Exelon Generation®

Order No. EA-12-051

RS-14-018

February 28, 2014

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

Byron Station, Units 1 and 2
Facility Operating License Nos. NPF-37 and NPF-66
NRC Docket Nos. STN 50-454 and STN 50-455

Subject: Second Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)

References:

1. NRC Order Number EA-12-051, " Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," dated March 12, 2012
2. NRC Interim Staff Guidance JLD-ISG-2012-03, "Compliance with Order EA-12-051, Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," Revision 0, dated August 29, 2012
3. NEI 12-02, Industry Guidance for Compliance with NRC Order EA-12-051, "To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," Revision 1, dated August 2012
4. Exelon Generation Company, LLC's Initial Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051), dated October 25, 2012
5. Exelon Generation Company, LLC Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051), dated February 28, 2013 (RS-13-028)
6. Exelon Generation Company, LLC First Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051), dated August 28, 2013 (RS-13-114)
7. NRC letter to Exelon Generation Company, LLC, Byron Station, Units 1 and 2 – Interim Staff Evaluation and Request for Additional Information Regarding the Overall Integrated Plan for Implementation of Order EA-12-051, Reliable Spent Fuel Pool Instrumentation (TAC Nos. MF0872 and MF0873), dated November 4, 2013

On March 12, 2012, the Nuclear Regulatory Commission ("NRC" or "Commission") issued an order (Reference 1) to Exelon Generation Company, LLC (EGC). Reference 1 was immediately effective and directs EGC to install reliable spent fuel pool level instrumentation. Specific requirements are outlined in Attachment 2 of Reference 1.

Reference 1 required submission of an initial status report 60 days following issuance of the final interim staff guidance (Reference 2) and an overall integrated plan pursuant to Section IV, Condition C. Reference 2 endorses industry guidance document NEI 12-02, Revision 1 (Reference 3) with clarifications and exceptions identified in Reference 2. Reference 4 provided the EGC initial status report regarding reliable spent fuel pool instrumentation. Reference 5 provided the Byron Station, Units 1 and 2 overall integrated plan.

Reference 1 requires submission of a status report at six-month intervals following submittal of the overall integrated plan. Reference 3 provides direction regarding the content of the status reports. Reference 6 provides the first six-month status report pursuant to Section IV, Condition C.2, of Reference 1 for Byron Station. The purpose of this letter is to provide the second six-month status report pursuant to Section IV, Condition C.2, of Reference 1, that delineates progress made in implementing the requirements of Reference 1. The enclosed report provides an update of milestone accomplishments since the last status report, including any changes to the compliance method, schedule, or need for relief and the basis, if any. The enclosed report also addresses the NRC Interim Staff Evaluation Request for Additional Information Items contained in Reference 7.

This letter contains no new regulatory commitments. If you have any questions regarding this report, please contact David P. Helker at 610-765-5525.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 28th day of February 2014.

Respectfully submitted,

Glen T. Kaegi
Director - Licensing & Regulatory Affairs
Exelon Generation Company, LLC

Enclosure:

1. Byron Station, Units 1 and 2 Second Six-Month Status Report for the Implementation of Order EA-12-051, Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation

Enclosure

Byron Station, Units 1 and 2

Second Six-Month Status Report for the Implementation of Order EA-12-051, Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation

(24 pages)

Byron Station, Units 1 and 2

Second Six-Month Status Report for the Implementation of Order EA-12-051, Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation

1 Introduction

Byron Station, Units 1 and 2, developed an Overall Integrated Plan (Reference 1 in Section 8), documenting the requirements to install reliable Spent Fuel Pool Level Instrumentation (SFPLI), in response to Reference 2. This enclosure provides an update of milestone accomplishments since submittal of the First Six-Month status report including any changes to the compliance method, schedule, or need for relief/relaxation and the basis, if any.

2 Milestone Accomplishments

The following milestones have been completed since the development of the First Six-Month status report (Reference 6), and are current as of February 8, 2014.

- None

3 Milestone Schedule Status

The following provides an update to the milestone schedule to support the Overall Integrated Plan. This section provides the activity status of each item, and the expected completion date noting any change. The dates are planning dates subject to change as design and implementation details are developed.

The revised milestone target completion dates do not impact the order implementation date.

Milestone	Target Completion Date	Activity Status	Revised Target Completion Date
Submit 60 Day Status Report	October 25, 2012	Complete	
Submit Overall Integrated Plan	February 28, 2013	Complete	
Submit Responses to RAIs	July 5, 2013	Complete	
Submit 6 Month Updates:			
Update 1	August 28, 2013	Complete	
Update 2	February 28, 2014	Complete with this submittal	
Provide Final Safety Evaluation (SE) Information	March 31, 2014	Not Started	
Update 3	August 28, 2014	Not Started	

Milestone	Target Completion Date	Activity Status	Revised Target Completion Date
Modifications:			
Conceptual Design	3Q2012	Complete	
Begin Detailed Design Engineering	1Q2013	Complete	
Issue Exelon Fleet contract to procure SFPI Equipment	2Q2013	Complete	
Complete and Issue SFPI Modification Package	1Q2014	Started	2Q2014
Begin Installation	2Q2014	Not Started	
Complete SFPI Installation and Put Into Service	4Q2014	Not Started	

4 Changes to Compliance Method

There are no changes to the compliance method as documented in the Overall Integrated Plan (Reference 1).

5 Need for Relief/Relaxation and Basis for the Relief/Relaxation

Byron Station, Units 1 and 2, expects to comply with the order implementation date and no relief/relaxation is required at this time.

6 Open Items from Overall Integrated Plan and Draft Safety Evaluation

The following tables provide a summary of the open items documented in the Overall Integrated Plan (Reference 1) or the Interim Safety Evaluation (ISE) and the status of each item.

Overall Integrated Plan Open Items		
OI#	**Description**	**Status**
1 (RAI-1a, Ref.4)	**For Level 1, specify how the identified location represents the higher of the two points described in the NEI 12-02 guidance for this level.**	Complete. 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:

Overall Integrated Plan Open Items		
OI#	**Description**	**Status**
		(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. For Byron, this is the level at which suction loss occurs due to uncovering the inlet pipe strainer. This level, (1), is elevation 417'–9¼", not considering any required margin as a result of vortex formation. (2) The level at which the water height, assuming saturated conditions (boiling); above the centerline of the cooling pump shaft provides the required net positive suction head. This level is 422'-0" at 2,000 gpm per pump and corresponds to the high point elevation of the inside of the suction piping. Water level below this elevation will result in vapor void formation inside the piping for pool temperatures of 212 °F. The typical margin required to prevent vortex formation at Point 1 is estimated to be less than the difference between Point 1 and Point 2. Thus, the higher of the above points is (2). Therefore, LEVEL 1 is 422'-0" and is applicable to both units.
2 (Ref.1)	Open Item: **Continuous level indication will be provided by a guided wave radar system, submersible pressure transducer, or other appropriate level sensing technology that will be determined during the detailed engineering phase of the project.**	Complete. (Addressed in Reference 6)
3 (RAI-1b, Ref. 4)	RAI Question: **A clearly labeled sketch depicting the elevation view of the proposed typical mounting**	Complete. (Addressed in Reference 4)

Overall Integrated Plan Open Items		
OI#	**Description**	**Status**
	arrangement for the portions of the instrument channel consisting of permanent measurement channel equipment (e.g., fixed level sensors and/or stilling wells, and mounting brackets). Indicate on this sketch the datum values representing Level 1, Level 2, and Level 3 as well as the top of the fuel. 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.	
4 (RAI-2, Ref.4)	RAI Question: **Provide a clearly labeled sketch or marked-up plant drawing of the plan view of the SFP area, depicting the SFP inside dimensions, the planned locations/placement of the primary and backup SFP level sensor, and the proposed routing of the cables that will extend from the sensors toward the location of the read-out/display device.**	Complete. The marked-up sketch is provided in enclosure-1, attached to this Second Six-Month update report.
5 (RAI-3, Ref.4)	RAI Question: **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**	Started. Note that the completion date for design has changed from January 2014 to April 2014. The requested information is planned to be provided by March 31, 2014 in accordance with the Interim SE date. However, if an extension to the Interim SE date is required Exelon will contact the NRC.

Overall Integrated Plan Open Items		
OI#	**Description**	**Status**
	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.** RESPONSE: Device total loading and mounting will be performed as part of the detailed design process. The current plan for the design of the SFPI system based on the current Exelon Nuclear program schedule for Byron started the design phase in June 2013 with design completion and 100% acceptance of the design in April 2014. The requested information will be provided by March 31, 2014 in accordance with the Interim SE date.	
6 (RAI-4, Ref.4)	RAI Question: **Provide the following:** **a) A description of the specific method or combination of methods that will be applied**	Started. Note that the completion date for design has changed from January 2014 to April 2014. The requested information is planned to be provided by March 31, 2014 in accordance

Overall Integrated Plan Open Items		
OI#	**Description**	**Status**
	to demonstrate the reliability of the permanently installed equipment under beyond-design basis 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 such that following a seismic event the instrument will maintain its required accuracy.** RESPONSE: Device qualification and reliability will be performed as part of the detailed design process. The current plan for the design of the SFPI system based on the current Exelon Nuclear program schedule for Byron started the design phase in June 2013 with design	with the Interim SE date. However, if an extension to the Interim SE date is required Exelon will contact the NRC.

Overall Integrated Plan Open Items		
OI#	**Description**	**Status**
	completion and 100% acceptance of the design in April 2014. The requested information will be provided by March 31, 2014 in accordance with the Interim SE date.	
7 (RAI-5, Ref.4)	RAI Question: **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 minimized to the extent practicable.** **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.**	Complete. The two channels of the proposed level measurement system will be installed such that: a) The level probes will be mounted on the east wall of the SFP and will be separated by a distance greater than the span of the shortest side of the pool. This meets the NEI 12-02, Revision 1 guidance for channel separation. b) The level sensor enclosure and the electronics/ UPS enclosure for the primary instrument channel will be installed in the Auxiliary Building in Unit 1 Electrical Penetration Area. The level sensor enclosure and the electronics/ UPS enclosure for the backup instrument channel will be installed in Unit 2 Electrical Penetration Area. Independence, physical and spatial separation of the level sensors and electronics/UPS enclosures for primary and backup instrument channels is maintained by routing the associated instrument channel cables through Unit 1 and Unit 2 respectively. The 120 VAC power to the primary instrument will be provided from a Unit 1 ESF-Division 2 MCC (132X2), and 120 VAC power to the backup level instrument will be provided from a Unit 2 ESF Division 2 MCC (232X2). The 120VAC distribution panels for the primary and backup instruments are powered by different 480V safety buses. Therefore the loss of any one bus will not result in the loss of ac

Overall Integrated Plan Open Items		
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		power to both instrument channels. Enclosure 1 demonstrates the physical separation between the primary and backup power sources. An analog level indicator for each channel will be provided in the Main Control Room (MCR). The primary channel indicator will be located on the Unit 1 side of the MCR at panel 1PM06J. The backup channel indicator will be located on the Unit 2 side of the MCR at panel 2PM06J. These analog level indicators will be credited as the level indications used by operators to satisfy the NRC Order EA-12-051 requirements. Providing the 120VAC power to primary and backup instrument channels from separate MCCs will address the concerns regarding power supply independence. Also, installing the SFP level indicator displays for primary and backup channels in separate units (Unit 1 for primary and Unit 2 for backup channels) addresses the concerns regarding physical and spatial separation. All power and instrument cables associated with the primary channel will be routed on the Unit 1 side of Auxiliary Building and Fuel Handling Building; and all power and instrument cables associated with the backup channel will be routed on the Unit 2 side of the Auxiliary Building and Fuel Handling Building to meet the physical and spatial separation requirements.
8 (RAI-6, Ref.4)	RAI Question: **Provide the following:** **a) A description of the electrical ac power sources and capabilities for the primary and backup channels.** **b) Please provide the results of the calculation depicting the battery backup duty cycle requirements demonstrating**	Started. Response for part (a): The primary and backup SFPLI instrument channels will be normally powered from 120 VAC Unit 1 and Unit 2 ESF Division 2 MCC respectively. These are on different safety buses, which maintains power source independence. Upon loss of normal AC power,

Overall Integrated Plan Open Items		
OI#	**Description**	**Status**
	that its capacity is sufficient to maintain the level indication function until offsite resource availability assured. RESPONSE: Device total power supply configuration will be performed as part of the detailed design process. The current plan for the design of the SFPI system based on the current Exelon Nuclear program schedule for Byron started the design phase in June 2013 with design completion and 100% acceptance of the design in April 2014. The requested information will be provided by March 31, 2014 in accordance with the Interim SE date.	individual batteries installed in each channel's electronics/ UPS enclosure will automatically maintain continuous channel operation for at least three (3) days. The power cables will be routed on the Unit 1 side for the primary channel and on the Unit 2 side for the backup channel so that spatial and physical separation is maintained between the primary and backup channels. These ESF MCCs have also been identified as part of the FLEX strategy to ensure that the SFPLI will have ac power restored if a Beyond Design Basis External Event would occur. Additionally, a receptacle and a selector switch are installed in each channel electronics/ UPS enclosure to directly connect emergency power to the SFPLI. Response for (b): Note that the completion date for design has changed from January 2014 to April 2014. The requested information is planned to be provided by March 31, 2014 in accordance with the Interim SE date. However, if an extension to the Interim SE date is required Exelon will contact the NRC.
9 (RAI-7, Ref.4)	RAI Question: **Provide the following:** **a) An estimate of the expected instrument channel accuracy performance under both (a) normal SFP level conditions (approximately Level1 or higher) and (b) at the beyond design-basis conditions (i.e., radiation, temperature, humidity, post-seismic and post-shock conditions) that would be present if the SFP level were at the Level2 and Level3 datum points.** **b) A description of the methodology that will be used for determining the maximum allowed deviation from the**	Started. Note that the completion date for design has changed from January 2014 to April 2014. The requested information is planned to be provided by March 31, 2014 in accordance with the Interim SE date. However, if an extension to the Interim SE date is required Exelon will contact the NRC.

Overall Integrated Plan Open Items		
OI#	**Description**	**Status**
	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. RESPONSE: Device channel accuracy analysis will be performed as part of the detailed design process. The current plan for the design of the SFPI system based on the current Exelon Nuclear program schedule for Byron started the design phase in June 2013 with design completion and 100% acceptance of the design in April 2014. The requested information will be provided by March 31, 2014 in accordance with the Interim SE date.	
10 (RAI-8, Ref.4)	RAI Question: **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**	Started. Note that the completion date for design has changed from January 2014 to April 2014. The requested information is planned to be provided by March 31, 2014 in accordance with the Interim SE date. However, if an extension to the Interim SE date is required Exelon will contact the NRC.

Overall Integrated Plan Open Items		
OI#	**Description**	**Status**
	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. **d) A discussion as to how these surveillances will be incorporated into the plant surveillance program.** **e) A description of the preventive maintenance tasks required to be performed during normal operation, and the planned maximum surveillance interval that is necessary to assure that the channels are fully conditioned to accurately and reliably perform their functions when needed.** RESPONSE: Device testing requirement analysis will be performed as part of the detailed design process just prior to turnover to Operations. The current plan for the design of the SFPI system based on the current Exelon Nuclear program schedule for Byron started the design phase in June 2013 with design completion and 100% acceptance of the design in April 2014. Following the issue of the design, procedures will start being developed with a projected July 2014 completion date. The requested information will be developed early and will be provided by March 31, 2014 in accordance with the Interim SE date.	
11 (RAI-9,	RAI Question: **Please provide the following:** **a) The specific location for each**	Complete. (Addressed in Reference 6)

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<tr><th>OI#</th><th>Description</th><th>Status</th></tr>
<tr><td>Ref.4)</td><td>of the primary and backup instrument channel displays.
b) If the 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.
c) 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.</td><td></td></tr>
<tr><td>12

(RAI-10, Ref.4)</td><td><u>RAI Question</u>:

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.</td><td><u>Complete.</u>

The modification review process will be used to ensure all necessary procedures are developed for maintaining and operating the spent fuel level instruments upon installation. These procedures will be developed in accordance with Exelon's procedure control process.

The objectives of each procedural area are described below:

<table>
<tr><th></th><th>Procedure</th><th>Objectives to be achieved</th></tr>
<tr><td>1.</td><td>System</td><td>To verify that system</td></tr>
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Overall Integrated Plan Open Items				
OI#	**Description**	**Status**		
			Inspection	components are in place, complete, and in the correct configuration, and that the sensor probe is free of significant deposits of crystallized boric acid.
		2.	Calibration and Test	To verify that the system is within the specified accuracy, is functioning as designed, and is appropriately indicating SFP water level.
		3.	Maintenance	To establish and define scheduled and preventive maintenance requirements and activities necessary to minimize the possibility of system interruption.
		4.	Repair	To specify troubleshooting steps and component repair and replacement activities in the event of system malfunction.
		5.	Operation	To provide sufficient instructions for operation and use of the system by plant operation staff.
		6.	Responses	To define the actions to be taken upon observation of system level indications, including actions to be taken at the levels

Overall Integrated Plan Open Items		
OI#	**Description**	**Status**
		defined in NEI 12-02.
13 (RAI-11, Ref.4)	RAI Question: **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.**	Complete. Response for a: Performance tests (functional checks) and Operator performance checks will be described in detail in the vendor operator's manual, and the applicable information is planned to be contained in plant operating procedures. Operator performance tests are planned to be performed periodically as recommended by the equipment vendor. Channel functional tests per operations procedures with limits established in consideration of vendor equipment specifications are planned to be performed at appropriate frequencies established equivalent to or more frequently than existing SFPI. Manual calibration and operator performance checks are planned to be performed in a periodic scheduled fashion with additional maintenance on an as-needed basis when flagged by the system's automated diagnostic testing features. Channel calibration tests per maintenance procedures with limits established in consideration of vendor equipment specifications are planned to be performed at frequencies established in consideration of vendor recommendations. SFPI channel/equipment maintenance/preventative maintenance and testing program requirements to ensure design and system readiness are planned to be established in accordance with Exelon's processes and procedures and in consideration of vendor recommendations to ensure that appropriate regular testing, channel checks, functional tests, periodic

<table>
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<tr><td></td><td></td><td>calibration, and maintenance is performed (and available for inspection and audit). Subject maintenance and testing program requirements are planned to be developed during the SFPI modification design process.

Response for b, c:

Both primary and backup SFPI channels incorporate permanent installation (with no reliance on portable, post-event installation) of relatively simple and robust augmented quality equipment. Permanent installation coupled with stocking of adequate spare parts reasonably diminishes the likelihood that a single channel (and greatly diminishes the likelihood that both channels) is (are) out-of-service for an extended period of time. Planned compensatory actions for unlikely extended out-of-service events are summarized as follows:
<table>
<tr><th># Channel(s) Out-of-Service</th><th>Required Restoration Action</th><th>Compensatory Action if Required Restoration Action not completed within Specified Time</th></tr>
<tr><td>1</td><td>Restore channel to functional status within 90 days (or if channel restoration not expected within 90 days, then proceed to Compensatory Action)</td><td>Immediately initiate action in accordance with Note below</td></tr>
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Overall Integrated Plan Open Items				
OI#	**Description**	**Status**		
		2	Initiate action within 24 hours to restore one channel to functional status and restore one channel to functional status within 72 hours	Immediately initiate action in accordance with Note below
		Note: Present a report to the on-site Plant Operations Review Committee (PORC) within the following 14 days. The report shall outline the planned alternate method of monitoring, the cause of the non-functionality, and the plans and schedule for restoring the instrumentation channel(s) to functional status.		

Interim Safety Evaluation Open Items		
OI#	**Description**	**Status**
1 (RAI 1, Ref. 5)	RAI Question: **Please provide the results of the calculation used to determine the water elevation necessary for the pump's required NPSH to confirm that Level 1 has been adequately identified.**	Complete. Byron Calculation NED-M-MSD-041, Rev. 2 shows that a water level of 424'-2" (corresponding to the low water level alarm) provides adequate water level to maintain normal fuel pool cooling system operation. Normal operation of this system is with one pump operating at 4,500 gpm with a pool temperature less than 140 °F. The calculation also shows that this water level is adequate to maintain proper pump flow up to 192 °F. However for saturated conditions (boiling), in order to maintain adequate net positive suction head the level will have to be at least 422'-0" at 2000 gpm per pump.
2 (RAI-4, Ref. 5)	RAI Question: **For RAI 3(a) above, provide the analyses used to verify the design criteria and methodology for seismic testing of the SFP instrumentation and the electronics units, including design basis maximum seismic loads and the hydrodynamic loads that could result from pool sloshing or other effects that could accompany such seismic forces.**	Started.
3 (RAI-5, Ref. 5)	RAI Question: **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.**	Complete. The structural integrity and mounting of SFP level equipment is based on formal calculations, plant drawings, and approved work plans per Exelon procedures and processes. Design Inputs include, but not limited to, the following: 1. Component weights and dimensions, core hole locations and support details. 2. The capability of concrete expansion anchors. 3. The loads (dynamic and static) for the

Interim Safety Evaluation Open Items		
OI#	**Description**	**Status**
		probe mounting bracket. 4. Concrete properties 5. Seismic accelerations requirements for electrical equipment 6. Allowable stresses for structural bolts. Methodology to qualify the safety related structural integrity includes, but not limited to the following: 1. Structural Weldments – Qualifying the weld design entails the selection of a weld's physical attributes, such as type, configuration and size, which will make it suitable for transferring the prescribed loads within appropriate limits. This process involves determining the maximum unit forces on the weld and comparing them with the weld capacity. The methodology determines weld design forces by assuming nominal linear stress/strain distribution. For each design, the engineer must confirm that the distribution of stiffness within the joint is consistent with this assumption. In some cases more refined techniques may be required to predict appropriate distribution of weld forces. 2. Concrete Expansions - The design methodology of concrete expansion anchor assemblies involves 1) application of component attachment loads to the plate, 2) analysis of the assembly to determine the resultant tension and shear forces on individual anchors, 3) evaluation of the anchor forces relative to anchor allowables and 4) computation and evaluation of bending stresses in the Concrete Expansion Anchor (CEA) plate. Reactions for the attached component (applied to the plate at the centroid of

Interim Safety Evaluation Open Items		
OI#	**Description**	**Status**
		the attachment weld) shall be resolved into moments, shears and axial loads (about the major axes of the expansion anchor plate). 3. Local Stress Effects – The member local stresses for open sections are computed according to specific procedures for flange attachments, web attachments, attachments to flanges of beams supporting concrete, and attachments to webs of beams supporting concrete. 4. Existing Embedment Plate Evaluation - Embedment plates for mechanical/electrical component support attachments (i.e., pipe supports, conduit supports, HVAC supports, etc.) are evaluated as follows: • Determine embedment plate detail based on the component support design drawing and appropriate structural drawings. • Determine an allowable load for the embedment plate detail per plant design tables. • Ensure that the attachment location satisfies the location tolerances used in determining the embedment plate allowables. • Calculate reactions at face of embedment plate. • Determine if the embedment plate can be qualified per criteria. 5. Conduit and Conduit Supports - Structural adequacy of rigid conduit is evaluated by determining the critical span condition, loads, checking conduit stresses and verifying structural adequacy of conduit clamps. Structural adequacy of Conduit, Junction Boxes and Junction Box supports is evaluated by determining loads, calculating

Interim Safety Evaluation Open Items		
OI#	**Description**	**Status**
		member forces and joint reactions, checking member stresses, checking connections, checking expansion anchor assemblies, checking attachments to structure and resolving overstresses. 6. Cable Tray Loading Violations (CTLVs) - The structural evaluation of cable tray supports for potential increase in design basis loading will be performed by identifying the hangers affected by the routing point. For each affected hanger the controlling routing point will be determined. Then actual load associated with the routing point will be computed. The actual load will be compared to the load used in the hanger design. An evaluation of cable tray hanger for any increased load will be performed. 7. Category I Partition Walls - When qualifying a wall for a new/revised attachment, the following method is utilized: • If the loads on the existing critical design strip are larger in magnitude than the loads on the design strip containing the new attachment, then the wall can be qualified by this comparison. • If the wall cannot be qualified by comparison of loading, moment and shear due to the attachment shall be calculated and their effects added to the critical design strip. New stresses or moment and shear will be compared to the allowable stresses/capacities. • If this results in an unacceptable overstress condition, detailed evaluation of the design strip containing the attachment is required. All existing attachments and core holes in the strip will be accounted for in this evaluation.

<table>
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(RAI-7, Ref. 5)</td><td><u>RAI Question:</u>

For RAI #6 above, provide the results from the selected methods, tests and analyses used to demonstrate the qualification and reliability of the installed equipment in accordance with the Order requirements.</td><td>Started.</td></tr>
<tr><td>5

(RAI-13, Ref. 5)</td><td><u>RAI Question:</u>

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. Provide a brief description of the specific technical objectives to be achieved within each procedure.</td><td><u>Complete.</u>

Appropriate quality assurance measures will be selected for the SFPIS required by Order EA-12-051, consistent with Appendix A-1 of NEI 12-02. Site procedures will be developed for system inspection, calibration and test, maintenance, repair, operation and normal and abnormal responses, in accordance with Exelon's procedure control process.

Technical objectives to be achieved in each of the respective procedures are described below:

<table>
<tr><th></th><th>Procedure</th><th>Objectives to be achieved</th></tr>
<tr><td>1.</td><td>System Inspection</td><td>To verify that system components are in place, complete, and in the correct configuration, and that the sensor probe is free of significant deposits of crystallized boric acid.</td></tr>
<tr><td>2.</td><td>Calibration and Test</td><td>To verify that the system is within the specified accuracy, is functioning as designed, and is</td></tr>
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Interim Safety Evaluation Open Items				
OI#	**Description**	**Status**		
				appropriately indicating SFP water level.
		3.	Maintenance	To establish and define scheduled and preventive maintenance requirements and activities necessary to minimize the possibility of system interruption.
		4.	Repair	To specify troubleshooting steps and component repair and replacement activities in the event of system malfunction.
		5.	Operation	To provide sufficient instructions for operation and use of the system by plant operation staff.
		6.	Responses	To define the actions to be taken upon observation of system level indications, including actions to be taken at the levels defined in NEI 12-02.

Note: RAIs not included in the Interim Staff Evaluation Open Items Table are duplicate to the RAIs in Reference 3 and are listed in the Overall Integrated Plan Open Item Table.

7 Potential Draft Safety Evaluation Impacts

There are no potential impacts to the Draft Safety Evaluation identified at this time.

8 References

The following references support the updates to the Overall Integrated Plan described in this enclosure.

1. Exelon Generation Company, LLC, letter to USNRC, "Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)," dated February 28, 2013 (RS-13- 028)
2. NRC Order Number EA-12-051, "Issuance of Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," dated March 12, 2012.
3. USNRC letter to Exelon Generation Company, LLC, Request for Additional Information Regarding Overall Integrated Plan for Reliable Spent Fuel Pool Instrumentation, dated June 7, 2013.
4. Exelon Generation Company, LLC, letter to USNRC, "Response to Request for Additional Information – Overall Integrated Plan in Response to Commission Order Modifying License Requirements for Reliable Spent Fuel Pool Instrumentation (Order No. EA-12-051)", dated July 3, 2013 (RS-13-156).
5. USNRC letter to Exelon Generation Company, LLC, "Interim Staff Evaluation and Request for Additional Information Regarding the Overall Integrated Plan for Implementation of Order EA-12-051, Reliable Spent Fuel Pool Instrumentation", dated November 4, 2013.
6. First Six-Month Status Report for the Implementation of Order EA-12-051, Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, dated August 28, 2013 (RS-13-114).

ENCLOSURE – 1

BYRON Station, Units 1 and 2 SFPI LAYOUT IN PLAN VIEW