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

June 25, 2013

Vice President, Operations
Entergy Nuclear Operations, Inc.
Indian Point Energy Center
450 Broadway, GSB
P.O. Box 249
Buchanan, NY 10511-0249

SUBJECT: INDIAN POINT NUCLEAR GENERATING UNIT NOS. 2 AND 3 - REQUEST FOR ADDITIONAL INFORMATION REGARDING RELIABLE SPENT FUEL POOL INSTRUMENTATION, ORDER NO. EA-12-051 (TAC NOS. MF0737 AND MF0738)

Dear Sir or Madam:

By letter dated February 27, 2013, Entergy Nuclear Operations, Inc., the licensee, submitted the Overall Integrated Plan in response to Order EA-12-051 regarding reliable spent fuel pool instrumentation for Indian Point Nuclear Generating Unit Nos. 2 and 3.

The Nuclear Regulatory Commission staff is reviewing the submittal and has determined that additional information is needed to complete its review. The specific questions are found in the enclosed request for additional information (RAI). Based on our discussions we understand that a response to the RAI will be provided within 60 days of the date of this letter.

Please contact me at (301) 415-1364 if you have any questions on this issue.

Sincerely,

Douglas V. Pickett

Douglas V. Pickett, Senior Project Manager
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-247 and 50-286

Enclosure:
Request for Additional Information

cc w/encl: Distribution via Listserv

REQUEST FOR ADDITIONAL INFORMATION

OVERALL INTEGRATED PLAN IN RESPONSE TO

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

ENTERGY OPERATIONS, INC

INDIAN POINT NUCLEAR GENERATING UNIT NOS. 2 AND 3

DOCKET NO. 50-247 AND 50-286

1.0 INTRODUCTION

By letter dated February 27, 2013 (Agencywide Documents Access and Management System (ADAMS) (Accession No. ML130720080), Entergy Operations, Inc. submitted an Overall Integrated Plan (OIP) in response to the March 12, 2012, U.S. Nuclear Regulatory Commission (NRC), Commission Order modifying licenses with regard to requirements for Reliable Spent Fuel Pool (SFP) Instrumentation (Order Number EA-12-051; ADAMS Accession No. ML12054A679) for Indian Point Nuclear Generating Unit Nos. 2 and 3. The NRC staff endorsed Nuclear Energy Institute (NEI) 12-02, "Industry Guidance for Compliance with NRC Order EA-12-051, to Modify Licenses with Regard to Reliable SFP Instrumentation," Revision 1, dated August 2012 (ADAMS Accession No. ML12240A307), with exceptions as documented in Interim Staff Guidance (ISG) 2012-03, "Compliance with Order EA-12-051, Reliable SFP Instrumentation," Revision 0, dated August 29, 2012 (ADAMS Accession No. ML12221A339).

The NRC staff has reviewed the February 27, 2013, response by the licensee and determined that the following Request for Additional Information (RAI) is needed to complete its Technical Review. If any part of this information is not available within the 60-day response period for this RAI, please provide the date this information will be submitted.

2.0 LEVELS OF REQUIRED MONITORING

The OIP states, in part, that:

> LEVEL 1: Level 1 is the level adequate to support operation of the normal fuel pool cooling system. It is the higher of the following two points:
>
> (1) the level at which reliable suction loss occurs due to uncovering the coolant inlet pipe or any weirs or vacuum breakers associated with suction loss.
>
> a. For the Unit 2 SFP, the elevation associated with this level is 89' – 5 3/8", and corresponds to the end of the suction pipe for the Aux. Coolant System (Reference 9, Section C-C).
>
> b. For the Unit 3 SFP, the elevation associated with this level is 89' - 5 3/8", and corresponds to the end of the suction pipe for the Aux. Coolant System (Reference 6, Plan 'Z').

(2) the level at which the normal fuel pool cooling pumps lose required net positive suction head (NPSH) assuming saturated conditions in the pool. What follows is the best available information concerning this level, and an evaluation will be completed to verify these values.

a. For the Unit 2 SFP, current plant specific analyses do not support identifying an NPSH level at saturated conditions. Further evaluation will be completed to determine this level.
b. For the Unit 3 SFP, there is no point above the suction line opening at 89' - 53/8" elevation that would result in $NPSH_r \geq NPSH_a$ for normal single pump operation (Reference 11).

For the Unit 2 SFP, final determination of Level 1 will be established as the higher of either (1) or (2) above."

RAI-1

Please provide the following:

a) For Level 1 in both Units 2 and 3, identify the functional reasons for selection of the suction pipe identified and verify that it is the HIGHER of the two points described in the NEI 12-02 guidance for this level.

b) A clearly labeled sketch depicting the elevation view of the proposed typical mounting arrangement for the portions of instrument channel consisting of permanent measurement channel equipment (e.g., fixed level sensors and/or stilling wells, and mounting brackets). Indicate on this sketch the datum values representing Level 1, Level 2, and Level 3 as well as the top of the fuel. 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.

3.0 INSTRUMENTATION DESIGN FEATURES

3.3 Mounting

The OIP states, in part, that

Both the primary and backup system will be installed as seismic category I to meet the NRC JLD-ISG-2012-03 and NEI 12-02 guidance requirements.

Other hardware stored in the SFP will be evaluated to ensure that it does not adversely interact with the SFP instrument probes during a seismic event.

RAI-2

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.

3.4 Qualification

The OIP states, in part, that

> Components of the instrument channels will be qualified for shock and vibration using one or more of the following methods:
>
> - Components will be supplied by manufacturers that implement 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 devices or transportation applications;
> - Components have a 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 (with the exception of replaceable batteries and chargers), the following measures will be used to verify that the design and installation is adequate:
>
> - Components will be 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:

- demonstration of seismic motion will be consistent with that of existing design basis loads at the installed location;
- 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;
- demonstration of seismic reliability using methods that predict equipment performance (e.g., analysis, testing, combination thereof, or use of experience data) where demonstration should be based on the guidance in Sections 7, 8, 9, and 10 of Reference 5 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.
- Augmented quality requirements will be applied to all components in the instrumentation channels for:

    - design control
    - procurement document control
    - instructions, procedures, and drawings
    - control of purchased material, equipment, and services
    - inspection, testing, and test control
    - inspections, test, and operating status
    - nonconforming items
    - corrective actions
    - records
    - audits

RAI-3

Please provide the following:

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

b) A description of the testing and/or analyses that will be conducted to provide assurance that the equipment will perform reliably under the worst-case credible design basis loading at the location where the equipment will be mounted. Include a discussion of this seismic reliability demonstration as it applies to (a) the level sensor mounted in the SFP area, and (b) any control boxes, electronics, or read-out and re-transmitting devices that will be employed to convey the level information from the level sensor to the plant operators or emergency responders.

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

3.5 Independence

The OIP states, in part, that

> The primary instrument channel will be independent of the backup instrument channel. Independence is obtained by physical separation of components between channels and the use of normal power supplied from separate 480V buses. Independence of power sources is described in Section 11. The two (2) permanently mounted instruments in the pool are physically separated as described in Sections 6 and 7.

RAI-4

Please provide the following:

a) A description of how the two channels of the proposed level measurement system meet this requirement so that the potential for a common cause event to adversely affect both channels is precluded.

b) Further information on how each level measurement system, consisting of level sensor electronics, cabling, and readout devices will be designed and installed to address independence through the application and selection of independent power sources, the use of physical and spatial separation, independence of signals sent to the location(s) of the readout devices, and the independence of the displays.

3.6 Power Supplies

The OIP states, in part, that.

- Each instrument channel is normally powered from a 120/118 VAC 60 Hz plant distribution panel to support continuous monitoring of SFP level. The primary channel will receive power from a different 480V bus than the backup channel. Therefore, loss of any one 480V bus does not result in loss of normal 120VAC power for both instrument channels.
- On loss of normal 120/118VAC power, each channel's uninterruptible power supply (UPS) automatically transfers to a dedicated backup battery. If normal power is restored, the channel will automatically transfer back to the normal AC power.
- The backup batteries are maintained in a charged state by commercial-grade uninterruptible power supplies. The batteries are sized to be capable of supporting monitoring for a minimum of 3 days of operation. This provides adequate time to allow the batteries to be replaced with a fresh battery or until off-site resources can be deployed by the mitigating strategies resulting from Order EA-12-049 Revision 0.

- An external connection permits powering the system from a portable power source.

RAI-5

If the level measurement channels are to be powered through a battery system (either directly or through an UPS, please provide the design criteria that will be applied to size the battery in a manner that ensures, with margin, that the channel will be available to run reliably and continuously following the onset of the BDB event for the minimum duration needed, consistent with the plant FLEX Program plans.

3.7 Accuracy

The OIP states, in part, that

> Accuracy will be consistent with the guidelines of NRC JLD-ISG-2012-03 Revision 0 and NEI 12-02 Revision 1. Accuracy and indication features are as follows:
>
> - Accuracy: The absolute system accuracy is better than $\pm$ 3 inches. This accuracy is applicable for normal conditions and the temperature, humidity, chemistry, and radiation levels expected for BDB event conditions.
> - Trending: The display trends and retains data when powered from either normal or backup power.
> - Restoration after Loss of Power: The system automatically swaps to available power (backup battery power or external power source) when normal power is lost. Neither the source of power nor system restoration impact accuracy. Previously collected data is retained.
> - Diagnostics: The system performs and displays the results of real-time information related to the integrity of the cable, probe, and instrument channel.

RAI-6

Please provide the following:

a) An estimate of the expected instrument channel accuracy performance under both (a) normal SFP level conditions (approximately Level 1 or higher) and (b) at the 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.

3.8 Testing

OIP states, in part, that

> Testing and calibration will be consistent with the guidelines of NRC JLD-ISG-2012-03 Revision 0 and NEI 12-02 Revision 1 and vendor recommendations.
>
> The display/processor performs automatic in-situ calibration and automatically monitors for cable, connector, and probe faults using Time Domain Reflectometry (TDR) technology. Channel degradation due to age or corrosion is not expected but can be identified by monitoring trends.
>
> Station procedures and preventive maintenance tasks will be developed to perform required surveillance testing, calibration, backup battery maintenance, functional checks, and visual inspections of the probes.

RAI-7

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 functional checks will be performed, and the frequency at which they will be conducted. Describe how calibration tests will be performed, and the frequency at which they will be conducted. Provide a discussion as to how these surveillances will be incorporated into the plant surveillance program.

d) A description of what preventive maintenance tasks are required to be performed during normal operation, and the planned maximum surveillance interval that is necessary to ensure that the channels are fully conditioned to accurately and reliably perform their functions when needed.

3.9 Display

The OIP states, in part, that

> The primary and backup instrument displays will be located in the areas described in section 7, which states the locations of displays as follows:

"...the credited displays for both Unit 2 and Unit 3's SFP instrument channels are within the respective Units' Fan Houses. In both Unit 2 and Unit 3, a remote display for both channels of instrumentation will be located in the respective Central Control Room (CCR) via additional cabling..."

The display will be consistent with the guidelines of NRC JLD-ISG-2012-03 Revision 0 and NEI 12-02 Revision 1.

For both normal and expected beyond design basis conditions, the displays are in mild environments that are:

- promptly accessible to plant staff and decision makers properly trained in the use of the equipment. Station operators can obtain SFP level data trends and report those to decision makers within 30 minutes of request.
- outside the area surrounding the SFP floor and protected from the environmental and radiological sources resulting from an event impacting the SFP.
- inside a seismic structure that provides protection from adverse weather or flooding.
- outside of any high radiation area or locked high radiation area during normal or expected beyond design basis conditions.

RAI-8

Please provide the following:

a) Since the "credited" primary and backup display location is other than the main control room, provide justification for prompt accessibility to displays including primary and alternate route evaluation, habitability at display location(s), continual resource availability for personnel responsible to promptly read displays, and provisions for communications with decision makers for the various SFP drain down scenarios and external events.

b) The reasons justifying why the locations selected enable the information from these instruments to be considered "promptly accessible" to various drain-down scenarios and external events.

c) Describe how the reliability of the "remote" display addresses the criteria in the Order and the guidance in NEI 12-02. Identify any deviations from that guidance.

4. PROGRAM FEATURES

4.2 Procedures

The OIP states, in part, that

Procedures for maintenance and testing will be developed using regulatory guidelines and vendor instructions.

BDB event operation guidance will also address the following:

- A strategy to ensure SFP water addition is initiated at an appropriate time consistent with implementation of NEI 12-06 Revision 1.
- Restoration of non-functioning SFP level channels after an event. Restoration timing will be consistent with the emergency condition. After an event, commercially available components that may not meet all qualifications may be used to replace components to restore functionality.

RAI-9

Please provide a description of the standards, guidelines and/or criteria that will be utilized to develop procedures for inspection, maintenance, repair, operation, abnormal response, and administrative controls associated with the SFP level instrumentation, as well as storage and installation of portable instruments.

4.3 Testing and Calibration

OIP states, in part, that

> Testing and calibration will be consistent with the guidelines of NRC JLD-ISG-2012-03 Revision 0 and NEI 12-02 Revision 1 and vendor recommendations.
>
> The display/processor performs automatic in-situ calibration and automatically monitors for cable, connector, and probe faults using TDR technology. Channel degradation due to age or corrosion is not expected but can be identified by monitoring trends.
>
> Station procedures and preventive maintenance tasks will be developed to perform required surveillance testing, calibration, backup battery maintenance, functional checks, and visual inspections of the probes.

RAI-10

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 what compensatory actions are planned in the event that one of the instrument channels cannot be restored to functional status within 90 days.

June 25, 2013

Vice President, Operations
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Indian Point Energy Center
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P.O. Box 249
Buchanan, NY 10511-0249

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Sincerely,

/ra/

Douglas V. Pickett, Senior Project Manager
Plant Licensing Branch I-1
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