Exelon Generation®

Order No. EA-12-051

RS-13-034

February 28, 2013

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

Peach Bottom Atomic Power Station, Units 2 and 3
Renewed Facility Operating License Nos. DPR-44 and DPR-56
NRC Docket Nos. 50-277 and 50-278

Subject: Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)

References:

1. 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, 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 24, 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

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 have a reliable indication of the water level in associated spent fuel storage pools. Specific requirements are outlined in Attachment 2 of Reference 1.

Reference 1 requires submission of an Overall Integrated Plan by February 28, 2013. The NRC Interim Staff Guidance (ISG) (Reference 2) was issued August 29, 2012 which endorses industry guidance document NEI 12-02, Revision 1 (Reference 3) with clarifications and exceptions identified in Reference 2. Reference 3 provides direction regarding the content of this Overall Integrated Plan. The purpose of this letter is to provide the Overall Integrated Plan pursuant to Section IV, Condition C.1, of Reference 1. This letter confirms EGC has received Reference 2 and has an Overall Integrated Plan complying with the guidance for the purpose of ensuring a reliable indication of the water level in associated spent fuel storage pools capable of supporting identification of required wide range pool water level conditions by trained personnel.

Reference 4 provided the EGC initial status report regarding reliable spent fuel pool instrumentation, as required by Reference 1.

Reference 3, Appendix A-2 contains the specific reporting requirements for the Overall Integrated Plan. The information in the enclosure provides the Peach Bottom Atomic Power Station, Units 2 and 3 Overall Integrated Plan pursuant to Appendix A-2 of Reference 3. The enclosed Integrated Plan is based on conceptual design information. Final design details and associated procedure guidance, as well as any revisions to the information contained in the Enclosure, will be provided in the 6-month Integrated Plan updates required by Reference 1.

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 2013.

Respectfully submitted,

Michael D. Jesse
Director - Licensing & Regulatory Affairs
Exelon Generation Company, LLC

Enclosure:

1. Peach Bottom Atomic Power Station, Units 2 and 3 Reliable Spent Fuel Pool Instrumentation (SFPI) Overall Integrated Plan

cc: Director, Office of Nuclear Reactor Regulation
NRC Regional Administrator - Region I
NRC Senior Resident Inspector - Peach Bottom Atomic Power Station, Units 2 and 3
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Enclosure 1

Peach Bottom Atomic Power Station, Units 2 and 3

Reliable Spent Fuel Pool Instrumentation (SFPI)

Overall Integrated Plan

(9 pages)

Peach Bottom Atomic Power Station, Units 2 and 3
Reliable Spent Fuel Pool Instrumentation
Overall Integrated Plan

Applicability:

This integrated plan, applicable to Peach Bottom Atomic Power Station (PBAPS) Units 2 and 3, is based on current conceptual design information and will be revised as the detailed engineering design proceeds. Consistent with the requirements of Order EA-12-051[1] and the guidance in NEI 12-02[2], Exelon's six-month reports will delineate the progress made, any proposed changes in compliance methods, updates to the schedule and, if needed, requests for relief and the basis.

Spent Fuel Pool Configuration:

The PBAPS is a two-unit Boiling Water Reactor (BWR) Station (Units 2 and 3) arranged south to north. Each unit has a dedicated, completely independent Spent Fuel Pool (SFP) located on its Reactor Building Refuel Floor. Each SFP is 40 feet, 0 inches wide (east - west), and 35 feet, 4 inches long (south – north). Elevations are as follows:

Parameter	PBAPS Elevations (both units)
Refuel Floor Elevation	234 feet 0 inches
SFP Normal Water Level	232 feet 10 inches
SFP – Top of Fuel Racks	210 feet 0 inches
SFP Floor Elevation	195 feet 3 inches

Schedule:

The installation of reliable Spent Fuel Pool Instrumentation (SFPI) associated with Unit 3 is scheduled for completion by the end of P3R20 (Fall 2015). This is based on the end of the second refueling outage for Unit 3 following submittal of this integrated plan. The installation of reliable SFPI associated with Unit 2 is scheduled for completion by the end of P2R21 (Fall 2016). This is based on the end of the second refueling outage for Unit 2 following submittal of this integrated plan.

Peach Bottom Atomic Power Station, Units 2 and 3
Reliable Spent Fuel Pool Instrumentation
Overall Integrated Plan

The current milestone schedule is as follows:

- Complete Conceptual Design (CD) for Pilot Plant (Limerick) — Complete
- Complete CD Follow-up Walkdowns at Remaining 9 Exelon Sites — Complete
- Submit Initial 60 day Status Report — Complete
- Develop Request for Proposal for Detailed Engineering Design Services — Complete
- Submit Integrated Plan — Complete with this submittal
- Order SFPI components — 2Q2013
- Begin Detailed Engineering Design for Unit 3 — 4Q2013
- Complete and Issue SFPI Modification Package for Unit 3 — 2Q2014
- Begin Detailed Engineering Design for Unit 2 — 4Q2014
- Complete and Issue SFPI Modification Package for Unit 2 — 2Q2015
- Begin SFPI Installation for Unit 3 — 2Q2015
- Complete SFPI Installation for Unit 3 and Put Into Service — P3R20
- Begin SFPI Installation for Unit 2 — 2Q2016
- Complete SFPI Installation for Unit 2 and Put Into Service — P2R21

Identification of Spent Fuel Pool Water Levels:

Key spent fuel pool water levels are operation support level, substantial radiation shielding level, and level where fuel remains covered (top of storage racks).

Level 1 – level adequate to support operation of the normal fuel pool cooling system

For both units, this level on the primary and backup SFPI channels is greater than 22 feet 9 inches (elevation 232 feet 9 inches) plus instrument accuracy above the top of the spent fuel storage racks. This level is based on the design accuracy of the SFPI channel, and a resolution of 1 foot or better for both the primary and backup instrument channels. The daily SFP level is monitored and recorded under an operator's ST procedure. The PBAPS SFPs have weirs that maintain the normal level between 232 feet 9 inches and 233 feet 0 inches, with 232 feet 10 inches the normal level per the ST.

Level 2 – level adequate to provide substantial radiation shielding for a person standing on the spent fuel pool operating deck

For both units, this level on the primary and backup SFPI channels is greater than 10 feet 0 inches (elevation 220 feet 0 inches) plus instrument accuracy above the top of the spent fuel storage racks. This is based on specification of this level as adequate in NRC JLD-ISG-2012-03[3] and NEI 12-02, the design accuracy of the SFPI channel, and the relatively low sensitivity of dose rates to water depth changes at this level. This level ensures there is adequate water to provide substantial radiation shielding from direct gamma radiation from stored spent fuel.

Level 3 – level at which fuel remains covered

For both units, this level on the primary and backup SFPI channels is greater than 0 feet 0 inches (elevation 210 feet 0 inches) plus instrument accuracy above the top of the spent fuel storage racks. This is based upon the design accuracy of the SFPI channel, and a resolution better than 1 foot for both the primary and backup SFPI channels. This monitoring level assures there is water covering the spent fuel stored in the racks.

Instruments:

The design of the instruments will be consistent with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02. Specifically, the channels will be designed as discussed below.

Primary (fixed) instrument channel: For both units, the primary SFPI channel sensing components will be permanently mounted in the unit's dedicated SFP. The primary SFPI channel will provide continuous level indication over a minimum range of 22 feet 10 inches - from the top of the spent fuel racks at elevation 210 feet 0 inches, to the SFP normal elevation of 232 feet 10 inches. This 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 design phase of the project.

Backup instrument channel: For both units, the backup SFPI channel sensing components also will be permanently mounted in the unit's dedicated SFP. The backup SFPI channel will provide continuous level indication over a minimum range of 22 feet 10 inches - from the top of the spent fuel racks at elevation 210 feet 0 inches, to the SFP normal elevation of 232 feet 10 inches. This continuous level indication will be provided by the same level sensing technology as the primary instrument channel, which will be determined during the detailed engineering design phase of the project.

Reliability:

Reliability of primary and backup SFPI channels will be assured by conformance with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02 as discussed below under Design Features and Program Features. Both primary and backup SFPI channels will be functional at all times when there is fuel in the SFP with allowances for testing, maintenance or repair per NEI 12-02. Reliability will be established through the use of an augmented quality assurance process.

Design Features:

Instrument Channel Design: The design of the instruments and the channel will be consistent with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02.

Arrangement: The SFPI design will install fixed primary and backup SFP level sensors, considering the northeast and southeast corners of the Unit 2 and Unit 3 SFPs. The sensors on each unit will be separated by a distance in excess of 30 feet. The SFPI design will verify the eastern sides of the SFPs meet arrangement criteria and facilitate associated conduit runs, or will design to a more appropriate arrangement. The sensors will be mounted, to the extent practical, near the pool walls and below the pool curb to minimize their exposure to damaging debris and not interfere with SFP activities. SFPI channel electronics and power supplies will be located in seismic and missile protected areas either below the Reactor Building Refuel Floor or in buildings other than the Reactor Building. The areas will be selected to provide suitable radiation shielding and environmental conditions for the equipment consistent with instrument manufacturer's recommendations. Power

supplies and indication equipment and cabling for each SFPI channel will be separated, equivalent to redundant safety related components.

Mounting: Design of the mounting of the sensors in the SFP shall be consistent with the seismic Class I criteria. Installed equipment will be verified to be seismically adequate for the seismic motions associated with the maximum seismic ground motion considered in the design of the plant area in which it is installed.

Qualification: Reliability of both instrument channels will be demonstrated via an appropriate combination of design, analyses, operating experience, and/or testing of channel components for the following sets of parameters:

- conditions in the area of all instrument components,
- effects of shock and vibration on instrument channel components used during and following any applicable event, and
- seismic effects on instrument channel components used during and following a potential seismic event.

The SFPI design will consider the temperature, humidity and radiation levels of the SFP and vicinity during normal operation, event and post-event conditions for no fewer than seven days post-event or until off-site resources can be deployed by the mitigating strategies resulting from Order EA-12-049[4]. Examples of beyond design basis external event conditions include:

- boiling water and steam environment (temperature of 212 degrees F and 100% relative humidity environment),
- radiological conditions for a normal refueling quantity of freshly discharged (100 hour) fuel with SFP Level 3 as described in Order EA-12-051, and
- the impact of Fukushima FLEX modifications mitigating strategies, such as adding water to the SFP.

Components of the SFPI channels will be rated by the manufacturer (or otherwise tested) for shock and vibration during and following any applicable event, using one or more of the following methods:

- components use known operating principles, are supplied by manufacturers using commercial quality programs (such as ISO9001) with shock and vibration requirements included in the purchase specification and instrument design. The components will be designed and tested for operation in environments where significant shock and vibrations are common,

- components have substantial history of operational reliability in environments with significant shock and vibration loadings, such as transportation applications, or

- components are inherently resistant to shock and vibration loadings, such as cables.

SFPI components (except for battery chargers and replaceable batteries) will be rated by the manufacturer (or otherwise tested) for seismic effects at levels commensurate with postulated design basis event conditions in the area, using one or more of the following methods:

- instrument channel components use known operating principles and are supplied by manufacturers with commercial quality programs (such as ISO9001). The procurement specification and/or instrument channel design shall include the seismic requirements and specify the need for commercial design and testing under seismic loadings consistent with design basis values at the installed locations,

- substantial history of operational reliability in environments with significant vibration, such as for portable hand-held devices or transportation applications. Such a vibration design envelope shall be inclusive of the effects of seismic motion imparted to the components proposed at the location of the proposed installation,

- adequacy of seismic design and installation is based on the guidance in Sections 7, 8, 9, and 10 of IEEE Standard 344-2004, "IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations", or a substantially similar industrial standard,

- demonstration that proposed devices are substantially similar in design to models that have been previously tested for seismic effects in excess of the

plant design basis at the location where the instrument is to be installed (g-levels and frequency ranges), or

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

Independence: The primary SFPI channel will be independent of the backup SFPI channel. This independence will be achieved through physical and electrical separation of each channels' components commensurate with hazard and electrical isolation needs.

Power Supplies: The SFPI design will identify power sources from different buses. Upon loss of normal power, individual channel installed batteries will automatically maintain continuous channel operation. The batteries will be replaceable and be sized to maintain channel operation until off-site resources can be deployed by the mitigating strategies resulting from Order EA-12-049. Each channel will have provisions for connection to another suitable power source, as designed and supplied in accordance with Order EA-12-049.

Accuracy: The SFPI design will select components designed to maintain their accuracy following a power interruption or change in power source without recalibration. SFPI channel including display accuracy, to be determined during detailed design, will consider SFP conditions, as identified in the Qualification section. SFPI channel accuracy will be sufficient to allow trained personnel to determine when the actual level reaches the specified lower level of each indicating range (Levels 1, 2 or 3) without conflicting or ambiguous indications.

Testing: The SFPI design will provide for routine testing and calibration consistent with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02, such as in-situ testing and calibration. Details will be determined during detailed engineering design, in accordance with established processes and procedures.

Display: The primary and backup SFPI displays will be located at the control room, remote shutdown panel, or other appropriate and accessible location. The specific location will be determined during detailed design. An appropriate and accessible location will include the following characteristics:

- occupied or promptly accessible to the appropriate plant staff giving appropriate consideration to various drain down scenarios,

- outside the area surrounding the SFP floor (e.g., an appropriate distance from the radiological sources resulting from an event impacting the Spent Fuel Pool),
- inside a structure providing protection against adverse weather, and
- outside of any very high radiation areas or LOCKED HIGH RAD AREA during normal operation.

Program Features

Training: Personnel who perform operation and maintenance functions associated with the SFPI channels will be trained to perform the job specific functions necessary for their assigned tasks. Applicable training materials will be developed consistent with equipment vendor guidelines, instructions, and recommendations. The Systematic Approach to Training (SAT) will be used to identify the population to be trained and to identify the initial and continuing training requirements. Initial training will be completed prior to placing the SFPI in service.

Procedures: Procedures will be developed using guidelines and vendor instructions to address the maintenance, operation and abnormal response issues associated with the SFPI primary and backup channels.

Procedures will also address the following situations:

- If, at the time of an event or thereafter until the unit is returned to normal service, a SFPI channel ceases to function, its function will be recovered within a period of time consistent with the emergency conditions that may exist at the time.
- If, at the time of an event or thereafter until the unit is returned to normal service, an SFPI channel component must be replaced, it may be replaced with a commercially available component that may or may not meet all of the qualifications noted above to maintain SFPI channel functionality.

Testing and Calibration: The testing and calibration of the SFPI will be consistent with vendor recommendations or other documented basis. Calibration will be specific to the mounted instruments and the displays. The Improved Instrument Setpoint Control Program (IISCP) will control the SFPI. The preventative maintenance process will control the recurring calibration task scope and frequency.

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Need for Relief and Basis: Exelon is not requesting relief from the requirements of Order EA-12-051 or the guidance in NRC JLD-ISG-2012-03 at this time.

Consistent with the requirements of Order EA-12-051 and the guidance in NEI 12-02, Exelon's six-month reports will delineate progress made, any proposed changes in compliance methods, updates to the schedule, and if needed, requests for relief and their basis.

References:

1. NRC Order Number EA-12-051, Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, dated March 12, 2012

2. 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 24, 2012

3. 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

4. NRC Order Number EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigating Strategies for Beyond-Design-Basis External Events, dated March 12, 2012