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NL-16-115

December 2, 2016

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
11555 Rockville Pike, OWFN-2 FL
Rockville, MD 20852-2738

SUBJECT: Request for Additional Information Regarding Review of Compliance with Order EA-12-049 "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events" and Order EA-12-051 "Modifying Licenses with Regard to Requirements for Reliable Spent Fuel Pool Instrumentation" (TAC Nos. MF0744/5 and MF0737/8)
Indian Point Units Number 2 and 3
Docket Nos. 50-247 and 50-286
License Nos. DPR-26 and DPR-64

REFERENCES:

1. Entergy letter to NRC (NL-16-089), Notification of Full Compliance with Order EA-12-049 "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events" and Order EA-12-051 "Modifying Licenses with Regard to Requirements for Reliable Spent Fuel Pool Instrumentation" (TAC Nos. MF0744 and MF0737), dated August 12, 2016.
2. NRC Order Number EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events, dated March 12, 2012 (ML 12054A736).
3. NRC Order Number EA-12-051, Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, dated March 12, 2012 (ML12054A682)
4. Entergy letter to NRC (NL-15-059), Notification of Full Compliance with Order EA-12-049 "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events" and Order EA-12-051 "Modifying Licenses with Regard to Requirements for Reliable Spent Fuel Pool Instrumentation" (TAC Nos. MF0745 and MF0738), dated May 20, 2015.

A151
NRR

Dear Sir or Madam:

The purpose of this letter is to provide the NRC with information discussed during an August 30, 2016 phone call. Following transmittal of a letter (Reference 1) notifying NRC of the full compliance of Indian Point 2 (IP2) with Orders EA-12-049 and EA-12-051 (References 2 and 3), a phone call was held with the NRC to discuss additional information necessary for the NRC to complete their review. The information requested in this phone call also applied to Indian Point 3 (IP3) whose letter of full compliance had been sent in previously (Reference 4). It therefore supplements References 1 and 4.

The information requested by NRC has been included in Attachments 1 and 2. Attachment 1 provides information on the Spent Fuel Pool instrumentation that had been previously supplied but not completely docketed. Attachment 2 is in the form of requests for information and Indian Point responses.

This letter contains no new regulatory commitments. Should you have any questions regarding this submittal, please contact Mr. Robert Walpole, Manager, Regulatory Assurance at (914) 254-6710.

I declare under penalty of perjury that the foregoing is true and correct; executed on December 2, 2016.

Sincerely,

AJV / sp

Attachment: 1. Indian Point Responses to NRC During Review of Order EA-12-051

2. Indian Point Response to August 30, 2016 Discussion of Required Information Regarding EA-12-049 and EA-12-051

cc: Mr. Douglas V. Pickett, Senior Project Manager, NRC NRR DORL
Mr. Daniel H. Dorman, Regional Administrator, NRC Region 1
Mr. John Boska, Senior Project Manager, NRC NRR DORL
NRC Resident Inspectors Office
Mr. John B. Rhodes, President and CEO, NYSERDA
Ms. Bridget Frymire, New York State Public Service Commission

Not all responses to the information requested by the NRC reviewers and provided by IPEC were placed on the docket. Final responses to all RAIs are presented in this attachment as an aggregation of the responses from the SE tracker at the NRC audit in order to place them on the docket. Minor editorial or not significant changes affecting these responses do not change them but significant changes would.

RAI #1
Please provide information regarding the specific requirements in the procedures controlling irradiated equipment or materials stored in the SFP, including details of any analysis performed to determine the projected dose rate impact and the appropriate Level 2 value as a result of other hardware stored in the SFP.

Response

Permanently stored irradiated material in the spent fuel pool is only stored in the spent fuel racks; therefore, there are no specific requirements in the procedures controlling irradiated equipment or materials stored in the SFP. Because IPEC has chosen Level 2 as 10 feet (+/- 1 foot) above the highest point of any fuel rack seated in the spent fuel pools, no additional analysis is required. Additionally, the IPEC FLEX strategy ensures that all activities in the proximity of the spent fuel pool are completed prior to the calculated time to boil and thus prior to reduction of spent fuel pool level; therefore, this strategy ensures that necessary operations in the vicinity of the spent fuel pool can be completed without significant dose consequences.

RAI #2
Please provide a description of the protection provided for the cabling routed along the exterior of the fuel building for Channel B of IP2 and IP3. Also, please provide a sketch to illustrate the remaining cable routing from the fuel building wall penetrations to the processor units for Channel A and Channel B for IP2 and IP3.

Response

For IP3, Channel A will penetrate through the west wall into the Fan House. The Fan House is a Seismic Class 1 structure that is protected against adverse weather conditions. The Channel B route will follow the east wall to the south wall, follow along the south wall and penetrate on the south side of the doorway between the Fan House and the Fuel Storage Building (FSB). Once outside the FSB, the two conduit runs will converge near the door between the FSB and the Fan House. Each channel will maintain plant design channelization requirements by remaining in their dedicated conduits. The two channels will be run down to the 67'-6" Elevation of the PAB Fan House. Both conduits are to be routed through the existing penetration south of the door between the Fan House and the upper mezzanine of the pipe penetration area. Once through the penetration they will be routed down the hall to the Gas Analyzer Rack, which is part of the retired in place Hydrogen Recombiner Panel. Per IP3 calculation IP-CALC-13-00083, "Evaluation of Conduit Supports for FLEX Program Spent Fuel Pool Level Instrumentation," all conduit supports (74 in total) are designed for seismic loads and seismically mounted to seismic structures. The IP3 SFPI cable routing within the Fan House is shown graphically in Figure 1. More detailed routing drawings are also included in the response to RAI #17.

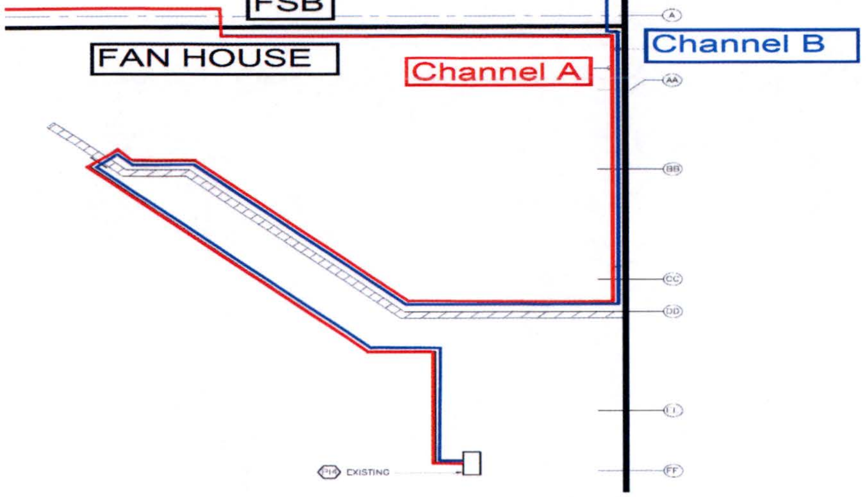

Figure 1: IP3 SFPI Fan House Cable Routing Sketch (not to scale)

For IP2, Channel A originates along the north side of the pool. The conduit runs along the north wall until the west wall then heads south along the west wall. It will penetrate through the west wall into the Fan House approximately 30 ft north of the doorway into the Fan House. The Fan House is a Seismic Class 1 structure that is protected against adverse weather conditions. The Channel B route will follow the east wall to the south wall, follow along the south wall and penetrate on the south side of the doorway between the Fan House and the Fuel Storage Building (FSB). Once outside the FSB, the two conduit runs will converge approximately 30 ft north of the door between the FSB and the Fan House. Each channel will maintain plant design channelization requirements by remaining in their dedicated conduits. The two channels will be routed along to the retired in place Hydrogen Recombiner Panel. The two indicators will be mounted on the panel by removing the retired in place equipment and installing the level indicators. Calculation IP-CALC-14-00086 addresses the seismic evaluation of all applicable conduit supports from the probes to the Hydrogen Recombiner panel. The IP2 SFPI cable routing within the Fan House is shown graphically in Figure 2. More detailed routing drawings are also included in the response to RAI #17.

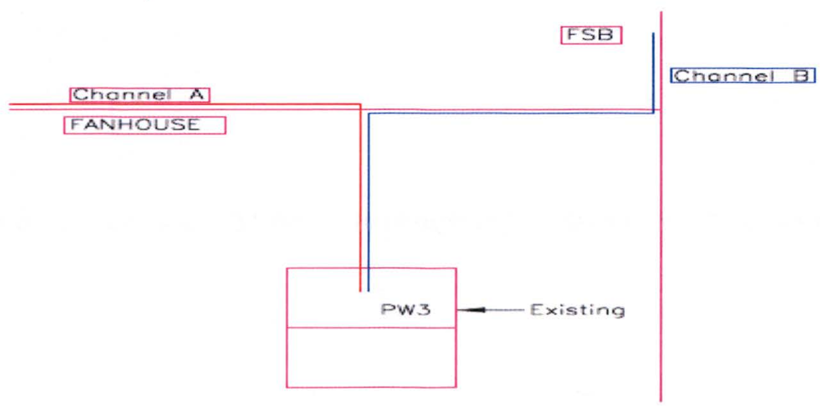

Figure 2: IP2 SFPI Fanhouse Cable Routing

Figure 2: IP2 SFPI Fan House Cable Routing Sketch (not to scale)

RAI #3

Please provide the analyses verifying that the seismic testing of the sensor/probe assemblies and the electronics units, and the analysis of the combined maximum seismic and hydrodynamic forces on the cantilevered portion of the assembly exposed to the potential sloshing effects, show that the SFP instrument design configuration will be maintained during and following the maximum seismic ground motion considered in the design of the SFP structure.

Response

MOHR has prepared site-specific seismic qualification reports for the IP3 SFP level instrument, which also bound IP2's seismic criteria. The qualification reports envelop all components of the new SFP level instrumentation required to be operational during a BDBEE and post-event. Therefore, the SFP instrumentation and electronic units are acceptable for use at the site. The analyses are contained in proprietary MOHR Test and Measurement LLC Reports:

1. NAI-1725-005, "Seismic Induced Hydraulic Response in the Indian Point 3 Spent fuel Pool"
2. NAI-1725-003, "GOTHIC Verification and Sensitivity Studies for Predicting Hydrodynamic Response to Acceleration in Rectangular Shaped Pools"
3. 1-0410-6, "MOHR EFP-IL SFPI System Seismic Test Report"
4. 1-0410-9.17, "MOHR SFP-1 Site-Specific Seismic Analysis Report: Indian Point Energy Center Unit 3 (IP3)"

Mounting bracket design and Seismic Category 1 mounting analysis are included in modification packages EC 45666 for IP3 and EC 50865 for IP2. Calculations IP-CALC-13-00082 for IP3 and IP-CALC-14-00087 for IP2 show that the SFPI Probe Mounting Brackets are structurally adequate and seismically qualified as all Interaction Ratios (IR) are less than one (1.0).

For IP3, calculations IP-CALC-13-00083 and IP3-NPD-10077-003.001 address the seismic evaluation of all applicable conduit supports from the probes to the Hydrogen Recombiner. The indicator panel, battery chargers, and isolator are mounted on the unistrut frame, which was analyzed for total loads.

For IP2, calculation IP-CALC-14-00086 addresses the seismic evaluation of all applicable conduit supports from the probes to the Hydrogen Recombiner. Calculation FCX-00102 addresses the seismic adequacy for mounting of the Mohr signal processor and backup DC battery cabinets on the Hydrogen Recombiner panel. ECN 63614 of Base EC 50865 marks up calculation FCX-00102 to include justification for the design of the bolting between the signal processor and the backup DC battery to the retired Hydrogen Recombiner Cabinet steel panel. This was done in response to the open item identified during the NRC audit of IP2.

RAI #4
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.

Response

See Response to RAI #3.

RAI #5
Please address how other hardware stored in the SFP will not create adverse interaction with the fixed instrument location(s).

Response

As a part of the Engineering Change (EC) process for IP2 and IP3, SFPI probe locations in the northwest and southeast corners of each pool were verified to be free of stored SFP hardware. Future hardware additions to the SFP are controlled by procedure.

RAI #6
Please provide the following:

a) **Information indicating i) the temperature ratings for all system electronics (including sensor electronics, system electronics, transmitter, receiver and display) and whether the ratings are continuous duty ratings; and, ii) what will be the maximum expected temperature in the room(s) in which the sensor electronics will be located under BDB conditions in which there will be no ac power available to run Heating Ventilation and Air Conditioning (HVAC) systems.**

b) **Information indicating the maximum expected relative humidity in the room in which the sensor electronics will be located under BDB conditions, in which there is no ac power available to run HVAC systems, and whether the sensor electronics is capable of continuously performing its required functions under this expected humidity condition.**

c) **Documentation or analysis of the maximum expected radiological conditions (dose rate and total integrated dose) to which the equipment located within the fan house will be exposed.**

Response

a) The IP3 SFPI signal processor and display panel will be installed in the Fan House. Per Calculation IP-CALC-13-00068, the maximum temperature is 125.7 °F, which is enveloped by the temperature the SFPI electronic equipment qualified for (131 °F per MOHR Report 1-0410-1, "MOHR EFP-IL SFPI System Temperature and Humidity Test Report").

The IP2 signal processor/display panels will be installed on Elevation 90' of the IP2 Upper Fan House, to make reliable information readily available regarding the status of the SFP level. Calculation IP-CALC-14-00088 documents that the spent fuel pool level instrumentation will remain functional during a FLEX scenario, i.e. during extreme summer and winter ambient conditions, since the local ambient temperatures will remain within the allowable operating temperature range of the instruments. The maximum temperature determined in IP-CALC-14-00088 is 122.6 °F. Therefore, it is reasonable to conclude that conditions in this area will not exceed the 131°F (55°C) which the SFPI was qualified to in MOHR Report 1-0410-1. The area will not require prolonged operator occupancy for SFPI.

b) MOHR has successfully tested its system electronics to operate in a humidity range of 5% to 95% relative humidity. Results of the vendor testing are available in proprietary MOHR Report 1-0410-1 Rev. 0, MOHR EFP-IL SFPI System Temperature and Humidity Report.

During an extended loss of AC power, the Fan House HVAC systems will no longer be available. Prior to the Fan House access doors being opened (if opened to regulate temperature or allow FLEX hose connections) the relative humidity in the Fan House is expected to drop because the heat loads are dominated by the sensible heat of electrical equipment (fans).

Under circumstances in which extreme heat is anticipated at IPEC, the worst case outside conditions in the plant's design basis are temperatures of 93°F dry bulb and 75°F wet bulb, with coincident relative humidity of approximately 43%. Thus, in the event a Fan House door is opened to outdoors, the relative humidity is not expected to challenge the bounding MOHR test case. These conditions are bounded by the 55 °C (131 °F) and 50 percent RH test case presented in MOHR Report 1-0410-1 which was endorsed by the NRC Audit Report for MOHR.

In the case of high humidity, ASHRAE defines a 0.4% dehumidification condition to be 79.8 °F db, 73.5 °F dew point, and ~81% RH for White Plains, New York. Similarly, 85.4 °F db, 76.6 °F wb, and ~67% RH is defined for a 0.4% evaporation condition. These conditions are also bounded by the test cases presented in MOHR Report 1-0410-1.

Therefore, the operational humidity range of 5% to 95% encompasses all expected conditions for the SFPI display location. The sensor electronics are capable of continuously performing their required function under the expected humidity conditions.

c) According to Entergy Engineering Standard IPEC EQ Program Manual EN-EQ-S-002-01, a total integrated radiation dose (TID) of 1.0E+04 rads is used as a threshold above which an environment is considered harsh. This applies to all equipment and materials at IPEC. This procedure acknowledges that USNRC Regulatory Guide 1.89, Section B suggests a lower threshold limit for electronic devices, but counter argues that other studies, including those sponsored by the NRC and EPRI, as well as various vendor test reports indicate that solid state electronic equipment typically used in nuclear power plants will support equipment operation at doses higher than 1.0E+04 rads and therefore this is conservative. Areas not considered harsh are designated as mild environments, such as the control rooms.

For IP2, calculation PGI-00412-00 concludes that the IP2 hydrogen recombiner, where the SFPI electronics enclosure and display is located, is located in a mild environment and therefore is an acceptable location for the electronics enclosure and display.

For IP3, calculation IP3-CALC-RAD-0004 indicates that the hydrogen combiner cabinet, where the SFPI electronics are located, receives normal operation dose of 2 mrem/hr. This results in a 40-year TID of 7.0E+02 rads, which is significantly lower than the IPEC harsh environment limit (1.0E+04 rads). This supports the designation of this area as a mild environment and therefore acceptable for electronics and display to be located.

RAI #7
Please provide information describing the anticipated environment for shock, shock test method, and test results regarding the processor. Also, please provide information on the anticipated environment for shock, a description of any analysis, and description of modeling related to the probe assembly.

Response

The NRC Audit Report for MOHR concludes that the shock and vibration test results were satisfactory. The report also acknowledges that the testing performed in MOHR Report 1-0410-16 is sufficient to close the open item identified during the MOHR audit.

The vendor testing provided adequately addresses the requirements for general robustness of the enclosures. The probe and repairable head are essentially a coax cable system that is considered inherently resistant to shock and vibration. The probes and repairable head were evaluated to be adequately designed for resilience against shock and vibration.

The new probe mounting components and fasteners are seismically qualified and designed as rigid components inherently resistant to vibration effects. The probes will be affixed to the bracket using a machine screw connection designed with proper thread engagement and lock washers.

The signal processor/display panels and battery backups will be installed in the Fan House. The equipment is not affixed or adjacent to any rotating machinery that would cause vibration effects in the area of installation. The new instrument mounting components and fasteners are seismically qualified and designed as rigid components inherently resistant to vibration effects. Similarly, the effects of shock on the supporting fixtures for the Fan House instruments are not a credible threat; all equipment in the area is qualified seismically such that there are no expected impacts from adjacent objects during the BDBEE or design basis earthquake requirements imposed by NEI 12-02. Even though shock and vibration is not credible for Fan House equipment, it is adequately addressed by vendor test reports.

RAI #8
Please provide information describing the anticipated environment for vibration, vibration test method, and test results regarding the processor. Also, please provide

information on the anticipated environment for vibration, a description of any analysis, and description of vibration modeling related to the probe assembly.

Response

See response to RAI #7.

RAI #9
Please provide analysis of the vendor analysis and seismic testing results and show that the instrument performance reliability, following exposure to simulated seismic conditions representative of the environment anticipated for the SFP structures at Indian Point Energy Center Units 2 and 3, has been adequately demonstrated.

Response

See Response to RAI #3.

RAI #10
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.

Response

For IP3, Instrument Channel A is being powered from Instrument Bus 31, Circuit 28, and Instrument Channel B is being powered from Instrument Bus 32, Circuit 28.

For IP2, Instrument Channel A is being powered 120V AC Distribution Panel #1, Circuit 6, and Instrument Channel B is being powered 120V AC Distribution Panel #2, Circuit 6. 120V AC Distribution Panel #1 is powered from 480V Bus 5A via MCC-26A and MCC-26AA. 120V Distribution Panel #2 is powered from redundant 480V Bus 6A via MCC26B and MCC-26BB. 480V Bus 5A is backed up by Emergency Diesel Generator 21 while Bus 6A is backed up by Emergency Diesel Generator 23.

RAI #11
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.

Response

Per MOHR Report 1-0410-7, the instrument testing demonstrates the battery capacity is sufficient for seven days continuous operation using conservative instrument power requirements. The permanent installed battery capacity of seven days is planned consistent with NEI 12-02 duration without reliance on or crediting of potentially more rapid FLEX program power restoration.

MOHR Report 1-0410-10 concludes that the accuracy is not affected by an interruption in power.

RAI #12
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.

Response

The NRC Audit Report for MOHR concludes that no deficits were identified with respect to maintenance of reliable function, accuracy, or calibration as a result of power interruption.

MOHR document No. 1-0410-3, "MOHR EFP-IL SFPI Proof of Concept Report," Rev. 0, dated October 17, 2012 states, in part, that the effects of temperature and humidity are insignificant with regard to measurement accuracy. The instrument accuracy is approximately 0.04 to 0.5 in. The results from testing performed on the probe at 500F in saturated steam (100% RH) showed a system accuracy of approximately 0.5 in. MOHR Document No. 1-0410-15, "MOHR EFP-IL-SFPI System Uncertainty Analysis," states, in part, that the EFP-IL-SFPI system, configured with a maximum length of transmission cable of 1000 ft., stays within the level measurement accuracy of +/- 3in. EFP-IL-SFPI system error is highest (-2.5 to +0.1 in) at the bottom of the probe near the top of the fuel rack.

MOHR Document No. 1-0410-10, "MOHR EFP-IL SFPI System Power Interruption Report," Rev. 1, dated January 10, 2014 describes power interruption testing on the EFP-IL signal processing unit and battery. Test results indicate that no deficits were identified with respect to maintenance of reliable function, accuracy, or calibration as a result of power interruption. The SFPI system's accuracy was maintained without recalibration following the power interruption.

RAI #13
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-throughs) 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.

Response

The display location can be reached without unreasonable delay utilizing the path to access the 67'-6" elevation of the Fan House which is through the RCA access point into the Primary Auxiliary Building (PAB). A walkdown was performed from the CCR to the display location on the 67'-6" elevation of the Fan House and it was timed at less than or equal to 20 minutes. There are also multiple other pathways to access the display if this primary route was not available following the BDB event. IP-CALC-13-00068, "Fan House Temperature Evaluation for FLEX Event SFP Level Instrument Function," analyzed the temperature conditions of the display location and concluded that although the maximum temperature could reach 125 °F, in an extreme heat condition, it will remain habitable for an operator to access the display and obtain the level information.

For IP2, the FLEX Strategy and Staffing plans account for personnel available following a BDB event. The display location can be reached without unreasonable delay utilizing the "normal" path to access the 88'-0" elevation of the Fan House which is through the RCA Access point into the PAB and then into the Fan House. The PAB is a Seismic Cat I building and the path consists of hallways which can be accessed following a BDB event. A walkdown was performed from the CCR to the display location on the 90'-0" elevation of the Fan House and it was timed at less than or equal to 20 minutes. There are also multiple other pathways (dependent upon the path obstruction) to access the display if this primary route was not available following the BDB event. EC 50865 evaluated the habitability of this location with an evaluation similar to that which was performed for Unit 3. Entergy does not plan to have an Operator continuously stationed at the display but to monitor the display on an as needed basis.

RAI #14
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.

Response

The calibration and test procedures developed by MOHR are provided in the MOHR technical manuals. The objectives are to measure system performance, determine if there is a deviation from normal tolerances, and return the system to normal tolerances.

Diagnostic procedures developed by MOHR are provided as automated and semi-automated routines in system software alerting the operator to abnormal deviation in selected system parameters such as battery voltage, 4-20 mA loop continuity, and TDR waveform of the transmission cable. The technical objective of the diagnostic procedures is to identify system conditions that require operator attention to ensure continued reliable liquid level measurement. Manual diagnostic procedures are also provided in the event that further workup is determined to be necessary.

Maintenance procedures developed by MOHR are provided in the technical manual. These allow a technician trained in EFP-IL system maintenance to ensure that system functionality is maintained.

For Unit 3, procedure 3-PT-Q140 provides guidance for performing a Channel Check of the primary and backup SFP level instrument channels, LI-6500-A, SFP Level Indicator Channel A, and LI-6500-B, SFP Level Indicator Channel B. 2-PT-Q096 is the comparable procedure for Unit 2 and is being tracked under AR 239890.

Operator Rounds procedure 3-RND-NUC has been created to check the status of the Unit 3 instrumentation daily. A comparable operator rounds procedure will be developed for Unit 2 and is being tracked under AR-239890.

3-FSG-011 is a new procedure for Unit 3 which provides actions to restore Spent Fuel Pit (SFP) level using an alternate makeup source for a Beyond Design Basis External Event (BDBEE) resulting in an Extended Loss of AC Power (ELAP). This procedure includes remote Spent Fuel Pool Level Indicator operation, the location of the displays, and cautionary statements such as an EMI/RFI exclusion zone around the displays. A comparable procedure will be created for Unit 2 and is being tracked under AR-209648.

A yearly channel functional/calibration task will be performed under the PM process as described below.

IP2 has developed preventative Maintenance task as follows:

PMID 33802-1 – 1 year channel check/functional check for channel A. PMID 33803-1 tracks the same PM for Channel B.

PMID 33802-2 – 10 year replacement of processor clock battery for channel A. PMID 33803-2 tracks the same PM for Channel B.

PMID 33802-3 – Perform on demand task to perform a flush of the head assembly to prevent boric acid buildup. PMID 33803-3 tracks the same PM for Channel B.

Similar PM are in place for IP3 under PMID 33420 tasks 1, 2 and 3 for IP3 Channel A and PMID 33421 tasks 1, 2 and 3 for IP3 Channel B. The IP3 PM tasks are the same frequency and scope as the IP2 tasks.

AR-224164 is tracking the development of the above PMID and subtasks (PMID 33420, 33421, 33802 and 33803.

RAI #15

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 the in-situ calibration process at the SFP location that will result in the channel calibration being maintained at its design accuracy.

Response

The list of procedures and PM tasks are listed in RAI 14. Details of each task are listed below.

Ops Rounds (twice a shift) – Operator Rounds procedure 3-RND-NUC has been created to check the status of the Unit 3 instrumentation daily. A comparable operator rounds calculation will be developed for Unit 2 and is tracked by AR-239890. These procedures will record the indicated spent fuel pool level on each channel and will check the green status light on each channel is indicating properly. If status light indication is unsatisfactory, the direction is provided to contact system engineering.

Channel Check (Quarterly). For Unit 3, procedure 3-PT-Q140 provides guidance for performing a Channel Check of the primary and backup SFP level instrument channels, LI-6500-A, SFP Level Indicator Channel A, and LI-6500-B, SFP Level Indicator Channel B. 2-PT-Q096 is the comparable procedure for Unit 2 and is tracked by AR-239890. This procedure will record the status of the green blinking system status light, record the level displaced on each channel, convert the displayed level to read in feet and inches and compare this value to the Spent Fuel Pit level gauge which is permanently mounted in the spent fuel pool. This procedure confirms that each channel of the SFP level indicating system is reading within +/- 3 inches of the installed level gauge.

3-FSG-011 is a new procedure for Unit 3 which provides actions to restore Spent Fuel Pit (SFP) level using an alternate makeup source for a Beyond Design Basis External Event (BDBEE) resulting in an Extended Loss of AC Power (ELAP). This procedure includes remote Spent Fuel Pool Level Indicator operation, the location of the displays, and cautionary statements such as an EMI/RFI exclusion zone around the displays. A comparable procedure will be created for Unit 2 and is tracked under AR-209648.

PMID task 1 for Channel Check/Panel Functional Check (1 year cycle) – This procedure checks the status of the LED green indicator light, verifies the time stamp on the display, verifies the correct channel designation is shown on the display, verifies the battery status is indicating properly, verifies the display is working and the display is showing a proper pool level. This task disconnects the AC sources and confirms the display continues to indicate proper level and the battery status icon changes color. AC power is restored and task confirms the battery status icon changes back to normal color and the system functions as expected based on LCD displays indication and LED indicator green status light.

PMID task 2 Signal Processor Clock Battery Replacement (10 year cycle) - To prevent failure of the onboard clock battery and adverse impact to the signal processor operating system. WO instructions and procedure changes are still pending and have not yet been issued.

PMID task 3 is performed on an as needed basis and provides the direction to perform a flush of the probe assembly to remove boric acid buildup. WO instructions and procedure changes are still pending and have not yet been issued.

AR-224164 is tracking the development of the above PMID and subtasks (PMID 33420, 33421, 33802 and 33803).

RAI #16 (New)

Please provide an assessment of potential susceptibilities of EMI/RFI in the areas where the SFP instrument located and how to mitigate those susceptibilities.

Response

The audit report of MOHR states:

As a result of the NRC staff's evaluation of the EMC testing results, the staff identified a generic open item applicable to all licensees using this technology to identify any additional measures, site-specific installation instructions or position taken to address the potential effect of an EMC event on the SFPI equipment

To address this concern, the Ops procedures include a cautionary statement to preclude radio usage within close proximity to the displays when taking a reading.

In addition, no system voltages being affected or installed are greater than 125 Volts, and new instrumentation cables in the Fuel Storage Building and Fanhouse are being installed in rigid steel conduit where practical to limit the amount of EMI emitted by the new wiring. The isolation transformer being installed in the power circuit of each SFPI circuit will limit the introduction of any noise or harmonics (typically referred to as "total harmonic distortion," or THD) into the safety related instrument buses that may be generated by the new equipment.

The topic notes of EC 50865 for IP2 requires that EMI/RFI exclusion zone signs be hung in the area immediately in front of the 22 Hydrogen Recombiner panel to preclude any EMI/RFI interference for radio or cell phone transmission or use. This also may be affixed to the face of the panel. Installation of this sign is tracked by AR 239890. A sign has been installed at IP3 and AR 239892 is tracking the installation of the permanent sign.

RAI #17 (New)

Please provide a final configuration of the IP2 and IP3 locations/placement of the primary and back-up SFP level sensor/probe, and the proposed routing of the cables that will extend from the sensors toward the location of the read-out/display device.

Response

Figure 3 through Figure 6 depict the Unit 2 & Unit 3 final cable routing and probe locations.

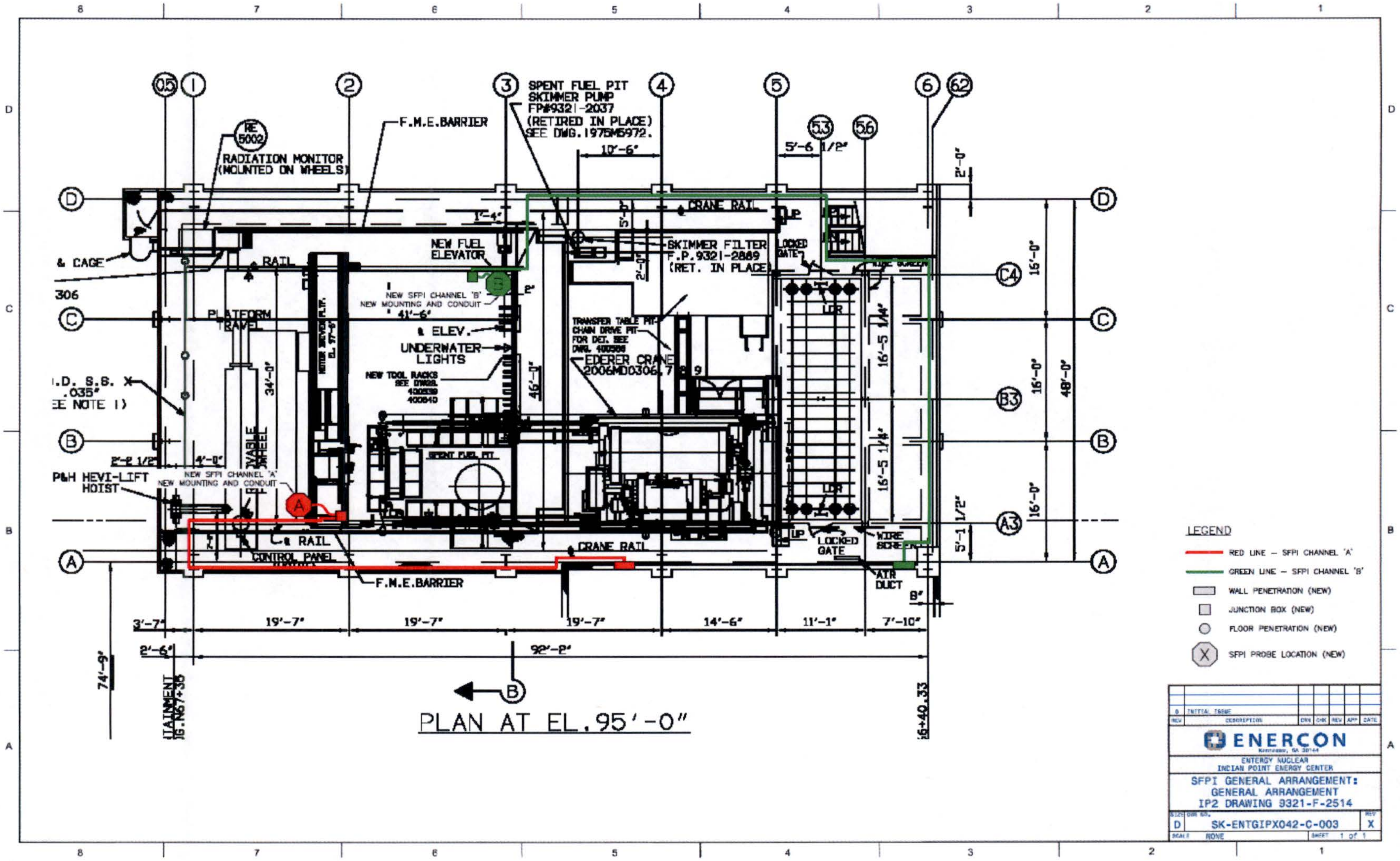

Figure 3: Unit 2 SFPI General Arrangement Drawing 1

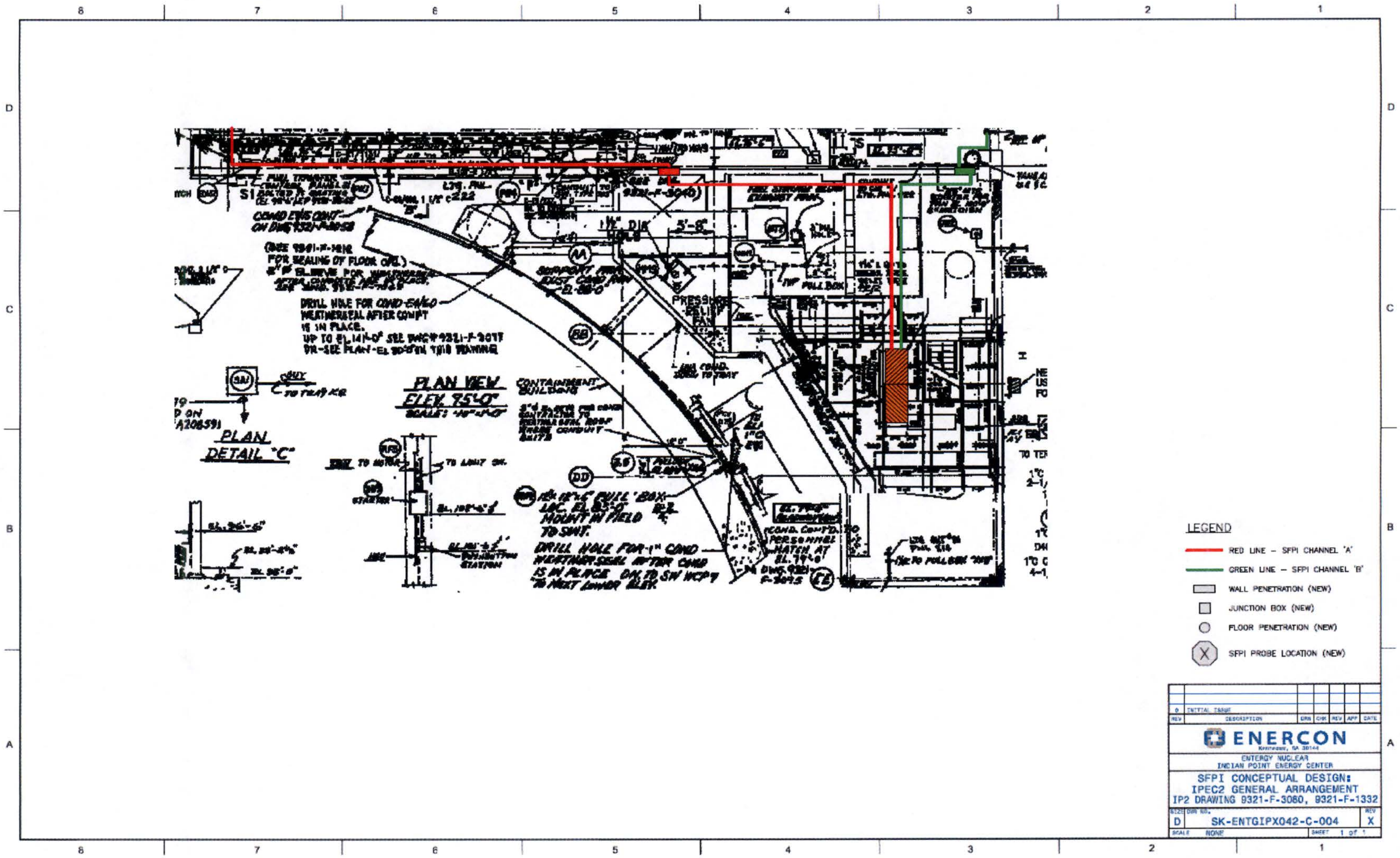

Figure 4: Unit 2 SFPI General Arrangement Drawing 2

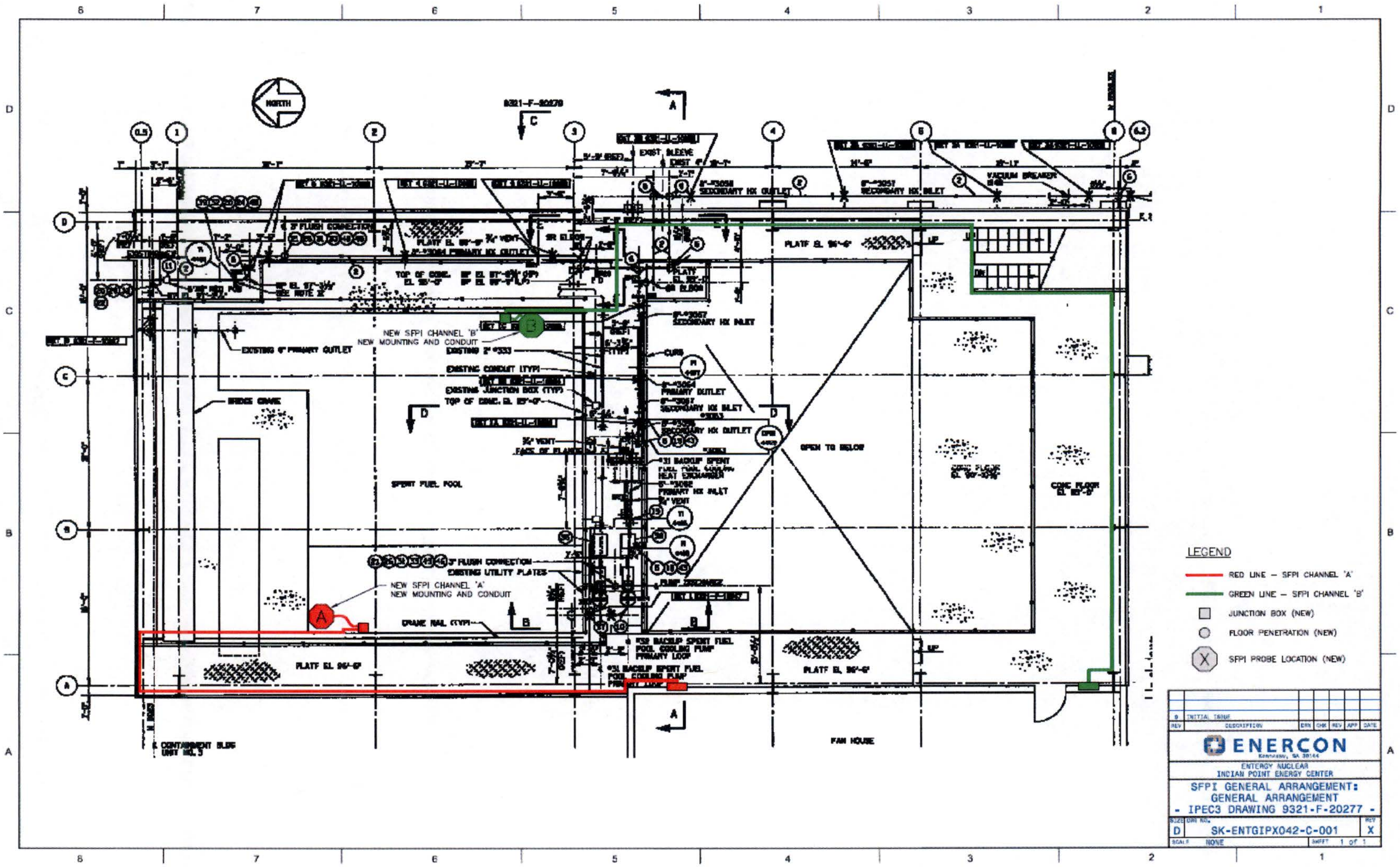

Figure 5: Unit 3 SFPI General Arrangement Drawing 1

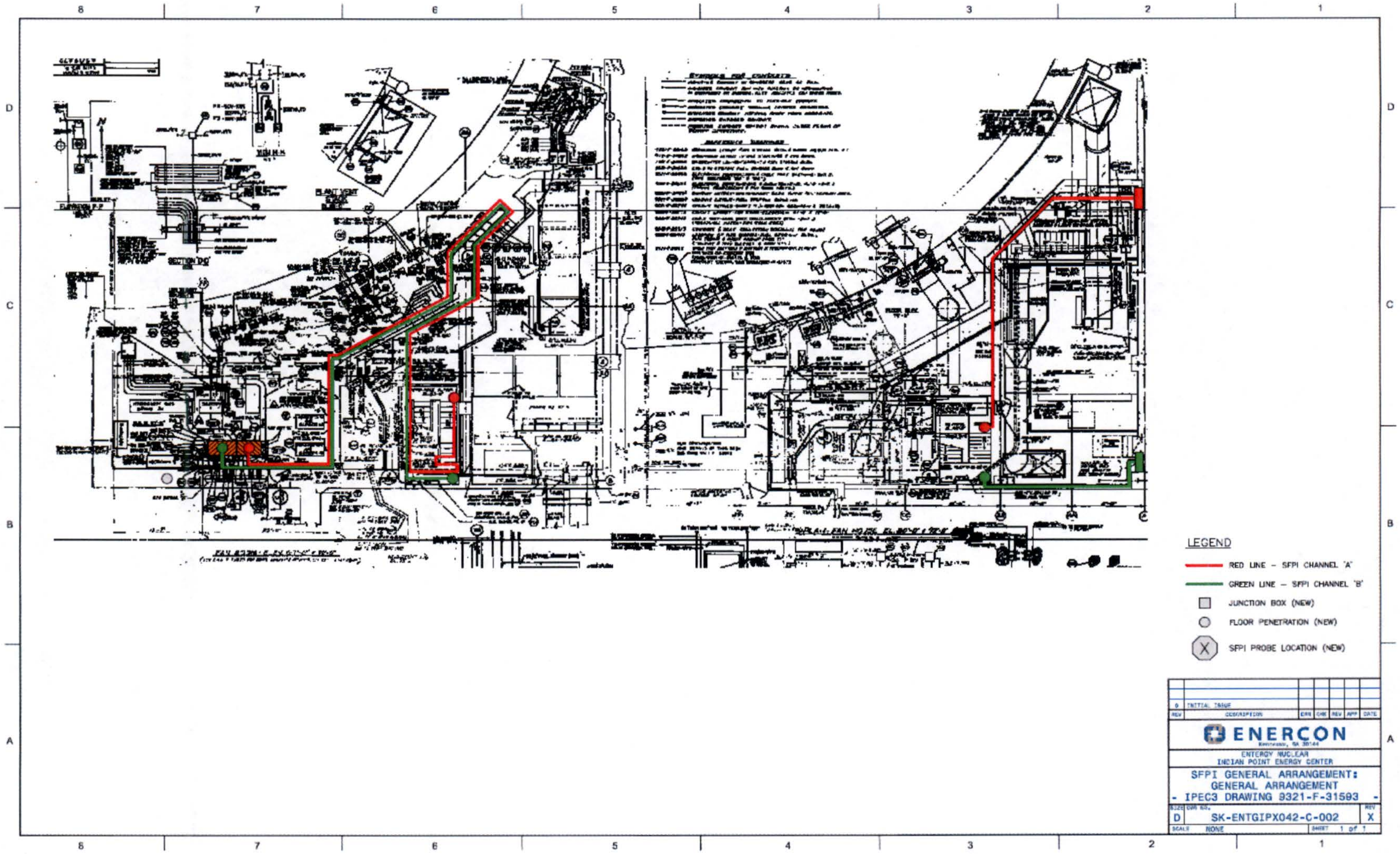

Figure 6: Unit 3 SFPI General Arrangement Drawing 2

RAI #18 (New)

Please provide the following:

a) **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.**

Response

SFPI channel/equipment maintenance/preventative maintenance and testing program requirements to ensure design and system readiness are established in accordance with Entergy's processes and procedures and in consideration of vendor recommendations to ensure that appropriate regular testing, channel checks, functional tests, periodic calibration, and maintenance is performed. See response to RAI #14 for a list of procedures and PM tasks being developed.

Both primary and backup SFPI channels incorporate permanent installation (with no reliance on portable, post-event installation) of relatively simple and robust augmented quality equipment. Control of compensatory actions for out of service SFPI channel(s) will be controlled by inclusion in the Plant's Technical Requirements Manual (TRM).

Compensatory actions for out of service SFPI channel(s) will be controlled by inclusion in the Plant's Technical Requirements Manual (TRM); a draft proposed TRM for SFPI is as follows:

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. The primary OR back-up spent fuel pool level instrument does not meet the FUNCTIONAL requirements.	A.1 Restore spent fuel pool level instrument to FUNCTIONAL status AND A.2 If not restored within two weeks, present a report to OSRC giving why out of service and plan to repair	90 days 14 days
B. Action A.1 completion time not met.	B.1 Initiate actions to implement compensatory measures such as use of	Immediately

	alternate suitable equipment or supplemental personnel	
C. The primary AND back-up spent fuel pool level instruments do not meet the FUNCTIONAL requirements.	C.1 Restore one of the channels of instrumentation.	24 hours
D. Required Action and associated Completion Time of Condition C not met.	D.1 Initiate action to implement compensatory measures such as use of alternate suitable equipment or supplemental personnel	Immediately

SURVEILLANCE	FREQUENCY
TRS 3.10.B.1 Perform CHANNEL CHECK	Quarterly

RAI #19 (New)

Please describe the impact of recent MOHR's SFPI equipment failure (failure of the filter coil (or choke) in particular) on the Indian Point's SFP level instrument. Also, any actions/measures Indian Point plans to implement to address this equipment failure.

If the equipment has been modified by the vendor, the equipment qualification needs to be re-evaluated.

This issue is applicable to both IP2 and IP3.

Response

The vendor MOHR has determined the source of the failures is a miniature surface mount common-mode choke component used on the Video and Digicomp printed circuit boards (PCB's) within the EFP-IL Signal Processor. The new boards have equivalent substitute components that are less susceptible to transient electrical events. The substitute components have equivalent size, mass, and solder attachment technique as the original component such that there is no impact to the system mechanical characteristics. The components demonstrate equivalent electrical performance such that EMC characteristics are not significantly changed. Proprietary MOHR Report 1-1010-2: EFP-IL MOD 1 Modification Package addresses continued equipment qualification following the repair.

The vendor recommended repair has been implemented on the IP2 equipment before this equipment was delivered to IP2.

The vendor repair of the IP3 equipment was performed under warrantee repair PO 10445066 and 10449598. The IP3 failure and subsequent repair for Channel B was captured under CR-IP3-2015-02383 and work order 411275. This item was returned to service in May 2015. The IP3 Channel A unit did not fail but was removed and sent to MOHR for warrantee repair. The work and repair on Channel A was captured under CR-IP3-2015-02661 and work order 412948. This item was returned to service in July 2015. The Factory Acceptance Test reports for the repaired units are capture under the Mohr test procedure 2014.01 EFP-IL00024 dated May 1 2015 and EFP-IL00025 dated June 30 2015.

At Grand Gulf, a new failure on the recently repaired Channel B level indicator was experienced on 10/20/15 and reported under CR-GGN-2015-06112. Investigation into this new failure mode on Channel B, completely unrelated to the issue above, is due to infant mortality related to a cold solder joint and is believed to be isolated to the single Grand Gulf unit. The Grand Gulf CR will capture all corrective actions and failure reports for this event. There is no indication that this issue is present at any of the modules being used at IP2 or IP3.

ATTACHMENT 2 TO NL-16-115

INDIAN POINT RESPONSE TO AUGUST 29, 2016

DISCUSSION OF REQUIRED INFORMATION

REGARDING EA-12-049 AND EA-12-051

ENTERGY NUCLEAR OPERATIONS, INC.
INDIAN POINT NUCLEAR GENERATING UNIT NOS. 2 AND 3
DOCKET NOS. 50-247 AND 50-286

Indian Point Response To Request For Information

During a phone call on August 29, 2016, the following was discussed with the NRC Staff. Indian Point Energy Center (IPEC) agreed to provide information on the docket including plant documents attached to this response or posted on the E Portal. It was agreed that the Final Implementation Plan (FIP) need not be updated unless so desired.

__SFP Questions__

Q1 The OIP level 3 setpoint appears to be outside the instrument span (For the Unit 2 SFP, LEVEL 3 is elevation 69 feet 8 1/4 inches and Unit 3 SFP, LEVEL 3 is elevation 69 feet 7 1/2 inches). The drawing in the 2-27-15 Six Month report show level 3 is higher than OIP (Level 3 was at 70' 8.25" for IP2 and 70' 7.5" for IP3) but there is no documentation. Reference E portal documents that identify level 3 settings and verify that the OIP Level 3 settings are not used anywhere with the level instruments or identify setpoints and show in span.

Response

Entergy Letter NL-13-103, Responses to Request for Additional Information (RAI) Regarding Reliable Spent Fuel Pool (SFP) Instrumentation, specifically RAI-1 with corresponding Figures 1 & 2, document the revised Level 3 elevation of 70' 8.25" for IP2 and 70' 7.5" for IP3. This is also captured in the IPEC 4th six-month update ISE RAI #17 response, submitted on 2/27/15. EC 50865 for IP2 and EC 45666 for IP3 correctly identify the Level 3 elevations consistent with the RAI responses. Unit 3 Compliance Letter NL-15-059, Unit 2 Compliance Letter NL-16-089, Unit 2 Alternate SFP Makeup and Cooling guideline 2-FSG-011, and Unit 3 Alternate SFP Makeup and Cooling guideline 3-FSG-011 all do not contain Level 3 elevations. Therefore, the correct Level 3 elevations, which are capable of being measured by the SFPI probes, are consistently used and the OIP Level 3 elevations are historic.

Q2 Docketed question response did not include information in tracker and need to be upgraded to reflect those. Look at Palo Verde letter, ML16155A084.

Response

Attachment 1 to this letter provides the requested information.

__Habitability Questions__

Q1. No discussion of environmental conditions in the SG atmospheric dump valve (ADV) area including location(s) where backup nitrogen bottles are installed. Nitrogen bottles may need to be changed out as they are depleted.

a. Provide a discussion that describes where operators manually control the ADVs and where workers replace nitrogen bottles. (both units)

b. Provide a discussion of the environmental (humidity, temperature, radiological conditions, etc.) conditions in the ADV area to address

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habitability of personnel to perform their functions during the ELAP event.

c. **Include a copy of the above signed plant calculation/evaluation(s) on the E Portal for NRC staff review, or add the discussion to a FIP supplement and docket it with the NRC. If prior SBO habitability evaluations are available, please post on E Portal also.**

Response

During the ELAP sequence, the ADVs are manually operated to cooldown and then maintain the RCS and main steam temperature. The connection of backup nitrogen bottles and the local operation of the ADVs is performed in the area of the ADVs on the 43' elevation of the Auxiliary Boiler Feed Pump Building. This area is open to the 64' 8" and 77' 4" elevations through open grating. The air from the 77' 4" elevation is normally exhausted through a roof fan.

The areas where the nitrogen connections are made and where the ADVs are controlled is inside the Auxiliary Boiler Feed Pump Building, in the vicinity of the main steam lines. Cold temperatures is not a concern during the initial connection and cooldown at approximately 30 minutes into the ELAP as main steam line temperature remains near or slightly above normal full power temperature. The main steam line temperatures during connection of backup nitrogen supply and starting the initial cooldown is in the range of 550°F. Following cooldown initiation, the main steam lines temperature decreases to approximately 400°F within 3 hours and 350°F within 24 hours and thereafter. Based on the heat sources in the room, temperature on the 43' elevation of the Auxiliary Boiler Feed Pump Building remains sufficient to support required operator actions. If required, during transition to or during operation in the Auxiliary Boiler Feed Pump Building, personnel are protected from the effects of cold weather by use of personal protective equipment. During cold weather conditions, operators have access to coats, hats, and gloves so that they can perform the required actions to implement the FLEX mitigating strategy. Permanently installed equipment that supports manual operation of the ADVs includes nitrogen bottles, tubing, hose, and pressure regulator. None of these components, when filled with compressed nitrogen, are affected by cold weather.

Due to the large interconnected volume above the 43' elevation, heat from the main steam piping diffuses and rises. Initial connection and operation of the ADVs is not affected as the initial actions are performed within the first 30 minutes after the ELAP occurs, prior to any significant heating of Auxiliary Boiler Feed Pump Building ADVs areas. As the RCS and main steam lines are depressurized and cooled using the ADVs, the ambient heat loss to the room continues to decrease, mitigating any temperature increase. In addition, following initial setup, continuous operator presence on the 43' elevation of the Auxiliary Boiler Feed Pump Building is not required. Rotation of operators or periodic entry to the area by the local operator results in acceptable operation of the ADVs. Similar to cold weather

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operation, the compressed nitrogen filled passive components and manually operated pressure regulator are not affected by hot weather.

Q2. No discussion addressing control room, ADV operation area, TDAFW pump room, battery and electrical equipment areas during cold weather. Only heat tracing is discussed. (Unit 2, Unit 3).

a. Provide a discussion that describes the effects of cold weather to personnel and equipment in the control room, ADV operation area, TDAFW pump room, battery and electrical equipment areas that demonstrates personnel are able to perform their actions and equipment continue to function during the ELAP event.

b. Include a copy of the above signed plant calculation/evaluation(s) on the E Portal for NRC staff review, or add the discussion to a FIP supplement and docket it with the NRC.

Response

Personnel are protected from the effects of cold weather by use of personal protective equipment. During cold weather conditions, operators have access to coats, hats, and gloves so that they can perform the actions required to implement the FLEX mitigating strategy. These items are stored inside job boxes contained within the FLEX Equipment Storage Building and are maintained by the FLEX Equipment Inventory and Inspection procedure 0-PT-A008.

Permanently installed equipment that could be adversely impacted by cold weather is limited to the batteries located in the control building and piping located within the TDAFW pump room.

Unit 2

Battery Rooms 21, 22 and 24 are located within the Cable Spreading Room on El. 33' of the Control Building. At this elevation, the Control Building shares a common boundary with the Turbine Building to the west and the Unit 1 Superheater Building to the south; none of the battery room walls share an external wall for the Control Building. The interior walls for the battery rooms consist of 8" thick masonry block. The northern exterior wall for the Cable Spreading Room consists of insulated metal panels. IP2 takes daily measurements of ambient temperature in all of the Battery Rooms. A review of the daily temperature data for the month of February from 2011 to 2016 was performed to determine an average temperature during a typical winter month. The average temperature for the battery rooms for this time period was 77°F. The acceptance criterion for minimum battery temperature in calculation IP-CALC-14-00076 (uploaded to the E portal) is 59°F. This leaves 18°F of margin over an 8 hour period to ensure the batteries are able to last through Phase 1. The outdoor temperature of -15°F will have to first cool the Cable

Indian Point Response To Request For Information

Spreading Room to have an impact on the battery rooms, however this cooldown will be slowed by the heat contribution of the Turbine Building and Superheater Building on the southern and western boundaries. Additionally, the components in the Cable Spreading Room will continue to provide heat after they lose power from the ELAP. By engineering judgment, the temperature margin of 18°F, the insulation provided by the Turbine Building, Superheater Building and Cable Spreading Room and residual heat from the existing equipment will allow the Battery Rooms to remain above 59°F through Phase 1 of the FLEX event. Furthermore, the battery rooms are surrounded by 8" concrete walls between the battery rooms and the cable spreading rooms and turbine building which will slow the cooldown due to the relatively high thermal resistance of the concrete.

Battery Room 23 is located on El. 33' of the Unit 1 Superheater Building in an enclosed masonry block room. None of the walls share an external wall with the Superheater Building. The Superheater Building is expected to be the same temperature as the Turbine Building at the onset of the ELAP which is higher than the 77°F starting temperature of Battery Room 23. Due to the significant air volume of the Superheater and Turbine Buildings it is reasonable to assume that the cool down from the -15°F ambient outside air will take some time to have any effect and ultimately decrease the battery room temperature below 59°F. Additionally, the 8" masonry walls between the battery room and the Superheater Building will lag the cooldown due to the relatively high thermal resistance of the concrete. Based on the evaluation above, it is reasonable to expect that Battery Room 23 air temperature will remain above 59°F through Phase 1 of the FLEX event.

Unit 3

Battery Rooms 31, 32 and 34 are located within the Cable Spreading Room on El. 33' of the Control Building. At this elevation the Control Building shares a western boundary with the Turbine Building and a portion of the southern wall shares a boundary with the Emergency Diesel Generator Building. The interior walls for the battery rooms consist of 8" thick masonry block. The southern wall of Battery Rooms 31 and 32 and the northern wall of Battery Room 34 are part of the exterior wall of the Control Building. The exterior walls for the Control Building consist of 2' thick reinforced concrete. The actual average daily minimum temperature is not readily available for IP3. Although the configuration is similar to IP2 conservatively the room temperature will be assumed to be 70°F. The acceptance criterion for minimum battery temperature in calculation IP-CALC-13-00056 is 60°F. This leaves 10°F of margin over an 8 hour period to ensure the batteries are able to last through Phase 1. The outdoor temperature of -15°F will have a direct impact on Battery Rooms 31, 32 and 34 through the 2' thick reinforced concrete walls, however there would be a significant lag due to the low conductivity of concrete. The interior walls will be subjected to the temperature of the Cable Spreading Room at the onset of the event. The west wall of the Control Building will be warmer than 70°F at the onset of the event due to the heat provided by the Turbine Building. Additionally, the equipment in the Cable Spreading Room will continue to provide heat after they lose power from the ELAP. Both the Turbine

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Building and Cable Spreading Room area will insulate the Battery Rooms and slow the temperature decline. Since concrete is a poor conductor and the exterior walls are relatively thick, the exterior concrete walls will slow the cooldown of the room as well. By engineering judgment, the temperature margin of 10°F, the 2' thick concrete exterior walls, insulation provided by the Turbine Building and Cable Spreading Room and residual heat from the existing components will allow the Battery Rooms to remain above 60°F through Phase 1 of the FLEX Event.

Battery No. 33 is located on El. 15' of the Emergency Diesel Generator Building in the compartment for Diesel Generator No. 31. This portion of the building, at El. 15', is below grade and will not be directly exposed to the outside ambient air of -15°F. In addition, Diesel Generator Room No. 31 has relatively thick reinforced concrete walls ranging from 2' on the north side to 3' on the south and west; the east wall is the boundary for the next diesel generator compartment. The electrolyte temperature for the batteries are recorded monthly. The average electrolyte temperature from November 2011 to August 2016 is 88°F. This leaves 28°F of margin over an 8 hour period to ensure the batteries are able to last through Phase 1. Additionally right up to the ELAP, the EDGs are being heated for immediate start and operation by block heaters in the cylinders and pre-lube pump operation. Given these conditions, it is reasonable to consider that the Diesel Generator Compartment No. 31 will remain above 60°F.

Section 4.6.1 of report IP-RPT-13-00059 (uploaded to the ePortal) states that the effects of cold weather are mitigated by closing the doors that are initially opened to provide cooling so that the heat provided by the equipment in the TDAFW pump room and battery rooms can maintain adequate temperatures to ensure equipment functionality.

All other equipment relied upon as part of the FLEX mitigating strategy located in the ADV operation area, control room, and electrical equipment area remains functional during an ELAP due to its location in robust structures and heating from the equipment itself.

Electrical Branch Questions

Q1 The battery room temperatures beyond 8 hours (time ventilation is restored) needs to be assessed (quantitative or qualitative) and discussed in terms of peak allowable battery temperatures in long term.

Response

IP2: During Phase 2 (beyond 8 hours) battery room ventilation is accomplished by use of a portable fan or blower within four hours of beginning battery charging operations. The portable fans or blowers will be positioned to blow air into each battery room. These blowers are powered from a diesel powered lighting tower. Phase 2 ventilation strategy will be maintained in Phase 3.

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IP3: Beyond 8 hours, battery room ventilation will be restored in Phase 2 when the FLEX DG is available to provide power and will be maintained in Phase 3.

As stated in the response to Confirmatory Item 3.2.4.2.B on the IP2 Compliance Letter (ML16235A292) and in response to AQ-46 on the IP3 Compliance Letter (ML15149A140) the change in temperature inside the battery rooms would be negligible due to their location and the thickness of the walls shared with the outside environment. Therefore, the battery rooms will remain near its pre-event temperature during Phase 1 of the ELAP event. Once the fans or blowers are placed into service during Phase 2 for IP2 (or the ventilation system is powered up by the FLEX diesel generator for IP3) it is reasonable to assume that the temperature inside the battery rooms will remain stable for the duration of the ELAP event.

Q2 The FIP limits some ELAP actions to 72 hours but does not show why this meets order limit of indefinite by transition to phase 3 or other reason. Look to supply time limits as needed in FIP.

Response

FIP Sections 2.3.3, 2.4.3 and 2.5.3 address Phase 3 core cooling, SFP makeup and containment integrity, respectively. Phase 3 durations begin once off-site equipment is deployed and operating to meet plant needs. No NSRC equipment is credited for operation prior to 72 hours. Therefore, 72 hours is considered the maximum length of time used in the different analysis to demonstrate that the Phase 2 FLEX strategies are capable to mitigate the consequences of an ELAP event. After this period of time, the credited NSRC equipment will be available to provide indefinite coping capability.

Section 2.3.4.2 (Steam Generator Atmospheric Dump Valves) provides the number of nitrogen cylinders required to address the operation of the ADVs for a period of 72 hours. Table 1, Item 27, provides a reasonable expectation that within 60 hours into the event, additional nitrogen bottles will be made available in order to provide continuous/indefinite capability to operate the ADVs after 72 hours (Phase 3).

Section 2.6.4 (Ice, Snow and Extreme Cold) states that the different analyses performed to determine if the water in the different tanks remains available and unfrozen were done for a period of 72 hours. These analyses (IP-CALC-14-00043, Rev. 0 and IP-CALC-13-00058, Rev. 1) provide additional results of ice content in the tanks after a period of 120 hours. The results show that the amount of ice that will build up after 120 hours constitutes a small portion of the available volume in each one of the credited tanks. Therefore, it is reasonable to assume that the Phase 2 FLEX strategies can provide an adequate amount of time to determine the required actions to provide indefinite coping capability to mitigate the consequences of an ELAP event under extreme cold conditions. For the specific case of tank connections analyses were performed (IP-CALC-14-00089 Rev. 0 and

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IP-CALC-15-00007 Rev. 0). Based on the results of the analyses, heat trace will be restored from the Phase 2 FLEX diesel generator and will continue through Phase 3. Therefore, the tank connections will remain available during an extreme cold BDBEE and will provide adequate water inventory to maintain core cooling and SFP makeup during Phase 2 and Phase 3.

Section 2.9.4 (Fueling of Equipment) states that the fueling analyses assumed 72 hours of fuel consumption for the Phase 2 FLEX equipment. Based on the minimum capacities of each one of the underground storage tanks (6 in total), the minimum amount of fuel available at the site is 39,178 gallons. Calculations (IP-CALC-14-00037 Rev. 0 and IP-CALC-13-00057 Rev. 0) determined that the maximum amount of diesel fuel needed for 72 hours of operation for all diesel components at the site is approximately 15,100 gallons. Therefore, there is adequate capacity to support continuous operation of the Phase 2 FLEX equipment beyond 72 hours (for at least 120 hours). In addition, Table 1, Item 28, provides reasonable expectation that within 76 hours a large fuel trailer delivery service will be established. Therefore, establishing a fuel delivery service within 76 hours will provide indefinite capability to refuel the Phase 2 FLEX equipment. Phase 3 equipment will either use onsite diesel fuel or have their own fuel provided from offsite (e.g., fuel truck delivery).

Section 2.11.1 (Equipment Operating Conditions) states that the temperature analyses for the CCR were performed for a period of 72 hours. The calculations' results (IP-CALC-14-00038 and IP-CALC-13-00065) show that by the end of this period of time the temperature on each one of the control rooms remains constant and below 110°F (IP2) and 120°F (IP3). The only action required to maintain this temperature is to open the control room access doors and the control room internal panel doors within 30 minutes of the event. Therefore, it is reasonable to assume that no additional actions are required to maintain indefinite coping capability to maintain the control room temperature at or below the limits stated above. Furthermore, for IP2, in case of an extreme high temperature BDBEE, the non-credited CCR HVAC system is anticipated to be available and may be restored once the Phase 2 FLEX DG is available to provide power. Similarly, for IP3, during an extreme high temperature event, the auxiliary CCR HVAC system is available, and credited after 72 hours into the event, to provide supplemental cooling once the Phase 2 FLEX DG is available. These actions will enhance the capability to maintain the CCRs temperature below the limits established above for an indefinite amount of time.

Q3 What is the battery manufacturer and cell type and capacity.

Response

IP2: Battery Design Rating Data are as follows (IP-CALC-14-00076, Rev. 0):

(1) Battery 21: 2GN-17, 125VDC, 1500AH-8Hr, 58 Cells. Manufacturer: ENERSYS
(2) Battery 22: 2GN-23, 125VDC, 1584AH-8Hr, 58 Cells. Manufacturer: ENERSYS

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(3) Battery 23: KCR-13, 125VDC, 495AH-8Hr, 58 Cells. Manufacturer: C&D Technologies
(4) Battery 24: KCR-13, 125VDC, 495AH-8Hr, 58 Cells. Manufacturer: C&D Technologies

IP3: Battery Design Rating Data are as follows (IP-CALC-13-00056, Rev. 0)

(1) Battery 31: LCY-39, 125VDC, 2400AH-8Hr, 59 Cells. Manufacturer: C&D Technologies
(2) Battery 32: LCY-39, 125VDC, 2400AH-8Hr, 58 Cells. Manufacturer: C&D Technologies
(3) Battery 33: KCR-13, 125VDC, 495AH-8Hr, 60 Cells. Manufacturer: C&D Technologies
(4) Battery 34: EA-11, 125VDC, 440AH-8Hr, 60 Cells. Manufacturer: ENERSYS

Q4 Are the pumps going to require additional electrical input or are they diesel (Confirm the call statement that all pumps used in the Phase 1 and Phase 2 strategy are diesel-powered or steam-powered (TDAFW), that is sufficient).

Response

All FLEX pumps are diesel-driven pumps.

Q5 What are the temperatures seen and what are the limits on the ADV solenoids, or do the FLEX procedures provide for handwheel operation of the ADVs if solenoids fail? Which procedure?

Response

The Atmospheric Dump Valves (ADVs) do not have installed hand wheels. They are not controlled by solenoids. During the FLEX event, the ADVs are manually controlled at the two 43 foot elevation local control stations in each Auxiliary Feedwater (AFW) Building by using staged in-situ nitrogen bottles, regulators, and manual valves. These basic components control the pneumatic supply to the ADV actuators, either directly or through positioners, permitting the desired manipulation of the ADVs. The materials of construction of these and other components in the control system (e.g., piping, tubing, and gages) consist of some combination of metal, plastic, elastomer, fiberglass, graphite, ceramic, and resin-impregnated-cellulose. The thermal capabilities of these materials were assessed in previously approved Engineering Change Evaluations 52601 and 52604. These evaluations found that all of the materials possess a continuous-use temperature limit of no less than 170 F.

No formal calculations have been performed to determine ambient temperatures at the ADV or ADV local control station locations. However, empirical temperature data is recorded daily on a per-shift basis for the upper elevation (~80 ft) of the

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AFW Building where the ADVs are situated and air temperatures are highest in the building during normal plant operation. This data has revealed that the building upper level temperature briefly peaked at ~132 F when outdoor ambient was approximately 100 F and the plant was operating at 100% power. During a FLEX event, the Reactor would be tripped and until Auxiliary Feedwater and ADV function were established, the Main Steam Safety Valves (MSSVs) may cycle open and closed to remove primary side energy and maintain secondary side pressure within limits. This MSSV cycling, if it occurs, would be expected to potentially raise the ambient temperature at the ADV / MSSV location above the recorded peak by several degrees due to high temperature steam traversing the MSSVs and their associated tailpipes. The MSSVs and ADVs discharge above the roof of the AFW Building and the 80 foot elevation has openings in the siding that permit venting of the area. If the outdoor temperature is conservatively assumed to be at the Indian Point location FLEX extreme (unrealistically high) value of 115 F, the indoor highest ambient temperature could then approach 150 F. This result is obtained by conservatively linearly adding the 15 degree ambient outdoor delta to the 132 F (plus) highest recorded temperature. At the 43 foot elevation, where the local ADV control panels are operated after shutdown in accordance with procedures 2/3-SOP-ESP-001 and 2-AOP-SSD-1, the ambient temperature would be significantly less (estimated to be 20 to 30 degrees lower). Since both 150 F and 130 F are less than 170 F, there are no concerns related to material thermal capability during post-FLEX event ADV operation.

All of the temperature values cited above are dry bulb. For personnel access and occupancy time capability, wet bulb temperatures are more relevant. In the vicinity of the ADV control stations, even at the highest possible dry bulb temperatures, the wet bulb temperatures would remain at or below 110 F due to the comparatively low relative humidity values in the area at high dry bulb temperatures. According to procedure EN-IS-108, allowed stay times for lightly clothed individuals performing low intensity work tasks (such as manually controlling ADVs) exceed 35 minutes at 110 F wet bulb and increase to over 90 minutes at 100 F wet bulb. Therefore, based on the allowed stay times and the earlier responses to Questions 1 and 2 which indicate that operator occupancy for ADV position control would be temporary and intermittent, it is deemed that there are no outstanding issues with personnel capabilities for post-FLEX event ADV operation.

Q6 The primary connection and alternate connection to the 480 volt FLEX generator are not clear. We clarified that the alternate connection is available (Section 2.3.5.10 states that the alternate connection has been designed specifically for the case of a BDB flood (Reference: Section 4.5.2 of IP-REPT-14-00006 and Section 4.5.2 of IP-REPT-13-00059). The strategy reports go further, stating that the alternate connection point is primarily for the flood hazard scenario.) for the flood and that closed this interpretive question.

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Response:

The primary connection to the 480V diesel generator is available for all BDBEE, except for a flooding event. The alternate connection is available for all BDBEE, except for a seismic event.

Q7 What is the method for phase rotation verification for FLEX generators, including NSRC generators? Reference needed.

Response

Procedures 2-FSG-005 and 3-FSG-005, Initial Assessment and FLEX Equipment Staging, provide phase rotation verification methodology.

Reactor Branch Questions

Q1 We need to identify what the reactor head vent capacity is for letdown from the RCS, during the period when boration of the RCS is performed, to show the ability to complete the boration in a reasonable period of time.

Response

IP2: The Reactor Vessel Head Vent valves are powered from AC power and consists of two valves in series that vent to the PRT (HCV-3100-MCC26B-7MR and HCV-3101-MCC26A-7MR). Utilizing these valves for letdown is delayed until the FLEX Diesel Generator (DG) is available to supply power (2-FSG-008). The Reactor Vessel Head Vent system will produce a letdown at a rate of 49.12 gpm at 310 psia (IP-CALC-14-00090, Rev. 1, IP2 Critical Flow through the RVHVS during a BDBEE).

IP3: The Reactor Vessel Head Vents are powered from battery backed 125 VDC and consists of two pairs of valves that vent to the PRT (RC-SOV-653 and RC-SOV-652 and RC-SOV-654 and RC-SOV-655). Utilizing these valves for letdown will be delayed until the FLEX Diesel Generator (DG) is available to supply power (3-FSG-008). Flow through both valves would produce letdown at a rate of 45.91 gpm at 310 psia (IP-CALC-15-00096, Rev. 0, Flow through the RVHVS during a BDBEE). The Reactor Vessel Head Vents are used for letdown because they do not require instrument air to open.

Q2 The CST and CWT are not robust. How do they survive damage from tornado. Discussion referenced white paper (IP-RPT-15-00031 has been uploaded to the E Portal as FIP Reference). The CWT is capable of simultaneously supplying both unit AFW pumps. It was noted that these would be discussed as alternative sources.

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Response

The IP2 design and licensing basis as described in UFSAR Section 1.11.5 is that, "The IP2 licensing basis does not include tornado protection for the design of the buildings, structures and components. Tornado protection is not a design criterion for IP2." Therefore, no specific protection from the effects of tornadoes is required for tanks to be credited in the IP2 strategies. To provide additional protection over and above the current design and licensing basis, all tanks credited for the IP2 strategies have been evaluated to survive a 360 mph wind loading (IP-RPT-13-00055). In addition, the effects of one missile acting at any time has been addressed by ensuring that two water sources are available to support each required strategy.

The IP3 licensing and design basis is that only one missile was considered acting at any time simultaneously with the 360 mph wind load (IP-RPT-13-00055). Consistent with this licensing and design basis all tanks credited for IP3 Order EA 12-049 strategies are designed to or have been evaluated to survive 360 mph wind loading. In addition, the effects of one missile acting at any time has been addressed by ensuring that two water sources are available to support each required strategy. This ensures no single missile will prevent the fulfillment of the strategy. Since the credited tanks have been evaluated to meet the current licensing basis they are considered a robust source of water.

An evaluation (IP-RPT-15-00031) determined that the separation distances, the orientation of the structures, and the shielding provided by adjacent structures provides protection of FLEX components from the dominant southwest to northeast and west to east tornado paths.

Consideration of an IP2 tornado missile beyond the current IP2 design basis determined that reasonable protection of FLEX critical areas and components for a BDBEE is assured by the combination of: 1) the rare occurrence of tornadoes at the site, 2) the low tornado wind speed at site, 3) the low probability of a tornado generated missile striking equipment or structures needed for a BDBEE, 4) the protection (shielding) provided by adjacent buildings or geographic features or the separation distance based on a reasonable tornado width and the axis of separation relative to probable tornado paths (IP-RPT-15-00031). The IP2 licensing basis does not include tornado protection for the design of the buildings, structures and components. However, to provide a congruous strategy for tornado events, the FLEX strategy for addressing tornado and tornado missiles impact on tanks established with the IP3 strategy was also evaluated for IP2. This does not constitute a new design bases criteria for IP2, but is a conservatively consistent strategy for the site in that the overall FLEX strategy can address the loss of any single FLEX tank on site. Based on the above, IPEC buildings containing FLEX components and RWSTs are reasonably protected from missiles by shielding. In addition, loss of CST concurrent with loss of CWST for IP2 and IP3 is reasonably

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prevented by the separation distance based on a reasonable tornado width and the axis of separation relative to probable tornado paths.

The IPEC integrated FLEX strategy uses the above basis as an alternate method to provide an equivalent missile protection strategy from that described in NEI 12-06.