



July 26, 2013

L-2013-223  
10 CFR 2.202

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

St. Lucie Units 1 and 2  
Docket Nos. 50-335 and 50-389

Florida Power & Light/St. Lucie's Response To Request For Additional Information Regarding Overall Integrated Plan In Response To Order EA-12-051, "Reliable Spent Fuel Pool Instrumentation"

References:

1. NRC Order Number EA-12-051, Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, dated March 12, 2012, Accession No. ML12056A044.
2. NRC Interim Staff Guidance JLD-ISG-2012-03, "Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation," Revision 0, dated August 29, 2012, Accession No. 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, dated August 24, 2012, Accession No. ML12240A307.
4. FPL Letter L-2012-384, dated October 25, 2012, "Florida Power & Light (FPL)'s 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)," Accession No. ML12300A420.
5. FPL Letter L-2013-079, dated February 28, 2013, "Florida Power & Light/St. Lucie'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)," Accession No. ML13063A026.
6. NRC Letter to FPL dated July 16, 2013, "St. Lucie Nuclear Power Plant, Units 1 and 2 - Request For Additional Information Regarding Overall Integrated Plan For Reliable Spent Fuel Pool Instrumentation (TAC Nos. MF0990 AND MF0991)," Accession No. ML13196A079.

On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued an order (Reference 1) to FPL/St. Lucie. Reference (1) was immediately effective and directed FPL to implement and maintain reliable spent fuel pool water level instrumentation. Specific requirements are outlined in Attachment 2 of Reference (1).

Reference (1) required submission of an Overall Integrated Plan by February 28, 2013. The NRC Interim Staff Guidance (ISG) (Reference 2) was issued August 29, 2012, which endorsed industry guidance document NEI 12-02, Revision 1 (Reference 3), with clarifications and exceptions identified in Reference (2). Reference (3) provided direction regarding the content of this Overall Integrated Plan.

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Reference (4) provided the FPL/St. Lucie initial status report regarding reliable spent fuel pool instrumentation, as required by Reference (1). Reference (5) provided FPL/St. Lucie'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).

The responses to the request for additional information contained in Reference (6) are contained in the Attachment to this letter.

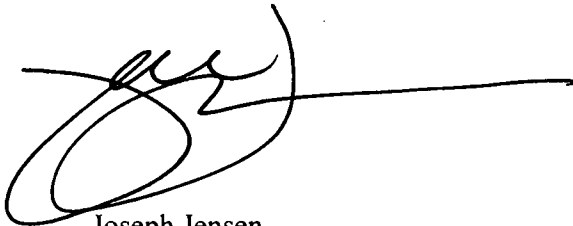
This letter contains no new Regulatory Commitments and no revisions to existing Regulatory Commitments.

If you have any questions please contact Mr. Eric Katzman, Licensing Manager, at (772) 467-7734.

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

Executed on July 26, 2013.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Jensen', with a long horizontal line extending to the right.

Joseph Jensen  
Site Vice President  
St. Lucie Plant

Attachment

Response to Request for Additional Information Regarding Overall Integrated Plan in Response to Order EA-12-051

cc: Director, Office of Nuclear Reactor Regulation  
NRC Regional Administrator  
NRC Resident Inspector

Response to Request for Additional Information Regarding Overall Integrated  
Plan in Response to Order EA-12-051

**1.0 INTRODUCTION**

By letter dated February 28, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13063A026), Florida Power & Light Company submitted an Overall Integrated Plan (OIP) in response to the March 12, 2012, Commission Order modifying licenses with regard to requirements for Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051; ADAMS Accession No. ML12054A679) for St. Lucie Nuclear Power Plant, Units 1 and 2. The U.S. Nuclear Regulatory Commission (NRC) staff endorsed Nuclear Energy Institute (NEI) 12-02 "Industry Guidance for Compliance with NRC Order EA-12-051, to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," Revision 1, dated August 2012 (ADAMS Accession No. ML12240A307), with exceptions, as documented in Interim Staff Guidance (ISG) 2012-03 "Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation," Revision 0, dated August 29, 2012 (ADAMS Accession No. ML12221A339).

The NRC staff has reviewed the February 28, 2013 response by the licensee and determined that the following Request for Additional Information (RAI) is needed to complete its Technical Review. If any part of this information is not available within the 30 day response period for this RAI, please provide the date this information will be submitted.

## **2.0 LEVELS OF REQUIRED MONITORING**

*The OIP states, in part, that*

*Key spent fuel pool water levels:*

- 1. Level adequate to support operation of the normal fuel pool cooling system  
Elevation 56'-0" for both Units 1 and 2. This elevation is derived from Unit 1  
UFSAR Section 9.1 and is shown on isometric drawings 8770-G-125 Sheet FS-  
W-3 and 2998-G-125 Sheet FS-W-6 (References 10, 11 & 12 respectively).*
- 2. Level adequate to provide substantial radiation shielding for a person standing on  
the spent fuel pool operating deck- An elevation approximately 10' above the  
highest fuel rack is utilized, with specific elevations as follows:*

*Unit 1: El. 46'-3" based on Unit 1 FSAR Fig. 1.2-19 (Reference 17) in  
conjunction with plant drawings 8770-11884, 8770-11885 & 8770-11890  
(References 13 thru 15 respectively).*

*Unit 2: El. 46'-5" based on Unit 2 FSAR Fig. 1.2-17 (Reference 18) and plant  
drawing 2998-18511 (Reference 16).*

*These elevations are approximately 10' above the top of the fuel racks (see level  
3 elevations below).*

- 3. Level where fuel remains covered -*

*Unit 1: El. 36'-3", based on Unit 1 FSAR Fig. 1.2-19 (Reference 17) in  
conjunction with plant drawings 8770-11884, 8770-11885 & 8770-11890  
(References 13 thru 15 respectively).*

*Unit 2: El. 36'-5", based on Unit 2 FSAR Fig. 1.2-17 (Reference 18) and plant  
drawing 2998-18511 (Reference 16).*

### **RAI-1**

*Please provide the following:*

- a) For level 1, specify how the identified location 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.*

#### FPL Response RAI-1.a

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 (NPSH) specified by the pump manufacturer or engineering analysis. To determine the higher of the two levels the following was taken into consideration:

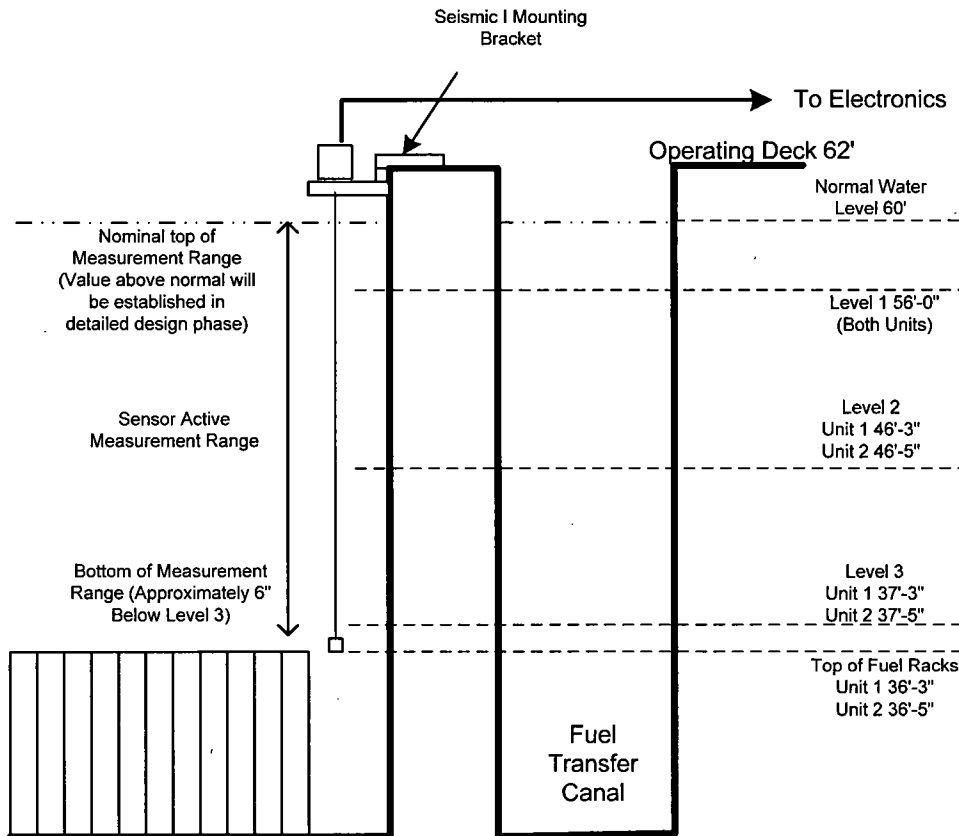
1. The level at which reliable suction loss occurs due to uncovering the coolant inlet pipe or any weirs or vacuum breakers associated with suction loss is established based on nominal coolant inlet pipe elevation. There are no siphon breakers in the suction lines at either unit at St. Lucie. The elevation of the suction line centerline is 56'-0" for both St. Lucie Units 1 and 2.
2. The level at which the normal SFP cooling pumps lose required NPSH assuming saturated conditions in the pool is below the elevation that defines Level 1 per (1) above. The centerline of the cooling pump suctions is at plant elevation 21'-7 ½ inches. The required NPSH at pump runout at saturated conditions is 12'. This corresponds to an NPSHR value of plant elevation 33'-7 ½", which is lower than the 56'-0" stated in (1) above.

The higher of the above levels is (1). Therefore, Level 1 elevation is established at 56'-0" for both the primary and backup instrumentation channels.

The SFP level instrument upper range will be at least 6 inches above Level 1 to account for channel accuracy and instrument loop uncertainty. From a practical perspective, the upper range capability will extend even higher (e.g., approximately 4 feet up to the normal operating level at elevation 60'-0".)

#### FPL Response RAI-1.b

The following sketch contains the information requested in RAI-1.b. Instrument uncertainty, which is to be determined, is not included in the elevation values for Levels 1 and 3.



Note that FPL is modifying the previously provided elevation for Level 3 based on subsequent industry and regulatory discussions that have occurred since submittal of the OIP.

NEI 12-02 describes Level 3 as the level where fuel remains covered and actions to implement make-up water addition should no longer be deferred. Level 3 corresponds nominally (i.e., +/- 1 foot) to the highest point of any fuel rack seated in the spent fuel pool. Level 3 is defined in this manner to provide the maximum range of information to operators, decision makers and emergency response personnel.

St. Lucie previously designated Level 3 as the actual top of the fuel storage racks. St. Lucie is now designating Level 3 as the water level greater than 1 foot above the top of the fuel storage racks plus the accuracy of the SFP level instrument channel, which is yet to be determined. Designation of this level as Level 3 is conservative; its selection assures that the fuel will remain covered, and at that point there would be no functional or operational reason to defer action to implement the addition of make-up water to the pool.

Accordingly, the previous Level 3 elevation of 36'-3" for St. Lucie Unit 1 is being revised to 37'-3" and 36'-5" for St. Lucie Unit 2 is being revised to 37'-5".

### **3.0 INSTRUMENTATION DESIGN FEATURES**

#### **3.1 Arrangement**

*The OIP states, in part, that*

*The two SFP level instrument channels will be installed in diverse locations, 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 SFP. As indicated above, the primary and backup SFP level sensors will be installed in the South side of each unit's SFP, as close to the opposite corners as practical to maintain maximum attainable separation. Sensor conditioning electronics and battery backup will be mounted in a remote location separated from the SFP by a reinforced concrete wall(s) which will provide suitable radiation shielding for the electronics.*

#### **RAI-2**

*Please provide a clearly labeled sketch or 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.*

#### **FPL Response RAI 2**

The answer to this request requires design information that is under development. The information will be provided at the 6 month update after it has been obtained.

#### **3.2 Mounting**

*The OIP states, in part, that*

*Mounting will be Seismic Class I. Installed equipment will be seismically qualified to withstand the maximum seismic ground motion considered in the design of the plant area in which it is installed.*

#### **RAI-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 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.*

### FPL Response RAI-3.a, b, c

The answer to this request requires design information that is under development. The information will be provided at the 6 month update after it has been obtained.

### **3.3 Qualification**

*The OIP states, in part, that*

*Components of the instrument channels will be qualified for shock and vibration using one or more of the following methods:*

- Components are supplied by manufactures using commercial quality programs (such as ISO9001, Quality management systems – Requirements (Reference 8)) with shock and vibration requirements included in the purchase specification at levels commensurate with portable hand-held device or transportation applications;*
- Components have a substantial history of operational reliability in environments with significant shock and vibration loadings, such as transportation applications; or*
- Components are inherently resistant to shock and vibration loadings, such as cables.*

*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, (Reference 9) or a substantially similar industrial standard.*

#### **RAI-4**

*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 required accuracy.*

#### **FPL Response RAI-4.a, b, c**

The answer to this request requires design information that is under development. The information will be provided at the 6 month update after it has been obtained.

#### **3.4 Independence**

*The OIP states, in part, that*

*The primary instrument channel will be redundant to and independent of the backup instrument channel. Independence will be obtained through separation of the sensors, indication, backup battery power supplies, associated cabling and channel power feeds.*

## RAI-5

*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.*

### FPL Response RAI-5.a

The permanently installed primary and backup instrument channels will be fully redundant to and independent of each other with respect to physical separation and the normal electrical power sources are from separate channel sources. The physical and electrical separation minimizes the potential for a single electrical fault or common cause event to adversely affect both channels.

The level sensors, located near the south-east and south-west corners of the SFP, will be physically separated to the extent practical by a distance equal to the shortest length of a pool side as allowed per NEI 12-02 Section 3.2. The length of the shortest side of the SFP at St. Lucie is approximately 33 feet. This horizontal separation minimizes a common cause event in the area of the SFP from adversely affecting both channels. This spatial separation will be maintained for the sensor cable within the SFP area. Once outside the SFP area, conduit and cable separation between the channels will be maintained to meet or exceed the current plant design and licensing basis separation criteria.

The level transmitters, one per channel, will be physically separated from each other and are located one elevation below the level sensors in the new fuel storage area directly outside the SFP room.

The third component, the level processor cabinets, one per channel, which includes the display and uninterruptible power supply (UPS), will be physically separated from each other by a distance meeting or exceeding current plant design basis separation for channels. The cabling for each channel will be located in physically independent conduits or raceways installed to seismic 1 criteria.

### FPL Response RAI-5.b

As stated in the response to RAI-5.a, each channel is fully redundant and independent of each other. Equipment and associated cabling located in the pool area will be physically separated by a distance equal to the length of the shortest side of the pool. Plant separation criteria will be maintained for instrument locations and associated cabling outside the SFP area. The level indication signals sent to each respective channel's readout device is completely independent of the other channel. No power sources or signals are shared between the two channels.

Each channel will be powered from separate lighting panels that are each fed from separate and independent MCCs that are fed from separate and independent 6.9 KV switchgear. Each channel is equipped with its own UPS and battery backup system.

### **3.5 Power supplies**

*The OIP states, in part, that*

*Both channels will be powered from dedicated batteries and local battery chargers. The battery chargers for both channels will normally be powered from separate sources of 120V AC power. Minimum battery life of 72 hours will be provided. The battery systems will include provision for battery replacement should the battery charger be unavailable following the event. Spare batteries will be readily available. In the event of a loss of normal power the battery chargers could be connected to another suitable power source.*

### **RAI-6**

- a) *A description of the electrical AC power sources and capacities for the primary and backup channels battery charger.*
- 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 BDB event for, b the minimum duration needed, consistent with the plant mitigation strategies for BDB external events (Order EA-12-049).*

### FPL Response RAI-6.a, b

The answer to this request requires design information that is under development. The information will be provided at the 6 month update after it has been obtained.

### 3.6 Accuracy

*The OIP states, in part, that*

*Instrument channels will be designed such that they will maintain their design accuracy following a power interruption or change in power source without recalibration.*

*Accuracy will consider SFP conditions, e.g., saturated water, steam environment, or concentrated borated water. Additionally, instrument accuracy will be sufficient to allow trained personnel to determine when the actual level exceeds the specified lower level of each indicating range (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.*

### RAI-7

*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 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 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.*

### FPL Response RAI-7.a, b

The answer to this request requires design information that is under development. The information will be provided at the 6 month update after it has been obtained.

### 3.7 Testing

*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. Details will be determined during the engineering and design phase. Instrument channel testing and calibration will be performed using existing plant work control processes.*

## RAI- 8

*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.*
- 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.*

### FPL Response RAI-8.a, b, c, d

The answer to this request requires design information that is under development. The information will be provided at the 6 month update after it has been obtained.

## 3.8 Display

*The OIP states, in part, that*

*The design will include remote indication that will be accessible during post event conditions.*

## RAI-9

*Please provide the following:*

- a) *The specific location for the primary and backup instrument channel display.*
- b) *Since both the primary and backup display locations are not in the main control room, please provide a description of the location for the primary and back up displays, including primary and alternate route evaluation, habitability at display location(s), continual resource availability for personnel responsible to promptly read displays, and provisions for communications with decision makers for the various SFP drain down scenarios and external events.*

- c) *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.*

FPL Response RAI-9.a, b, c

The answer to this request requires design information that is under development. The information will be provided at the 6 month update after it has been obtained.

## **4.0 PROGRAM FEATURES**

### **4.1 Procedures**

*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.*

### **RAI-10**

*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.*
- 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.*

### **FPL Response RAI 10.a, b**

The answer to this request requires design information that is under development. The information will be provided at the 6 month update after it has been obtained.

### **4.2 Testing and Calibration**

*The OIP states, in part, that*

*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 instrument and the monitor.*

**RAI-11**

*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.*

FPL Response RAI 11.a, b, c

The answer to this request requires design information that is under development. The information will be provided at the 6 month update after it has been obtained.