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JAFP-13-0132
October 3, 2013

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

Subject: Response to Request for Additional Information for the Overall Integrated Plan for the Commission Order Modifying Licenses with Regard to Requirements for Reliable Spent Fuel Pool Instrumentation

James A. FitzPatrick Nuclear Power Plant
Docket No. 50-333
License No. DPR-059

Reference:

1. NRC Order Number, Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, EA-12-051 (ML12056A044), dated March, 12, 2012
2. Entergy to NRC, James A. FitzPatrick Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying License with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051), JAFP-13-0023, dated February 28, 2013
3. NRC letter to Entergy, Request for Additional Information Regarding Overall Integrated Plan for Reliable Spent Fuel Pool Instrumentation, ML13226A534, dated August 29, 2013

Dear Sir or Madam:

On March 12, 2012, the NRC issued an order (Reference 1) to Entergy Operations, Inc. (Entergy). Reference 1 required submission of an Overall Integrated Plan which was provided via Reference 2. Reference 3 contains an NRC Request for Additional Information (RAI). The attachment provides the responses to these RAIs for James A. FitizPatrick Nuclear Power Plant (JAF). The RAI responses provided in the attachment are based on the current preliminary design information/vendor input which is subject to change as the design is finalized.

This letter contains no new regulatory commitments. If you have any questions regarding this report, please contact Chris M. Adner, Licensing Manager, at 315-349-6766.

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I declare under penalty of perjury that the foregoing is true and correct. Executed on 3rd day of October, 2013.

Sincerely,

Lawrence M. Coyle
Site Vice President

LMC/CMA/mh

Attachment: JAF Spent Fuel Pool Instrumentation RAI Responses

cc: Director, Office of Nuclear Reactor Regulation
NRC Regional Administrator
NRC Resident Inspector
Ms. Jessica A. Kratchman, NRR/JLD/PMB, NRC
Mr. Mohan Thadani, Senior Project Manager
Ms. Bridget Frymire, NYSPSC
Mr. Francis J. Murray Jr., President NYSERDA

JAFP-13-0132

Attachment

JAF Spent Fuel Pool Instrumentation RAI Responses

(13 Pages)

JAF Spent Fuel Pool Instrumentation RAI Responses

RAI 1

Please provide the following:

a) **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.**

b) **The OIP states, "Other hardware stored in the SFP will be evaluated to ensure that it does not adversely interact with the SFP instrument probes during a seismic event". Given the potential for varied dose rates from other materials stored in the SFP, describe how level 2 will be adjusted to other than the elevation provided in section 2 above.**

Entergy Response:

a) The requested information is provided in Figure 1. The figure indicates Levels 1, 2, and 3 as well as the approximate location of the proposed mounting bracket incorporating the Seismic Category I attachment. The sensor is a perforated tubular coaxial waveguide that provides continuous level measurement axially and is sensitive over its entire length. The sketch applies to both the primary and backup channels.

   The spent fuel pool (SFP) level lower instrument span or probe bottom extends down to at least three inches below the upper limit of the range of Level 3 to account for channel accuracy or instrument loop uncertainty. Therefore, the SFP level probe bottom/span extends down to at least elevation 346 feet 7-3/8 inches (see Figure 1). The SFP level upper instrument span includes the high water level alarm elevation.

b) Section 2.3.2 of NEI 12-02 states that Level 2 represents the range of water level where any necessary operations in the vicinity of the spent fuel pool can be completed without significant dose consequences from direct gamma radiation from the stored spent fuel. NEI 12-02 gives two options to determine Level 2. The first option defines Level 2 as ten feet above the highest point of any fuel rack. The second option states that Level 2 is based on the need to provide adequate radiation shielding to maintain personnel radiological dose levels within acceptable limits while performing local operations in the vicinity of the pool. The evaluation of the level needed to provide personnel protection should consider the scope of the local operations, including installation of portable SFP instrument channel components, along with the emergency conditions that may apply at the time of operator actions.

   Level 2 is not adjusted for hardware stored in the spent fuel pool, since NEI 12-02 states that Level 2 is based on the dose consequences from direct gamma radiation from the stored spent fuel.

JAF Spent Fuel Pool Instrumentation RAI Responses

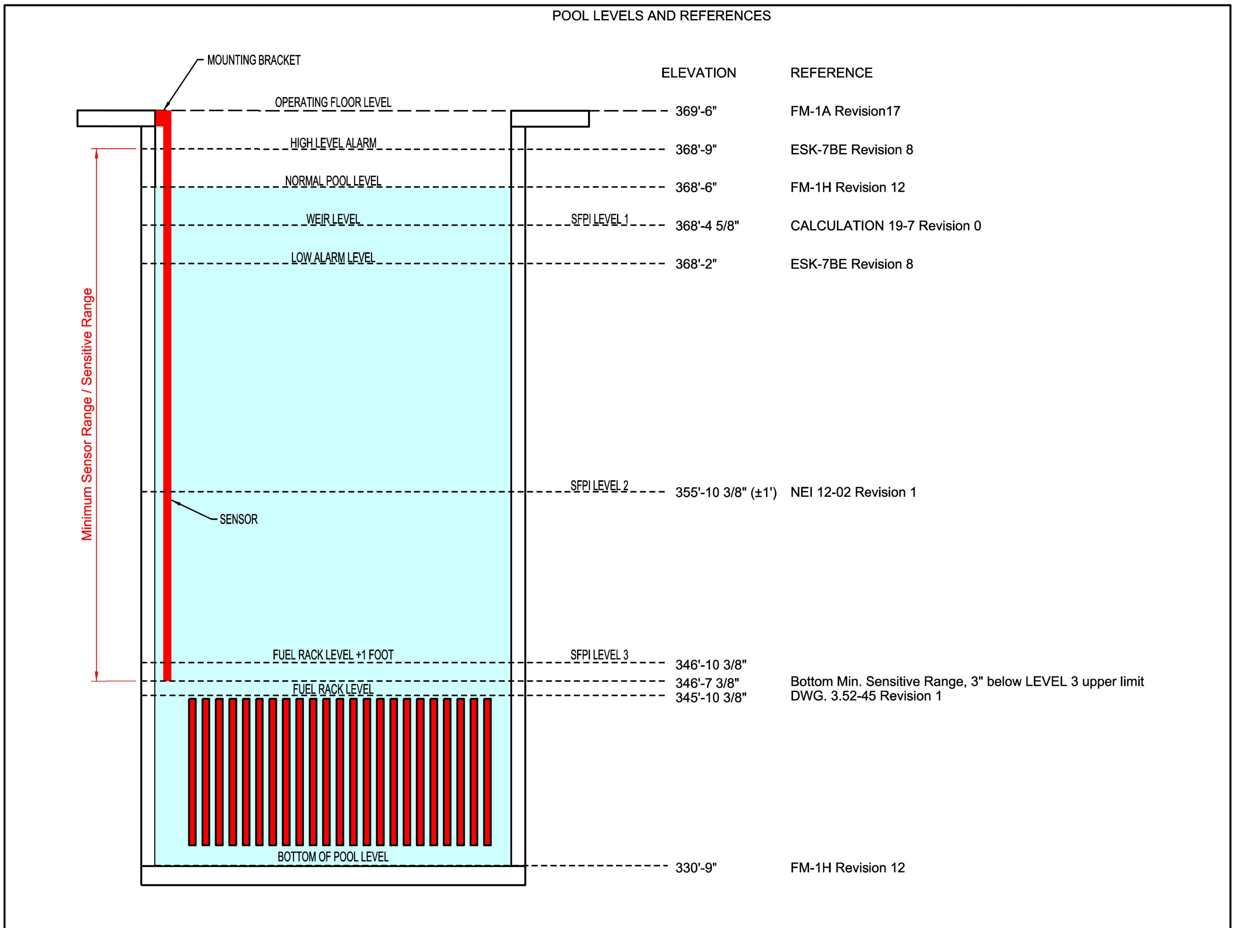


FIGURE 1 (SFP Elevation View with Levels Indicated)

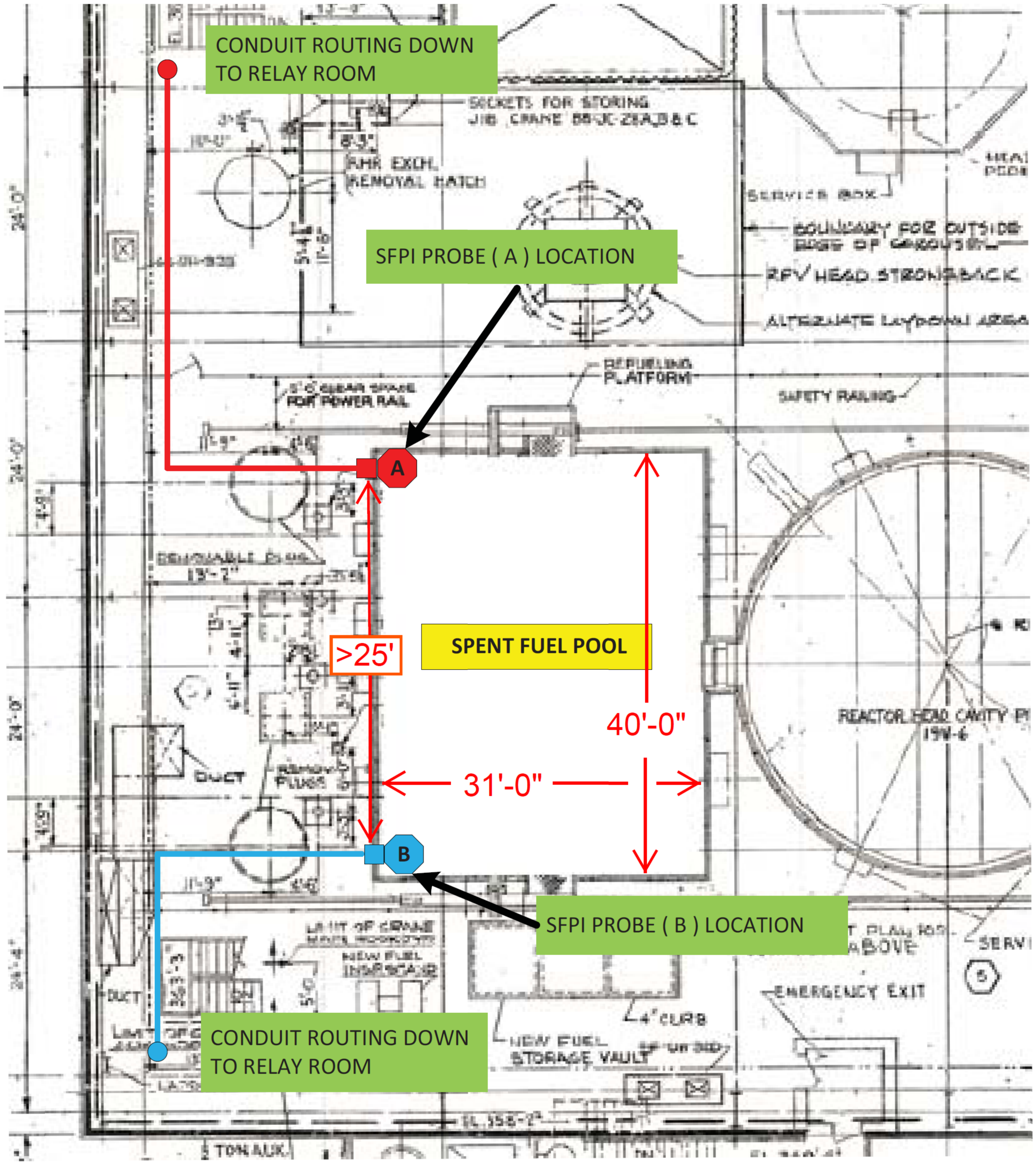
Figure 1

RAI-2

Please modify the marked-up plant drawing in Attachment 1 of the plan view of the spent fuel pool area, to clearly depict the spent fuel pool inside dimensions, the approximate separation in feet of the planned locations/placement of the primary and back-up spent fuel pool 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.

<u>Entergy Response:</u>
Figure 2 shows the approximate locations of the Spent Fuel Pool Instrumentation (SFPI) probes along with the inside dimensions of the spent fuel pool. The conceptual routing of the cables in the refueling floor area is available in Attachment 1 to the JAF OIP. Detailed design has not been completed at this time.

JAF Spent Fuel Pool Instrumentation RAI Responses



PLAN ELEVATION 369' - 6"

Figure 2

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.**

JAF Spent Fuel Pool Instrumentation RAI Responses

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 spent fuel pool structures so as to support the level sensor assembly.**

d) **Please describe how other material stored in the SFP will not create adverse interaction with the fixed instrument location(s).**

Entergy Response:

a) The loading on the probe mount and probe body includes both seismic and hydrodynamic loading using seismic response spectra that bound the JAF design basis maximum seismic loads applicable to the installation location(s). The static weight load is also accounted for in the modeling described below but is insignificant in comparison to seismic and hydrodynamic loads. Analytic modeling is being performed by the instrument vendor using Institute of Electrical and Electronic Engineers IEEE 344-2004 methodology.

   The simple unibody structure of the probe assembly makes it a candidate for analytic modeling and the dimensions of the probe and complex hydrodynamic loading terms in any case preclude meaningful physical testing.

   A detailed computational SFP hydrodynamic model has been developed for the instrument vendor by Numerical Applications, Inc., author of the GOTHIC computational fluid dynamics code. The computational model accounts for multi-dimensional fluid motion, pool sloshing, and loss of water from the pool.

   Seismic loading response of the probe and mount is separately modeled using finite element modeling software. The GOTHIC-derived fluid motion profile in the pool at the installation site and resultant distributed hydrodynamic loading terms are added to the calculated seismic loading terms in the finite element model to provide a conservative estimate of the combined seismic and hydrodynamic loading terms for the probe and probe mount, specific to the chosen installation location for the probe.

b) The proximal portion of the level probe is designed to be attached near its upper end (refer to vendor schematic Figure 3) to a Seismic Category I mounting bracket configured to suit the requirements of a particular SFP. The bracket may be bolted and/or welded to the SFP deck and/or SFP liner/wall according to the requirements of the particular installation per Seismic Category I requirements.

c) See RAI-3.b response above.

d) An evaluation of non-special nuclear material inventory located in the SFP will be performed during the SFPI modification process. The storage of non-special nuclear material that is not stored in designated locations is governed by procedure AP-17.03, Spent Fuel Pool Material Control. This procedure will be used to prevent any instrument interference from non-special nuclear materials.

JAF Spent Fuel Pool Instrumentation RAI Responses

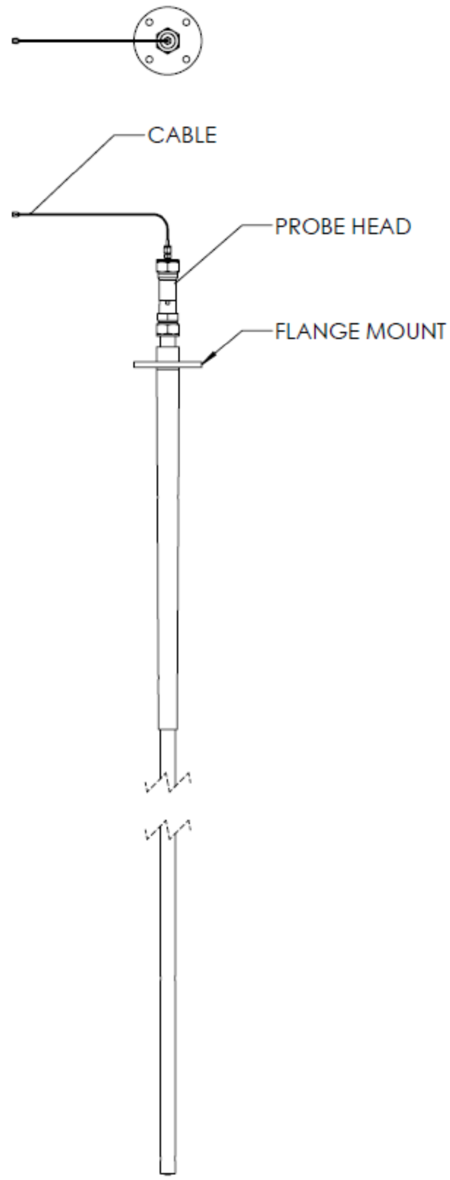


Figure 3

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 spent fuel pool 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.**

Entergy Response:

a) As stated in NEI 12-02, "Components in the area of the SFP will be designed for the temperature, humidity, and radiation levels expected during normal, event, and post-event conditions…." Components in other areas are planned to be designed for their corresponding maximum conditions. The discussion below describes the testing and qualification intended to demonstrate equipment reliability as needed for the expected conditions associated with the SFP level channel active components (signal processor and probe assembly including vendor-supplied hard-line coaxial cable pigtail). Class 1E nuclear-qualified interconnecting coaxial cable is planned to be utilized between the vendor-supplied probe coaxial cable pigtail and the signal processor / display located in the Relay Room.

Temperature:

Signal processor: Designed for mild environment installation. Physical testing in an environmental chamber to demonstrate normal operation at the operating temperatures specified for the instrument.

Probe assembly: Qualification by materials properties and use history of substantially similar probe designs in steam generator applications at significantly higher temperatures and pressures and saturated steam environments.

Humidity:

Signal processor: Designed for mild environment installation. Physical testing in an environmental chamber to demonstrate normal operation at the operating humidity specified for the instrument.

Probe assembly: Qualification by materials properties and use history as noted above.

Shock:

Signal processor: Physical testing to commercial and/or military standards using shake-table and drop testing.

Probe assembly: Finite element analysis in conjunction with seismic modeling described above.

Vibration:

Signal processor: Physical testing to applicable commercial and/or military standards using shake-table and drop testing.

Probe assembly: The probe assembly and bracket together form a simple static unibody structure with intrinsic vibration resistance that is additionally subject to substantial damping due to the surrounding water medium. This is planned to be modeled using finite element modeling in conjunction with seismic modeling described above.

JAF Spent Fuel Pool Instrumentation RAI Responses

Radiation:

Signal processor: The signal processor is installed in a mild environment with radiation levels similar to background radiation, with the acknowledgement that the radiation limit for the signal processor is similar to other commercial-grade complementary–metal–oxide–semiconductor (CMOS)-based electronics. Radiation testing is not planned. It should be noted that the instrument performs self-diagnostics before measurements are obtained and the electronics are easily accessible for periodic replacement.

Probe assembly: Materials properties qualification is used.

b) Signal processor (electronics): Triaxial shake-table testing is planned to be performed by the vendor to envelope seismic category 1 safe shutdown earthquake (SSE) conditions or JAF design basis maximum seismic loads (relative to the location where the equipment is mounted) using IEEE 344-2004 methodology.

Probe assembly (level sensor): Seismic and hydrodynamic finite element analysis is performed by the vendor using relevant IEEE 344-2004 methodology (using enveloping seismic category 1 SSE conditions or JAF design basis maximum seismic loads relative to the location where the equipment is mounted), as described in the RAI-4.a response above.

c) With respect to the probe assembly, combined seismic and hydrodynamic analysis will be used to demonstrate that the probe waveguide's geometric dimensions do not change significantly as a result of the seismic conditions. In the absence of alteration to the geometric configuration of the probe waveguide there is no mechanism for seismic excitation of the probe assembly to alter system accuracy.

The accuracy of system electronics will be demonstrated following seismic excitation as part of the seismic testing protocol.

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) Additional 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.

Entergy Response:

a) The primary instrument (Channel A) will be located in the southeast corner of the SFP, while the backup instrument (Channel B) will be located in the northeast corner of the SFP. Locating the new instruments across the pool from each other takes advantage of the distance between the probes for missile and debris protection.

The conceptual design provides two level instruments in the Spent Fuel Pool (SFP) with cabling routed to two display/processors, both mounted on the east wall of the Relay Room at the 284' 8" elevation below the Main Control Room (MCR). Power for each channel is provided from independent 120VAC, 60 Hz power sources. Backup power is provided by a battery capable of providing continuous display operation for at least three days. The battery power will be provided to the display/processor. The design prevents failure of a single channel from causing the alternate channel to fail.

b) The design provides two identical non-safety related wide-range level instruments which feed two independent trains of non-safety cable and indicators to provide a highly reliable remote display of SFP water level. Physical separation of the two channels will be accomplished by separately routing cable and conduit as much as practical. The use of raceways (i.e., conduit or covered trays where appropriate for existing hazards) will provide additional protection from damage due to debris during a BDB event.

   Each display/processor will have a battery installed adjacent to the display enclosure which is capable of providing power for at least three days.

RAI-6

Please provide the following:

a) **Additional description of the 600 VAC bus configuration providing the normal electrical AC power source and capacities for the primary and backup channels. Please confirm that these sources are independent sources and confirm that they may be independently re-powered following a loss of AC power event per the plant mitigation strategies for BDB external events (Order EA 12-049).**

b) **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 the minimum duration needed, consistent with the plant mitigation strategies for BDB external events (Order EA 12-049).**

c) **Please describe what is meant by "An external connection permits powering the system from any portable OC source." What are the voltages of OC power that may be used to power the equipment, and what provisions (staging, resources, training, etc.) will be made to bring such external power sources to the equipment?**

<u>Entergy Response:</u>

a) The electrical design has not yet been completed. Details on the description of the power source configuration will be provided in a future six-month status update in accordance with the engineering change package.

b) The sample rate estimates have been developed by the vendor using conservative instrument power requirements and measured battery capacity with draw-downs during and following exposure of the batteries to their maximum operating temperature for up to seven days. The instrument configuration is planned to be established for an automated sample rate when under battery power consistent with seven days continuous operation (three days minimum). Permanent installed battery capacity for seven days continuous operation is planned consistent with NEI 12-02 duration without reliance on or crediting of potentially more rapid FLEX Program power restoration. Batteries are readily replaceable via spare stock without the need for recalibration to maintain accuracy of the instrument. These measures ensure adequate power capacity and margin.

JAF Spent Fuel Pool Instrumentation RAI Responses

c) A portable DC source can be used to power the instrument directly. The voltage range of the portable DC source is 9-36 VDC. Information related to the provisions for staging the portable DC source will be documented in a future six-month status update in accordance with the engineering change package.

RAI-7

Please provide the following:

a) An estimate of the expected instrument channel accuracy performance (e.g., in percent of span) under both a) normal spent fuel pool level conditions (approximately Level 1 or higher) and b) at the BDB conditions (ie., 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.

Entergy Response:

a) The instrument channel level accuracy will be specified as ± 3.0 inches for all expected conditions. The expected instrument channel accuracy performance would be approximately ±1% of span (based on the sensitive range of the detector).

b) In general relative to normal operating conditions, any applicable calibration procedure tolerances (or acceptance criterion) are planned to be established based on manufacturer's stated/recommended reference accuracy (or design accuracy). The methodology used is planned to be captured in plant procedures and/or programs.

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 spent fuel pool 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 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.

JAF Spent Fuel Pool Instrumentation RAI Responses

Entergy Response:

a) The level instrument automatically monitors the integrity of its level measurement system using in-situ capability. Deviation of measured test parameters from manufactured or as-installed configuration beyond a configurable threshold prompts operator intervention.

Periodic calibration checks of the signal processor electronics to extrinsic National Institute of Standards and Technology (NIST)-traceable standards can be achieved through the use of standard measurement and test equipment.

The probe itself is a perforated tubular coaxial waveguide with defined geometry and is not calibrated. It is planned to be periodically inspected electromagnetically using time-domain reflectometry (TDR) at the probe hardline cable connector to demonstrate that the probe assembly meets manufactured specification and visually to demonstrate that there has been no mechanical deformation or fouling.

Periodic testing and calibration will be proceduralized as discussed in the response to RAI-8.c.

b) Each instrument electronically logs a record of measurement values over time in non-volatile memory that is compared to demonstrate constancy, including any changes in pool level, such as that associated with the normal evaporative loss/refilling cycle. The channel level measurements can be directly compared to each other (i.e., regular cross-channel comparisons). The two displays are installed in close proximity to each other, thus simplifying cross channel checks. Direct measurements of SFP level may be used for diagnostic purposes if cross-channel comparisons are anomalous.

Channel checks will be proceduralized as discussed in the response to RAI-8.c.

c) Performance tests (functional checks) are automated and/or semi-automated (requiring limited operator interaction) and are performed through the instrument menu software and initiated by the operator. There are a number of other internal system tests that are performed by system software on an essentially continuous basis without user intervention but which can also be performed on an on-demand basis with diagnostic output to the display for the operator to review. Other tests such as menu button tests, level alarm, and alarm relay tests are only initiated manually by the operator. Performance checks are described in detail in the Vendor Operator’s Manual, and the applicable information is planned to be contained in plant operating procedures.

Performance tests are planned to be performed periodically as recommended by the equipment vendor, for instance quarterly but no less often than the calibration interval of two years.

Channel functional tests per operations procedures with limits established in consideration of vendor equipment specifications are planned to be performed at appropriate frequencies established equivalent to or more frequently than existing spent fuel pool instrumentation.

Manual calibration tests are as described above in RAI-8.a and b.

Manual calibration and operator performance checks are planned to be performed in a periodic scheduled fashion with additional maintenance on an as-needed basis when flagged by the system’s automated diagnostic testing features.

JAF Spent Fuel Pool Instrumentation RAI Responses

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.

d) Periodic (e.g., quarterly or monthly) review of the system level history and log files and routine attention to any warning message on the system display is recommended by the vendor. Formal calibration checks are recommended by the vendor on a two-year interval to demonstrate calibration to external NIST-traceable standards. Formal calibration check surveillance interval and timing would be established consistent with applicable guidance [i.e., NEI 12-02 Section 4.3; on a refueling outage interval basis and within 60 days of a planned refueling outage]. Items such as system batteries are planned to be assessed under the Preventive Maintenance (PM) program for establishment of replacement frequency. Surveillance/PM timing/performance are planned to be controlled via tasks in the PM program.

RAI-9

Please provide the following:

a) **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 backup displays, including justification for prompt accessibility to 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.**

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.**

<u>Entergy Response:</u>

a) Both the primary and backup channel displays will be mounted in panels located on the east wall of the Relay Room at the 284’ 8” elevation below the MCR. The Relay Room can be reached from the Main Control Room by descending the northwest stairwell one elevation. Alternatively, the Relay Room can be accessed by exiting the Main Control Room to the Administrative Building, descending one of the two stairwells, and entering the Relay Room from the 286' elevation of the Administrative Building.

Detailed design work has not commenced. Information from the habitability evaluation will be included in a future six-month status update.

The FLEX staffing plan has not been completed at this time. The schedule for this information will be included in the February 28, 2014 six-month status update.

Portable radios will be used if necessary to communicate with decision makers.

b) The display panels are deemed promptly accessible due to the short distance between the Main Control Room and the location of the display panels. The panels are located on the east wall of the Relay Room at the 284’ 8” elevation below the MCR.

JAF Spent Fuel Pool Instrumentation RAI Responses

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 spent fuel pool 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.**

Entergy Response:

a) Vendor recommended inspection, maintenance, and repair procedures for the liquid level measurement system have been developed through the vendor's 30-year experience developing and manufacturing liquid level measurement and cable testing instrumentation. These are for the most part specific to the system's proprietary electronics, subject to relevant industry standards for electronics fabrication and inspection and vendor's quality management system.

   Where relevant, standards for naval shipboard liquid level indicating equipment have been used to develop procedures for operation, abnormal response, and administrative controls.

   Portable instrumentation is not utilized. Both primary and backup SFPI channels incorporate permanent hard-wired installation.

   The specific procedures to be used to capture the required activities described in this RAI response have not yet been developed but are planned to be developed in accordance with the vendor recommendations and Entergy processes and procedures.

b) The specific procedures and their technical objectives to be used to capture the required activities described in the response to RAI 10.a above have not yet been developed but are planned to be developed in accordance with the vendor recommendations and Entergy processes and procedures. These procedures will contain the technical objectives associated with the maintenance, inspection, testing, repair and utilization of the SFPI. Portable instrumentation is not utilized. Both primary and backup SFPI channels incorporate permanent hard-wired installation.

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.**

JAF Spent Fuel Pool Instrumentation RAI Responses

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.

Entergy Response:

a) See RAI-7, 8 and 10 responses above for related descriptions of associated maintenance and testing program details. SFPI channel/equipment maintenance/preventative maintenance and testing program requirements to ensure design and system readiness are planned to be established in accordance with Entergy's processes and procedures and in consideration of vendor recommendations to ensure that appropriate regular testing, channel checks, functional tests, periodic calibration, and maintenance is performed. Subject maintenance and testing program requirements are planned to be developed during the SFPI modification design process.

b) Both primary and backup SFPI channels incorporate permanent installation (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) is (are) 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 if Required Restoration Action not completed within Specified Time
1	Restore channel to functional status within 90 days (or if channel restoration not expected within 90 days, then proceed to Compensatory Action).	Immediately initiate action in accordance with Note below.
2	Initiate action within 24 hours to restore one channel to functional status, and restore one channel to functional status within 72 hours.	Immediately initiate action in accordance with Note below.

Note: Present a report to the on-site safety review committee within the following 14 days. The report shall outline the planned alternate method of monitoring, the cause of the non-functionality, and the plans and schedule for restoring the instrumentation channel(s) to functional status.

c) The requested information is provided in the RAI-11.b response.