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PSEG
Nuclear LLC

AUG 20 2013

Order EA-12-051

LR-N13-0166

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

Hope Creek Generating Station
Renewed Facility Operating License No. NPF-57
NRC Docket No. 50-354

Subject: PSEG Nuclear LLC's Response to Request for Additional Information for the Hope Creek Generating Station's Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)

References:

1. PSEG Letter LR-N13-0019, "PSEG Nuclear LLC's Overall Integrated Plan (OIP) for the Hope Creek Generating Station in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)," dated February 27, 2013
2. NRC Order Number EA-12-051, "Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool (SFP) Instrumentation," dated March 12, 2012
3. NRC Letter to PSEG, "Hope Creek Generating Station, Unit No. 1 - Request for Additional Information Regarding Overall Integrated Plan for Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051) TAC No. MF1031," dated July 22, 2013

By letter dated February 27, 2013 (Reference 1), PSEG Nuclear LLC (PSEG) provided the Hope Creek Generating Station (HCGS) Overall Integrated Plan (OIP) in response to the Nuclear Regulatory Commission (NRC) Order modifying licenses with regard to reliable Spent Fuel Pool (SFP) instrumentation (Reference 2).

This letter is provided in response to the NRC's Request for Additional Information (RAI) (Reference 3) regarding the OIP (Reference 1). Attachment 1 contains the HCGS

response to the RAI. Consistent with Reference 3, the attached response includes schedules for providing final information that is not currently available.

There are no regulatory commitments contained in this letter.

If you have any questions or require additional information, please do not hesitate to contact Mrs. Emily Bauer at 856-339-1023.

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

Executed on 8/20/2013
(Date)

Sincerely,

Paul J. Davison

Paul J. Davison
Site Vice President
Hope Creek Generating Station

Attachment 1: Response to Request for Additional Information - Overall Integrated Plan in Response to Order EA-12-051 "Reliable Spent Fuel Pool Instrumentation"

cc: Mr. E. Leeds, Director of Office of Nuclear Reactor Regulation
Mr. W. Dean, Administrator, Region I, NRC
Mr. J. Hughey, Project Manager, NRC
NRC Senior Resident Inspector, Hope Creek
Mr. P. Mulligan, Manager IV, NJBNE
Hope Creek Commitment Tracking Coordinator
PSEG Corporate Commitment Coordinator

Response to Request for Additional Information
Overall Integrated Plan in Response to
Order EA-12-051 "Reliable Spent Fuel Pool Instrumentation"

Hope Creek Generating Station
PSEG Nuclear LLC

Hope Creek Generating Station
Response to Request for Additional Information
Reliable Spent Fuel Pool Instrumentation

NRC RAI No. 1, Levels of Required Monitoring

The [Overall Integrated Plan] OIP states, in part,

> Level 1 – This is the water level required to support operation of the normal fuel pool cooling system. Indicated SFP [Spent Fuel Pool] level on either the Primary or Back-up instrument channels of greater than approximately elevation 200' – 0" based on the level at which loss of reliable suction occurs due to uncovering of the SFP weir.
>
> Level 2 – This is the water level required to provide substantial radiation shielding for personnel standing on the SFP operating deck. Indicated SFP level on either the Primary or Back-up instrument channels of greater than approximately elevation 185'- 6" (+/- 1' – 0"). This elevation is approximately 10' above the top of the fuel racks and ensures a minimum of 10' above the top of the fuel. This water level ensures there is a sufficient depth for a minimum shielding depth over the top of the stored fuel and provides substantial radiation shielding for personnel to respond to Beyond-Design-Basis external events and initiate any SFP makeup strategies.
>
> Level 3 – This is the water level required such that the spent fuel remains covered. Indicated SFP level on either the Primary or Back-up instrument channels of greater than approximately elevation 175'-6" (+/- 1' – 0"). This water level ensures that there is adequate water level above the stored fuel seated in the fuel racks.

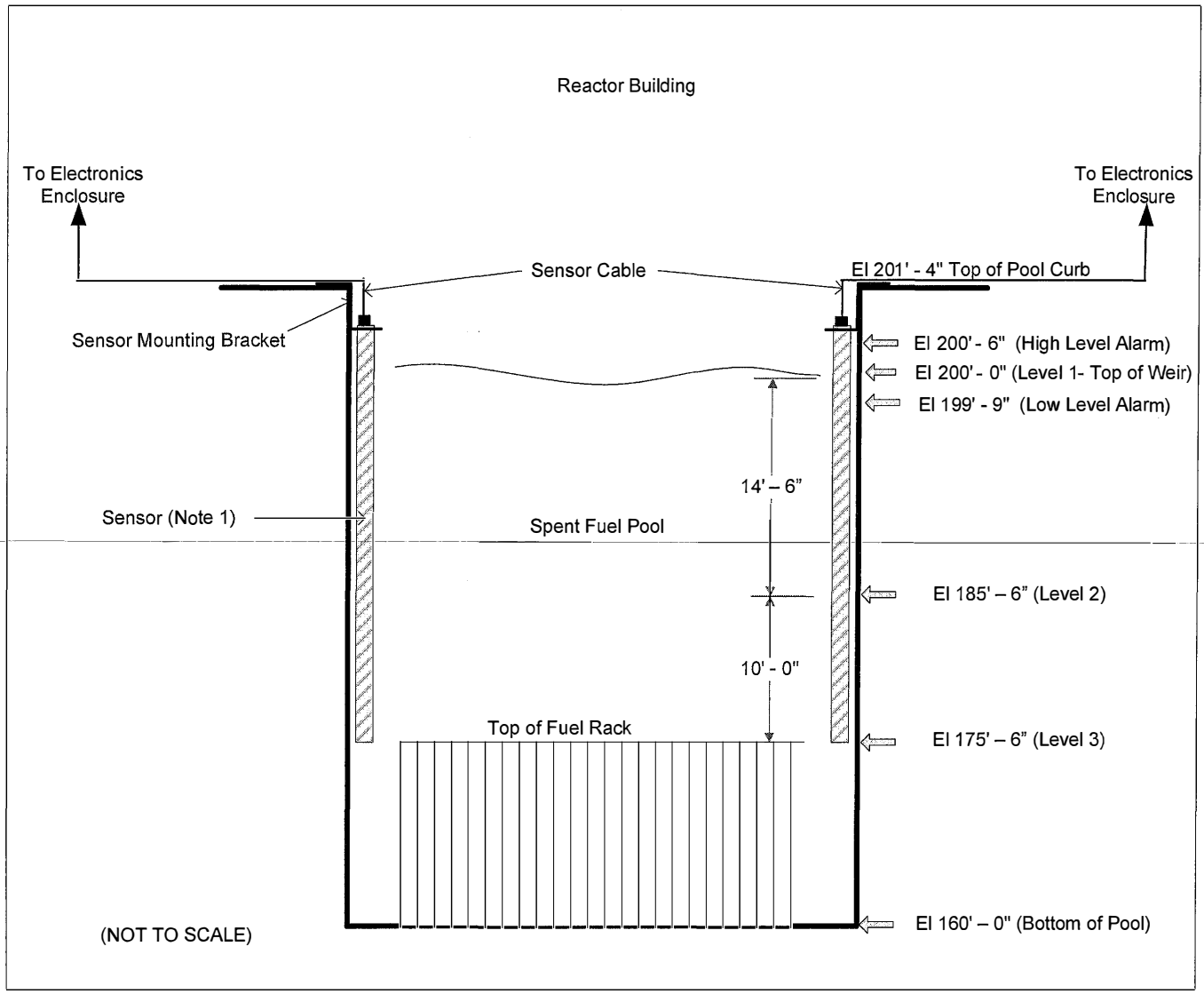
Please provide the following:

Please provide a clearly labeled sketch depicting the elevation view of the proposed typical mounting arrangement for the portions of the 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 rack. 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.

PSEG Response

The sketch below provides an elevation view of the SFP for HCGS showing the Level 1, 2, and 3 datum points, elevation of the fuel racks, and other elevations related to the SFP and cooling system. It is anticipated that the final mounting arrangement (e.g., fixed level sensors and mounting brackets) will be available upon completion of the final design. The final design is scheduled for completion by the end of the second quarter of 2014. Details will be provided to the NRC in the August 2014, six-month OIP update.

Hope Creek Spent Fuel Pool Levels
Elevation View



(Note 1) – The sensor's total span (i.e., measurement range that is sensitive to measurement of the fuel pool level) is approximately 25' – 0". The sensor is capable of continuously monitoring level over the entire range from the existing Hi Level Alarm down to the proposed Level 3. Actual length of the sensor will be determined during detailed design.

NRC RAI No. 2, Arrangement

The OIP states, in part,

> The primary and backup channel level sensor probes will be installed in different locations of the SFP for a maximum separation within the limits of the existing SFP design. The primary and backup channels will be physically separated in accordance with the guidelines provided in NEI 12-02 Revision 1. In the conceptual design [Reference 7], the SFP probes bolt to mounting plates for installation at the corner of the SFP, or along the side of the SFP. This mounting will allow the probe to be installed within a few inches of the SFP liner without penetrating the liner thereby minimizing the chances of interference with other structures, and occupying limited space of the SFP deck. Existing barriers will be used to provide a level of protection for the sensor and interconnecting cable located along the SFP wall or on the refueling floor. These physical barriers will protect the instrument sensors and cables from potential missile hazards generated by an event. The final sensor mounting design and cable routing will maintain a low profile to ensure that there is no interference with the existing fuel handling equipment. Specific details will be developed during the detailed design phase.
>
> The primary and backup channel indicating transmitters (electronics) will be located in an environment providing adequate protection from temperature, humidity, and radiation. The conceptual design locates the indicating transmitter electronics in a readily accessible area of the Auxiliary Building. The primary display is integral to the electronics enclosure which is available to personnel for providing prompt information to decision makers. Additional indicators may be provided in the Main Control Room. Specific details will be developed during the detailed design phase.
>
> All cabling associated with each channel's sensor, power supply, and indicator will be independently routed in separate raceways from cabling associated with the other channel.

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 sensor and mounting brackets, and the proposed routing of the cables that will extend from the sensors toward the location of the read-out/display device.

PSEG Response

The attached Hope Creek Spent Fuel Pool Level Sketch Plan View depicts the approximate locations for both the primary and back-up level sensors. As stated in the OIP for HCGS, both the primary and backup channels will be physically separated in accordance with the guidelines provided in NEI 12-02 Revision 1. Specifically, the sensors will be in different corners of the SFP and separated by a distance comparable to the shortest side of the pool. The interconnecting cables that extend from the sensors toward the location of the electronics enclosures will be installed using separate routes and separate but existing embedded conduits for transition from the SFP to the first junction point. The existing embedded conduits in the floor concrete provide a physical barrier to protect from potential missile hazards. From the first junction point until the cable leaves the Reactor Building, and transitions into the Auxiliary

Building, separate conduit routes are used to protect the cable from potential missile hazards. In the Auxiliary Building, the cables will be routed using HCGS installation criteria for cable separation E-1408 "Wire Cable Notes and Details" (Reference 9) over the entire length of the cable.

NRC RAI No. 3, Mounting

The OIP states, in part,

> Installed equipment will be qualified to withstand the maximum seismic ground motion considered in the design of the plant area where the equipment will be installed. The basis for the seismically designed mountings will be the plant seismic design basis at the time of the submittal of this integrated plan. The instrument sensors mounted in the SFP will be designed to Seismic Category I.

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.*

PSEG Response

a) The design criteria used to estimate total loading, including static and dynamic loads is in accordance with "Design Criteria for Reactor Building for the Hope Creek Generating Station" (Reference 11) for the SFP level sensor assembly mounting and "Design Criteria for Auxiliary Building Control & Diesel Generating Areas for the Hope Creek Generating Station" (Reference 12) for the electronics enclosures. The HCGS Structural Design Criteria provides both the design criteria and the methodology used for determining total loading. Final static and dynamic (seismic and hydrodynamic) loads will be provided by the manufacturer based on their final design and the testing and/or analysis results. The final static, dynamic, and hydrodynamic loads will be available upon completion of the final design. The final design is scheduled for completion by the end of the second quarter of 2014. Details will be provided to the NRC in the August 2014, six-month OIP update.

b) The HCGS SFP Level Instrumentation Guided Wave Radar (GWR) sensor design does not include a stilling well. The low mass and reaction to seismic loading permit the sensor assembly's mount to be very simple, lightweight, and require a very small footprint. The sensor assembly can be mounted on the curb's horizontal surface or curb face. The sensor

assembly is designed to mount in close proximity to the liner without penetrating it. Therefore, there are no points of attachment to the SFP liner.

The final mounting details will be available upon completion of the final design. The final design is scheduled for completion by the end of the second quarter of 2014. Details will be provided to the NRC in the August 2014, six-month OIP update.

c) The mounting details have not been finalized. The final mounting details will be available upon completion of the final design. The final design is scheduled for completion by the end of the second quarter of 2014. Details will be provided to the NRC in the August 2014, six-month OIP update.

NRC RAI No. 4, Qualification

The OIP states, in part,

> Components of the instrument channels installed in the SFP area will be qualified for shock and vibration using one or more of the following methods:
>
> - Components are supplied by manufacturers using commercial quality programs (such as ISO9001, Quality management systems – Requirements…) 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 loading, such as portable hand-held device or transportation applications; or
>
> - Components are inherently resistant to shock and vibration loadings, such as cables.
>
> For seismic effects on instrument channel components used after a potential seismic event for only installed components, the following measures will be used to verify that the design and installation is adequate. Applicable components of the instrument channels are rated by the manufacturer (or otherwise tested) for seismic effects at levels commensurate with those of postulated design basis event conditions in the area of instrument channel component use, using one or more of the following methods:
>
> - Adequacy of seismic design and installation is demonstrated based on the guidance 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;
> - Demonstration that proposed devices are substantially similar in design to models that have been previously tested for seismic effects in excess of the plant design basis at the location where the instrument is to be installed (g-levels and frequency ranges); or

- Seismic qualification using seismic motion consistent with that of existing design basis loading at the installation location."

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 (i) the level sensor mounted in the SFP area, and (ii) 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) *Please provide a description of the specific method or combination of methods that will be used to confirm the reliability of the permanently installed equipment following seismic conditions to maintain its required accuracy.*

PSEG Response

a) Reliability of the permanently installed equipment under BDB ambient temperature, humidity, shock, vibration, and radiation conditions will be demonstrated by the manufacturer through their equipment design, testing, and/or analysis as specified in the PSEG procurement specification. Section 7 of the procurement specification (Reference 8) provides performance requirements for temperature, humidity, pressure, radiation, chemistry, shock and vibration, EMI/RFI, and seismic requirements based on the environmental and seismic design criteria from NEI 12-02 Revision 1.

All equipment located in the reactor building will be certified for use by the manufacturer for survivability under post-event conditions including temperatures of at least 100° Centigrade (212° Fahrenheit), 100 percent condensing atmosphere, submerged operation for components located in the SFP, and exposure to postulated radiation levels when the SFP water levels are at the top of the fuel storage rack for an extended period of time. The new electronics enclosures will be installed in the Auxiliary/Control Building, and will be evaluated to ensure reliability under BDB conditions.

Further details of the qualification used to confirm the reliability of the permanently installed equipment will be available upon completion of the final design. The final design is scheduled for completion by the end of the second quarter of 2014. Details will be provided to the NRC in the August 2014, six-month OIP update.

b) Dynamic analysis, including the applicable seismic and hydrodynamics loads, will be used to determine the total loads on the sensor assembly and its mounting. Site specific analysis will be performed to demonstrate the structural adequacy of the mounting at the selected location.

The new SFP electronics enclosures will be qualified in accordance with the Seismic Qualification requirements outlined in IEEE-344 2004 (Reference 6) using a bounding

set of criteria that will envelope HCGS Auxiliary/Control Building Required Response Spectra (RRS). The electronics enclosures mount will be seismically qualified to reflect the specific plant configuration determined by the final design.

In addition to the above, the electronics enclosures will be qualified by the manufacturer for use at temperatures, humidity, and radiation levels consistent with other electronic devices containing digital components located in mild environments. The inherent shielding of the structures between the fuel handling building and the Auxiliary/Control Building will result in negligible radiation exposure to the electronics enclosures located in the Lower Relay Room.

Further details of the qualification by testing and/or analysis used to confirm the reliability of the permanently installed equipment during and following seismic event will be available upon completion of the final design. The final design is scheduled for completion by the end of the second quarter of 2014. Details will be provided to the NRC in the August 2014, six-month OIP update.

c) The new SFP level instrumentation system will be tested and/or analyzed using a bounding set of seismic response spectra that will meet the seismic design and qualification requirements for HCGS (Reference 8). Testing and/or analysis will confirm that the system maintains its required accuracy following a seismic event.

Further details of the qualification by testing and/or analysis used to confirm the reliability of the permanently installed equipment during and following seismic event will be available upon completion of the final design. The final design is scheduled for completion by the end of the second quarter of 2014. Details will be provided to the NRC in the August 2014, six-month OIP update.

NRC RAI No. 5, Independence

The OIP states, in part,

> The primary instrument channel will be independent of the back-up instrument channel. Both the primary and back-up instrument channels will be of the same technology and manufacturer and model.
>
> Independence will be achieved through physical separation of the final installed devices. The two (2) permanently installed instrument sensors will be separated by a distance comparable to the shortest length of a side of the SFP, to the extent practical, based on the existing SFP geometry and construction. The interconnecting cabling associated with each channel will follow separate and independent routes back to the indicating transmitter (electronics) enclosure. The normal AC power source for each channel will be provided from independent and separate sources.

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.

PSEG Response

a) For HCGS, the primary and back-up level sensors will be located in different corners of the SFP, the transmitter electronics enclosures are located in the Lower Relay Room within the Auxiliary/Control Building, and HCGS E-1408 "Wire, Cable Notes and Details" (Reference 9) for instrument cabling will be applied to the design. Refer to the sketch provided in response to RAI-2. Additionally, the HCGS Reactor Building and Auxiliary/Control Building are Seismic Class 1 structures designed to withstand seismic, flooding and wind events and therefore provide reasonable protection in accordance with assumptions used for FLEX strategies outlined in NEI 12-06 (Reference 5).

b) The HCGS SFP level instrumentation system will be designed to be a complete integrated solution that meets the requirements set forth in EA-12-051 (Reference 2), NEI 12-02 Revision 1 (Reference 1), and JLD-ISG-2012-03 (Reference 3). The system provides two completely independent channels of instrumentation providing indication of SFP water level. Each channel is comprised of a GWR sensor, the sensor mount, and an electronics enclosure (transmitter, signal conditioner, communications circuitry, display panel, and internal battery). The electronics for each channel will be equipped with appropriate connections to provide a signal to the remote displays. The normal power supply for each channel will be provided using separate and independent station 120VAC power sources that are fed from battery-backed inverters (vital supplies) such that loss of one power source will not result in the loss of both channels. In addition to the normal AC power supply, each channel will contain a back-up battery and will automatically transfer from AC power to the battery back-up upon a loss of AC power.

NRC RAI No. 6, Power Supplies

The OIP states, in part,

> The normal power supply for each channel will be provided by independent AC or DC [direct current] power sources such that loss of one power source will not result in the loss of both channels. In addition to the normal plant AC or DC power supply to each channel, a back-up power source will also be provided in the form of a back-up battery independent of the normal AC or DC power sources. The back-up power will have sufficient capacity to support reliable instrument channel operation through the use of replaceable batteries until appropriate off-site resource availability is reasonably assured.

Please provide the following:

a) *Please provide 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), 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 the minimum duration needed, consistent with the plant mitigation strategies for BDB external events (Order EA-12-049) [Reference 4].*

PSEG Response

a) The normal power supply for each channel will be provided using separate and independent station 120VAC power sources that are fed from battery-backed inverters (vital supplies) such that loss of one power source will not result in the loss of both channels. The station batteries providing power to the SFP instrument channels will remain operational through an initial coping period as developed in accordance with NEI 12-06 (Reference 5).

b) As stated in the response to a), the level measurement channels will use separate and independent station 120VAC power sources that are fed from a battery-backed inverter as the normal supply. Back-up power is provided by means of batteries internal to each electronics enclosure. The design criteria applied to the instrument specification is for continuous system operation for 72 hours following loss of AC power. System power consumption will be based on the specified values provided by the manufacturer which will be available upon completion of the final design. The final design is scheduled for completion by the end of the second quarter of 2014. Details will be provided to the NRC in the August 2014, six-month OIP update.

NRC RAI No. 7, Accuracy

The OIP states, in part,

> The instrument channels will maintain their designed accuracy following a power interruption or change in power source without requiring recalibration. The instrumentation channels utilize COTS [Commercial-Off-The-Shelf] components and, therefore, the final design will ensure vendor published instrument design accuracies are acceptable in accordance with the guidelines of NEI 12-02 Revision 1. Accuracies 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 providing conflicting or ambiguous information.
>
> Accuracy requirements will consider all SFP conditions (e.g., saturated water, steam environment).

Additionally, from Section IV, “Instruments,” of the OIP,

> Both the primary and backup channels will utilize a fixed instrument providing continuous level measurement over the entire range. The measured range will

be from approximately elevation 175'-11" to approximately elevation 201'– 4" for a total indicated range of 25'- 5" (305" +/- 12"). The exact range will be determined during the detailed engineering design."

Please provide the following:

a) *An estimate of the expected instrument channel accuracy performance (e.g., in % span) under both (i) normal SFP level conditions (approximately Level 1 or higher) and (ii) 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.*

c) *A description of how, with level three defined as approximately 175'-6" (+/- 1' – 0"), a measured range down to only approximately elevation 175'-11" allows for instrument accuracy sufficient to allow trained personnel to determine when the actual level exceeds the specified level as per the guidance in NEI 12-02.*

PSEG Response:

a) The selected SFP level instrumentation system is expected to have a design reference accuracy of better than +/- 1% of span and will maintain this accuracy over the entire range of operating conditions, including BDB conditions. It will maintain its design accuracy following a power interruption without the need for recalibration. The final design accuracy information will be provided by the manufacturer and will be available upon completion of the final design, The final design is scheduled for completion by the end of the second quarter of 2014. Details will be provided to the NRC in the August 2014, six-month OIP update.

b) The maximum allowed deviation from the channel design accuracy for channel check and calibration tolerances will be developed as part of the detailed design using the standard HCGS Setpoint Methodology Technical Standard (Reference 10). The final tolerances will be developed from design accuracy information provided by the manufacturer and will be available upon completion of the final design. The final design is scheduled for completion by the end of the second quarter of 2014. Details will be provided to the NRC in the August 2014, six-month OIP update.

c) This section of the OIP should have identified a nominal value of 175' – 6" as the low end of the measurement range, consistent with Level 3. The sensor will be capable of continuously monitoring level over the entire range from the existing Hi Level Alarm down to the proposed Level 3. Refer to the elevation view sketch provided in response to RAI-1. The final length of the sensor, instrument span and accuracy will provide sufficient information to allow trained personnel to determine when the actual level exceeds the specified level per the guidance in NEI 12-02 Revision 1. The final details will be provided by the manufacturer upon completion of the final design. The final design is scheduled for completion by the end of the second quarter of 2014. Details will be provided to the NRC in the August 2014, six-month OIP update.

NRC RAI No. 8, Testing

The OIP states, in part,

> The instrument channel design will provide for routine testing and calibration. Installed sensors will be designed to allow testing and/or calibration via in-situ methods while mounted in the SFP. Removal of the sensor from the SFP will not be required for calibration.
>
> Instrument channel design will provide for routine testing and calibration consistent with Order EA-12-051 and the guidance in NEI 12-02 Revision 1.

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.*

PSEG Response

a) A description of the capability and provisions for the proposed level sensing equipment as well as specific periodic testing and calibration capabilities enabling the equipment to be tested in-situ will be provided by the manufacturer. This information is not yet available and will be available upon completion of the final design. The final design is scheduled for completion by the end of the second quarter of 2014. Details will be provided to the NRC in the August 2014, six-month OIP update.

b) The two independent channels of the SFP level instrumentation system will be cross-checked against each other. Since the two wide range level channels are independent, a channel check tolerance based on the design reference accuracy of each channel will be applied for cross comparison between the two channels. The overall channel tolerance will be determined using the HCGS Instrument Setpoint Technical Standard (Reference 10) and instrument reference accuracy information provided by the manufacturer.

c) Specific details of the functional and calibration test program, including frequencies, will be developed as part of the final design. The final design is scheduled for completion by the end of the second quarter of 2014. Details will be provided to the NRC in the August 2014, six-month OIP update.

d) Specific details of the preventative maintenance program, including maximum frequencies, will be developed as part of the final design. The final design is scheduled for completion by the end of the second quarter of 2014. Details will be provided to the NRC in the August 2014, six-month OIP update.

NRC RAI No. 9, Display

The OIP states, in part,

> Trained personnel will be capable of monitoring the SFP water level from a location remote to that of the SFP area. The selected location for the display(s) will ensure information related to SFP level is promptly available to plant staff and key decision makers.
>
> The primary display associated with each of the permanently installed (fixed) instrument channels (both Primary and Backup) will be integrated into the instrument transmitter (electronics) enclosure. The electronic enclosure will be located in an appropriate and accessible area to allow the display location to meet the following characteristics:
>
> - Occupied or promptly accessible to the appropriate plant staff giving appropriate consideration to various drain down scenarios
> - Outside of the area surrounding the SFP floor, e.g., an appropriate distance from the radiological sources resulting from an event impacting the SFP
> - Inside a structure providing protection against adverse weather
> - Outside of any very high radiation area or locked HIGH RAD area during normal operation
>
> Each instrument channel (Primary and Backup) will also have the capability to drive an external remote instrument loop that can be used to provide level indication at a second display location or be used as an input to the plant computer. Failure of the external remote instrument loop signal will not adversely impact the primary display located in the transmitter (electronics) enclosure.
>
> The conceptual design locates the electronic enclosure and primary display in readily accessible area located within the Auxiliary Building."

Please provide the following:

a) *A description of the specific location for the primary and secondary instrument channel displays. A description of the specific location for any secondary displays, and a description of the quality and reliability qualifications of the instrument channel components located between the location of the main display and the location of the secondary displays.*

b) *If the primary and backup display locations are not within the main control room, then 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.

c) *The reasons justifying why the locations selected enable the information from these instruments to be considered "promptly accessible" from a response time perspective. Include consideration of various drain-down scenarios.*

PSEG Response

a) Both the primary and back-up channels displays will be located in the Lower Relay Room of the Auxiliary/Control Building. This is a Seismic Category 1 structure designed to withstand flooding, wind and seismic events. Each electronics enclosure will provide both a local display and a retransmitted signal to a remote display located in the main control room. Refer to the sketch provided with the response for RAI-2.

b) Final design details for the display units, including justification for prompt accessibility from the main control room, habitability, resource availability and communications with decision makers is scheduled to be completed as part of the BDB mitigating strategies assessments and included in applicable processes and procedures. Final details of the display location(s) will be developed as part of the final design. The final design is scheduled for completion by the end of the second quarter of 2014. Details will be provided to the NRC in the August 2014, six-month OIP update.

c) See response to b) above.

NRC RAI No. 10, 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.

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.*

PSEG Response

a) Procedures for operation (both normal and abnormal response), calibration, testing, maintenance, inspection, and administrative controls associated with the SFP level instrumentation will be developed in accordance with existing controlled station administrative and technical procedures that govern procedure development. These procedures ensure standardization of format and terminology and ease of use, along with assurance of a consistent level of quality. Specific details of the procedures for inspection, maintenance, repair, operation, abnormal response, and administrative controls will be developed as part of the final design package. The final design is scheduled for completion by the end of the second quarter of 2014. Details will be provided to the NRC in the August 2014, six-month OIP update.

b) The specific technical objectives associated with the procedures are yet to be developed. There are no portable instruments associated with the new SFP level instrumentation system that are required for normal operation. Consequently, specific procedures for storage and installation are not required. Specific technical objectives associated with the procedures will be developed as part of the final design package. The final design is scheduled for completion by the end of the second quarter of 2014. Details will be provided to the NRC in the August 2014, six-month OIP update.

NRC RAI No. 11, 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 SFP level instrument channels to maintain the instrument channels as described in JLD-ISG-2012-03 and the guidance in NEI 12-02 Revision 1. Testing and calibration of the instrumentation will be consistent with vendor recommendations and any other documented basis.

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.*

PSEG Response

a) The maintenance and testing of the SFP level instrumentation system will be incorporated into the normal station preventative maintenance and work control processes based on manufacturer recommendations for maintenance and periodic testing. The calibration and maintenance program will include testing to validate the functionality of each instrument channel within 60 days of a planned refueling outage, considering normal testing scheduling allowances as outlined in NEI 12-02 Revision 1. The new systems will receive unique identification numbers and be entered into the PSEG preventative maintenance program. A recurring task for the required maintenance frequency will be established. Normal station administrative controls will be used to schedule regular testing and calibration to demonstrate conformance within design and system limits.

   The preventative maintenance, test and calibration program will be developed consistent with manufacturer recommendations. This information will be available following completion of the final design. The final design is scheduled for completion by the end of the second quarter of 2014. Details will be provided to the NRC in the August 2014, six-month OIP update.

b) The guidance in NEI 12-02, Rev. 1, states:

   > *The primary or back-up instrument channel can be out of service for testing, maintenance and/or calibration for up to 90 days provided the other channel is functional. Additionally, compensatory actions must be taken if the instrumentation channel is not expected to be restored or is not restored within 90 days. If both channels become non-functioning then initiate actions within 24 hours to restore one of the channels of instrumentation and implement compensatory actions (e.g., use of alternate suitable equipment or supplemental personnel) within 72 hours.*

   In the event that either a primary or backup SFP level instrumentation channel must be taken out of service or is inoperable for any reason, a notification will be entered into PSEG corrective action program to restore the channel to service within 90 days. The determination of required compensatory actions is part of the overall effort to develop the FLEX Program administrative controls and implementing procedures. In the event that a channel cannot be restored to service within the 90 day period, expedited actions to restore the channel would be initiated and tracked via PSEG's Corrective Action Program. If both channels are determined to be non-functional, PSEG will initiate appropriate actions within 24 hours to restore one of the instrument channels and implement compensatory actions within 72 hours.

   The FLEX Program will incorporate the guidance of NEI 12-02 Revision 1, including the requirements associated with out of service times and compensatory actions. The FLEX program is expected to be sufficiently developed to provide details to the NRC in the August of 2014, six-month OIP update.

c) Since the sensor and interconnecting cables are passive devices, their simultaneous failure is not considered credible and therefore compensatory actions are not expected to be required for failure of both sensors. PSEG intends to purchase a portable version of the level instrument electronics to use for testing and for monitoring of a single channel whenever necessary for compensatory measures; however, the appropriate

compensatory measures have yet to be defined and the determination of these actions is part of the overall effort to develop the FLEX program administrative controls and implementing procedures. The FLEX Program will incorporate the guidance of NEI 12-02 Revision 1, including the requirements associated with out of service time. The FLEX program is expected to be sufficiently developed to provide details to the NRC in the August 2014, six-month OIP update.

References:

1) 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 (ADAMS Accession ML12240A307)

2) US Nuclear Regulatory Commission Order EA-12-051, "Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," March 12, 2012 (ADAMS Accession ML12056A044)

3) NRC Interim Staff Guidance JLD-ISG-2012-03, "Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation," Revision 0, August 29, 2012 (ADAMS Accession ML12221A339)

4) US Nuclear Regulatory Commission Order EA-12-049, "Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," March 12, 2012 (ADAMS Accession ML12056A045)

5) NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," Revision 0, August 2012 (ADAMS Accession ML12221A205)

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

7) H-1-EC-IDI-0132 – "Reliable Wide Range Spent Fuel Pool Instrumentation" Conceptual Design, dated December 19, 2012

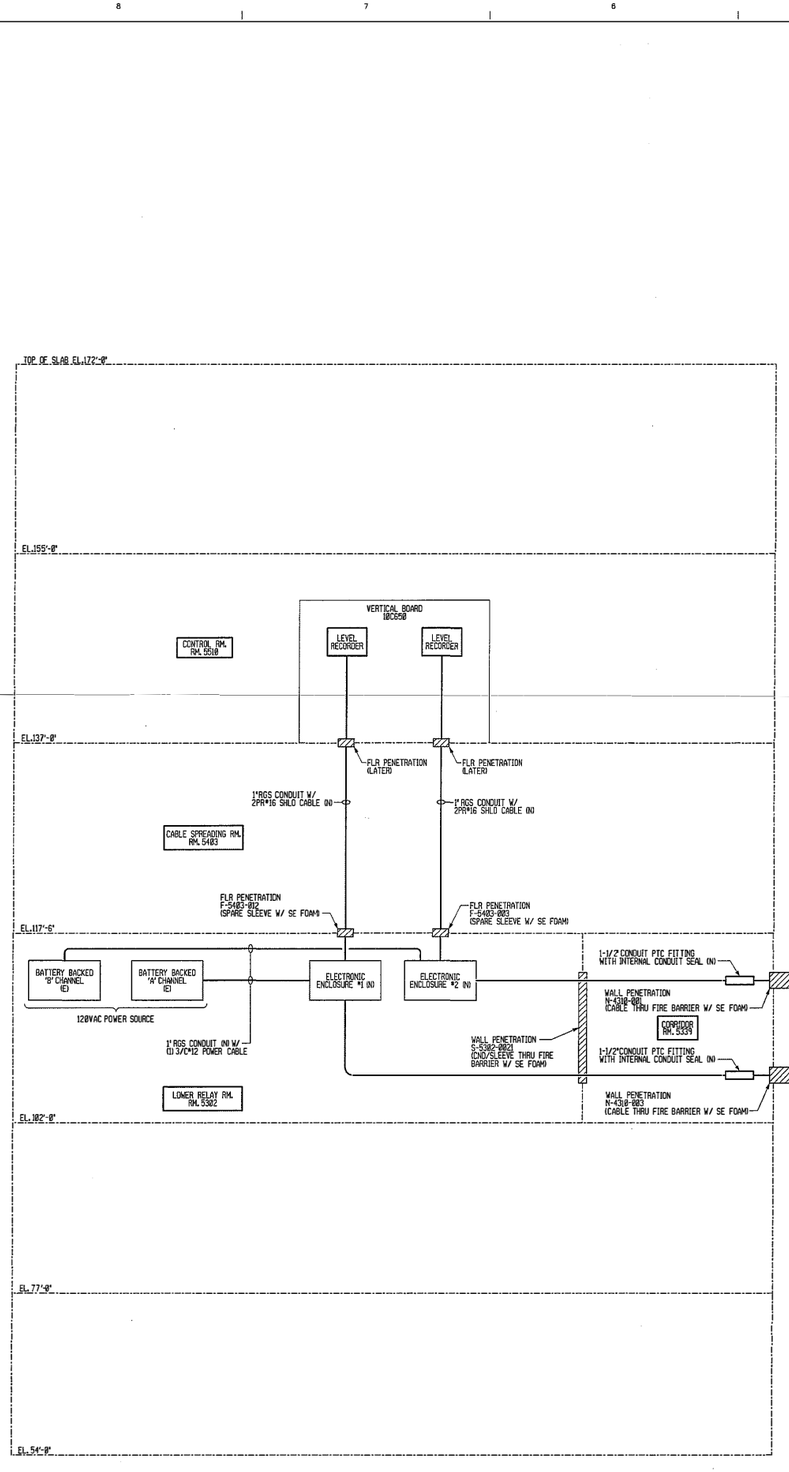
8) A-5-SF-EC-CDS-0517 - "Spent Fuel Pool Level Instrumentation Detailed Specification"

9) E-1408 – "Wire, Cable Notes and Details"

10) HC.DE-TS.ZZ-1001 – "Instrument Setpoint Calculations for Hope Creek Generating Station"

11) 10855-D2.2 – "Design Criteria for Reactor Building for the Hope Creek Generating Station"

12) 10855-D2.4 – "Design Criteria for Auxiliary Building Control & Diesel Generating Areas for the Hope Creek Generating Station"



LEGEND:

(N) NEW EQUIPMENT
(E) EXISTING EQUIPMENT

NOTES:

1. FIELD SHALL DISCONNECT EXISTING CABLE FROM LE-4657 AND PULL BACK TO LT-4657.SECTION OF CONDUIT 12NRXZ01 IN THE FUEL POOL SHALL HAVE TO BE MODIFIED TO ADD A CONDULET TEE.ROUTE EXISTING CABLE BACK TO LE-4657 ALONG WITH NEW VENDOR CABLE TO NEW FUEL POOL LEVEL PROBE *1 VIA CONDUIT 12NRXR01.
2. FIELD SHALL DISCONNECT EXISTING CABLES FROM RE-4813A&B AND PULL BACK TO 12NJXZJA. ADD NEW 1" CONDUIT FROM INTB2618 TO NEW LEVEL PROBE *2.ROUTE EXISTING CABLES BACK TO RE-4813A&B ALONG WITH NEW VENDOR CABLE TO NEW FUEL POOL LEVEL PROBE *2.
3. FIELD SHALL SUPPORT NEW CONDUIT USING STANDARD CONDUIT SUPPORT TYPES PER DWG E-1406-0 AS REQ'D.

RAI-2

HOPE CREEK SPENT FUEL POOL LEVEL SKETCH PLAN VIEW