UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

October 29, 2013

Mr. David A. Heacock
President and Chief Nuclear Officer
Dominion Nuclear Connecticut, Inc.
Innsbrook Technical Center
5000 Dominion Boulevard
Glen Allen, VA 23060-6711

SUBJECT: MILLSTONE POWER STATION, UNIT NOS. 2 AND 3 - INTERIM STAFF EVALUATION AND REQUEST FOR ADDITIONAL INFORMATION REGARDING THE OVERALL INTEGRATED PLAN FOR IMPLEMENTATION OF ORDER EA-12-051, RELIABLE SPENT FUEL POOL INSTRUMENTATION (TAC NOS. MF0838 AND MF0839)

Dear Mr. Heacock:

On March 12, 2012, the U.S. Nuclear Regulatory Commission (NRC) issued Order EA-12-051, "Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation" (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12054A679), to all power reactor licensees and holders of construction permits in active or deferred status. This order requires the licensee to have a reliable indication of the water level in associated spent fuel storage pools capable of supporting identification of the following pool water level conditions by trained personnel: (1) level that is adequate to support operation of the normal fuel pool cooling system, (2) level that is adequate to provide substantial radiation shielding for a person standing on the spent fuel pool operating deck, and (3) level where fuel remains covered and actions to implement make-up water addition should no longer be deferred.

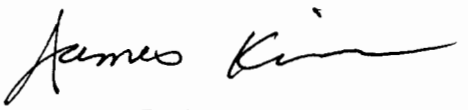
By letter dated February 28, 2013 (ADAMS Accession No. ML13070A006), Dominion Nuclear Connecticut, Inc. (the licensee) provided the Overall Integrated Plan (OIP) for Millstone Power Station, Units 2 and 3, describing how it will achieve compliance with Attachment 2 of Order EA-12-51 by Fall, 2015, for Unit 2, and Fall, 2014, for Unit 3. By letter dated June 26, 2013 (ADAMS Accession No. ML13175A242), the NRC staff sent a request for additional information (RAI) to the licensee. The licensee provided supplemental information by letters dated July 26, 2013 (ADAMS Accession No. ML13213A015) and August 23, 2013 (ADAMS Accession No. ML13242A014).

The NRC staff has reviewed these submittals with the understanding that the licensee will update its OIP as implementation of the Order progresses. With this in mind, the staff has included an interim staff evaluation with this letter to provide feedback on the OIP. The staff's findings in the interim staff evaluation are considered preliminary and will be revised as the OIP is updated. As such, none of the staff's conclusions are to be considered final. A final NRC staff evaluation will be issued after the licensee has provided the information requested.

The interim staff evaluation also includes RAIs, response to which the NRC staff needs to complete its review. The licensee should provide the information requested in the 6-month status updates, as the information becomes available. However, the staff requests that all information be provided by March 31, 2014, to ensure that any issues are resolved prior to the date by which the licensee must complete full implementation of Order EA-12-051. The licensee should adjust its schedule for providing information to ensure that all this information is provided by the requested date.

If you have any questions regarding this letter, please contact me at 301-415-4125 or via e-mail at James.Kim@nrc.gov.

Sincerely,



James Kim, Project Manager
Plant Licensing Branch I-1
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Office of Nuclear Reactor Regulation

Docket Nos. 50-336 and 50-423

Enclosure:
Interim Staff Evaluation and
Request for Additional Information

cc w/encl: Distribution via Listserv

INTERIM STAFF EVALUATION AND REQUEST FOR ADDITIONAL INFORMATION

BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE OVERALL INTEGRATED PLAN IN RESPONSE TO

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

DOMINION NUCLEAR CONNECTICUT, INC

MILLSTONE POWER STATION, UNITS 2 AND 3

DOCKET NOS. 50-336 AND 50-423

1.0 INTRODUCTION

On March 12, 2012, the U.S. Nuclear Regulatory Commission (NRC) issued Order EA-12-051, "Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation" (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12054A679), to all power reactor licensees and holders of construction permits in active or deferred status. This order requires, in part, that all operating reactor sites have a reliable means of remotely monitoring wide-range Spent Fuel Pool (SFP) levels to support effective prioritization of event mitigation and recovery actions in the event of a Beyond-Design-Basis (BDB) external event. The order required all holders of operating licenses issued under Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," to submit to the NRC an Overall Integrated Plan (OIP) by February 28, 2013.

By letter dated February 28, 2013 (ADAMS Accession No. ML13063A012), Dominion Nuclear Connecticut, Inc. (the licensee) provided the OIP for Millstone Power Station, Units 2 and 3 (MPS2, MPS3), describing how it will achieve compliance with Attachment 2 of Order EA-12-51 by Fall, 2015, for Unit 2, and Fall, 2014, for Unit 3. By letter dated June 26, 2013 (ADAMS Accession No. ML13175A242), the NRC staff sent a request for additional information (RAI) to the licensee. The licensee provided supplemental information by letters dated July 26, 2013 (ADAMS Accession No. ML13213A015) and August 23, 2013 (ADAMS Accession No. ML13242A014).

2.0 REGULATORY EVALUATION

Order EA-12-051 requires all holders of operating licenses issued under 10 CFR Part 50, notwithstanding the provisions of any Commission regulation or license to the contrary, to comply with the requirements described in Attachment 2 to the Order except to the extent that a more stringent requirement is set forth in the license. Licensees shall promptly start implementation of the requirements in Attachment 2 to the Order and shall complete full implementation no later than two refueling cycles after submittal of the OIP or December 31, 2016, whichever comes first.

Order EA-12-051 required the licensee, by February 28, 2013, to submit to the Commission an OIP, including a description of how compliance with the requirements described in Attachment 2 of the Order will be achieved.

Attachment 2 of Order EA-12-051 requires the license to have a reliable indication of the water level in associated spent fuel storage pools capable of supporting identification of the following pool water level conditions by trained personnel: (1) level that is adequate to support operation of the normal fuel pool cooling system, (2) level that is adequate to provide substantial radiation shielding for a person standing on the SFP operating deck, and (3) level where fuel remains covered and actions to implement make-up water addition should no longer be deferred.

Attachment 2 of Order EA-12-051, states that the SFP level instrumentation shall include the following design features:

1.1 Instruments: The instrumentation shall consist of a permanent, fixed primary instrument channel and a backup instrument channel. The backup instrument channel may be fixed or portable. Portable instruments shall have capabilities that enhance the ability of trained personnel to monitor spent fuel pool water level under conditions that restrict direct personnel access to the pool, such as partial structural damage, high radiation levels, or heat and humidity from a boiling pool.

1.2 Arrangement: The spent fuel pool level instrument channels shall be arranged in a manner that provides reasonable protection of the level indication function against missiles that may result from damage to the structure over the spent fuel pool. This protection may be provided by locating the primary instrument channel and fixed portions of the backup instrument channel, if applicable, to maintain instrument channel separation within the spent fuel pool area, and to utilize inherent shielding from missiles provided by existing recesses and corners in the spent fuel pool structure.

1.3 Mounting: Installed instrument channel equipment within the spent fuel pool shall be mounted to retain its design configuration during and following the maximum seismic ground motion considered in the design of the spent fuel pool structure.

1.4 Qualification: The primary and backup instrument channels shall be reliable at temperature, humidity, and radiation levels consistent with the spent fuel pool water at saturation conditions for an extended period. This reliability shall be established through use of an augmented quality assurance process (e.g., a process similar to that applied to the site fire protection program).

1.5 Independence: The primary instrument channel shall be independent of the backup instrument channel.

1.6 Power supplies: Permanently installed instrumentation channels shall each be powered by a separate power supply. Permanently installed and portable instrumentation channels shall provide for power connections from sources independent of the plant [alternating current (ac)] and [direct current (dc)] power distribution systems, such as portable generators or replaceable batteries. Onsite generators used as an alternate power source and replaceable batteries used for instrument channel power shall have sufficient capacity to maintain the level indication function until offsite resource availability is reasonably assured.

1.7 Accuracy: The instrument channels shall maintain their designed accuracy following a power interruption or change in power source without recalibration.

1.8 Testing: The instrument channel design shall provide for routine testing and calibration.

1.9 Display: Trained personnel shall be able to monitor the spent fuel pool water level from the control room, alternate shutdown panel, or other appropriate and accessible location. The display shall provide on-demand or continuous indication of spent fuel pool water level.

Attachment 2 of Order EA-12-051, states that the SFP instrumentation shall be maintained available and reliable through appropriate development and implementation of the following programs:

2.1 Training: Personnel shall be trained in the use and the provision of alternate power to the primary and backup instrument channels.

2.2 Procedures: Procedures shall be established and maintained for the testing, calibration, and use of the primary and backup spent fuel pool instrument channels.

2.3 Testing and Calibration: Processes shall 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.

On August 29, 2012, the NRC issued an Interim Staff Guidance document (the ISG), JLD-ISG-2012-03, "Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation" (ADAMS Accession No. ML12221A339), to describe methods acceptable to the NRC staff for complying with Order EA-12-051. The ISG endorses, with exceptions and clarifications, the methods described in the Nuclear Energy Institute (NEI) guidance document NEI 12-02, Revision 1, "Industry Guidance for Compliance with NRC Order EA-12-051, 'to

Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," dated August 2012 (ADAMS Accession No. ML12240A307). Specifically, the ISG states:

> The NRC staff considers that the methodologies and guidance in conformance with the guidelines provided in NEI 12-02, Revision 1, subject to the clarifications and exceptions in Attachment 1 to this ISG, are an acceptable means of meeting the requirements of Order EA-12-051.

3.0 TECHNICAL EVALUATION

3.1 Background and Schedule

Millstone Power Station (MPS), Units 2 and 3, have independent L-shaped SFPs, each with adjacent transfer canals and spent fuel cask laydown pits that are sealable by using removable gates. The SFP is an L-shaped structure located in the Auxiliary Building adjacent to the Main Control Room (MCR). The Units 2 and 3 SFPs are not interconnected in anyway.

The licensee submitted its OIP on February 28, 2013. The OIP states that installation of the SFP level instrumentation will be completed by Fall 2015, for MPS2, and Fall 2014, for MPS3, which is before startup from the second refueling outage for each unit.

The NRC staff has reviewed the licensee's schedule for implementation of SFP level instrumentation provided in its OIP. If the licensee completes implementation in accordance with this schedule, it would appear to achieve compliance with Order EA-12-051 within two refueling cycles after submittal of the OIP and before December 31, 2016.

3.2 Spent Fuel Pool Water Levels

Attachment 2 of Order EA-12-051 states, in part, that

> All licensees identified in Attachment 1 to this Order shall have a reliable indication of the water level in associated spent fuel storage pools capable of supporting identification of the following pool water level conditions by trained personnel: (1) level that is adequate to support operation of the normal fuel pool cooling system [Level 1], (2) level that is adequate to provide substantial radiation shielding for a person standing on the SFP operating deck [Level 2], and (3) level where fuel remains covered and actions to implement make-up water addition should no longer be deferred [Level 3].

NEI 12-02 states, in part, that

> Level 1 represents the HIGHER of the following two points:
>
> - The level at which reliable suction loss occurs due to uncovering of the coolant inlet pipe, weir or vacuum breaker (depending on the design), or

- The level at which the water height, assuming saturated conditions, above the centerline of the cooling pump suction provides the required net positive suction head specified by the pump manufacturer or engineering analysis.

In its OIP, the licensee stated that Level 1 for Unit 2 is the indicated level on either the primary or back-up instrument channel of greater than approximate elevation 36 feet (ft.) 0 inches (in.), based on the elevation at which the top of the upper SFP cooling pump suction line penetrates the pool wall. For Unit 3, the licensee stated that Level 1 is the indicated level on either the primary or back-up instrument channel of greater than approximate elevation 46 ft. 10 in., based on the elevation at which the top of the upper SFP cooling pump suction line penetrates the pool walls.

In its July 26, 2013 letter, the licensee stated that for both units, a calculation would be performed to verify that adequate water level is available to support net positive suction head (NPSH) for the SFP cooling pump. The licensee also stated that the results of the calculation, including justification for the Level 1 value specified in the OIP, will be provided to the staff in the February 2014 six month status update.

In its letter dated August 23, 2013, the licensee stated, for Unit 2, in part, that

> As indicated in the response to RAI 1a, the formal calculation performed to verify that adequate water level is available to support net positive suction head (NPSH) has been completed and independently reviewed. Results of the calculation confirm the Level 1 value of 35.8 feet specified in RAI response letter is HIGHER than the minimum NPSH value of 16.75 feet (Reference 4).

In this same letter, the licensee stated for Unit 3, in part, that

> As indicated in the response to RAI 1b, the formal calculation performed to verify that adequate water level is available to support Net Positive Suction Head (NPSH) has been completed and independently reviewed. Results of the calculation, confirm the Level 1 value of 46.8 feet specified in RAI response letter is HIGHER than the minimum NPSH value of 46.7 feet (Reference 4).

In its letter dated July 26, 2013, the licensee provided two tables, one for each unit. Each figure shows the approximate location of the elevations identified as Levels 1, 2 and 3, and the SFP level instrument span. The NRC staff notes that in these figures, Level 1 for Unit 2 is identified at an elevation of 35.8 ft. and Level 1 for Unit 3 is identified at an elevation of 46.8 ft. The staff also notes that these levels are adequate for normal SFP cooling system operation and it is also adequate to ensure the required fuel pool cooling pump NPSH. This level represents the higher of the two points described in NEI 12-02 for Level 1, for both units.

NEI 12-02 states, in part, 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. Level 2 is based on either of the following:

- 10 feet (+/- 1 foot) above the highest point of any fuel rack seated in the spent fuel pools, or

- a designated level that provides adequate radiation shielding to maintain personnel radiological dose levels within acceptable limits while performing local operations in the vicinity of the pool. This level shall be based on either plant-specific or appropriate generic shielding calculations, considering the emergency conditions that may apply at the time and the scope of necessary local operations, including installation of portable SFP instrument channel components.

In its OIP, the licensee stated that Level 2 for Unit 2 is the indicated level on either the primary or back-up instrument channel of greater than approximate elevation 22 ft. 5 in., and for Unit 3, the indicated level on either the primary or back-up instrument channel of greater than approximate elevation 35 ft. 4 in.; based on the elevations that are approximately 10 ft. above the top of the fuel racks and ensures a minimum level of 10 ft. above the top of the fuel, for both units.

In its letter dated July 26, 2013, the licensee provided two tables, one for each unit. Each figure shows the approximate location of the elevations identified as Levels 1, 2 and 3, and the SFP level instrument span. The NRC staff notes that in these figures, Level 2 for Unit 2 is identified at an elevation of 22.5 ft. and Level 2 for Unit 3 is identified at an elevation of 35.3 ft. The staff also notes that the licensee designated Level 2 using the first of the two options described in NEI 12-02 for Level 2.

NEI 12-02 states, in part, that

> 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.

In its OIP, the licensee stated that Level 3 for Unit 2 is the indicated level on either the primary or back-up instrument channel of greater than approximate elevation 12 ft. 5 in., and for Unit 3 is the indicated level on either the primary or back-up instrument channel of greater than approximate elevation 25 ft. 4 in. The licensee stated that this monitoring level assures that the fuel remains covered.

In its letter dated July 26, 2013, the licensee provided two tables, one for each unit. Each figure shows the approximate location of the elevations identified as Levels 1, 2 and 3, and the SFP level instrument span. The NRC staff notes that in these figures, Level 3 for Unit 2 is identified at an elevation of 12.5 ft. and Level 3 for Unit 3 is identified at an elevation of 25.3 ft. and that these elevations are the highest point of any spent fuel storage rack seated in the SFPs.

The licensee's proposed plan, with respect to identification of Levels 1, 2, and 3, appears to be consistent with NEI 12-02, as endorsed by the ISG.

3.3 Design Features: Instruments

Attachment 2 of Order EA-12-051, states, in part, that

> The instrumentation shall consist of a permanent, fixed primary instrument channel and a backup instrument channel. The backup instrument channel may be fixed or portable. Portable instruments shall have capabilities that enhance the ability of trained personnel to monitor spent fuel pool water level under conditions that restrict direct personnel access to the pool, such as partial structural damage, high radiation levels, or heat and humidity from a boiling pool.

NEI 12-02 states, in part, that

> A spent fuel pool level instrument channel is considered reliable when the instrument channel satisfies the design elements listed in Section 3 [Instrumentation Design Features] of this guidance and the plant operator has fully implemented the programmatic features listed in Section 4 [Program Features].

In its OIP, the licensee stated that the primary and backup instrument channels, for both units, would use fixed instruments providing a continuous level measurement over the entire range. The licensee stated that for Unit 2, the measurement range will be from approximately elevation 37 ft. 0 in. to elevation 12 ft. 5 in. (for a total indicated range of approximately 24 ft. 7 in.) and for Unit 3, from approximately elevation 50 ft. 4 in. to elevation 25 ft. 4 in. (for a total indicated range of approximately 25 ft. 0 in.)

In its letter dated July 26, 2013, the licensee provided two tables (one for each unit) depicting the SFP elevations identified as Levels 1, 2, and 3 and the SFP level instrument span. These figures showed that the instrument range for MPS 2 would be approximately 24.5 ft. and approximately 25 ft. for MPS3.

The NRC staff notes that the range specified for the licensee's instrumentation will cover Levels 1, 2, and 3 as described in Section 3.2 above. The licensee's proposed plan, with respect to the number of channels and the range of the instrumentation for its SFP appears to be consistent with NEI 12-02, as endorsed by the ISG.

3.4 Design Features: Arrangement

Attachment 2 of Order EA-12-051, states, in part, that

> The spent fuel pool level instrument channels shall be arranged in a manner that provides reasonable protection of the level indication function against missiles that may result from damage to the structure over the spent fuel pool. This protection may be provided by locating the primary instrument channel and the fixed portions of the backup instrument channel, if applicable, to maintain instrument channel separation within the spent fuel pool area, and to utilize inherent shielding from missiles provided by existing recesses and corners in the spent fuel pool structure.

NEI 12-02 states, in part, that

> The intent of the arrangement requirement is to specify reasonable separation and missile protection requirements for permanently installed instrumentation used to meet this order. Although additional missile barriers are not required to be installed, separation and shielding can help minimize the probability that damage due to an explosion or extreme natural phenomena (e.g., falling or wind-driven missiles) will render fixed channels of SFP instrumentation unavailable. Installation of the SFP instrument channels shall be consistent with the plant-specific SFP design requirements and should not impair normal SFP function.
>
> Channel separation should be maintained by locating the installed sensors in different places in the SFP area.

In its OIP, the licensee stated, for both units, in part, that

> The primary and back-up channel level sensor probes will be installed on opposite sides of the SFP to maintain adequate channel separation. In the conceptual design, the SFP probes bolt to a triangular mounting plate for installation at the corner of the SFP or a rectangular plate for mounting at the side of the SFP. The mounting options will allow the probe to be installed within a few inches of the SFP liner, minimizing the chances of interference with other structures, and occupying limited space on the SFP deck. Existing barriers and physical separation 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 missiles 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 cables associated with a channel's sensor, power supply and indicator will be independently routed in separate raceways from cables associated with the other channel.

In its OIP, the licensee also stated that for Unit 2, the:

> Primary instrument channel level sensing components will be located on the east wall of the SFP. Back-up instrument channel level sensing components will be located in the northwest corner of the SFP.

For Unit 3, the:

> Primary instrument channel level sensing components will be located on the east wall of the SFP and the back-up instrument channel level sensing components will be located in the west wall of the SFP.

In its letter dated, July 26, 2013, the licensee stated, for both units, in part, that

> The final locations for the level sensors, electronics and display units have not yet been determined. As discussed in the response to RAI No. 5, the conceptual design places the sensors in the Fuel Building, and the transmitters in the Auxiliary Building. Per the response to RAI No. 9, the locations of the read-outs/displays are in the Auxiliary Building for both MPS2 and MPS3.
>
> The final system component locations will be available upon completion of the final design, scheduled for December 2013, and will be forwarded to the NRC during the subsequent scheduled status update.

In its letter dated, August 23, 2013, the licensee stated, in part, that

> The SFP LI system continues to utilize Guided Wave Radar technology; however, the level sensor manufacturer has changed. Accordingly, there are design and installation configuration differences from those originally indicated in the OIP and the RAI response letter. Further details of the probe design and installation will be available upon completion of the final design, scheduled to be completed by December 2013 (see Milestone status table, Section 3), and will be forwarded to the NRC during the February 2014 six month status update. Subsequently, completion of procurement of the SFP instruments has been rescheduled to May 2014.

The licensee's proposed location of the primary and backup level instruments for both of its SFPs appears to be consistent with NEI 12-02, as endorsed by the ISG. However, the NRC staff notes that the information regarding final locations for the level sensors, electronics and display for the SFP level instrumentation is not currently available for review and that there are design and installation configuration differences from those originally indicated by the licensee as a result of the changed sensor manufacturer. The staff also notes that in its letter dated August 23, 2013, the licensee stated that further information will be forwarded to the staff during the February 2014 six month status update. The staff has identified these requests as:

RAI #1

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 the proposed routing of the cables that will extend from these sensors toward the location of the read-out/display device.

(This information was previously requested as RAI-2 in the NRC letter dated June 26, 2013)

3.5 Design Features: Mounting

Attachment 2 of Order EA-12-051 states, in part, that

> Installed instrument channel equipment within the spent fuel pool shall be mounted to retain its design configuration during and following the maximum seismic ground motion considered in the design of the spent fuel pool structure.

NEI 12-02 states, in part, that

> The mounting shall be designed to be consistent with the highest seismic or safety classification of the SFP. An evaluation of other hardware stored in the SFP shall be conducted to ensure it will not create adverse interaction with the fixed instrument location(s).
>
> The basis for the seismic design for mountings in the SFP shall be the plant seismic design basis at the time of submittal of the Integrated Plan for implementing NRC Order EA-12-051.

In its OIP, the licensee stated that for both units:

> Both the primary and backup systems will be installed as Seismic Category I to meet the NRC ISG JLD-ISG-2012-03 and NEI 12-02 guidance requirements.

In its letter dated July 26, 2013, the licensee stated for both units, in part, that

a) The design criteria to be used to estimate the total loading on the mounting devices is an item to be supplied by the vendor per the DNC procurement specification. The vendor has provided the following:

   "The flexible probe will have excursions that will result in some impacts to the liner. However, the flexible nature of the probe results in a self-relaxing response to static and hydrodynamic loading that will dramatically limit the inertia and energy that the probe can impart to the liner."

   Further details of the hydrodynamic/seismic evaluation will be provided by the vendor in accordance with the final procurement specification. The full qualification will be available upon completion of the final design, scheduled for December 2013, and will be forwarded to the NRC during the subsequent scheduled status update.

b) Because of the lightweight and flexible design of the Guided Wave Radar (GWR) probe, a stilling well is not required. The lack of probe mass and the probe's reaction to seismic loading permit the pool mount to be very simple, lightweight, and require little space for attachment. It can be attached on the curb's horizontal surface or curb face in most pool situations. Attachment on the curb face results in the cable conduit from the mount to the transmitter

enclosure being the only protrusion above the curb. The transmitter enclosures will be located in the Auxiliary Building.

The space used on the SFP deck and over the pool is minimal. Weight is minimal, and recognizing the self-damping characteristics of the flexible probe, seismic issues are easily manageable conditions. The probe is comprised of a flexible stainless steel cable secured at the top by a connector and flange. The bottom of the probe has a uniquely designed weight. The probe is designed to hang in close proximity to the liner without touching it. During an event, preliminary analysis shows that the probe will contact the liner, but the weight of the probe, the bumper material, the self-relaxing characteristics of the cable and the dampening effects of the pool inventory result in very little energy being imparted to the pool liner. Therefore, there are no points of attachment on the SFP liner.

The final mounting details will be available upon completion of the final design, scheduled for December 2013, and will be forwarded to the NRC during the subsequent scheduled status update.

c) As discussed above, the flexible GWR probe will be mounted either on the SFP curb horizontal surface or the curb face. Because of the design, no attachment to the pool liner is required.

The licensee's proposed plan, with respect to the seismic design of the mounting, appears to be consistent with NEI 12-02, as endorsed by the ISG. The staff plans to verify the results of the licensee's seismic testing and analysis report when it is completed based on the licensee's response to the following RAIs.

RAI #2

Please provide the results of the analyses used to verify the design criteria and methodology for seismic testing of the SFP instrumentation and the electronics units, including, design basis maximum seismic loads and the hydrodynamic loads that could result from pool sloshing or other effects that could accompany such seismic forces.

RAI #3

For each of the mounting attachments required to attach SFP Level equipment to plant structures, please describe the design inputs, and the methodology that was used to qualify the structural integrity of the affected structures/equipment.

3.6 Design Features: Qualification

Attachment 2 of Order EA-12-051 states, in part, that

> The primary and backup instrument channels shall be reliable at temperature, humidity, and radiation levels consistent with the spent fuel pool water at saturation conditions for an extended period. This reliability shall be established

> through use of an augmented quality assurance process (e.g. a process similar to that applied to the site fire protection program).

NEI 12-02 states, in part, that

The instrument channel reliability shall be demonstrated via an appropriate combination of design, analyses, operating experience, and/or testing of channel components for the following sets of parameters, as described in the paragraphs below:

- conditions in the area of instrument channel component use for all instrument components,
- effects of shock and vibration on instrument channel components used during any applicable event for only installed components, and
- seismic effects on instrument channel components used during and following a potential seismic event for only installed components…

The NRC staff assessment of the instrument qualification is discussed in the following subsections below: (3.6.1) Augmented Quality Process, (3.6.2) Post Event Conditions, (3.6.3) Shock and Vibration, and (3.6.4) Seismic Reliability.

3.6.1 Augmented Quality Process

Appendix A-1 of the guidance in NEI 12-02 describes a quality assurance process for non-safety systems and equipment that is not already covered by existing quality assurance requirements. Within the ISG, the NRC staff found the use of this quality assurance process to be an acceptable means of meeting the augmented quality requirements of Order EA-12-051.

In its OIP, the licensee stated, for both units, that augmented quality requirements consistent with NEI 12-02, Appendix A-1 would be applied to this project.

The licensee's proposed augmented quality assurance process, for MPS2 and MPS3, appears to be consistent with NEI 12-02, as endorsed by the ISG.

3.6.2 Post Event Conditions

NEI 12-02 states, in part, that

> The temperature, humidity and radiation levels consistent with conditions in the vicinity of the [SFP] and the area of use considering normal operational, event and post-event conditions for no fewer than seven days post-event or until off-site resources can be deployed by the mitigating strategies resulting from Order EA-12-049 should be considered. Examples of post-event (beyond-design-basis) conditions to be considered are:
>
> - radiological conditions for a normal refueling quantity of freshly discharged (100 hours) fuel with the SFP water level 3 as described in this order,

- temperatures of 212 degrees F and 100% relative humidity environment,
- boiling water and/or steam environment
- a concentrated borated water environment.

In its OIP, the licensee stated, for both units, consistent with NEI 12-02, in part, that

> Temperature, humidity and radiation levels consistent with conditions in the vicinity of the SFP and the area of use considering normal operational, event and post-event conditions will be addressed in the engineering and design phase. These conditions will be considered for no fewer than seven days post-event or until off-site resources can be deployed by the mitigating strategies resulting from Order EA-12-049 (Reference 5). Examples of post-event (beyond-design-basis) conditions that will be considered are:
>
> - radiological conditions for a normal refueling quantity of freshly discharged (100 hours) fuel with Level 3 SFP water level as described in Section III,
> - temperatures of 212 degrees F and 100% relative humidity environment,
> - boiling water and/or steam environment,
> - a concentrated borated water environment, and...

In its letter dated July 26, 2013, the licensee stated, in part, that

> Equipment that will be located in the spent fuel pool will be certified for use in post-event conditions including temperatures in excess of 100° Centigrade, 100 percent condensing atmosphere, submerged operation at elevated chemical concentrations, and exposure to postulated radiation levels with the fuel storage rack uncovered for an extended period of time. The remaining equipment will be installed in the Auxiliary Building and qualified for use at temperatures up to 60° Centigrade, 100 percent condensing atmosphere, and 1 $x10^4$ rads integrated dose. The inherent shielding of the structures along the line of sight between the fuel and the equipment will result in negligible doses to the equipment, even for uncovered fuel.

In its letter dated July 26, 2013, the licensee stated, in part, that

> Further details of the qualification and test program used to confirm the reliability of the permanently installed equipment during and following seismic conditions will be available upon completion of the final design, scheduled for December 2013, and will be forwarded to the NRC during the subsequent scheduled status update.

The NRC staff has concerns with the licensee's lack of information regarding the capability of the SFP level instrumentation to continuously perform its required functions under post-even conditions. The staff has identified these requests as:

RAI #4

Please provide analysis of the maximum expected radiological conditions (dose rate and total integrated dose) to which the equipment (including transmitters, control boxes, and display panels) will be exposed. Also, please provide documentation indicating how it was determined that the electronics for the SFP level instrumentation is capable of withstanding a total integrated dose of $1X10^4$ Rads. Please discuss the time period over which the analyzed total integrated dose was applied.

RAI #5

Please provide information indicating (a) what are the temperature ratings and whether the temperature ratings for the system electronics (including transmitters, control boxes, and display panels) are continuous duty ratings; and, (b) what will be the maximum expected ambient temperature in the rooms in which the system electronics will be located under BDB conditions in which there are no AC power available to run Heating Ventilation and Air Conditioning (HVAC) systems?

RAI #6

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

3.6.3 Shock and Vibration

NEI 12-02 states, in part, that

> Applicable components of the instrument channels are rated by the manufacturer (or otherwise tested) for shock and vibration 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:
>
> - instrument channel components use known operating principles, are supplied by manufacturers with commercial quality programs (such as ISO9001) with shock and vibration requirements included in the purchase specification and/or instrument design, and commercial design and testing for operation in environments where significant shock and vibration loadings are common, such as for portable hand-held devices or transportation applications;
>
> - substantial history of operational reliability in environments with significant shock and vibration loading, such as transportation applications, or
>
> - use of component inherently resistant to shock and vibration loadings or are seismically reliable such as cables.

In its OIP, the licensee stated, for both units that the components of the instrument channels will be qualified for shock and vibration using one or more of the methods identified in NEI 12-02.

The NRC staff has concerns with the licensee's lack of information regarding the capability of the SFP level instrumentation to continuously perform its required functions under the expected shock and vibration conditions. The staff has identified these requests as:

RAI #7

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

RAI #8

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

RAI #9

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

3.6.4 Seismic Reliability

The ISG recommends the use of Sections 7, 8, 9, and 10 of IEEE 344-2004 [Institute of Electrical and Electronics Engineers] for seismic qualification of the SFP level instrumentation.

In its OIPs, the licensee stated, for both units, in part, that

> For seismic effects on the installed instrument channel 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 at the location of the instrument channel component using one or more of the following methods:
>
> - Substantial history of operational reliability in environments with significant vibration, such as for portable hand-held devices or transportation applications. Such a vibration design envelope will be inclusive of the effects

of seismic motion imparted to the components proposed at the location of the proposed installation.

- 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,[Reference 7] or a substantially similar industrial standard; or
- 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].

In its letter dated July 26, 2013, the licensee stated, in part, that

> The new SFP level instrumentation system will be tested and analyzed to meet the SQURTS seismic envelope for plants in the United States.
>
> Site specific analysis will be performed to certify the mount's performance at the selected location.
>
> Testing will confirm that the system maintains its design accuracy after a seismic event.
>
> Further details of the qualification and test program used to confirm the reliability of the permanently installed equipment during and following seismic conditions will be available upon completion of the final design, scheduled for December 2013, and will be forwarded to the NRC during the subsequent scheduled status update.

The NRC staff notes that the licensee's planned approach with respect to the seismic reliability of the instrumentation appears to be consistent NEI 12-02, as endorsed by the ISG. The staff also notes that further information regarding reliability and qualification of the permanently installed SFP level instrumentation equipment during and following seismic conditions will be available upon completion of the final design and that the licensee will forward this information to the staff in the February 2014, six month status report. The staff has identified these requests as:

RAI #10

Please provide the following:

a) 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.

b) A description of the specific method or combination of methods that will be used to confirm the reliability of the permanently installed equipment during and following seismic conditions to maintain its required accuracy.

(This information was previously requested as RAI-4 Item b and Item c in the NRC letter dated June 26, 2013)

In addition, the staff plans to verify the results of the licensee's testing and analysis used to demonstrate the qualification and reliability of the installed equipment when it is completed based on the licensee's response to the following RAI.

RAI #11

For RAI #10 above, please provide the results for the selected methods, tests and analyses used to demonstrate the qualification and reliability of the installed equipment in accordance with the Order requirements.

3.6.5 Qualification Evaluation Summary

Upon acceptable resolution of the RAIs in Section 3.6, the NRC staff will be able to make a conclusion regarding the instrument qualification.

3.7 Design Features: Independence

Attachment 2 of Order EA-12-051 states, in part, that

> The primary instrument channel shall be independent of the backup instrument channel.

NEI 12-02 states, in part, that

> Independence of permanently installed instrumentation, and primary and backup channels, is obtained by physical and power separation commensurate with the hazard and electrical isolation needs. If plant AC or DC power sources are used then the power sources shall be from different buses and preferably different divisions/channels depending on available sources of power.

In its OIP, the licensee stated, for both units, in part, that

> Independence will be achieved through physical separation of the final installed instruments. The two (2) permanently installed instrument sensors will be separated by a distance comparable to the shortest length of a side of the pool, to the extent practical, based on the existing SFP geometry and construction. The cables associated with each channel will follow separate and independent routes from the instruments to each electronic's enclosure and from the

> enclosures to the displays. The normal AC or DC power source for each channel will be provided from independent and separate sources.

In its letter dated July 26, 2013, the licensee stated, for both units, in part, that

> The MPS2 and MPS3 SFP level instrumentation systems are designed to be a complete integrated solution that meets the requirements set forth in EA-12-051, NEI 12-02 Rev. 1, and JLD-ISG-2012-03. Each system provides two completely independent channels of level instrumentation. Each channel is comprised of the GWR flexible probe, the probe mount, the transmitter, the instrument enclosure containing the DC power source and charger, sensor conditioning and communication circuitry, and local indication and is equipped with appropriate enclosure connections to remote displays and alternate power sources.
>
> The MPS2 sensors will be located on opposite sides of the SFP and the Unit 3 sensors will be located on opposite ends of the longest side of the spent fuel pool. The transmitters and the instrument enclosures for both MPS2 and MPS3 (including display) will be located in the Auxiliary Building. DNC's standard separation criteria for safety related instrument cable at Millstone Power Station (MPS) will be applied.
>
> Each level channel is powered from its own dedicated 24-volt DC sealed batteries with a charging source connected to AC power. For MPS2, the AC charging source is supplied by two independent distribution panels. For MPS3, the AC charging source is from different breakers on the same distribution panel and each channel is protected from ground faults and surges from the common AC supply. In addition to the normal DC power supply to each channel, a back-up power source will also be provided to each channel in the form of a portable back-up battery and connections to alternate power sources independent of the normal AC or DC power sources.

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

RAI #12

Please provide the NRC staff with the final configuration of the power supply source for each channel so that the staff may conclude that the two channels are independent from a power supply assignment perspective.

3.8 Design Features: Power Supplies

Attachment 2 of Order EA-12-051, states in part, that

> Permanently installed instrumentation channels shall each be powered by a separate power supply. Permanently installed and portable instrumentation channels shall provide for power connections from sources independent of the plant ac and dc power distribution systems, such as portable generators or replaceable batteries. Onsite generators used as an alternate power source and replaceable batteries used for instrument channel power shall have sufficient capacity to maintain the level indication function until offsite resource availability is reasonably assured.

NEI 12-02 states, in part, that

> The normal electrical power supply for each channel shall be provided by different sources such that the loss of one of the channels primary power supply will not result in a loss of power supply function to both channels of SFP level instrumentation.
>
> All channels of SFP level instrumentation shall provide the capability of connecting the channel to a source of power (e.g., portable generators or replaceable batteries) independent of the normal plant AC and DC power systems. For fixed channels this alternate capability shall include the ability to isolate the installed channel from its normal power supply or supplies. The portable power sources for the portable and installed channels shall be stored at separate locations, consistent with the reasonable protection requirements associated with NEI 12-06 (Order EA-12-049). The portable generator or replaceable batteries should be accessible and have sufficient capacity to support reliable instrument channel operation until off-site resources can be deployed by the mitigating strategies resulting from Order EA-12-049.
>
> If adequate power supply for either an installed or portable level instrument credits intermittent operation, then the provisions shall be made for quickly and reliably taking the channel out of service and restoring it to service. For example, a switch on the power supply to the channel is adequate provided the power can be periodically interrupted without significantly affecting the accuracy and reliability of the instrument reading. Continuous indication of SFP level is acceptable only if the power for such indication is demonstrably adequate for the time duration specified in section 3.1[.]

In its OIP, the licensee stated, for both units, in part, that

> The normal power supply for each channel will be provided by different 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 and/or DC power supply to each channel, a back-up power source will also be provided to each channel in the form of a back-up battery independent of the normal AC or DC power sources.

In its letter dated July 26, 2013, the licensee stated, for both units, in part, that

> Each level channel is powered from its own dedicated 24-volt DC sealed batteries with a charging source connected to AC power. The seismically qualified batteries are designed to supply power for the entire level monitoring channel for at least seven days after a station black out (SBO). The enclosure and associated electronics are qualified for continuous operation in an operating environment of 0-50° Centigrade and 95 percent humidity, non-condensing atmosphere without the need for cooling fans.
>
> Since the system is designed to support continuous operation over a seven-day or longer SBO period, there is sufficient time to either restore or provide a back-up source of AC power to recharge the 24-volt batteries. Deployment of an AC power source to recharge the level monitoring channel batteries will be included in the FLEX implementing procedures. As such, each channel will be available to run reliably and continuously following the onset of a BDB event for the minimum duration needed.

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

RAI #13

Please provide the results of the calculation depicting the battery backup duty cycle requirements demonstrating that its capacity is sufficient to maintain the level indication function until offsite resource availability is reasonably assured.

3.9 Design Features: Accuracy

Attachment 2 of Order EA-12-051 states, in part, that

> The instrument channels shall maintain their designed accuracy following a power interruption or change in power source without recalibration.

NEI 12-02 states, in part, that

> Accuracy should consider operations while under SFP conditions, e.g., saturated water, steam environment, or concentrated borated water. Additionally, instrument accuracy should 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.

In its OIP, the licensee stated, for both units, in part, that

> The instrument channels will maintain their design accuracy following a power interruption or change in power source without requiring recalibration. Since the

> instrumentation is generally commercial off the shelf supplied components, the vendor published instrument accuracies will be verified as acceptable and will be used as a basis for final configuration and calibration procedures.
>
> Accuracy requirements will consider SFP conditions, e.g., saturated water, steam environment, and 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 GWR/TDR equipment selected will have accuracy within the resolution requirements of NEI 12-02, Figure 1.
>
> Specific details regarding accuracy will be obtained from the supplier during the detailed design phase.

In its letter dated July 26, 2013, the licensee stated, for both units, in part, that

> The selected MPS2 and MPS3 SFP level instrumentation systems are expected to have a design accuracy of+/- 2 inches and maintain this accuracy over the full range of operating conditions, including BDB conditions. Design accuracy is also expected to be maintained following a power interruption without the need for recalibration. The final design accuracy will be available upon completion of the final design, scheduled for December 2013, and will be forwarded to the NRC during the subsequent scheduled status update.
>
> Calibration of the SFP level system is performed in-situ. Channel check and calibration tolerances will be developed as part of the detailed design. The final calibration methodology will be available upon completion of the final design, scheduled for December 2013, and will be forwarded to the NRC during the subsequent scheduled status update.

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

RAI #14

Provide the following:

a) **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.**

b) Please provide analysis verifying that the proposed instrument performance is consistent with these estimated accuracy normal and BDB values. Please demonstrate that the channels will retain these accuracy performance values following a loss of power and subsequent restoration of power.

3.10 Design Features: Testing

Attachment 2 of Order EA-12-051 states, in part, that

> The instrument channel design shall provide for routine testing and calibration.

NEI 12-02 states, in part, that

> Static or non-active installed (fixed) sensors can be used and should be designed such that testing and/or calibration can be performed in-situ. For microprocessor based channels the instrument channel design shall be capable of testing while mounted in the pool.

In its OIP, the licensee stated, for both units, 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. The installed sensors will be designed to allow testing and/or calibration via in-situ methods while mounted in the pool. Removal of the sensor from the pool will not be required for calibration or testing.
>
> Specific details regarding testing procedures and calibration requirements will be reviewed and determined with the supplier during the detailed design phase.

In its letter dated July 26, 2013, the licensee stated, in part, that

a) The SFP level instrumentation system is capable of individual channel in-situ calibration and cross-calibration of the two independent level indications channels. In-situ calibration is performed at the transmitter enclosure using internal displays. The GWR determines pool depth by measuring the time of flight of a pulse from the transmitter to the water interface and back to the transmitter's receiver. A calibration device, provided by the manufacturer, incorporates time of flight delays equal to various pool levels. The device is connected to the transmitter and is exercised for each level. Following calibration, the depth indications for both pool level sensors will be compared as a final functional check of the level measurement.

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 accuracy of each channel will be applied for cross comparison between the two channels. The tolerance is determined as the square root of the sum of

> the squares of the expected design accuracy value, which is +/- 2 inches [reference the response to RAI-7]. Therefore, the channel check tolerance would then be 2.8 inches.
>
> The wide range instruments may also be cross checked against the existing narrow range pool level measurement channels where available [MPS3 only]. If deemed necessary, tolerances for this cross check will be developed as part of the final design.

The NRC staff notes that the results of the comparison between the SFP level instrument channels can be compared with the acceptance criteria described in Section 3.9 above to determine if recalibration or troubleshooting is needed. The licensee's proposed design, with respect to routine in-situ instrument channel functional and calibration tests, appears to be consistent with NEI 12-02, as endorsed by the ISG.

3.11 Design Features: Display

Attachment 2 of Order EA-12-051 states, in part, that

> Trained personnel shall be able to monitor the spent fuel pool water level from the control room, alternate shutdown panel, or other appropriate and accessible location. The display shall provide on-demand or continuous indication of spent fuel pool water level.

NEI 12-02 states, in part, that

> The intent of this guidance is to ensure that information on SFP level is reasonably available to the plant staff and decision makers. Ideally there will be an indication from at least one channel of instrumentation in the control room. While it is generally recognized (as demonstrated by the events at Fukushima Daiichi) that SFP level will not change rapidly during a loss of spent fuel pool cooling scenario more rapid SFP drain down cannot be entirely discounted. Therefore, the fact that plant personnel are able to determine the SFP level will satisfy this requirement, provided the personnel are available and trained in the use of the SFP level instrumentation (see Section 4.1) and that they can accomplish the task when required without unreasonable delay.
>
> SFP level indication from the installed channel shall be displayed in the control room, at the alternate shutdown panel, or another appropriate and accessible location (reference NEI 12-06). An appropriate and accessible location shall have 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, and
- outside of any very high radiation areas or LOCKED HIGH RAD AREA during normal operation.
- If multiple display locations beyond the required "appropriate and accessible location" are desired, then the instrument channel shall be designed with the capability to drive the multiple display locations without impacting the primary "appropriate and accessible" display.

In its OIP, the licensee stated that for Unit 2:

> The conceptual design locates the electronic enclosure and primary display in the Main Control Room (MCR). Specific details regarding the display and display locations will be finalized during the detailed design phase.

In its OIP, the licensee stated that for Unit 3:

> The conceptual design locates the electronic enclosure and primary display in the Auxiliary Building. Specific details regarding the display and display locations will be finalized during the detailed design phase.

In its letter dated July 26, 2013, the licensee stated, for both units, in part, that

> The current design places the instrument channel display units for both channels of MPS2 and MPS3 in a Seismic Category 1 portion of the Auxiliary Building structure which will be accessible from the Main Control Room from primary and alternate routes. The final design will verify that the habitability of the access routes and locations in the Auxiliary Building structure where the instrument channel display units are planned will be located outside of any very high radiation areas or locked high radiation area during normal operation or various drain-down conditions. Communications with the Main Control Room and/or Technical Support Centers will be maintained via two-way radio...
>
> Final design details for the instrument channel display units are scheduled to be completed by December 2013. Upon completion of the final design, justification for prompt accessibility from the Main Control Room and habitability will be forwarded to the NRC during the subsequent scheduled status update.

The NRC staff notes that the location of the instrument channel display for both units is currently in the auxiliary building structure. The staff also notes that the final design will verify that the habitability of the access routes and locations in the Auxiliary Building structure where the instrument channel display units are planned will be located outside of any very high radiation areas or locked high radiation area during normal operation or various drain-down conditions. The staff notes that the licensee indicated that final design details for the instrument channel displays is scheduled to be completed by December 2013 that the licensee will forward this information to the staff during the February 2013 six month status report. The staff has identified this request as:

RAI #15

Please provide the following:

a) **The specific location for the primary and backup instrument channel display.**

b) **For any SFP level instrumentation displays located outside the MCR, please describe the evaluation used to validate that the display location can be accessed without unreasonable delay following a BDB event. Include the time available for personnel to access the display as credited in the evaluation, as well as the actual time (e.g., based on walk-through) that it will take for personnel to access the display. Additionally, please include a description of the radiological and environmental conditions on the paths personnel might take. Describe whether the display location remains habitable for radiological, heat and humidity, and other environmental conditions following a BDB event. Describe whether personnel are continuously stationed at the display or monitor the display periodically.**

3.12 Programmatic Controls: Training

Attachment 2 of Order EA-12-051 states, in part, that

> Personnel shall be trained in the use and the provision of alternate power to the primary and backup instrument channels.

NEI 12-02 states, in part, that

> The personnel performing functions associated with these SFP level instrumentation channels shall be trained to perform the job specific functions necessary for their assigned tasks (maintenance, calibration, surveillance, etc.). SFP instrumentation should be installed via the normal modification processes. In some cases, utilities may choose to utilize portable instrumentation as a portion of their SFP instrumentation response. In either case utilities should use the Systematic Approach to Training (SAT) to identify the population to be trained. The SAT process should also determine both the initial and continuing elements of the required training.

In its OIP, the licensee stated, for both units, in part, that

> The Systematic Approach to Training (SAT) will be used to identify the population to be trained and to determine both the initial and continuing elements of the required training. Training will be completed prior to placing the instrumentation in service.

The licensee's proposed plan, with respect to the training personnel in the use and the provision of alternate power to the primary and backup instrument channels, including the approach to identifying the population to be trained, appears to be consistent with NEI 12-02, as endorsed by the ISG.

3.13 Programmatic Controls: Procedures

Attachment 2 of Order EA-12-051 states, in part, that

> Procedures shall be established and maintained for the testing, calibration, and use of the primary and backup spent fuel pool instrument channels.

NEI 12-02 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.

In its OIP, the licensee stated that for both units:

> Procedures will be developed using guidelines and vendor instructions to address the maintenance, operation, and abnormal response issues associated with the new SFP instrumentation.

In its letter dated July 26, 2013, the licensee stated, for both units, in part, that

> Procedures for inspection, maintenance, repair, operation, abnormal response, 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.

The NRC staff has concerns with the licensee's lack of information about its plans to develop procedures. The staff previously requested this information as RAI-10 in NRC letter dated June 26, 2013. However, based on feedback from licensees, the staff revised this RAI as follows:

RAI #16

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

3.14 Programmatic Controls: Testing and Calibration

Attachment 2 of Order EA-12-051 states, in part, that

> Processes shall 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.

NEI 12-02 states, in part, that

> Processes shall 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 at the design accuracy. The testing and calibration of the instrumentation shall be consistent with vendor recommendations or other documented basis.

In its OIP, the licensee stated, for both units, in part, that

> Processes will be established and maintained for scheduling and implementing necessary testing and calibration of the primary and back-up 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.

In its letter dated July 26, 2013, the licensee stated, for both units, in part, that

a) The maintenance and testing of the SFP level instrumentation systems will be incorporated into the normal station surveillance and work control processes based on vendor recommendations for maintenance and periodic testing. The calibration and maintenance program will include surveillances or testing to validate the functionality of each instrument channel within 60 days of a planned refueling outage considering normal testing scheduling allowances (e.g., 25%).

   The preventive maintenance, test and calibration program will be developed consistent with the vendor's recommendations. This information will be available following completion of the final design, scheduled for December 2013, and will be forwarded to the NRC during the subsequent scheduled status update....

b) In the event a channel of SPF level instrumentation is out of service for any reason, an administrative action statement will be entered to restore the channel to service within 90 days. Functionality of the other channel associated with the same SFP as the out of service channel will be confirmed via appropriate surveillance measures until the non-functioning channel is returned to service. As with item a) above, the frequency of these actions will be developed consistent with vendor recommendations.

c) 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 DNC's Corrective Action System. If both channels associated with the same SFP are determined to be non-functional, DNC will initiate appropriate compensatory actions within 24 hours.

The appropriate compensatory actions have not yet been specified. The determination of these actions is part of the overall effort to develop the BDB Program administrative and implementation procedures. The BDB Program will incorporate the guidance of NEI 12-02, including the requirements associated with out of service time and is scheduled for completion in September 2014. A description of compensatory actions will be forwarded to the NRC during the subsequent scheduled status update.

The licensee's proposed plan, with respect to testing and calibration, as well as, compensatory actions for instruments out of service, appears to be consistent with NEI 12-02, as endorsed by the ISG. The NRC staff notes that the final information regarding SFP level instrumentation testing and calibration program and compensatory actions is not currently available for review. The licensee indicated that the BDB Program will incorporate the guidance of NEI 12-02; including the requirements associated with out of service time and that the BDB Program is currently scheduled for completion in September 2014. The licensee will forward this information to the staff in a subsequent scheduled status update. The staff has identified this request as:
RAI #17

Please provide the following:

a) Further information describing the maintenance and testing program the licensee will establish and implement to ensure that regular testing and calibration is performed and verified by inspection and audit to demonstrate conformance with design and system readiness requirements. Please include a description of the 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) Information describing compensatory actions when both channels are out-of-order, and the implementation procedures.

c) Additional information describing expedited and compensatory actions in the maintenance procedure to address when one of the instrument channels cannot be restored to functional status within 90 days.

3.15 Instrument Reliability

NEI 12-02 states, in part, that

A spent fuel pool level instrument channel is considered reliable when the instrument channel satisfies the design elements listed in Section 3 [Instrument

> Design Features] of this guidance and the plant operator has fully implemented the programmatic features listed in Section 4 [Program Features].

In its OIP, the licensee stated that the channel design would meet Section 3 of the NEI guidance and that reliability would be assured through implementation of the programmatic controls that are consistent with the applicable guidance in NEI 12-02. Upon acceptable resolution of the RAIs noted above, the NRC staff will be able to make a conclusion regarding the reliability of the SFP instrumentation.

4.0 CONCLUSION

The NRC staff is unable to complete its evaluation regarding the acceptability of the licensee's plans for implementing the requirements of Order EA-12-051 due to the need for additional information as described above. The staff will issue an evaluation with its conclusion after the licensee has provided the requested information.

The interim staff evaluation also includes RAIs, response to which the NRC staff needs to complete its review. The licensee should provide the information requested in the 6-month status updates, as the information becomes available. However, the staff requests that all information be provided by March 31, 2014, to ensure that any issues are resolved prior to the date by which the licensee must complete full implementation of Order EA-12-051. The licensee should adjust its schedule for providing information to ensure that all this information is provided by the requested date.

If you have any questions regarding this letter, please contact me at 301-415-4125 or via e-mail at James.Kim@nrc.gov.

Sincerely,

/ra/

James Kim, Project Manager
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-336 and 50-423

Enclosure:
Interim Staff Evaluation and
Request for Additional Information

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RidsRgn1MailCenter Resource
DRahn, NRR
MMitchell, NRR
BPurnell, NRR
LPLI-1 R/F
RidsNrrDeEicb Resource
RidsNrrDssSbpb Resource
RidsNrrPMMillstone Resource
CRoque-Cruz, NRR
GCasto, NRR
RKuntz, NRR

ADAMS Accession No. ML13291A115 ***See memo dated October 8, 2013**

OFFICE	NRR/DORL/LPL1-1/PM	NRR/DORL/LPL1-1/LA	NRR/DSS/SBPB/BC
NAME	JKim	KGoldstein	GCasto*
DATE	10/23/13	10/23/13	10/8/13
OFFICE	NRR/DE/EICB/BC	NRR/DORL/LPL1-1/BC	NRR/DORL/LPL1-1/PM
NAME	JThorp*	RBeall	JKim
DATE	10/8/13	10/29/13	10/29/13

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