently assumed in the plant design basis.*
3.	**Please provide the following:** **a) The design criteria that will be used to estimate the total loading on the mounting device(s), including static weight loads and dynamic loads. Describe the methodology that will be used to estimate the total loading, inclusive of design basis maximum seismic loads and the hydrodynamic loads that could result from pool sloshing or other effects that could accompany such seismic forces.** **b) A description of the manner in which the level sensor (and stilling well, if appropriate) will be attached to the refueling floor and/or other support structures for each planned point of attachment of the probe assembly. Indicate in a schematic the portions of the level sensor that will serve as points of**	<u>NextEra Response Question 3a</u> *All SFPIS equipment will be designed in accordance with the Seabrook Nuclear Plant Safe Shutdown Earthquake (SSE) design requirements. Simple static analyses will be used to evaluate the anchorage design for the SFPIS level sensor, electronic enclosures, conduits and associated supports. This conservative analysis methodology will use peak acceleration in each of three orthogonal directions obtained from the building response spectra at the mounting location. Those accelerations are increased by 50% to account for multi-modal response (multiplied by 1.5). Attachment loads are calculated in each of the three directions, loads are combined by Square Root Sum of the Squares (SRSS), and then combined with dead weight loads and compared with allowable loads.* *Westinghouse evaluated the structural integrity of the SFPIS sensor mounting brackets in calculation CN-PEUS-14-16 (Reference 14). The GTSTRUDL model, used by Westinghouse to calculate the stresses in the bracket assembly, considers load combinations for the dead load, live load including hydrodynamic load and seismic load on the bracket. The reactionary forces calculated from these loads become the design inputs for the mounting bracket and it's anchorage to the refuel floor to withstand a Safe Shutdown Earthquake (SSE). The seismic load input for this analysis was obtained from the Amplified Response Spectra (ARS) for the Spent Fuel Building (SFB) and the following methodology was used by Westinghouse to determine the stresses on the sensor bracket assembly:* • *Frequency analysis, taking into account the dead weight and the hydrodynamic mass of the structure,*

Table 2		
Question No.	**NRC QUESTION**	**LICENSEE RESPONSE**
	attachment for mechanical/mounting or electrical connections. **c) A description of the manner by which the mechanical connections will attach the level instrument to permanent SFP structures so as to support the level sensor assembly.**	*was performed to obtain the natural frequencies of the structure in all three directions.* • *SSE response spectra analysis was performed to obtain member stresses and support reactions.* • *The seismic loads for each of the three directions were combined by the Square Root of the Sum of Squares (SRSS) Method.* • *Sloshing analysis was performed to obtain liquid pressure and its impact on bracket design and anchorage.* • *The seismic results are combined with the dead load results and the hydrodynamic pressure results in absolute sum. These combined results are compared with the allowable stress values.* *<u>Sloshing</u>* *Sloshing forces were obtained by analysis. The TID-7024, Nuclear Reactors and Earthquakes, 1963, by the US Atomic Energy Commission, approach has been used to estimate the wave height and natural frequency. Horizontal and vertical impact force on the bracket components were calculated using the wave height and natural frequency obtained using TID-7024 approach.* *Using this methodology, sloshing forces were calculated and added to the total reactionary forces that would be applicable for the bracket anchorage design. The analysis also determined that the level probe can withstand a design basis seismic event.* *During the design basis event, the SFP water level is expected to rise and parts of the level sensor probe are assumed to become submerged in borated water. The load impact due to the rising water and submergence of the bracket components has also been considered for the overall sloshing impact. Reliable operation of the level measurement sensor with temporary submerged interconnecting cable has also been demonstrated by Westinghouse. Boron build up on the probe has been analyzed to determine the potential effects on the sensor.* *The following Westinghouse documents provide information with respect to the design criteria used, and a description of the methodology used to estimate the total loading on the device.* *a) CN-PEUS-14-16 – Pool-side Bracket Seismic Analysis* *b) WNA-TR-03149-GEN – Sloshing Analysis* *c) EQ-QR-269, WNA-TR-03149-GEN, EQ-TP-353 – Seismic Qualification of other components of SFPI* *d) Westinghouse Letter LTR-SEE-II-13-47, Determination if the Proposed Spent Fuel Pool level*

Table 2		
Question No.	NRC QUESTION	LICENSEE RESPONSE
		instrumentation can be sloshed out of the Spent fuel pool during a seismic Event. *The design criteria used in this calculation met the requirements to withstand SSE and will meet the Seabrook Station seismic Category I installation requirements. The methods used in the calculation followed the IEEE 344-2004 and IEEE 323-2003 requirements for seismic qualification of the SFPIS instrument and raceway installations.* *Westinghouse calculation CN-PEUS-14-16, rev 002 (FP 700468), 'SFPIS Mounting Bracket Seismic Analysis,' established the design loading requirements for the pool side brackets. Since the brackets cantilever over the pool, and water displacement was determined to be above the SFP high water level, slosh loads resulting from an earthquake were considered as part of the bracket design and analysis. The seismic load effects were calculated based on self-weight, dead load of the instrumentation, hydrodynamic load (sloshing) due to seismic effects and the seismic load.* *The Westinghouse analysis assumes the hydrodynamic load acts in the vertical direction on the launch plate. The load is applied at center of the launch plate (the same location as where the coupler is located) and was determined as 185.8 lb.* *Furthermore, the following summary of Interaction Ratios (IRs) demonstrates that the bracket design is adequate for the all applicable seismic loading including hydrodynamic loading. The IRs are based on Safe Shutdown Earthquake (SSE) loading, including hydrodynamic load (sloshing), due to seismic effects compared to AISC normal allowable (i.e., without an allowable stress increase factor).* *Controlling Bolt IR ....0.44 (3/8" Bolt)* *Thread Engagement IR...................... 0.89 (enclosure bolts)* *FP 700468, Appendix G, EC 281849 ensures that the anchor design is adequate for the intended loads.* **NextEra Response Question 3b** *The Westinghouse designed SFPIS level sensor consists of a stainless steel cable probe suspended from a launch plate via a coupler/connector assembly. The launch plate is a subcomponent of the bracket assembly, will be mounted to the refuel floor via four concrete expansion anchors. Enclosure 4 shows the level sensor mounting bracket with mechanical attachment points.* **NextEra Response Question 3c**

Table 2		
Question No.	NRC QUESTION	LICENSEE RESPONSE
		The bracket assembly that supports the sensor probe and launch plate will be mechanically connected to the SFP structure. The mechanical connection consists of four concrete expansion anchors that will bolt the bracket assembly to the SFP structure via the base plate. The loads for the bracket concrete anchors were established by Seabrook based on translation of loads established by Westinghouse for the Pool-side bracket in Seismic Analysis CN-PEUS-14-16 (Reference 14). The concrete expansion anchors will be designed by Seabrook to meet the calculated Westinghouse loads (tension and shear loads) for the Seabrook modified bracket design with appropriated safety margin. *Seabrook design change EC 281849 modified the Westinghouse sensor probe 'Z'-shaped, stainless steel, probe bracket to allow for installation along the West side of the SFP (Ref. Enclosure 4). Each of the modified probe mounting plate will bolted to the West pool side concrete using four 5/8" diameter Hilti III stainless steel anchors each having a 4" minimum concrete embedment. Eccentric loads on the cantilever plate bolt group are checked based on forces and moments at the center of the Hilti Plate/cantilever plate taken from page 27 of the Westinghouse analysis (Reference 14).* *Loads at Center of HKB3 Group* *Fx = 65#, Fy = 279#, Fz = 45#, Mx = 5,000 in #, My = 1,860 in #, Mz = 4,200 in #* *SS HKB III Allowables* *Tension = 2,065#, Shear = 4,160#* *Interaction* *IR bolt =* $T_{bolt} / T_{allowable} + V_{bolt} / V_{allowable} = 0.465 < 1.0$*.....OK* *The HKB III bolts control the connection design which is based on conservative and maximum bolt tension and shear taken from the Westinghouse Strudl model. Base plate bending and shear stresses will be small due to minimal loading on the ¾" cantilever plate.*
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.**	**NextEra Response Question 4** *The following documents provide the analyses used to verify the design criteria and describe the methodology that was applied for qualification of the SFPIS equipment, inclusive of the seismic and hydrodynamic loads for the pool side equipment:* a. *FP 700468; Westinghouse CN-PEUS-14-16 – Pool-side Bracket Seismic Analysis (Reference 14), revised by Seabrook to qualify modifications to the pool side bracket.* b. *WNA-TR-03149-GEN – SFPIS Standard Product Final Summary Design Verification Report (Reference 20)* c. *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*

Table 2		
Question No.	NRC QUESTION	LICENSEE RESPONSE
		9Reference 30). *d. EQ-QR-269 – Design Verification Testing Summary Report for the Spent Fuel Pool Instrumentation System (Reference 18).* *e. FP 700489, Seabrook SFPIS Pool Mounting Bracket* *No equipment failures were noted as a result of seismic testing. Seismic test results are documented in the Westinghouse qualification report summaries referenced above.* *As described in the response to Question 3 above, equipment anchorage will be designed by Seabrook to meet the calculated Westinghouse loads (tension and shear loads) with appropriated safety margin.*
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**	<u>NextEra Response Question 5</u> *The Fuel Storage, Containment Enclosure Building and the Control Buildings are seismic Category I reinforced concrete structures designed and constructed to meet the requirements of Seabrook UFSAR 3.8.4, Reinforced concrete is designed and constructed per the American Concrete Institute code ACI 318-71. Steel framing within the structures is designed and constructed to the requirements of the American Institute of Steel Construction code, AISC Specification for the Design, Fabrication and Erection of Structural Steel for Building 1969 Edition. Concrete walls are a minimum of 24 inches thick concrete with a minimum compressive strength of 3000 psi. No block or concrete masonry partitions are utilized in any Category I structure.* *Structural integrity qualification of the Category I buildings for actual and postulated loads imposed by equipment mounted to the structure is addressed by local analysis of the attachment mechanism. Attachment to the structures will use concrete anchors. Embedded concrete anchor allowable loads are based on the anchor failing before the concrete. Thus a properly designed embedded anchor assures that the concrete structure maintains its local structural integrity.* *The effect of the actual and postulated loads on the global building structural integrity is a matter of comparison of the additional load to the generic design loads for the structure. Generic design loads, as described in the structural design criteria, are used to account for undefined loads. Additional loads that exceed the generic design loads warrant an evaluation of the affected structural elements. Loads that exceed the generic design loads are not expected for this activity.* *The design inputs for the attachment connection are the weight of the component, the method of attachment, the local*

Table 2		
Question No.	NRC QUESTION	LICENSEE RESPONSE
		seismic response of the building, any other pertinent loads per UFSAR 3.8.4.3 Loads and Loading Combinations. The allowable loads for the attachment mechanism are also design input. *Simple static analyses will be used to evaluate the support attachment design. This conservative analysis methodology uses peak acceleration in each of three orthogonal directions obtained from the building amplified response spectra. Those accelerations are increased by 50% to account for multi-modal response (multiplied by 1.5). Attachment loads are calculated in each of the three directions, loads are combined by SRSS, and then combined with dead weight loads and compared with allowable loads.* *Alternatively, the stiffness of the component and support may be computed and the frequency of the first mode of vibration estimated. Should the frequency fall in the rigid range of the response spectra then the zero period accelerations of the three orthogonal directions may be used for the static analysis described above.* *1. Control Panels, 1-SF-CP-300-A and 1-SF-CP-300:* *The sensor electronics control panels, 1-SF-CP-300-A and 1-SF-CP-300-B, will be located in the respective "A" and "B" Train Essential Switchgear Rooms as shown in Enclosure 3. These control cabinets and junction boxes are to be installed in accordance with Seabrook drawing 1-NHY-300228. Drawing 1-NHY-300228, "Notes and Details," provides prequalified, generic, seismically qualified supports.* *2. Transmitter enclosures (1-SF-LIT-2616 and 1-SF-LIT-2617):* *The electronics cabinet will be installed on a seismically qualified C-32A figure 1 box supports in accordance with Seabrook drawing 1-NHY-300228.. The sensor head unit bracket and attached Level Indicating Transmitters 1-SF-LIT-2616 and 1-SF-LIT-2617, are to be installed inside a 24" x 24" x 12" deep NEMA 4X electronics cabinet seismically supported by the C-32A figure 1 box support frame detailed on 1-NHY-300228, sheet C-32A. Modifications to the C-32A frame required for supporting the sensor head bracket/level transmitter and electronics cabinet are detailed in Seabrook design change EC 281849.* *The electronics cabinet is a 24" x 24" x 12" deep NEMA 4X stainless steel enclosure. (Reference typical NEMA 4X details; http://www.austinenclosures.com/products/view/ NEMA_4X_Stainless_Steel_Enclosure/AB-242412NFX/). The enclosure is 14 gage cold rolled steel that weighs less than 60 lbs. The sensor head mounting bracket is an 8" length of HSS 6" x 4" x ¼" that, including mounting hardware, conservatively weighs 10 lbs. Per the Westinghouse drawings the total weight of the NEMA 4X electronics box including all internal components is less than 100 lbs. The C32A figure 1 support is seismically qualified for 150 lbs. load on the frame for all areas of the plant including areas having higher ARS than the ARS that is applicable to the CEVA where the seismic demand is low (ground response).*

<table>
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<tr><th>Question No.</th><th>NRC QUESTION</th><th>LICENSEE RESPONSE</th></tr>
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Please provide the following:

a) A description of the specific method or combination of methods you intend to apply to demonstrate the reliability of the permanently installed equipment under beyond-design-basis ambient temperature, humidity, shock, vibration, and radiation conditions.

b) 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.

c) 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.

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<u>NextEra Response Question 6a</u>

a) *Reliability of the new SFPIS was demonstrated by Westinghouse using a combination of design, analysis, operating experience and testing. The qualification program demonstrated that the new SFPIS will be capable of continuous operation while subjected to the normal and anticipated Beyond Design Basis Event (BDBE) service conditions. NRC Order EA 12-051 requires that the equipment be able to withstand the post event environment for no fewer than 7 days including the impact of FLEX mitigating strategies. For Seabrook the required environmental service conditions for the SFPIS equipment are noted in the following tables.*

Environmental Conditions at the Spent Fuel Pool:

Parameter	***Normal Plant Operation***	***Beyond Design Basis Operation***
Temperature	*104 °F*	*212 °F*
Pressure	*Slightly Negative (-) 3 psig*	*Slightly Positive*
Humidity	*2 - 60 %*	*100 % (Saturated Steam)*
Radiation TID	*1E03 R γ*	*1E07 R γ*
Boron	*2400 ppm - 2600 ppm*	*9000 ppm*

Environmental Conditions in the Containment Enclosure Ventilation Building (CEVA):

Parameter	***Normal Plant Operation***	***Beyond Design Basis Operation***
Temperature	*104 °F*	*98 °F***
Pressure	*Slightly Negative (-) 3 psig*	*Slightly Positive*
Humidity	*2 - 60 %*	*2 – 60 %*
Radiation TID	*1E03 R γ*	*1E03 R γ*

</td></tr>
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Table 2		
Question No.	**NRC QUESTION**	**LICENSEE RESPONSE**

Environmental Conditions in the Essential Switchgear Rooms:

Parameter	***Normal Plant Operation***	***Beyond Design Basis Operation***
Temperature	*104 °F*	*104 °F*
Pressure	*Slightly Negative (-) 3 psig*	*Slightly Positive*
Humidity	*2 - 60 %*	*2 – 60 %*
Radiation TID	*1E03 R γ*	*1E03 R γ*

Spent Fuel Pool Water Chemistry Properties:

Parameter	***Normal Fuel Pool Operation***
Electric Conductivity	*Determined by the concentration of boric acid and alkali present. Expected range will be < 8 to 12 μMhos/cm.*
Solution pH	*4.0 – 5.0*
Chloride, ppm max.	*≤ 0.15*
Fluoride, ppm max.	*≤ 0.15*
Silica, ppm max.	*≤ 3*
Sulfate	*≤ 0.15*
Aluminum	*< 0.5 ppm*
Ca + Mg	*< 0.5 ppm*
Magnesium	*< 0.25 ppm*
Tritium	*< 0.63 uCi/ml*
Silica	*25 ppm max*
Boron Concentration	*2400 ppm -2600 ppm (9000 ppm BDBE)*

The results of the Westinghouse supplied equipment qualification program are summarized in;

- *EQ-QR-269, Design Verification Testing Summary Report for the Spent Fuel Pool Instrumentation System*

Table 2		
Question No.	**NRC QUESTION**	**LICENSEE RESPONSE**
		(Reference 18). • *WNA-TR-03149-GEN, SFPIS Standard Product Final Summary Design Verification Report (Reference 19).* • *CN-PEUS-14-16 – Pool-side Bracket Seismic Analysis (Reference 14).* *These reports document the seismic, electromagnetic compatibility and environmental testing and evaluations that were performed by Westinghouse to assure reliability of the system under normal and BDBE conditions. Required environmental and seismic qualification testing was performed in accordance with IEEE 323-2003 and IEEE 344-2004. The Seabrook environmental service conditions were bounded by the Westinghouse qualification test conditions.* *Seismic Testing: Seismic qualification testing was performed by Westinghouse in accordance with the requirements of IEEE 344-2004. Technical evaluations were also performed by Westinghouse to confirm that the coaxial connector for the SFPIS meet the Westinghouse establish seismic requirements. Westinghouse's design specification satisfies the Seabrook installation requirements to withstand a SSE.* *Vibration Justification: Components for both the primary and backup measurement channels will be permanently installed and fixed to rigid Seismic Category 1 structures and will not be subject to anticipated shock or vibration inputs beyond those covered by seismic verification. The mounting brackets and NEMA 4X enclosures that will be used to house the SFPIS electronics are inherently resistant to shock and vibration loadings. As a result, no additional shock and vibration testing is required for these components.* *Sloshing Justification: Sloshing forces were obtained by analysis. The TID-7024, Nuclear Reactors and Earthquakes, 1963, by the US Atomic Energy Commission, approach has been used to estimate the wave height and natural frequency. Horizontal and vertical impact force on the bracket components were calculated using the wave height and natural frequency obtained using TID-7024 approach. Using this methodology, sloshing forces were calculated and added to the total reactionary forces that would be applicable for the bracket anchorage design. The analysis also determined that the level probe can withstand a design basis seismic event. The sloshing calculation performed by Westinghouse (LTR-SEE-II-13-47, Reference 29) was reviewed for a design basis seismic event and found acceptable. Sloshing forces were taken into consideration for the anchorage design of the pool side bracket to ensure the bracket is rigidly mounted to include sloshing affects.* *Environmental Testing: Prior to conducting seismic qualification testing the SFPIS equipment was mechanically preconditioning, thermally aged and radiation aged in accordance with the requirements of IEEE 323-2003. As part of the environmental testing program, the SFPIS coaxial cable, coupler and probe located within the spent fuel pool area were also subjected to steam testing at 0-95% RH (Non-condensing) for the electronic enclosures and 0-100% (Non-condensing) for the sensor electronics (level transmitter). The EMC testing was also performed in accordance with the requirements of NRC Regulatory Guide 1.180. The aggregate of the*

Table 2		
Question No.	NRC QUESTION	LICENSEE RESPONSE
		environmental verification activities for the SFPIS demonstrate that the SFPIS will operate reliably per the service environment requirements specified for the Spent Fuel Building (SFB) as well those as for outside the SFB. *The plant Service environment chart (1-NHY-300219, reference 37) summarize the environmental conditions for the essential switchgear rooms where the SFPI displays will be located and containment enclosure fan area (CEVA) where the level transmitters will be mounted. The referenced calculations support the noted environmental conditions for radiation, pressure and humidity. The specified normal conditions are not expected to change in these areas as a result of an extended loss of offsite power event. See Enclosure 6.* *Seabrook calculation MSVCS-FAG-08 calculates the temperature response of the environmental zones outside of Containment following a loss of all non-Class 1E HVAC systems. This calculation concluded that the steady-state temperature in the CEVA would not exceed 98°F when one train of the Class 1E ventilation is running (1-EAH-FN-31-A/B, 1-EAH-FN-5-A/B and 1-EAH-FN-108-A/B). Therefore, one train of Class 1E, safety related ventilation is assumed to be available as part of the FLEX strategies to ensure area temperature is not exceeded for long term operation of the SFPIS following a BDBE.* *The A and B switchgear room supply and exhaust fans (1-CBA-FN-19, -20, -32 and -33) are capable of maintaining temperature in the A and B switchgear rooms below 104°F.* *During the interim to re-establishing power to the area ventilation systems noted above, compensatory operator actions may be required to induce natural circulation cooling in the Spent Fuel Building, CEVA and/ or Essential Switchgear Rooms. These actions will include the opening of doors to the outside environment and the deployment of portable equipment to initiate area cooling. Assessment of these areas for high temperature and deployment of compensatory ventilation actions will be directed by the new FLEX Support Guideline (FSG) procedures.* *Temperature and humidity in the Fuel Storage Building are assumed to increase from normal operating conditions to the conditions specified in Order EA-12-051 (212 F and 100% saturated steam).* *During normal plant operation the Fuel Storage Air Handling System (FAH) maintains a slightly negative pressure ((-) 3 psig) in the Fuel storage Building to support fuel handling operations. During a BDB event the ventilation would shutdown due to loss of power and Fuel Storage Building pressure would increase to atmospheric pressure (slightly positive). Based on review of the design of the pool side components a negative pressure of (-) 3 psig will not negatively impact the capability of the equipment to perform as designed. The pool side components are passive devices. The coupler is composed of stainless steel with a boric silicate glass seal. The connector on the coupler also contains a silicone gasket and PEEK insulator that seals the coaxial cable connection. The cable connectors are*

Table 2		
Question No.	**NRC QUESTION**	**LICENSEE RESPONSE**
		installed using crimp type connections that are sealed by epoxy. These seals will prevent the potential for moisture to be driven into the pool side probe connections and cables by this relatively small change in atmospheric pressure. *SFP Chemistry:* *The SFPIS components that reside within the spent fuel pool that were evaluated for exposed to the chemistry of the spent fuel pool water are the Pool-Side Bracket, the probe and the coupler assembly. The materials for these components were selected by Westinghouse based on the application and are inherently resistant to the chemistry in the environment of the SFP. An evaluation of the SFPIS materials and compatibility with the SFP chemistry was provided by Westinghouse in report WNA-TR-03149-GEN (Reference 19)* *Westinghouse also evaluated the effect that boric acid build up on the probe cable would have on SFPIS level measurement. Westinghouse testing demonstrated that the level measurement remained within standard accuracy of +/- 3 inches with a 4-inch-long, 0.25-inch layer of boric acid buildup on the SFPIS probe cable. Westinghouse also evaluated changes in boron concentration that would result as the SFP boils and level decreases to the top of the fuel racks. Analysis contained in Westinghouse letter LTR-CDME-13-78 (Reference 30) indicates that the boron concentration up to 9000 ppm post-event will not impact performance or accuracy the SFPIS.* **NextEra Response Question 6b** *The SFPIS equipment (inside and outside of the SFB) were subjected seismic testing to demonstrate that the equipment will perform reliably during and following a seismic event. Seismic testing was conducted in accordance with IEEE 344-2004 and IEEE 323-2003. The seismic test results are documented in Westinghouse Reports EQ-QR-269 (Reference 18) and EQLR-281 (Reference 31). A pull test was also performed by Westinghouse to support seismic qualification of the 90 degree connectors on the coaxial sensor cables. This testing is documented in Westinghouse letter LTR-EQ-14-26 (Reference 32). Prior to seismic testing, the equipment was subjected to thermal and radiation aging as specified in Westinghouse document EQ-EV-196 (Reference 33).* *The SFPIS equipment was tested to the Safe Shutdown Earthquake (SSE) and Hard Rock High Frequency (HRHF) spectra shown in Figure 4.4-1 and Figure 4.4-2 of Westinghouse Report EQ-QR-269 (Reference 18). The Operating Basis Earthquake (OBE) Test Response Spectra (TRS) at 5% critical damping was at least 70% of the respective SSE seismic level. Five successful OBE level tests were performed, followed by two successful SSE level tests and one successful HRHF level test. The seismic Test Response Spectra (TRS)*

Table 2		
Question No.	**NRC QUESTION**	**LICENSEE RESPONSE**
		contained in Figures 4.4-1 and 4.4-2 of Westinghouse Report EQ-QR-269 was compared to the Seabrook area specific required response spectra (RRS) and found to be enveloping with respect to the plant OBE and SSE response spectra included Enclosure 4 and reference 38. *Therefore, the SFPIS seismic qualification demonstrated that the SFPIS will maintain functionality in a BDBE environment (before and after a seismic event), including:* *1. Structural integrity of the SFPIS system will be maintained before, during, and after a seismic event.* *2. The level reading and transmitting portions of the system will work before and after the seismic event, and remain within the acceptance criteria of ± 3 inches.* *3. The SFPIS capability for the SFPIS to switch to battery power automatically when AC power is removed will be maintained before, during, and after a seismic event.* • *The seismic adequacy of the SFPIS (all components) was demonstrated by Westinghouse in accordance with the following standards:* • *IEEE 344-2004, IEEE Recommended Practice for Seismic Qualification of Class 1E Electrical Equipment for Nuclear Power Generating Stations* • *IEEE-323-1974, Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations* • *USNRC Regulatory Guide 1.100, Rev. 3* • *USNRC Regulatory Guide 1.92, Rev. 1* *Seismic adequacy of the level sensor probe supporting bracket within the SFP area was demonstrated by analysis as discussed in response to Item 3 above.* **NextEra Response Question 6c** *As described in the response to NRC question 3, Westinghouse seismically qualified the SFPIS equipment in accordance with the requirements of IEEE 344-2004 to OBE and SSE TRS that envelopes the RRS for the equipment mounting locations at Seabrook. The acceptance criteria for the seismic testing included verification that SFPIS level indication accuracy (+/- 3 inches) was demonstrated during seismic qualification testing. With*

Table 2		
Question No.	NRC QUESTION	LICENSEE RESPONSE
		the instrument being seismically qualified and installed as described in the response to NRC question 3 above, the instrument is assured to maintain reliable and accurate indication when required. Westinghouse report WNA-CN-00301-GEN and Seabrook Engineering Change 281849 provide the channel accuracy from measurement to display.
7.	**For RAI No. 6 above, please provide the results for the selected methods, tests and analyses utilized to demonstrate the qualification and reliability of the installed equipment in accordance with the Order requirements.**	<u>NextEra Response Question 7</u> *Westinghouse documents EQ-QR-269, EQ-TP-354, WNA-TR-03149-GEN describe the qualification program that Westinghouse applied to the SFPI components and summarizes the qualification test results. Westinghouse qualified the SFPI components to a 10 year design requirement. Seismic and environmental qualification testing of the equipment was performed in accordance with IEEE 344-2004 and IEEE 323-2003. Prior to conducting qualification testing the SFPIS equipment was mechanically preconditioning, thermally aged and radiation aged in accordance with the requirements of IEEE 323-2003. As part of the environmental testing, the SFPIS coaxial cable, coupler and probe located within the spent fuel pool area were subjected to steam testing. The EMC testing was also performed in accordance with NRC Regulatory Guide 1.180.* *The Seabrook environmental service conditions are bounded by the Westinghouse qualification test conditions. In summary, the SFPIS equipment has been qualified by Westinghouse to withstand the following environmental conditions:* ***Environmental Conditions for Equipment in the Spent Fuel Pool Area:*** *The components that will be located in the spent fuel pool area are SFPIS probes and mounting brackets, launch plates, couplers and coaxial signal cables. In accordance with NRC Order EA-12-051 the components that will be located in the spent fuel pool area are required to operate reliably at temperature, humidity and radiation levels consistent with postulated worst case BDBE service conditions for at least seven days including:* • *Radiological conditions for a normal refueling quantity of freshly discharged (100 hours) fuel with the SFP water at level 3,* • *Temperature of 212 degrees F and 100% relative humidity environment,* • *SFP boiling water and/or steam environment,* • *Concentrated borated water environment.* *Components of the system were subjected to beyond design basis conditions of heat and humidity, thermal and radiation aging mechanisms. This testing confirmed functionality of these system components under the postulated BDBE conditions. Since the radiological conditions for level 3 had not been calculated previously,*

Table 2		
Question No.	**NRC QUESTION**	**LICENSEE RESPONSE**
		Seabrook contracted AREVA NP Inc to determine the total integrated dose to the pool side SFPIS equipment for reduced SFP inventory conditions. The results of the calculation are document in Seabrook FP 700488, Spent Fuel Pool Instrumentation System Dose Assessment." The 7 day Time Integrated Dose (TID) to the pool side SFPIS equipment was calculated by Seabrook based on the results of the AREVA analysis with consideration of the shielded that would be provided by the water in the pool during drain down. *The TID to the pool side equipment considering worst case normal operational conditions and post event conditions, for no less than 7 days post event is 8.872E6 rad. This TID is bounded by Westinghouse qualification of pool side SFPIS equipment to 1E7 rad. This dose calculation is also considered to be conservative since the Seabrook FLEX strategies initiate makeup to the spent fuel pool well in advance of inventory loss to level 3. Therefore, the duration of SFPIS operation at Level 3 will be much less than the 120.55 hrs assumed in the analysis above.* *The Westinghouse qualification reports noted above describe the testing and evaluations that were performed as part of the equipment qualification program to demonstrate the capability of the pool side equipment to perform reliably for at least 185 hours when subjected to the beyond design basis environmental conditions noted in the table below. This duration exceeds the seven day requirement from NRC Order EA-12-051 for operation of the SFPIS. The as tested environmental parameters also envelop the normal and BDBE service conditions for the Fuel Storage Building.* *Westinghouse Qualified Environmental Conditions at the Spent Fuel Pool:*

Parameter	***Normal Plant Operation***	***Beyond Design Basis Operation***
Temperature	*50 - 140 °F*	*212 °F*
Pressure	*Atmospheric*	*Atmospheric*
Humidity	*0-95% RH*	*100% Saturated Steam*
Radiation TID (above Pool)	*1E03 R γ*	*1E07 R γ*
Radiation TID (1' above top of fuel rack)	*≤ 1E09 R γ (only probes stainless steel cable and weight are exposed for the period)*	*1E07 R γ (only probe's stainless steel cable and weight are exposed for 7 days)*

Table 2		
Question No.	NRC QUESTION	LICENSEE RESPONSE
		With the exception of pressure the qualification program demonstrated that the pool side equipment will perform reliable during normal and anticipated BDB environmental conditions in the Fuel Storage Building for the seven day duration required by NRC Order EA-12-051. During normal plant operation the Fuel Storage Air Handling System (FAH) maintains a slightly negative pressure ((-) 3 psig) in the Fuel storage Building to support fuel handling operations. During a BDB event the ventilation would shutdown due to loss of power and Fuel Storage Building pressure would increase to atmospheric pressure (slightly positive). Based on review of the design of the pool side components a negative pressure of (-) 3 psig will not negatively impact the capability of the equipment to perform as designed. The pool side components are passive devices. The coupler is composed of stainless steel with a boric silicate glass seal. The connector on the coupler also contains a silicone gasket and PEEK insulator that seals the coaxial cable connection. The cable connectors are installed using crimp type connections that are sealed by epoxy. These seals will prevent the potential for moisture to be driven into the pool side probe connections and cables by this relatively small change in atmospheric pressure.

Environmental Conditions Outside of the Spent Fuel Pool Area:

The components outside the spent fuel pool area are required to operate reliably for the service environmental conditions specified for a mild environment. These components are the level transmitters, SFP Surge Filter and enclosures, and the SFPIS electronic equipment. Testing and evaluations that were performed by Westinghouse verified that this equipment will perform reliably when subjected to the normal and BDBE environmental condition noted below:

Environmental Conditions outside of the Spent Fuel Building:

Parameter	***Normal Plant Operation***	***Beyond Design Basis Operation***
Temperature	*50-120 deg. F*	*140 °F*
Pressure	*Atmospheric*	*Atmospheric*
Humidity	*0-95% RH*	*0-100% (non-condensing) for Sensor Electronics (Level transmitter)* *0-95% (non-condensing) for Electronics Enclosure*
Radiation TID	*1E03 R γ*	*1E03 R γ*
Environmental Duration (for single charge of system installed batteries)	*3 days*	*3 days*

Table 2		
Question No.	**NRC QUESTION**	**LICENSEE RESPONSE**
		With the exception of pressure the qualification program demonstrated that the equipment located outside of the Spent Fuel Building will perform reliable during normal and anticipated BDB environmental conditions for the seven day duration required by NRC Order EA-12-051. During normal plant operation the Containment Enclosure Ventilation Area (CEVA) and the Essential Switchgear Rooms are maintained a slightly negative pressure by the area ventilations systems. The SFPIS equipment that will be located in these areas will consist of cabling and panel wiring, batteries, emergency power control switches and the various electronic modules, digital indicators, power supplies, UPSs and surge filters that comprise the SFPIS signal processing electronics. These components are similar in construction to other safety related and non-safety related components that have been in service in these areas for many years. *Based on similarity and operating experience, it was concluded that the minor pressure differential that results from area ventilations system operation will not affect reliability or performance of the SFPIS components that are located in CEVA or Essential Switchgear Rooms.* *The level transmitter housings were also verified to meet IP67 rating per EPSILON 08 TEST 2373, which ensures that the equipment is protected from dust and water ingress such that it can withstand 100% humidity. The Westinghouse supplied coaxial cable is rated for temperatures up to 221 deg. F and will be able to withstand the conditions expected in the spent fuel building during a Beyond Design Basis Event (BDBE), which exceed those outside the spent fuel pool area. The coaxial cable connectors are also rated to meet IP67.* ***Shock and Vibration:*** *SFPIS pool side brackets were analyzed for Safe Shutdown Earthquake (SSE) design requirements per NRC order EA-12-051 and NEI 12-02 guidance. Components for both the primary and backup measurement channels will be permanently installed and fixed to rigid Seismic Category 1 structures and will not be subject to anticipated shock or vibration inputs beyond those covered by seismic verification. The mounting brackets and NEMA 4X enclosures that will be used to house the SFPIS electronics are inherently resistant to shock and vibration loadings. As a result, no additional shock and vibration testing is required for these components.* *SFPIS pool side brackets for both the primary and backup Westinghouse SFP measurement channels will be permanently installed and fixed to rigid refuel floors, which are Seismic Category I structures. The SFPI system components, such as level sensor and its bracket, display enclosure and its bracket, were subjected to seismic testing, including shock and vibration test requirements. The results for shock and vibration tests were consistent with the anticipated shock and vibration expected to be seen by mounted equipment. The level sensor electronics are enclosed in a NEMA-4X housing. The display electronics panel utilizes a NEMA-4X rated stainless steel housing as well. These housings will be mounted to a seismically qualified wall and will contain the active electronics, and aid in protecting the internal components from vibration induced damage.*

Table 2		
Question No.	NRC QUESTION	LICENSEE RESPONSE
		Electromagnetic Compatibility (EMC) Qualification: *The Westinghouse supplied SFPIS equipment was subjected to EMI/ RFI emissions and susceptibility type testing in accordance with the guidance provided in Regulatory Guide 1.180 Revision 1. The EMC qualification program included tests for Low and High Frequency Radiated Susceptibility (magnetic fields), Low and High Frequency Conducted Susceptibility, Low and High Frequency Radiated Emissions (Electric Field), Electrostatic Discharge, Surge and Electrical Fast Transients. Radiated Electromagnetic Emissions from the equipment were also measured. Westinghouse identified that the suite of EMC tests and acceptance criteria were established based mainly on the non-safety related classification of the SFPIS. A summary of the results of the EMC qualification testing are provided in the Westinghouse reports referenced above.* *Based on the results of the EMC qualification testing, Westinghouse confirmed that the SFPIS could only be qualified to the operational requirements for a Performance Criterion B system. The requirements for performance criterion A ensure that the equipment under test will continue to operate during and after the test. Performance criterion B only requires that the equipment under test continue to operate after the test, but not during the test. Both performance criterion A and B require that there is no degradation or loss of function below the performance level specified by the manufacturer when the equipment is used as intended. For the EMC qualification testing Westinghouse monitored performance of the system level reading with an acceptance criteria based on the capability to provide level readings within the established accuracy of the system (+/- 3 inches).* *During EMC testing Westinghouse encountered several challenges to qualification of the equipment to performance criterion B and modifications were required to harden the system. These modifications included routing of the coaxial cable in conduit from the level transmitter to the SFP probe, the addition of EMI gasketing around the door of the remote enclosure, replacement of the sensor (transmitter) level indicator view port housing cover with a solid metal cover and several wiring and grounding modifications to remove antenna effects from cabling and shield ground connections within the electronics enclosure. These modifications were incorporated into the standard Westinghouse SFPIS product design.* *As a result of the challenges that Westinghouse encountered during EMC testing, a Utility Working Group was formed to review the test methods and determine the applicability of using performance criterion B versus criterion A for the SFPIS. The Utility Working Group concluded that criterion A should be applied as the goal for EMC qualification to ensure that the equipment will operate as intended. The group also requested that Westinghouse identify any gaps where the equipment could not be sufficiently hardened to meet criterion A with a basis for acceptance. With the Utility working Groups input, Westinghouse performed additional EMC qualification testing using performance criterion A. The results of this testing identified that the exposed portion of the probe is susceptible to radiated emissions. Westinghouse Report EQ-QR-269 documents the results of the supplemental EMC testing.*

Table 2		
Question No.	NRC QUESTION	LICENSEE RESPONSE
		Since the SFPIS could not be fully qualified to the operational requirements for performance criterion A due to RFI susceptibility of the probe, Seabrook contracted National Technical Systems to perform EMI/ RFI surveys of Spent Fuel Building and CEVA areas where the new equipment will be located. The results of the surveys are documented in Seabrook FP 700466, Evaluation of Spent Fuel Pool Area EMI/ RFI Background Conditions. Comparison of the survey results to the results of the additional EMC testing that was performed by Westinghouse indicates that there are no EMI/ RFI sources in the Spent Fuel Building during normal plant operation that would negatively affect proper operation or the capability to calibrate the SFPIS. Since the use of portable transmitters could have an effect on operation of the equipment, administrative controls will be implemented at Seabrook to ensure that radio use within the Spent Fuel Building is precluded during periods when the system is being calibrated and/ or level readings are being taken in response to a BDBE. It should also be noted that EMI/ RFI sources will be limited to portable transmitter devices during a BDBE since power to plant communications equipment would not be available. ***Chemistry/Boron Plating:*** *The SFPIS components that reside in or near the SFP will be exposed to the chemistry of the SFP as noted above. The materials of the probe (316L Stainless Steel) and the pool side bracket (ASTM A 240 Type 304) were selected specifically based on the application and environment of the spent fuel pool. The coupler assemblies were also manufactured from stainless steel and boric silicate glass. These materials are inherently resistant to the chemistry in the SFP environment. The only item of concern is boron due to the potential for plating that can occur on objects in the SFP at the normal water level. The probe manufacturer and Westinghouse performed testing to demonstrate the effects of boron on level measurement. The test demonstrated that the level measurement remained within standard accuracy with a 0.25 inch by 4 inch long layer of boric acid build up on the probe cable (See Reference 19). This was further demonstrated during the Factory Acceptance Testing of the SFPIS by Westinghouse.* *The results of the Westinghouse supplied equipment qualification program are summarized in;* • *EQ-QR-269, Design Verification Testing Summary Report for the Spent Fuel Pool Instrumentation System (Reference 18).* • *WNA-TR-03149-GEN, SFPIS Standard Product Final Summary Design Verification Report (Reference 19).* • *CN-PEUS-14-16 – Pool-side Bracket Seismic Analysis (Reference 14)* *These reports document the seismic, electromagnetic compatibility and environmental testing and evaluations that were performed by Westinghouse to assure reliability of the system under normal and BDBE conditions. Required environmental and seismic qualification testing was performed in accordance with IEEE 323-2003 and IEEE 344-2004.* *Westinghouse report EQ-QR-269 contains an open item to track resolution of the potential shortfall in the*

Table 2		
Question No.	**NRC QUESTION**	**LICENSEE RESPONSE**
		radiation dose calculations performed by Steris Isomedix based on NRC NON to Steris Isomedix Inspection Report No. 99901445/ 2014-201. Westinghouse provided an interim position on the inspection report in Westinghouse letter LTR-EQ-14-163. Westinghouse's position is that the requirements for radiation aging of the SFPIS equipment included margin and uncertainty that was based on industry standards and known accuracy of the Steris dosimetry equipment. The radiation aging certificate for the SFPIS equipment identifies that a minimum of 12.1 Mrads was achieved; therefore, the actual radiation dose that was achieved for aging of the SFPIS equipment was sufficient for a 10-year specimen. NextEra is tracking closure of this open item and will provide additional update if this position changes. *The BDBE radiation value to which the Westinghouse equipment is qualified are 1E+09 R γ for the stainless steel probe assembly in the spent fuel pool and 1E+07 R γ for the SFPIS equipment (coupler, coaxial cable and connector) above the pool (Ref. Section 5.1.2 of Westinghouse Report WNA-TR-03149-GEN, Reference 19). When the SFP water level is at Level 3, the only components of the SFPI that are exposed to higher radiation are the stainless steel probe and anchor. These components are manufactured from stainless steel which is resistant to the effects of high radiation.* *As described above, to the pool side SFPIS equipment was qualified to1E07 R γ. Based on the results of calculations documented in FP 700488, Spent Fuel Pool Instrumentation System Dose Assessment" the dose rate for actions at the SFP during BDBE with SFP inventory reduced to level 2 is 0.01 rad/ hr. This dose rate assures adequate shielding is provided to maintain radiological exposure to personnel performing preplanned operator actions in response to loss of SFP inventory within acceptable limits if SFP inventory is reduced to level 2.*
8.	**Please provide the NRC staff with the final configuration of the power supply source for each channel so the staff may conclude the two channels are independent from a power supply assignment perspective.**	<u>NextEra Response Question 8</u> *One of the requirements of NRC Order EA-12-051 is that permanently installed SFP instrument channels shall be powered by separate power supplies. To satisfy this requirement, instrument loop L-2616 will be supplied 120 Vac power from Train A diesel backed MCC E515 via an existing spare circuit (CKT 20) in distribution panel E3E. Similarly, Train B diesel backed 120 Vac power from an existing spare circuit in MCC E615 distribution panel E3F (CKT 20) will be used to power instrument loop L-2617. The unit electrical distribution one line diagram is attached as Enclosure 5. This diagram shows independence of the power supply from MCC-E515 and MCC-E615.*
9.	**Please provide the results of the calculation depicting the battery backup duty cycle requirements and compatibility with the duration required for the plant mitigating strategy for assuring SFP level filling/**	<u>NextEra Response Question 9</u> *The Westinghouse Report, WNA-CN-00300-GEN (Reference 23), provides the results of the calculation depicting the battery backup duty cycle. This calculation demonstrates that battery has the capacity to maintain the level indicating*

Table 2		
Question No.	NRC QUESTION	LICENSEE RESPONSE
	cooling.	*function to the display locations in the A and B Train Essential Switchgear Rooms for 4.22 days. The Flex designated guidelines for Seabrook is 3 days; therefore, the results of the calculation meet the battery capacity requirements for Seabrook.*
10.	Please provide the following: a) An estimate of the expected instrument channel accuracy performance under both (a) normal SFP level conditions (approximately Level 1 or higher) and (b) at the beyond design-basis conditions (i.e., radiation, temperature, humidity, post-seismic and post-shock conditions) that would be present if the SFP level were at the Level 2 and Level 3 datum points. b) A description of the methodology that will be used for determining the maximum allowed deviation from the instrument channel design accuracy that will be employed under normal operating conditions.	<u>NextEra Response Question 10a</u> *The Westinghouse documents WNA-CN-00301-GEN (Reference 22) and WNA-DS-02957-GEN (Reference 34) describe the channel accuracy under both (a) normal SFP level conditions and (b) at the Beyond Design Basis (BDB) conditions that would be present if SFP level were at Level 2 and Level 3 datum points. The overall channel accuracy for the SFPIS level indication was established by Westinghouse based on individual component accuracies using statistical square root sum of the squares (SRSS) methodology as stated in ISA RP67.04.02-2010, "Methodologies for the Determination of Setpoints for Nuclear Safety Related Instrumentation." Each instrument channel will be accurate to within +/- 3 inches during normal spent fuel pool level conditions.* *The instrument channels will retain this accuracy during and following a BDBE. This accuracy is within the ±1 foot channel accuracy requirements of the Order.* <u>NextEra Response Question 10b</u> *Westinghouse calibration procedure WNA-TP-04709-GEN (Reference 25) describes the methodology that will be used to ensure that channel accuracy is maintained. As described in the Westinghouse calibration procedure, an empirical two point check of the equipment performance will be performed by lifting the probe assembly by a fixed distance. This method requires unbolting of probe bracket assembly at the pool and lifting the assembly approximately 2-1/2 feet above the curb of the SFP. The distance traveled will be compared to the change in SFPIS level reading. If the indicated SFPIS level is not within +/- 3 inch of level readings that are based on M&TE measurement of SFP level, the electronic*

Table 2		
Question No.	**NRC QUESTION**	**LICENSEE RESPONSE**
		output of the level transmitter would be verified and if required calibrated to set to the output to the required 4-20 mA signal. If the electronic output calibration doesn't resolve the anomaly a full range calibration adjustment will be performed using the Westinghouse Calibration kit. This calibration method uses a replicate probe, coupler and launch plate to simulate the installed field equipment to perform a full range (five point) calibration of the level transmitter. *Standard checks will also be completed following the calibration to ensure that the SFPIS channels are operating properly. These checks will include verification of the power supply performance, transmitter waveform inspection, cleaning of any residual boron buildup on the probes and visual inspection of the probe assemblies for indication of degradation or damage. Procedures developed by Seabrook will follow the guidance provided in Westinghouse calibration procedure WNA-TP-04709-GEN. Calibration will be performed once per refueling cycle within 60 days of a planned refueling outage considering normal testing scheduling allowances (e.g. 25%). This frequency is in compliance with the NEI 12-02 guidance for Spent Fuel Pool Instrumentation. New I&C maintenance procedures will be written to incorporate the Westinghouse calibration methods.*
11.	**Please provide the following:** **a) A description of the capability and provisions the proposed level sensing equipment will have to enable periodic testing and calibration, including how this capability enables the equipment to be tested in-situ.** **b) A description of the ways testing and calibration will enable performance of regular channel checks of each independent channel against the other and against any other permanently-installed SFP level instrumentation.** **c) A description of how functional checks will be performed, and the frequency at which they will be conducted. Describe how calibration tests will be performed, and the frequency at which they will be conducted. Provide a discussion as to how these surveillances will be incorporated into the plant surveillance**	<u>NextEra Response Question 11a</u> *Westinghouse calibration procedure WNA-TP-04709-GEN (Reference 25) describes the capabilities and provisions for periodic verification and calibration of the SFPIS, including in-situ testing. Seabrook will utilize the methodology provided in the Westinghouse calibration procedure in plant procedures for the functional check at the pool side bracket.* <u>NextEra Response Question 11b</u> *The level displayed by the SFPIS channels will be verified every 24 hours as part of Nuclear System Operator (NSO) rounds. This verification will compare level readings from the SFPIS channels to the existing control room SFP level indication (1-SF-LI-2607). Channel maintenance including channel calibration(s) will be initiated if the deviation between indicated level readings exceeds the bounding 3.0 inch uncertainty of SFP level readings between the existing SFP level indicator (1-SF-LI-2607, +/- 2 in.) and the new SFPIS indicators (+/- 3 in).* <u>NextEra Response Question 11c</u> *Procedures developed by Seabrook will follow the guidance provided in Westinghouse calibration procedure WNA-TP-04709-GEN. Calibration will be performed once per refueling cycle within 60 days of a planned refueling outage considering normal testing scheduling allowances (e.g. 25%). This frequency is in compliance with the NEI 12-02 guidance for Spent Fuel Pool Instrumentation. New I&C maintenance procedures will be written to incorporate the Westinghouse calibration methods. Standard checks will also be completed as part of the calibration to ensure that the SFPIS channels are operating properly.* *These checks will include verification of the power supply performance, transmitter waveform inspection, cleaning of*

Table 2		
Question No.	NRC QUESTION	LICENSEE RESPONSE
	program. d) A description of what preventive maintenance tasks are required to be performed during normal operation, and the planned maximum surveillance interval that is necessary to ensure that the channels are fully conditioned to accurately and reliably perform their functions when needed.	*any residual boron buildup on the probes and visual inspection of the probe assemblies for indication of degradation or damage. Calibration procedure implementation will be tracked as a preventive maintenance activity under the work control program.* <u>NextEra Response Question 11d</u> *The level displayed by the SFPIS channels will be verified every 24 hours as part of Nuclear System Operator (NSO) rounds as described in the response to question 11.b above. Channel maintenance or calibrations that result from unacceptable deviations in level indications will be tracked by the corrective action program and associated maintenance activities under the work control program.* *Seabrook will develop preventive maintenance tasks for the SFPI per Westinghouse recommendation identified in the technical manual WNA-GO-00127-GEN (Reference 24) to assure that the channels are fully conditioned to accurately and reliably perform their functions when needed.*
12.	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, include a description of the radiological and environmental conditions on the paths personnel might	<u>NextEra Response Question 12</u> *NRC Order EA-12-051includes a requirement that the indication of SFP level must be promptly accessible to the appropriate plant staff. For this application the appropriate plant staff includes the plant Operators and Technical Support Center (TSC) staff. The SFP level indication will be provided by digital panel meters located on the front of the redundant SFPIS control panels that will be mounted in the "A" and "B" Train Essential Switchgear Rooms which are located in the Control Building. These locations assure that the SFP level indications will be promptly accessible from the Control Room Operators and TSC through assess routes that are protected by seismic Category 1 structures against adverse weather, missiles and potentially degraded SFP radiological conditions that could occur during a BDBE.*

Table 2		
Question No.	NRC QUESTION	LICENSEE RESPONSE
	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.	*Figure 5.1 of Seabrook procedure SM 7.20, "Control of Time Critical Actions and Operator response Times", established a conservative 2 minute transit time for an Operator to travel from the Control Room to the "B" Train Essential Switchgear Room. The "A" Train Essential Switchgear Room is directly adjacent to the Train B Switchgear Room. Conservatively assuming a 1 minute transit time between the essential switchgear rooms and 5 minutes to read and communicate the SFP level reading to the Control Room, the maximum time to achieve a SFP level reading from the Control Room is conservatively assumed to be 8 minutes. This time is considered to be reasonable with respect to the requirement for prompt accessible indication of SFP level indications.* The plant Service environment charts attached as Enclosure 6 summarize the environmental conditions for the essential switchgear rooms where the SFPI displays will be located. The referenced calculations support the noted environmental conditions for radiation, pressure and humidity. The A and B switchgear room supply and exhaust fans (1-CBA-FN-19, -20, -32 and -33) are capable of maintaining temperature in the A and B switchgear rooms below 104°F. Radiological conditions will not prevent access to the indication. The 60 year TID for the area is specified as 1.50E3 rad. The maximum relative humidity specification for the area is 60 %. The specified normal conditions are not expected to change in these areas as a result of an extended loss of offsite power event.
13.	**Please provide a list of the procedures addressing operation (both normal and abnormal response), calibration, test, maintenance, and inspection that will be developed for use of the SFP instrumentation. Include a brief description of the specific technical objectives to be achieved within each procedure.**	<u>NextEra Response Question 13</u> *The modification review process will be used to ensure all necessary procedures are developed for maintaining and operating the spent fuel level instruments after installation. These procedures will be developed in accordance with NextEra procedural controls. The objectives of each procedural area are described below:* *<u>Inspection, Calibration and Testing</u> - Guidance on the performance of periodic visual inspections, as well intrusive testing, to ensure that each SFP channel is operating and indicating level within its design accuracy.* *<u>Preventative Maintenance</u> - Guidance on scheduling of, and performing, appropriate preventative maintenance activities necessary to maintain the instruments in a reliable condition.* *<u>Maintenance</u> - To specify troubleshooting and repair activities necessary to address system malfunctions.* *<u>Programmatic Controls</u> - Guidance on actions to be taken if one or more channels is out of service.* *<u>System Operations</u> - To provide instructions for operation and use of the system by plant staff.* *<u>Response to inadequate levels</u> - Action to be taken on observations of levels below normal level will be addressed in Site off normal procedures and /or FLEX Support Guidelines.* *Westinghouse calibration procedure WNA-TP-04709-GEN (Reference 25) describes the capabilities and provisions for periodic testing and calibration of the SFPIS, including in-situ testing. Seabrook utilized the methodology*

Table 2		
Question No.	NRC QUESTION	LICENSEE RESPONSE
		described in the Westinghouse calibration procedure for the functional channel checks at the pool side bracket and channel calibrations. *The following procedures have been developed to maintain the system:*

PM	*TITLE*	*FREQ*
SF-L-2616-CAL-1	*TRAIN A SPENT FUEL POOL LEVEL (BDB) CALIBRATION*	*1 Year*
SF-L-2616-BR-1	*TRN A SFP LEVEL 1-SF-CP-300-A BATTERY REPLACEMENT*	*3 Year*
SF-L-2616-MAN-1	*TRN A SFP LVL XMTR 1-SF-LIT-2616 REPLACEMENT*	*7 Year*
SF-L-2616-MAN-2	*TRN A SFP LVL PWR SUPPLY 1-SF-UQ-2616 REPLACEMENT*	*10 Year*
SF-L-2617-CAL-1	*TRAIN B SPENT FUEL POOL LEVEL (BDB) CALIBRATION*	*1 Year*
SF-L-2617-BR-1	*TRN B SFP LEVEL 1-SF-CP-300-B BATTERY REPLACEMENT*	*3 Year*
SF-L-2617-MAN-1	*TRN B SFP LVL XMTR 1-SF-LIT-2617 REPLACEMENT*	*7 Year*
SF-L-2617-MAN-2	*TRN B SFP LVL PWR SUPPLY 1-SF-UQ-2617 REPLACEMENT*	*10 Year*

The following high level FSGs will direct operators to monitor SFP level using SFPIS:

FSG-0.0, Extended Loss of All AC Power with SEPS
FSG-0.1, Extended Loss of All AC Power without SEPS
FSG-5, Initial Assessment and FLEX Equipment Staging
FSG-11, Alternate SFP Makeup and Cooling
FSG-14, Extended Loss of All AC Power while Plant Shutdown

When SFP level cannot be maintained greater than 23 feet above the top of the racks the FSG procedures direct operators to implement FSG-11, Alternate SFP Makeup and Cooling.

FSG-5, Initial Assessment and FLEX Equipment Staging, will provides methods to establish portable ventilation in the CEVA area when area temperature is greater than 130°F.

FSG-5, Attachment G, Restore Miscellaneous Lighting and Pipe Chase Ventilation Power, will provide an alternate power source to SFPIS.

The following Operating Procedures will also be revised to address alignment of the SFPIS for operation.

OS1014.01, Spent Fuel Cleanup and Cooling System Fill and Vent (system lineup)
OS1046.58, MCC-515 Maintenance Procedure
OS1046.65, MCC-615 Maintenance Procedure

Table 2		
Question No.	NRC QUESTION	LICENSEE RESPONSE
14.	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.	<u>NextEra Response Question 14a</u> SFPI channel/equipment maintenance/preventative maintenance and testing program requirements to ensure design and system readiness will be established in accordance with NextEra's processes and procedures. The design modification process will take into consideration the vendor recommendations to ensure that appropriate regular testing, channel checks, functional tests, periodic calibration, and maintenance is performed (and available for inspection and audit). Once the maintenance and testing program requirements for the SFP are determined, the requirements will be documented in Maintenance program documents. Performance checks, described in the Vendor Operator's Manual, and the applicable information will be contained in plant procedures. Operator performance tests will be performed periodically as recommended by the vendor. Channel functional tests with limits established in consideration of vendor equipment specifications will be performed at appropriate frequencies. Channel calibration tests per maintenance procedures with limits established in consideration of vendor equipment specifications are planned to be performed at frequencies established in consideration of vendor recommendations. <u>NextEra Response Question 14b</u> Both primary and backup SFPI channels incorporate permanent installations (with no reliance on portable, post-event installation) of relatively simple and robust augmented quality equipment. Permanent installation coupled with stocking of adequate spare parts reasonably diminishes the likelihood that a single channel (and greatly diminishes the likelihood that both channels) will be out-of-service for an extended period of time. Planned compensatory actions for unlikely extended out-of-service events are summarized as follows:

# Channel(s) Out-of-service	Required Restoration Action	Compensatory action
1	Initiate actions to restore channel to functional status within 90 days. (Note 1)	Implement actions in accordance with Note 2.
2	Initiate action to restore at least one channel to	Implement actions in accordance with

Table 2		
Question No.	NRC QUESTION	LICENSEE RESPONSE
		| | functional status within 24 hours. | Note 2 within 72 hours. | Note 1: If channel restoration is not expected to be completed within 90 days initiate compensatory action. Note 2: Initiate an evaluation in accordance with the corrective action program. The evaluation shall initiate compensatory actions to implement an alternate method of monitoring and schedule required actions for restoring the instrumentation channel(s) to functional status. **<u>NextEra Response Question 14c</u>** See RAI-14.b response above.
15.	**Please provide a description of the in-situ calibration process at the SFP location that will result in the channel calibration being maintained at its design accuracy.**	**<u>NextEra Response Question 15</u>** *Westinghouse calibration procedure WNA-TP-04709-GEN (Reference 25) describes the capabilities and provisions for periodic testing and calibration of the SFPIS, including in-situ testing. Seabrook will utilize the methodology described in the Westinghouse calibration procedure for the functional check at the pool side bracket.* *The level displayed by the channels will be verified per the Seabrook administrative and operating procedures, as recommended by Westinghouse vendor technical manual WNA-GO-00127-GEN (Reference 24). If the level is not within the required accuracy (+/- 3 in), a full range channel calibration will be performed.* *Channel verifications will be performed on a 24 hour basis by comparing SFP level reading from indicators SF-LI-2616, SF-LI-2617 and SF-LT-2607. Channel maintenance and/ or channel calibration will be initiated if the deviation between indicated level readings exceeds 3.0 inches between the new SFPIS indicators or 2.0 inches between the new SFPIS indicator and the existing 1-SF-LI-2607 indicator. Channel maintenance and/ or channel calibration will also be performed if the SFPIS indicator displays an off scale "Hi", "Lo" or out of range reading ("0000") when spent fuel pool level is within the normal operating band (24.81 to 25.23 Ft above the fuel racks).*

References

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.
4) NEI 12-06, Diverse and Flexible Coping Strategies (FLEX) Implementation Guide, Revision 0, August 2012.
5) ML 13217A166, NRC Electronic Mail to NextEra Energy Seabrook, LLC, "Draft Requests for Additional Information Regarding the Seabrook Overall Integrated Plan for Reliable SFP Instrumentation, dated July 18, 2013.
6) ML13267A388, Seabrook Station, Unit 1 – "Interim Staff Evaluation and Request for Additional Information Regarding the Overall Integrated Plan for Implementation of Order EA-12-051, Reliable Spent Fuel Pool Instrumentation (TAC No. MF0837)," dated December 4, 2013.
7) ML13063A438, NextEra Energy Seabrook, LLC's Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049), dated February 22, 2013.
8) ML13063A439, NextEra Energy Seabrook, LLC's Overall Integrated Plan in Response to March 12, 2012 Commission Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051), dated February 26, 2013.
9) ML12311A012, NextEra Energy Seabrook Letter, SBK-L-12211, Initial Status Report in Response to March 12,2012 Commission Order Modifying Licenses with Regard to Spent Fuel Pool Instrumentation (Order Number EA-12-051), dated October 26,2012.
10) ML13247A177, NextEra Energy Seabrook, LLC, First Six Month Status Report for the Implementation of Order EA-12-051, "Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation , dated August 28, 2013.
11) ML14064A189, NextEra Seabrook, LLC, Second Six-Month Status Report I Responese to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, dated February 27, 2014.
12) ML14246A192, NextEra Energy Seabrook, LLC's Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051), dated August 24, 2014.
13) Seabrook Calculation (FP 700488), Spent Fuel Pool Instrumentation System Dose Assessment.
14) Westinghouse Calculation CN-PEUS-14-16, Seismic Analysis of the SFP Mounting Bracket at Seabrook Station Unit 1, Revision 0.
15) Engineering Change Package 281849 - SPENT FUEL POOL INSTRUMENTATION UPGRADE FOR NRC ORDER EA-12-051.
16) Seabrook UFSAR Sections 1.2, 1.8, 3.1, 3.4, 3.5, 3.9 (B), 3.9 (N), 3.10 (B), 3.11, 6.1 (B), 6.1 (N), 6.5, 6.6, 7.1, 7.4, 8.1, 8.3, 9.1, 9.2, 12.2, 12.3, 12.4, 14.2 and 15.7.
17) Westinghouse Proprietary Document, WNA-PT-00188-GEN, "Spent Fuel Pool Instrumentation System (SFPIS) Standard Product Test Strategy," Revision 3.
18) Westinghouse Proprietary Document, EQ-QR-269, "Design Verification Testing Summary Report for the Spent Fuel Pool Instrumentation," Revision 5.
19) Westinghouse Proprietary Document, WNA-TR-03149-GEN, "SFPIS Standard Product Final Summary Design Verification Report," Revision 1.
20) Westinghouse Proprietary Document, WNA-DC-00269-FPL, "Spent Fuel Pool Instrumentation System Compliance Matrix - FPL/NextEra –Seabrook Unit 1," Revision 1.
21) Westinghouse Proprietary Document, WNA-TP-04752-GEN, "Spent Fuel Pool Instrumentation System Standard Product Integrated Functional Test Procedure," Revision 2.
22) Westinghouse Proprietary Document, WNA-CN-00301-GEN, "Spent Fuel Pool Instrumentation System Channel Accuracy Analysis," Revision 1.
23) Westinghouse Proprietary Document, WNA-CN-00300-GEN, "Spent Fuel Pool Instrumentation System Power Consumption Calculation," Revision 1.
24) Westinghouse Proprietary Document, WNA-GO-00127-GEN, "Spent Fuel Pool Instrumentation System Standard Product Technical Manual," Revision 3.
25) Westinghouse Proprietary Document, WNA-TP-04709-GEN, "Spent Fuel Pool Instrumentation System Calibration Procedure," Revision 4.

References

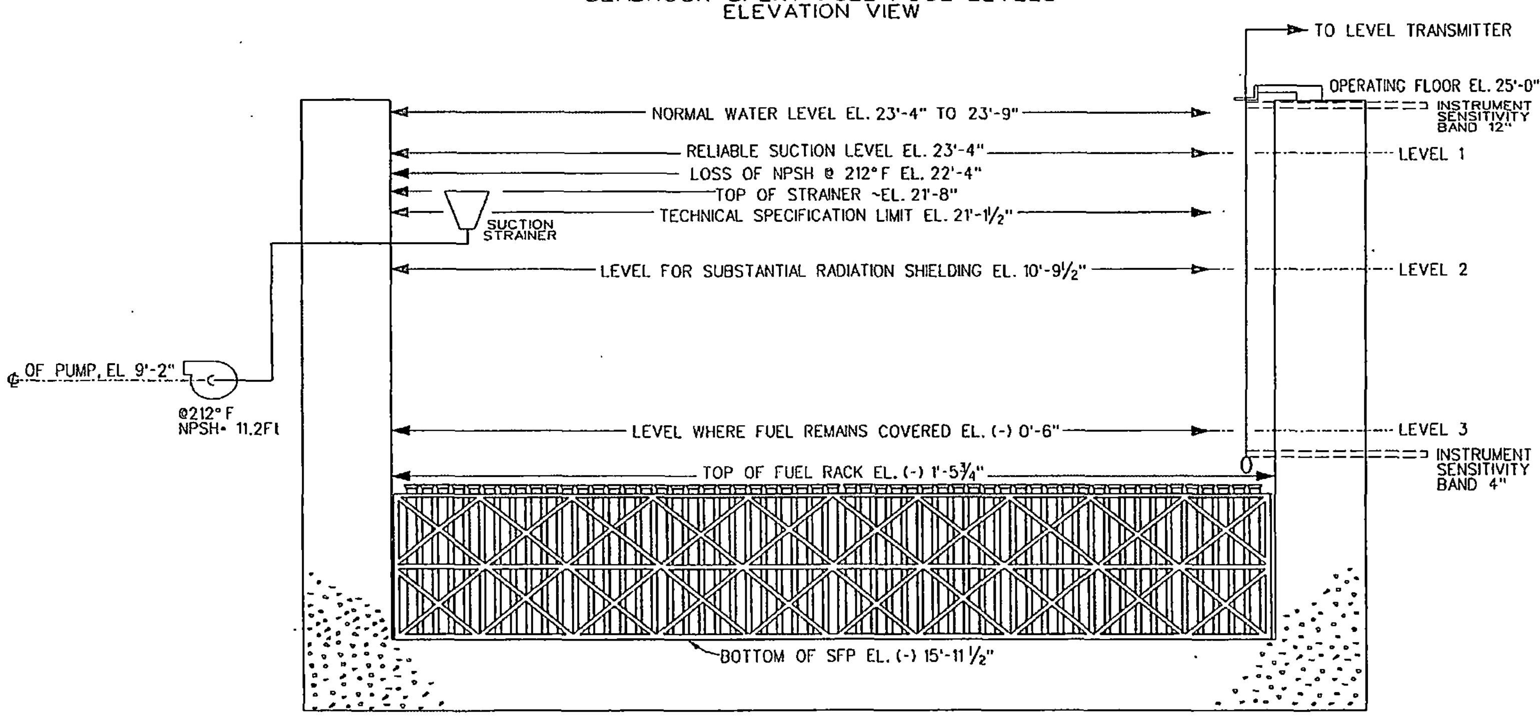
26) Westinghouse Proprietary Document, WNA-AR-00377-GEN, "Spent Fuel Pool Instrumentation System Failure Modes and Effect Analysis," Revision 4.
27) Westinghouse Proprietary Document, LTR-EQ-14-163, "Interim Position for Radiation Aging of the Spent Fuel Pool Instrumentation System"
28) Westinghouse Proprietary Document, LTR-SFPIS-13-35, "SFPIS: Basis for Dose Requirement and Clarification of Production Equivalency of Electronics Enclosure Used for Seismic Testing," Revision 1.
29) 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.
30) Westinghouse Proprietary Document , LTR-CDME-13-78 Rev 1, "Concentration of Boric Acid in the Watts Bar Spent Fuel Pool Due to Boiling and Its Effect on Level Instrumentation Cables."
31) Westinghouse Proprietary Report, EQLR-281, Revision 1, "Seismic Design Verification Test Report for the Spent Fuel Pool Instrumentation System," September 2014.
32) Westinghouse Proprietary Letter, LTR-EQ-14-26, Revision 0, "Static Pull Test for Spent Fuel Pool Instrumentation System Connector," February 6, 2014.
33) Westinghouse Proprietary Document, EQ-EV-196, Revision 1, "Preconditioning, Thermal Aging and Radiation Aging of the Coaxial Signal Cables and Couplers for the Spent Fuel Pool Instrumentation System," August 2014.
34) Westinghouse Proprietary Document, WNA-DS-02957-GEN, Revision 4, "Spent Fuel Pool Instrumentation System Design Specification," May 2014.
35) LTR-SPFIS-13-027, Rev 0, "Radial and Pasternack Coax Cable Connector Documentation and Comparison", Westinghouse Electric Company, LLC.
36) Seabrook Calculation C-S-1-24606, "Spent Fuel Pool Level for Reliable Pump Suction," Revision 00
37) Seabrook Specification S-S-1-E-0227, "Spent fuel Pool Instrumentation System," Revision 002.
38) Drawing 1-NHY-300219, "Seabrook Service Environment Chart"
39) *Calculation C-S-1-84616, "Power Uprate Spent Fuel Pool Cooling System Analysis," Revision 1.*
40) *Seabrook Design Basis Document DBD-SF-01, "Spent Fuel Pool Facilities and Spent Fuel pool Cooling, Purification and Cleanup System," Revision 1. (Applicable Pages Attached)*

Enclosure 1 to SBK-L-15138

Spent Fuel Pool Levels Elevation View

ENCLOSURE 1

SEABROOK SPENT FUEL POOL LEVELS
ELEVATION VIEW



NOTES:
1. ALL ELEVATIONS ARE NOMINAL
2. NOT TO SCALE
3. LEVEL TRANSMITTER ACCURACY +/- 3 IN.

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Enclosure 2 to SBK-L-15138

Summary of Westinghouse Spent Fuel Pool Instrumentation Design Requirements

ENCLOSURE - 2						
#	**Topic**	**Parameter Summary**	**Westinghouse Reference Document Number**	**Additional Comment**	**Test or Analysis Results**	**Licensee Evaluation**
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.	N/A	The design and implementation requirements as defined in Table 2 references 1, 2 and 3 are bounded by the design Westinghouse Design Specification for the SFPIS (WNA-DS-02957-GEN).
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	The SFPIS qualification test strategy as described in WNA-PT-00188-GEN envelopes the Seabrook specific environmental and seismic design requirements. Refer to Seabrook Specification S-S-E-0227, Spent Fuel Pool Instrumentation System.
3	Environmental qualification for electronics enclosure with Display	50^0 F to 140^0 F, 0 to 95% RH TID ≤ 1E03 R γ normal (outside SFP area) TID ≤ 1E03 R γ abnormal (outside SFP area)	EQ-QR-269 and WNA-TR-03149-GEN for all conditions.	Results are summarized in EQ-QR-269 and WNA-TR-03149-GEN. Radiation Aging verification summarized in Section 5 of WNA-TR-03149-GEN.	Test passed conditions described.	For Seabrook specific temperature and humidity requirements the electronic enclosures that will be located in the Containment Enclosure Building and Control Building Essential Switchgear Rooms are enveloped by the Westinghouse qualification for normal and BDBE conditions. As described in Westinghouse Report WNA-TR-03149-GEN, radiation is not considered to be an aging mechanism for equipment that is only subjected to TID ≤ 1E4 rads. TID to equipment located in the Containment Enclosure Building and Control Building Essential Switchgear Rooms will be less than 1E3 rads for normal and BDBE conditions. Refer to Seabrook Specification S-S-E-0227, Spent Fuel Pool Instrumentation System. Westinghouse has provided an interim position regarding the radiation aging qualification and the open item from Steris (ref. Response to Table 2, NRC Question 7). NextEra Energy is tracking closure of the open item and will provide additional update if Westinghouse's position changes.

ENCLOSURE - 2

#	Topic	Parameter Summary	Westinghouse Reference Document Number	Additional Comment	Test or Analysis Results	Licensee Evaluation
4	Environmental Testing for Level Sensor components in SFP area – Saturated Steam & Radiation	50 °F to 212° F and 100% humidity	EQ-QR-269	Thermal aging test results summarized in EQ-QR-269 Section 5.2. Steam test results summarized in EQ-QR-269 Section 5.7.	Passed	The temperature and humidity values of 212°F and 100% envelop the service environment requirements for the SFPIS components that will be located in the SFP area. Refer to Seabrook Specification S-S-E-0227, Spent Fuel Pool Instrumentation System.
		1E03 R γ normal (SFP area)	WNA-TR-03149-GEN and EQ-QR-269	Thermal Aging & radiation aging verification are summarized in Sections 4.1 and 5 (entire system) of WNA-TR-03149-GEN	Passed	The normal operating dose in the SFP area per is ≤ 1.E03 R γ. Refer to Seabrook Specification S-S-E-0227, Spent Fuel Pool Instrumentation System.
		1E07 R γ BDBE (SFP area)	EQ-QR-269	Radiation aging program was conducted in accordance with procedures EQ-TP-326 and EQ-TP-354. Radiation aging results are summarized in EQ-QR-269 Section 5.3.	Passed	The BDBE radiation value to which the Westinghouse equipment was qualified is 1.E+9 R γ for the probe stainless steel cable and weight and 1E+7R γ for the equipment on the Operating deck above the pool (Ref. Section 5.1.2 of WNA-TR-03149-GEN). With SFP water level at Level 3 the only components of SFPI that are exposed to the SFP are the stainless steel probe and the stainless steel anchor. Since stainless steel is inherently resistant to degradation from radiation the probe and anchor, environmental testing of these components was not required. Equipment located above the SFP (Coaxial cable, coupler and connector) were aged to 1E+11 R γ to assure qualification to 1E+7 R γ. Westinghouse completed its aging qualification of the SFPIS to 10 years. Westinghouse has provided an interim position regarding the radiation aging qualification and the open item from Steris (ref. Response to Table 2, NRC Question 7). NextEra Energy is tracking closure of the open item and will provide additional update if Westinghouse's position changes.

#	Topic	Parameter Summary	Westinghouse Reference Document Number	Additional Comment	Test or Analysis Results	Licensee Evaluation
5	Environmental Testing for Level Sensor Electronics Housing – outside SFP	50^0 F to 140^0 F, 0 to 95% RH TID ≤ 1E03 R γ normal (outside SFP area) TID ≤ 1E03 R γ abnormal (outside SFP area)	WNA-TR-03149-GEN and EQ-QR-269	Testing summarized in WNA-TR-03149-GEN, Section 3.3. Radiation Aging verification summarized in WNA-TR-03149-GEN, Section 5. Thermal aging test results summarized in EQ-QR-269 Section 5.2. Steam test results summarized in EQ-QR-269 Section 5.7	Passed	Temperature is ≤ 140°F and humidity is ≤ 95% RH for abnormal conditions in the Containment Enclosure Building and Control Building Essential Switchgear Rooms. As described in Westinghouse Report WNA-TR-03149-GEN, radiation is not considered to be an aging mechanism for equipment that is only subjected to TID ≤ 1E4 rads. TID to equipment located in the Containment Enclosure Building and Control Building Essential Switchgear Rooms will be less than 1E3 rads for normal and BDBE conditions. Refer to Seabrook Specification S-S-1-E-0227, Spent Fuel Pool Instrumentation System
6	Thermal & Radiation Aging – organic components in SFP area	1E03 R γ normal (SFP area) 1E07 R γ BDBE (SFP area)	EQ-QR-269 and WNA-TR-03149-GEN	Thermal aging test results summarized in EQ-QR-269 Section 5.2. Radiation aging results are summarized in EQ-QR-269 Section 5.3 Thermal Aging & radiation aging verification summarized in Sections 4.1 and 5 of WNA-TR-03149-GEN.	Passed	See response to Item 4 above. Aging Tests – Westinghouse completed aging qualification of SFPIS to 10 years. Westinghouse has provided an interim position regarding the radiation aging qualification and the open item from Steris (ref. Response to Table 2, NRC Question 7). NextEra Energy is tracking closure of the open item and will provide additional update if Westinghouse's position changes.

ENCLOSURE - 2

#	Topic	Parameter Summary	Westinghouse Reference Document Number	Additional Comment	Test or Analysis Results	Licensee Evaluation
7	Basis for Dose Requirement	**Normal Conditions:** 1E03 R γ TID (above pool) 1E09 R γ TID (1' above fuel rack) **BDBE Conditions:** 1E07 R γ TID (above pool) ≤ 1E09 R γ TID (1' above fuel rack)	LTR-SFPIS-13-35 and WNA-DS-02957-GEN	Westinghouse Basis for Radiation Dose Requirement	Passed for all conditions	NextEra has determined the Westinghouse basis is acceptable. The normal operating dose in the SFP area is ≤ 1E+3 R γ, which is bounding for Seabrook. Refer to Section 5.1.1 of WNA-TR-03149-GEN and Seabrook specification S-S-1-E--0227, Spent Fuel Pool Instrumentation System. Equipment located above the SFP (Coaxial cable, coupler and connector) were aged to 1E+11 R γ to assure qualification to 1E+7 R γ. The as tested test BDBE condition (TID of 1E+11 R γ) above bounds the Seabrook requirement of 1.06E+7 R γ.
8	Seismic Qualification	Per Spectra in WNA-DS-02957-GEN	EQ-QR-269	EQ-QR-269 summarizes the results of seismic testing that was performed by Westinghouse.	Passed	The TRS that was used by Westinghouse for seismic qualification of the SFPIS, including the poolside mounting brackets, envelops the Seabrook RSS.
			WNA-TR-03149-GEN	WNA-TR-03149-GEN provides high level summary of the pool-side bracket analysis and equipment seismic test program.	Passed	

ENCLOSURE - 2						
#	Topic	Parameter Summary	Westinghouse Reference Document Number	Additional Comment	Test or Analysis Results	Licensee Evaluation
			EQ-TP-353 (procedure)	Seismic Pull test for straight and 90 degree coaxial connectors was performed in accordance with Westinghouse procedure EQ-TP-353.	Passed	
9	Sloshing	N/A	LTR-SEE-II-13-47 and WNA-TR-03149-GEN.	Calculation to demonstrate that probe will not be sloshed out of the SFP. Sloshing is also addressed in Section 7.2 of WNA-TR-03149-GEN.	Passed	Adequate sloshing forces (inclusive of vertical and horizontal impact forces, hydrodynamic forces) were considered by Westinghouse in the calculation for sloshing forces. The calculated forces were also considered by Westinghouse in the design the bracket, including anchorage requirements, to ensure the probe will not be degraded or sloshed out of the SFP during a seismic event.
10	Spent Fuel Pool Instrumenta-tion System Functionality Test Procedure	Acceptance Criteria for Performance during EQ testing	WNA-TP-04613-GEN and WNA-TP-00189-GEN	Test plan and procedure used to demonstrate that SFPIS meet its operational and accuracy requirements during Equipment Qualification Testing.	Passed	The monitoring requirements from Westinghouse procedures WNA-TP-04613-GEN and WNA-TP-00189-GEN assure SFPIS performance in accordance with requirements of Table 2 reference 1, 2 and 3.
11	Boron Build-Up	Per requirement in WNA-DS-02957-GEN	WN-TR-03149-GEN, LTR-CDME-13-78A and LTR-SFPIS-13-026	Boron build up demonstrated through Integrated Functional Test (IFT).	Passed	Boron buildup testing and justification provided in WNA-TP-00189-GEN "Integrated Functional Test Plan" assure SFPIS performance in accordance with the requirements of Table 2 reference 1, 2 and 3

ENCLOSURE - 2						
#	**Topic**	**Parameter Summary**	**Westinghouse Reference Document Number**	**Additional Comment**	**Test or Analysis Results**	**Licensee Evaluation**
12	Pool-side Bracket Seismic Analysis	N/A	CN-PEUS-14-16	Analysis included seismic forces and hydrodynamic forces, as appropriate.	Passed	See response to NRC Question. 4. Seabrook seismic requirements to withstand a SSE are bounded by the Westinghouse analysis for the poolside mounting bracket. Equipment anchorage will be designed by Seabrook to meet the calculated Westinghouse loads (tension and shear loads, and hydrodynamic load) with appropriated safety margin.
13	Additional Brackets (Sensor Electronics and Electronics Enclosure)	N/A	WNA-DS-02957-GEN	Weights provided to licensees for their own evaluation.	N/A	Equipment anchorage will be designed by Seabrook to meet the calculated Westinghouse loads (tension and shear loads, and hydrodynamic load) with appropriated safety margin.
14	Shock & Vibration	WNA-DS-02957-GEN	WNA-TR-03149-GEN	WNA-TR-03149-GEN, Section 7 provides justification for shock and vibration.	N/A	Westinghouse SFP measurement channels will be permanently installed and fixed to rigid, structural walls or floors of Seismic Category 1 structures.

ENCLOSURE - 2

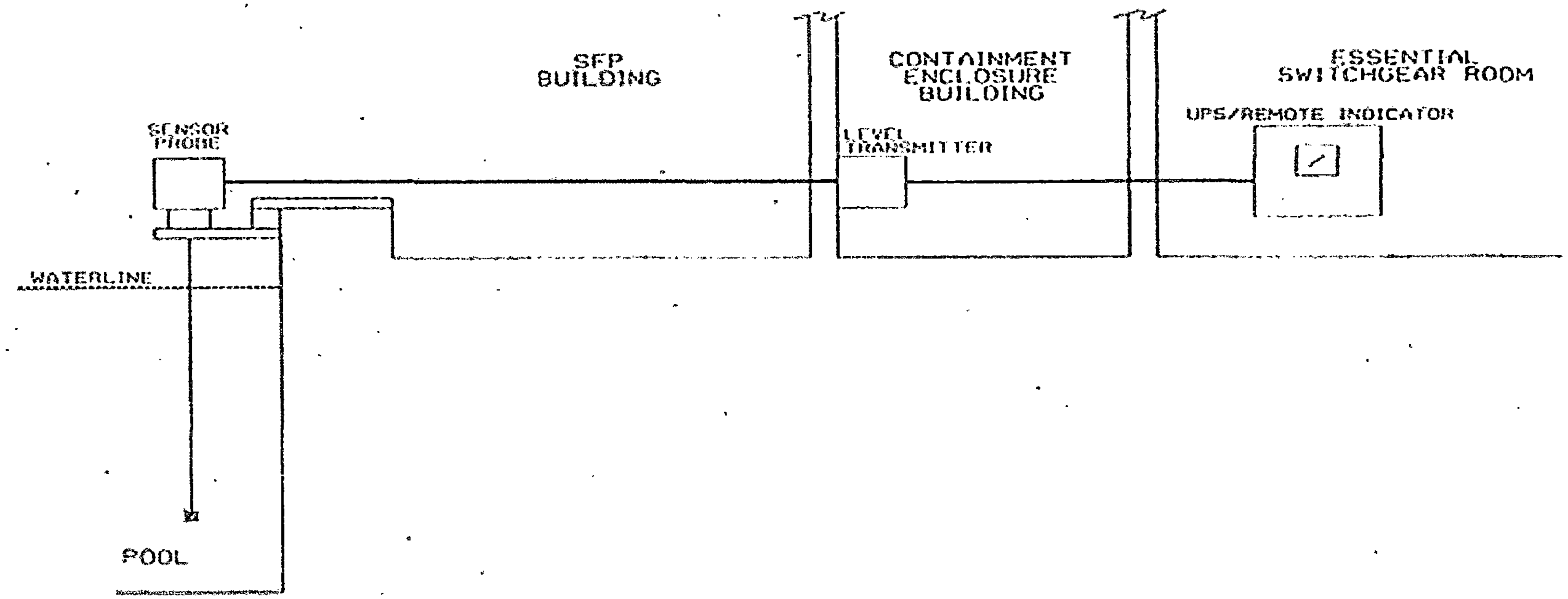
#	Topic	Parameter Summary	Westinghouse Reference Document Number	Additional Comment	Test or Analysis Results	Licensee Evaluation
15	Westinghouse Factory Acceptance Test, including dead zone verification.	Integrated Functional Test Requirements from WNA-DS-02957-GEN. 12" dead-zone at top of probe 4" dead-zone at bottom of probe	WNA-TP-04752-GEN, WNA-TR-03357-WEP, WNA-TR-03351-GPRY1	The Integrated Functional Test demonstrated functionality of the full system, which included calibration of each channel. Dead-zone tests are described in WNA-TP-04752-GEN, Section 9.6.2.	passed	SFPIS functional testing and post modification testing in accordance with Engineering Change 281849 assure SFPIS performance in accordance with the requirements of Table 2 references 1, 2 and 3.
16	Channel Accuracy	+/- 3 inches per WNA-DS-02957-GEN	WNA-CN-00301-GEN	Channel accuracy from measurement to display.	Passed	Seabrook has reviewed WNA-DS-02957-GEN and WNA-CN-00301-GEN and found that channel accuracy requirements are met.
17	Power Consumption	3 day battery life (minimum) SFPIS power consumption	WNA-CN-00300-GEN	N/A	Passed	Seabrook has reviewed WNA-CN-00300-GEN and concluded that the SFPIS battery has a capacity that is > 72 hours which meets the Order requirements. The SFPIS power loading does not challenge the plant electrical distribution system or Emergency Diesel Generator loading.
18	Technical Manual	N/A	WNA-GO-00127-GEN	Information and instructions for Operation, Installation, use, etc. are included here.	N/A	Seabrook will utilize WNA-GO-00127-GEN as input for procedure preparation and system maintenance.

ENCLOSURE - 2						
#	Topic	Parameter Summary	Westinghouse Reference Document Number	Additional Comment	Test or Analysis Results	Licensee Evaluation
19	Calibration	Routine Testing/calibration verification and Calibration method	WNA-TP-04709-GEN	Includes preventative maintenance actions such as those for Boron buildup and cable probe inspection.	N/A	Seabrook will utilize WNA-TP-04709-GEN as input for development of plant procedures for calibration and preventive maintenance of the SFPIS.
20	Failure Modes and Effects Analysis (FMEA)	N/A	WNA-AR-00377-GEN	Addresses mitigations for the potential failure modes of the system.	N/A	Seabrook will utilize WNA-AR-00377-GEN as input for procedure preparation and system troubleshooting if required.
21	EMI/ RFI Qualification Testing	RG 1.180, Rev. 1 test conditions	WNA-TR-03149-GEN and EQ-QR-269	N/A	Passed to performance criterion B	Refer to the response to Table 2, NRC Question 7. NextEra has reviewed the test report and concluded that the results comply with the requirements performance criterion B.

Enclosure 3 to SBK-L-15138

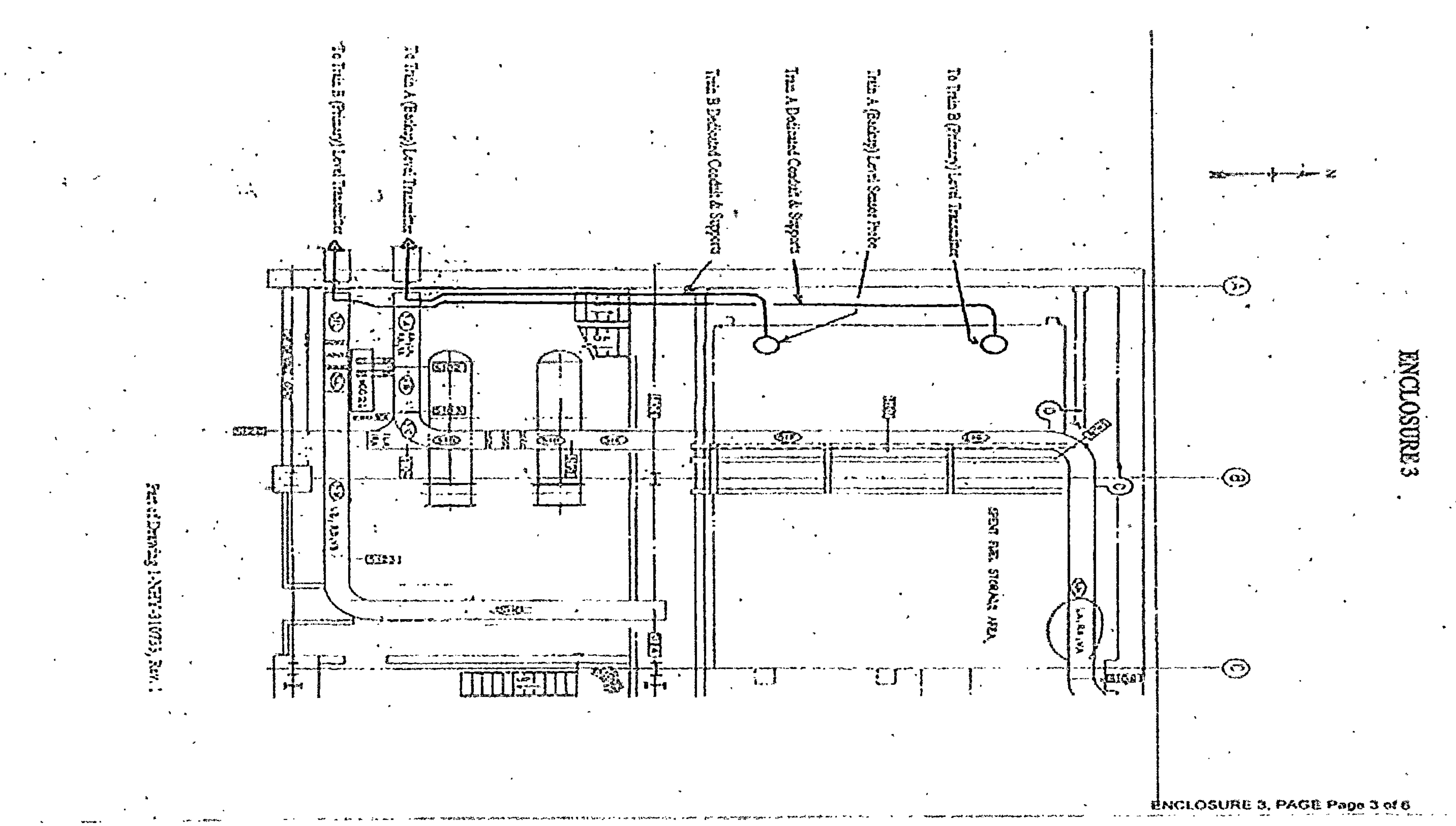
Plan Views of Instrument Channel Arrangement

ENCLOSURE 3

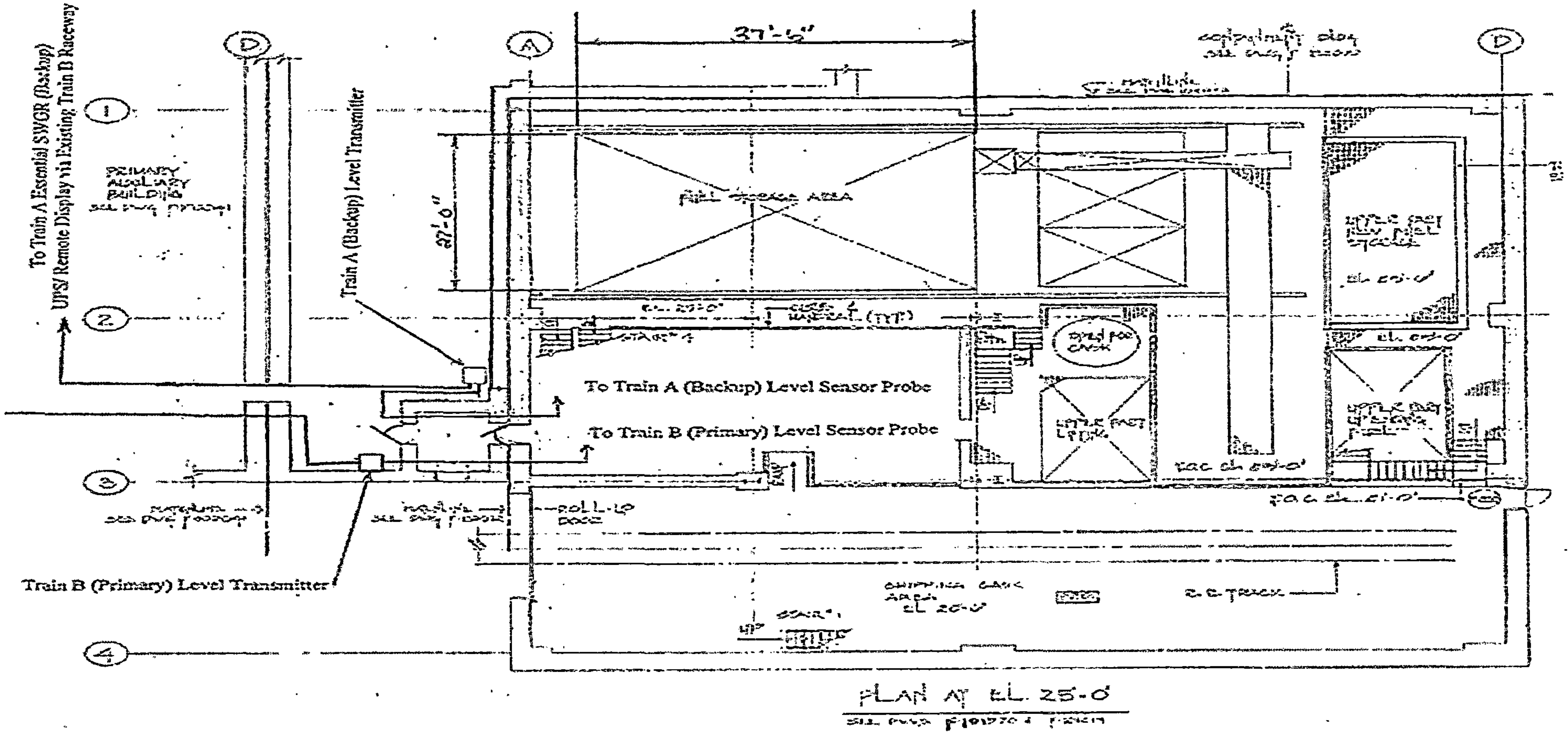


SIMPLIFIED SFP LEVEL
MONITORING CHANNEL SKETCH

JIM S SIMPLIFIED SFP.dgn 8/12/2013 2:07:10 PM

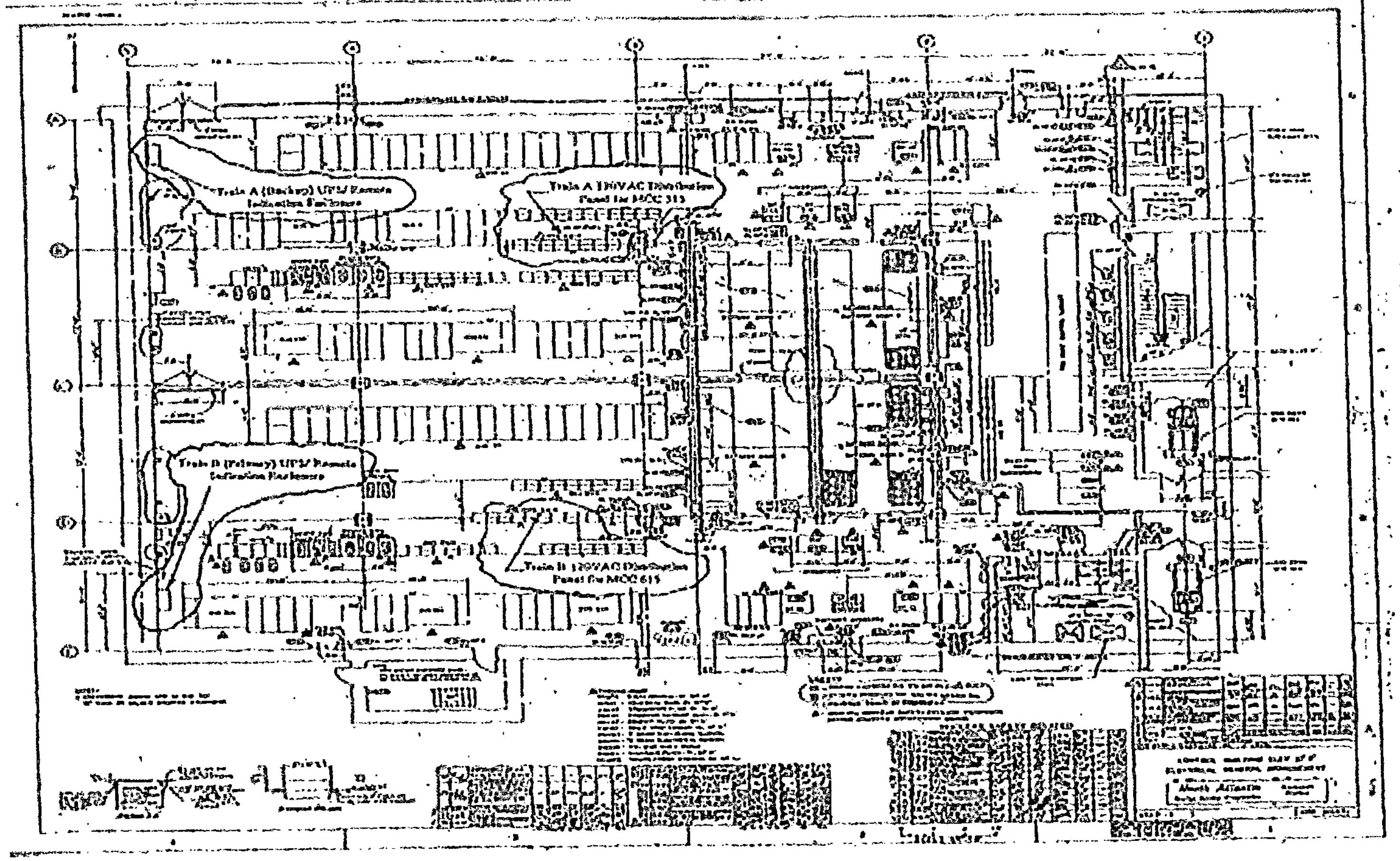

ENCLOSURE 3
To Train B (Primary) Level Transmitter
Train A (Backup) Level Sensor Probe
Train A Dedicated Conduit & Supports
Train B Dedicated Conduit & Supports
To Train A (Backup) Level Transmitter
To Train B (Primary) Level Transmitter
SPENT FUEL STORAGE AREA
Part of Drawing 1-NHY-310735, Rev. 1
ENCLOSURE 3, PAGE Page 3 of 6

ENCLOSURE 3



Enclosure 3, Page 4 of 6

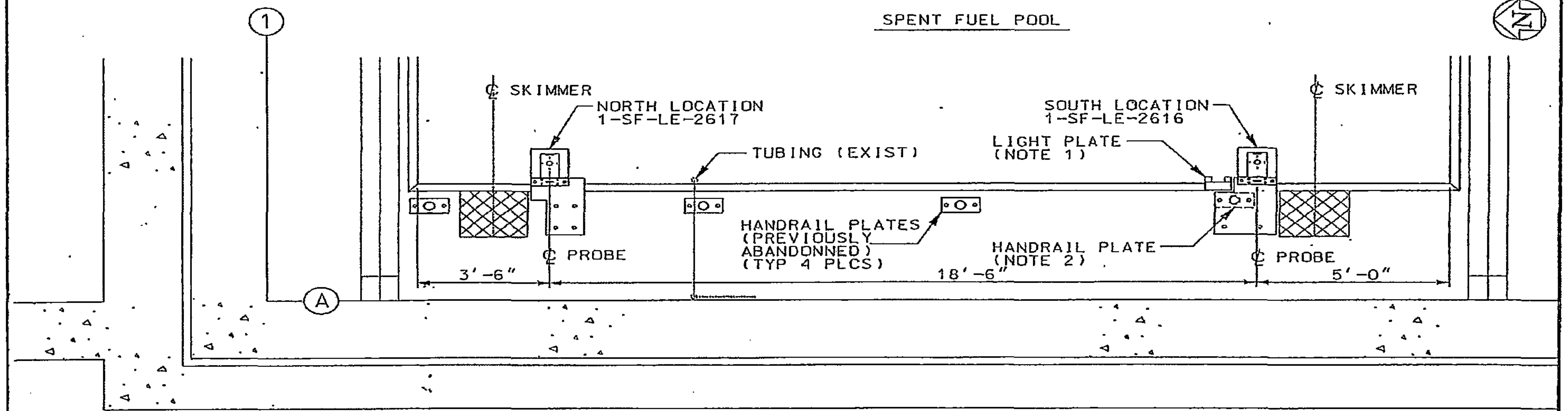
Enclosure 3



ENCLOSURE 3, PAGE Page 5 of 6

ENCLOSURE 3

SPENT FUEL POOL LEVEL SENSOR LOCATION DIAGRAM



LOCATION PLAN

NOTE ✻: SEABROOK MODIFICATIONS TO THE POOL SIDE BRACKET ARE CONSERVATIVELY CLASSIFIED AS SAFETY CLASS 3, SEISMIC CATEGORY I TO ENSURE PROPER QUALITY OF MATERIAL AND WORKMANSHIP FOR THIS APPLICATION.

AFFECTED DOC'S: 101570, 101571, 111572
REFERENCE: 102200, 102203, ECA99/113212

NOTES:

1. THE EXISITNG UNDERWATER LIGHT ASSEMBLY BRACKET, WELDED TO THE SFP CURB ANGLE PER EC14371 AND LOCATED ADJACENT TO 1-SF-LE-2616, IS TO BE ABANDONED IN PLACE AND A NEW BRACKET WILL BE INSTALLED BY EC281537. A MINIMUM OF 3'-0" NORTH OF THE PROBE CENTERLINE. REFERENCE SK 111576-EC281849 SHEET 2. SEE EC281537 FOR DETAILS SPECIFIC TO THE RELOCATION OF THE LIGHT ASSEMBLY.
2. EXISTING HANDRAIL ANCHOR PLATE TO BE REMOVED. HILTI'S ARE TO BE LEFT IN PLACE AND REUSED FOR NEW INSTRUMENT PLATE.

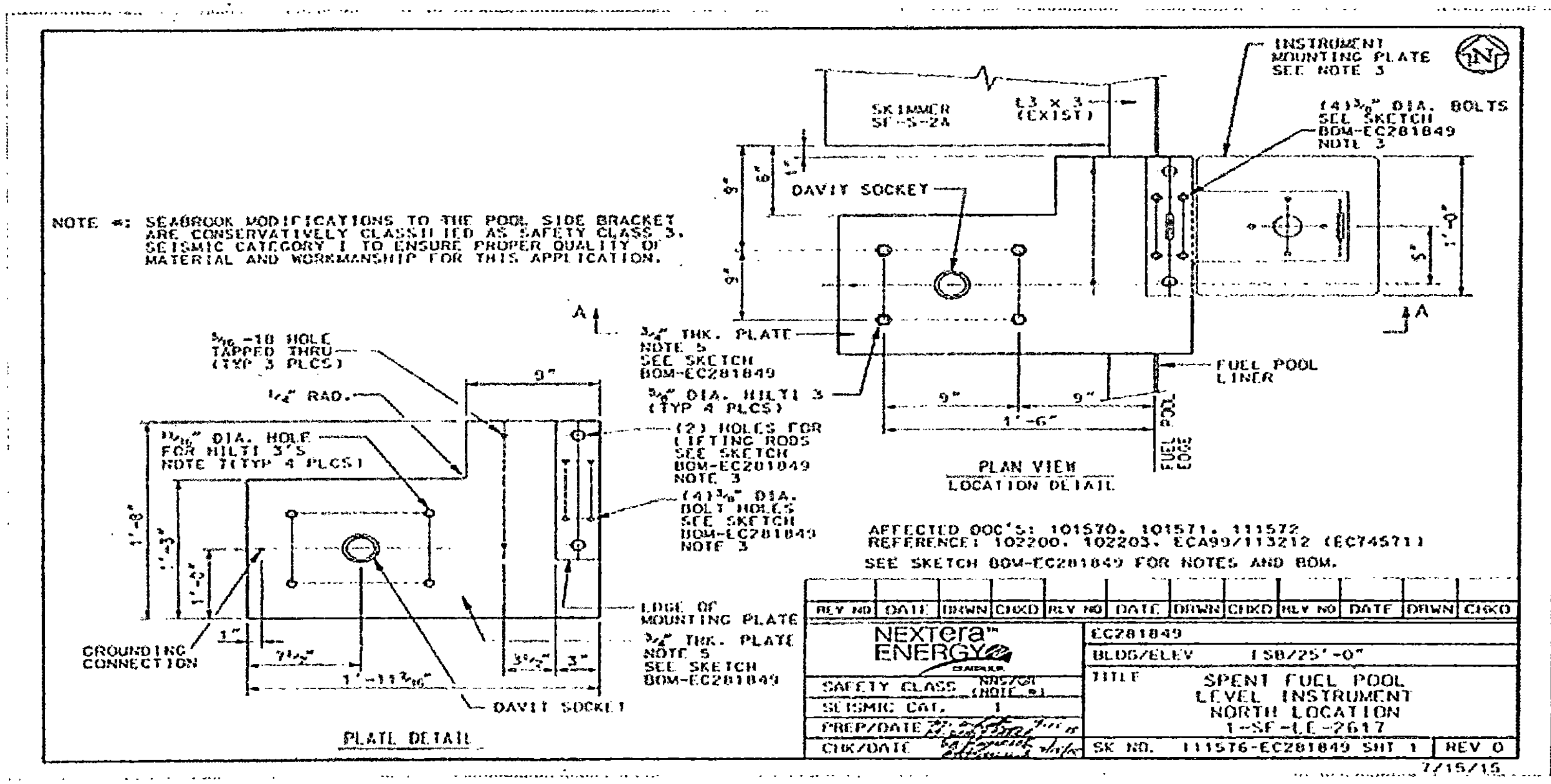
REV NO	DATE	DRWN	CHKD	REV NO	DATE	DRWN	CHKD	REV NO	DATE	DRWN	CHKD

NEXTera™ ENERGY SEABROOK	EC281849
	BLDG/ELEV: FSB/25'-0"
SAFETY CLASS: NNS/OR (NOTE ✻)	TITLE: SPENT FUEL POOL LEVE INSTRUMENT 1-SF-E-2616 & 2617
SEISMIC CAT.: I	
PREP/DATE: [signature] 7-15-11	
CHK/DATE: [signature] 7/15/11	SK NO. 101570-EC281849 — REV 0

Enclosure 4 to SBK-L-15138

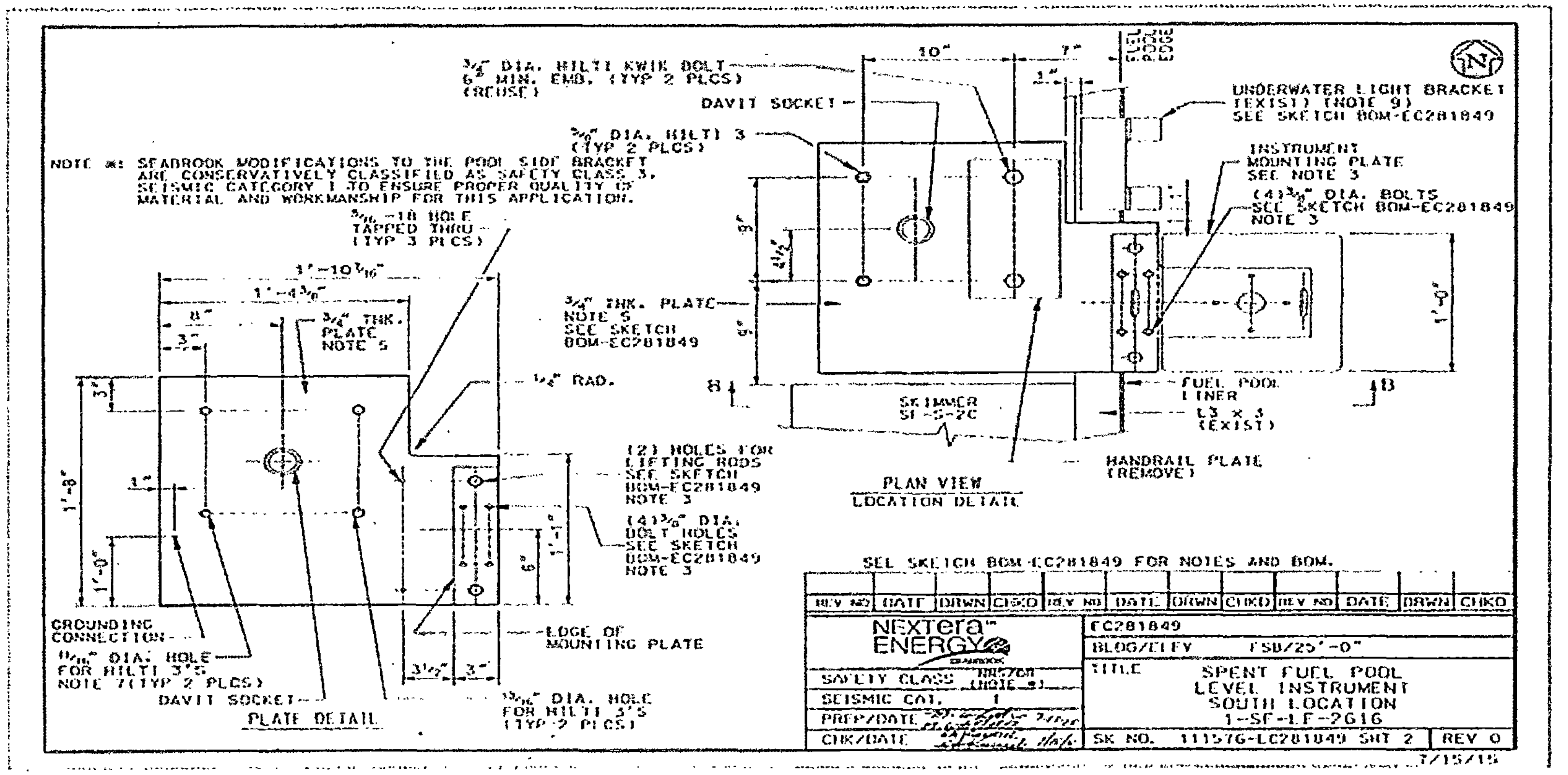
Pool Side Bracket Design and Seismic Requirements

ENCLOSURE 4



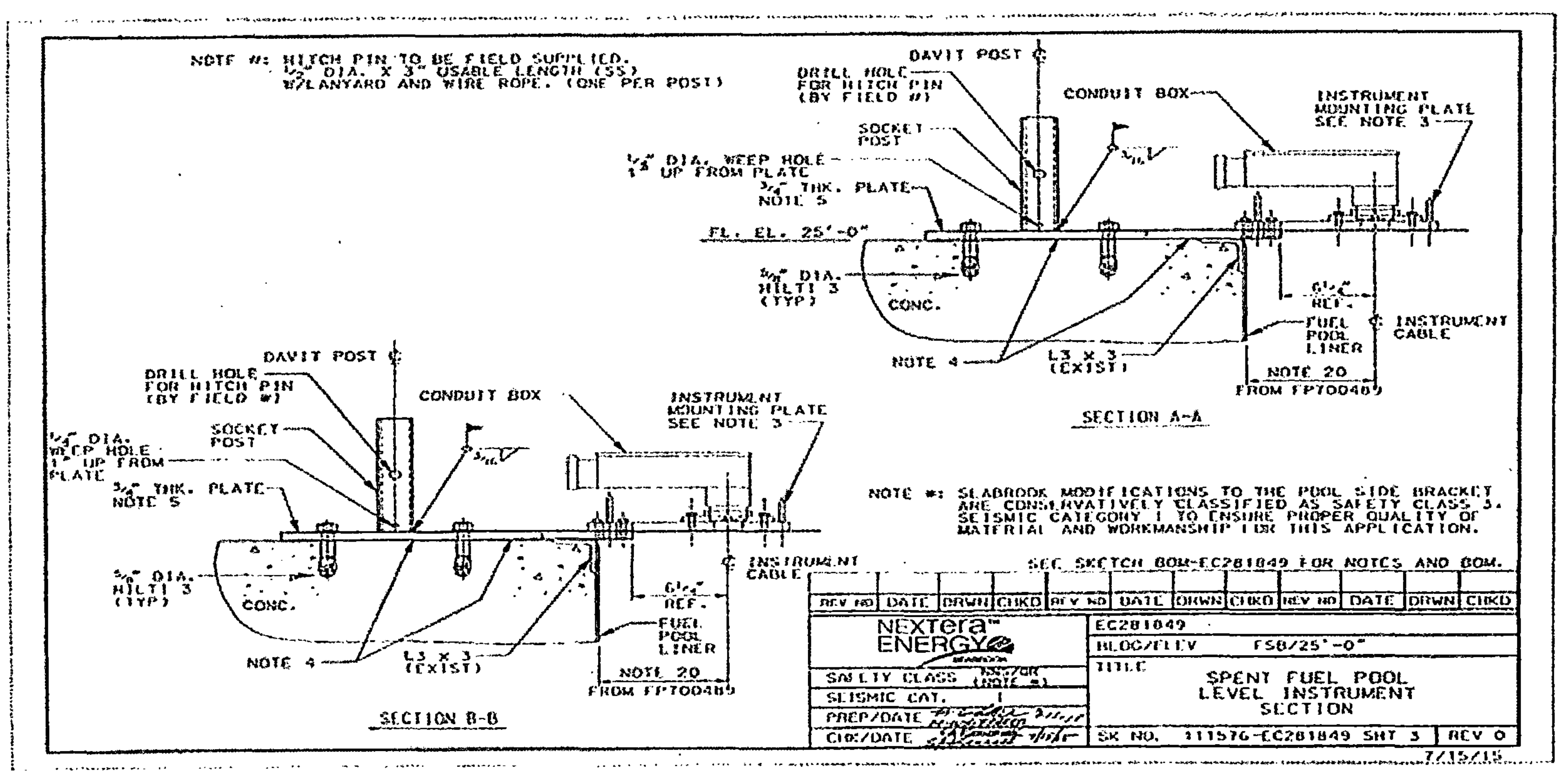
ENCLOSURE 4, PAGE Page 2 of 6

ENCLOSURE 4

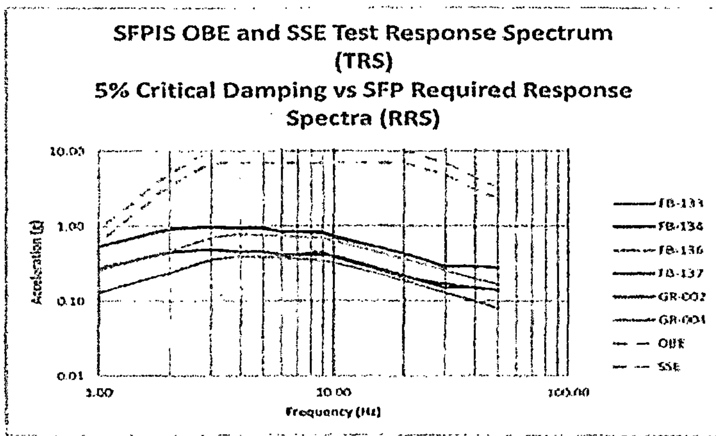


ENCLOSURE 4, PAGE Page 3 of 6

ENCLOSURE 4



ENCLOSURE 4, PAGE Page 4 of 6



REFER TO THE NEXT PAGE FOR KEY.

RESPONSE SPECTRA GRAPH KEY:

SEPIS TEST RESPONSE SPECTRA[1]

OBE - Operating Basis Earthquake Test Response Spectrum, 5% damping

SSE - Safe Shutdown Earthquake Test Response Spectrum, 5% damping

SEABROOK REQUIRED RESPONSE SPECTRA (RRS)

FB-133, Fuel Storage Building ARS, Horizontal, N-S, OBE 4% damping

FB-134, Fuel Storage Building ARS, Horizontal, E-W, OBE 4% damping

FB-136, Fuel Storage Building ARS, Horizontal, N-S, SSE 4% damping

FB-137, Fuel Storage Building ARS, Horizontal, N-S, SSE 4% damping

GR-002, Ground Response Spectra, Vertical, OBE, 4% damping

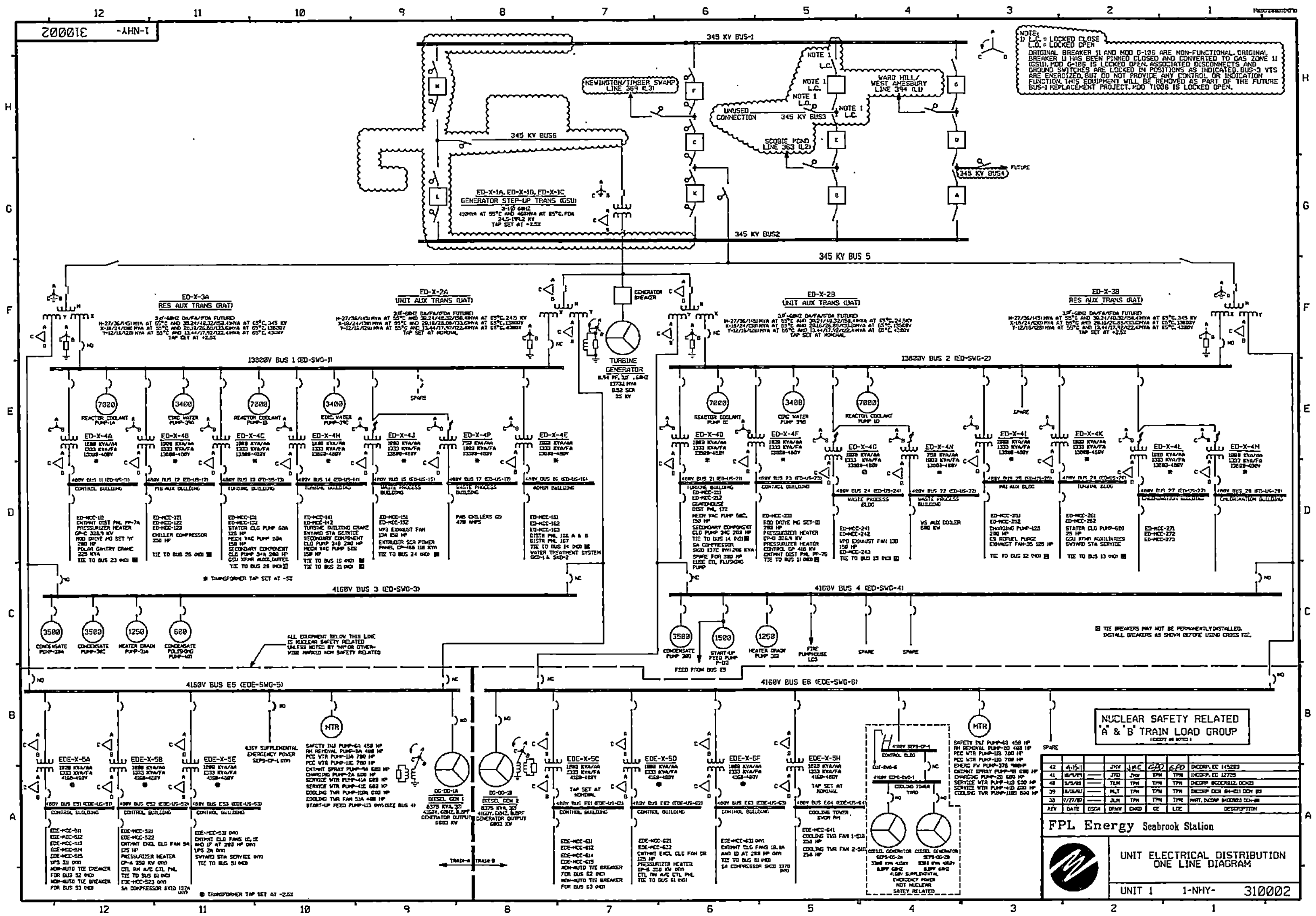
GR-004, Ground Response Spectra, Vertical, SSE, 4% damping

[1] The seismic Test Response Spectra (TRS) contained in Figures 4.4-1 and 4.4-2 of Westinghouse Report EQ-QR-269 was compared to the Seabrook area specific required response spectra (RRS) and found to be enveloping with respect to the plant OBE and SSE response spectra.

Enclosure 5 to SBK-L-15138

1-NHY-310002

ENCLOSURE 5



345 KV BUS-1
345 KV BUS6
345 KV BUS2
345 KV BUS 5
345 KV BUS4
ED-X-3A
RES AUX TRANS (RAT)
ED-X-2A
UNIT AUX TRANS (UAT)
ED-X-2B
UNIT AUX TRANS (UAT)
ED-X-3B
RES AUX TRANS (RAT)
TURBINE GENERATOR
4160V BUS 3 (ED-SWG-3)
4160V BUS 4 (ED-SWG-4)
4160V BUS E5 (EDE-SWG-5)
4160V BUS E6 (EDE-SWG-6)
NUCLEAR SAFETY RELATED
'A' & 'B' TRAIN LOAD GROUP
FPL Energy Seabrook Station
UNIT ELECTRICAL DISTRIBUTION
ONE LINE DIAGRAM
UNIT 1
1-NHY-
310002

Enclosure 6 to SBK-L-15138

Service Environment Chart
1-NHY-300219

EQ ZONE CB-6A (CONTROL BUILDING, TRAIN A SWITCHGEAR ROOM A EL. 21'-6")

NORMAL CONDITIONS	Notes} Ref.	ABNORMAL CONDITIONS	Notes/ Ref.	PARAMETER	EVENT	DESIGN BASIS EVENT CONDITIONS	Notes/ Ref.
55 to 104	R1, R2	104	N5, R1	Peak Temperature (oF)	HELB	N/A	N/A
					MELB	N/A	N/A
					LOCA	104	R1
0 to ATM (+)	R3	0 to ATM (+)	N2	Peak Pressure (psig)	HELB	N/A	N/A
					MELB	N/A	N/A
					LOCA	ATM (+)	R3
3 to 60	N6 R3	3 to 60	N2	Maximum Relative Humidity (%)	HELB	N/A	N/A
					MELB	N/A	N/A
					LOCA	60	R3
N/A	N/A	N/A	N/A	Water Spray	HELB	N/A	N/A
N/A	N/A	N/A	N/A	Integrated Dose (rads)	LOCA	8760 Hours (1 Year)	R4
						N/A	
2.86E-03	N3	2.86E-03	N2	Maximum Dose Rate, y (r/hr)	LOCA	N/A	N/A
1.50E+03	N4 R5	1.50E+03	N2	Integrated y Dose (rads)	LOCA	8760 Hours (1 Year)	R4
						Negligible	
N/A	N/A	N/A	N/A	Maximum Flood Height (Ft. above floor)	MELB HELB	N/A	R6

References: Notes:

R1. Calculation 6.01.42.01
R2. Calculation 6.01.42.02. R3. Calculation 6.01.42.08

R4. Calculation C-S-1-28007

R5. Calculation C-S-1-38017
R6. TP-7, MELB Study

R7. Calculation MS-MISC-32

N1. ATM represents atmospheric pressure. Areas where the normal pressure is slightly negative or positive are identified as ATM (-)or ATM (+).

N2. The normal environmental parameter is unchanged during the abnormal or design basis event. N3. Dose rate is the value calculated by dividing the 60 year integrated normal dose by (60* 8760). N4. The total integrated dose is for 60 years.

N5. Abnormal event is result of loss of offsite power from 100% power conditions. Event duration is for 2 hours and occurs once over plant operating life.
N6. *Humidity may reach 95% during plant shutdown conditions* (Reference 7).

EQ ZONE CB-6A- Temperature Profile Data Table

Post-LOCA Heat Up (Calculation 6.01.42.01)	
Time (Sec)	Temperature (oF)
0.1	104
31536000	104

Notes:

1. This Zone is provided with safety-related ventilation.

EQ ZONE CB-6B (CONTROL BUILDING, TRAIN B SWITCHGEAR ROOM A EL. 21'-6")

NORMAL CONDITIONS	Notes/ Ref.	ABNORMAL CONDITIONS	Notes/ Ref.	PARAMETER	EVENT	DESIGN BASIS EVENT CONDITIONS	Notes/ Ref.
55 to 104	R1, R2	104	N5,R1	Peak Temperature (oF)	HELB	N/A	N/A
					MELB	N/A	N/A
					LOCA	104	R1
0 to ATM (+)	R3	0 toATM (+)	N2	Peak Pressure (psig)	HELB	N/A	N/A
					MELB	N/A	N/A
					LOCA	ATM (+)	R3
3 to 60	N6 R3	3 to 60	N2	Maximum Relative Humidity (%)	HELB	N/A	N/A
					MELB	N/A	N/A
					LOCA	60	R3
N/A	N/A	N/A	N/A	Water Spray	HELB	N/A	N/A
N/A	N/A	N/A	N/A	Integrated ß Dose (rads)	LOCA	8760 Hours (1 Year)	R4
						N/A	
2.86E-03	N3	2.86E-03	N2	Maximum Dose Rate, y (r/hr)	LOCA	N/A	N/A
1.50E+03	N4 R5	1.50E+03	N2	Integrated y Dose (rads)	LOCA	8760 Hours (1 Year)	R4
						Negligible	
N/A	N/A	N/A	N/A	Maximum Flood Height (Ft. above floor)	MELB HELB	N/A	R6

References: Notes:

R1. Calculation 6.01.42.01

R2. Calculation 6.01.42.02. R3. Calculation 6.01.42.08

R4. Calculation C-S-1-28007

R5. Calculation C-S-1-38017

R6. TP-7, MELB Study

R7. Calculation MS-MISC-32

N1. ATM represents atmospheric pressure. Areas where the normal pressure is slightly negative or positive are identified as ATM (-)or ATM (+).

N2. The normal environmental parameter is unchanged during the abnormal or design basis event. N3. Dose rate is the value calculated by dividing the 60 year integrated normal dose by (60* 8760). N4. The total integrated dose is for 60 years.

N5. Abnormal event is result of loss of offsite power from 100% power conditions. Event duration is for 2 hours and occurs once over plant operating life.

N6. Humidity may reach 95% during plant shutdown conditions (Reference 7).

EQ ZONE CB-6B - Temperature Profile Data Table

Post-LOCA Heat Up (Calculation 6.01.42.01)	
Time (Sec)	Temperature eF)
0.1	104
31536000	104

Notes:

1. This Zone is provided with safety-related ventilation.

EQ ZONE CE-1 (EQUIPMENT VAULT, CONTAINMENT ENCLOSURE FAN AREAEL. 21'-0")

NORMAL CONDITIONS	Notes/ Ref.	ABNORMAL CONDITIONS	Notes/ Ref.	PARAMETER	EVENT	DESIGN BASIS EVENT CONDITIONS	Notes/ Ref.
50 to 104	R1	98	NS R4	Peak Temperature (oF)	HELB	108	RS
					MELB	150	R7
					LOCA	154	N7 R6
ATM (-)	N1 R2	ATM (-)	N1, N2	Peak Pressure (psig)	HELB	0.35	RS
					MELB	1.0	R7
					LOCA	(-)0.009	R2
3 to 60	N6 R2	3 to 60	N2	Maximum Relative Humidity (%)	HELB	100	RS
					MELB	100	R7
					LOCA	18	R2
N/A	N/A	N/A	N/A	Water Spray	HELB	N/A	N/A
N/A	N/A	N/A	N/A	Integrated ß Dose (rads)	LOCA	8760 Hours (1 Year)	R8
						N/A	
2.86E-03	N3	2.86E-03	N2	Maximum Dose Rate, y (r/hr)	LOCA	N/A	N/A
1.50E+03	N4 R3	1.50E+03	N2	Integrated y Dose (rads)	LOCA	8760 Hours (1 Year)	R8
						4.30E+06	
N/A	N/A	N/A	N/A	Maximum Flood Height (Ft. above floor)	MELB HELB	0.5	N8 R9

References:

R1. Calculation 6.01.53.07
R2. Calculation 6.01.53.13
R3. Calculation C-S-1-38017
R4. 86DCR724
RS. UE&C Report 9763-006-S-N-2 & Calculation 4.3.35.3F
R6. MSVCS-FAG-16
R7. Calculation 9763-F-CP-05
R8. Calculation C-S-1-28007
R9. TP-7, MELB Study
R10. Calculation MS-MISC-32
R11. Structural Drawing No. 9763- F-101619

Notes:

N1. ATM represents atmospheric pressure. Areas where the normal pressure is slightly negative or positive are identified as ATM (-)or ATM(+).

N2. The normal environmental parameter is unchanged during the abnormal or design basis event. N3. Dose rate is the value calculated by dividing the 60 year integrated normal dose by (60* 8760).

N4. The total integrated dose is for 60 years.

NS. Abnormal event is result of loss of offsite power from 100% power conditions. Event duration is for 2 hours and occurs once over plant operating life.

N6. Humidity may reach 95% during plant shutdown conditions (Reference 10).

N7. Maximum space temperature with a maximum PCCW temperature of 126°F.

N8. The 6 inch flood height is because there is a 6 inch curb around the door at the north end at El. 21'-6" that prevents water from entering the stairwell that descends to the electrical and I&C equipment room at the south end of the east Main Steam and Feedwater Pipe Chase (Reference 9, Section 4.8.1 and Reference 11).

EQ ZONE CE-1 -Temperature Profile Data Table

Composite HELB (UE&C Report 9763-006-S-N-2 & Calculation 4.3.35.3F)		Composite MELB (SBU-95078 & Calculation 9763-F-CP-05)		Post-LOCA Heat Up (Calculation MSVCS-FAG-16)	
Time (Sec)	Temperature (oF)	Time (Sec)	Temperature (oF)	Time (Sec)	Temperature COF)
0.1	104	0.1	104	0.1	104
90	108	1	150	1800	154
200	104	7201	150	261000	154
31536000	104	134641	104	520000	104
		31536000	104	31536000	104

Notes:

1. PLHU profile divisions based on AR 00211544 response memo that seemed to imply 30 minute ramp up and 72 hour ramp down after 72 hours at peak.
2. Original MELB duration from 150°F to 104°F was 3.5 hours in SBU-95078. However, due to a math error in Attachment 1, the duration is actually 35.4 hours.
3. This Zone is provided with safety-related ventilation.