



Order No. EA-12-051

RS-13-029

February 28, 2013

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

Clinton Power Station, Unit 1
Facility Operating License No. NPF-62
NRC Docket No. 50-461

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.

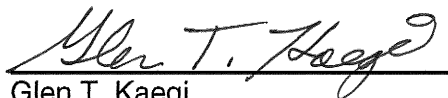
Reference 4 provided the EGC initial status report regarding reliable spent fuel pool instrumentation, as required by Reference 1.

Reference 3, Appendix A-2 contains the specific reporting requirements for the Overall Integrated Plan. The information in the enclosure provides the Clinton Power Station, Unit 1 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,



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

Enclosure:

1. Clinton Power Station, Unit 1 Reliable Spent Fuel Pool Instrumentation (SFPI) Overall Integrated Plan

cc: Director, Office of Nuclear Reactor Regulation
NRC Regional Administrator - Region III
NRC Senior Resident Inspector - Clinton Power Station, Unit 1
NRC Project Manager, NRR - Clinton Power Station, Unit 1
Mr. Robert J. Fretz, Jr, NRRIJLD/PMB, NRC
Mr. Robert L. Dennig, NRRIDSS/SCVB, NRC
Illinois Emergency Management Agency - Division of Nuclear Safety

Enclosure 1

Clinton Power Station, Unit 1

Reliable Spent Fuel Pool Instrumentation (SFPI)

Overall Integrated Plan

(8 pages)

Clinton Power Station, Unit 1 Reliable Spent Fuel Pool Instrumentation Overall Integrated Plan

Applicability:

This integrated plan applies to Clinton Power Station, Unit 1 and is based on current conceptual design information. This plan will be revised as necessary as detailed design engineering proceeds. Consistent with the requirements of Order EA-12-051 (Reference 1) and the guidance in NEI 12-02 (Reference 3), 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 the basis.

General Description:

Clinton Power Station is a single unit BWR 6 with a Mark III containment. The unit has an Upper Containment Fuel Storage Pool located in the Containment Building and a Spent Fuel Pool (SFP) and Fuel Cask Storage Pool located in the Fuel Building. During normal, on-line operation irradiated fuel is only stored in the SFP and not in either the Upper Containment Fuel Storage Pool or the Fuel Cask Storage Pool. The SFP floor is at the 712' elevation. Normal fuel pool water level is at the 754' elevation and the top of the fuel rack is 727.31' elevation. All references are plant elevations with respect to mean sea level.

Schedule:

The installation of reliable level instrumentation for the SFP associated with Unit 1 is scheduled for completion by the end of C1R15 (Spring 2015) based on the end of the second refueling outage following submittal of this integrated plan. Unit 1 irradiated fuel is discharged to the SFP via the Upper Containment Fuel Storage Pool. During normal, on-line operation this pool contains no irradiated fuel. Although Clinton is licensed to store fuel in the Fuel Cask Storage Pool, there are no fuel racks in this pool at this time. Should it be decided at a later time to add fuel racks in this pool, only irradiated fuel discharged from the reactor for more than 5 years will be stored here. Thus, the Upper Containment Fuel Storage Pool and the Fuel Cask Storage Pools are not considered spent fuel pools per NRC JLD-ISG-2012-03 (Reference 2) and NEI 12-02 (Reference 3).

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

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- Develop Request for Proposal for Detailed Engineering Design Services Complete
- Submit Integrated Plan Complete with this submittal
- Begin Detailed Engineering Design 3rd Quarter 2013
- Complete and Issue Spent Fuel Pool Instrumentation (SFPI) Modification Package 1st Quarter 2014
- Procure SFP Instrumentation 1st Quarter 2015
- Begin SFPI Installation 1st Quarter 2015
- Complete SFPI Installation and Put Into Service 2nd Quarter 2015

Identification of Spent Fuel Pool Water Levels:

Key spent fuel pool water levels will be identified as follows:

Level adequate to support operation of the normal fuel pool cooling system (Level 1): Indicated level on either primary or backup instrument channel of greater than 26 feet 8 ¼ inches (elevation 754') plus instrument accuracy above the top of the storage racks based on the design accuracy of the instrument channel (which is to be determined) and a resolution better than 1 foot for both the primary and backup instrument channels. This is based on the height of the SFP weir, demonstrating that a water level of 26 feet 8 ¼ inches (elevation 754') is adequate for normal fuel pool cooling system operation. All references are plant elevations with respect to sea level.

Level adequate to provide substantial radiation shielding for a person standing on the spent fuel pool operating deck (Level 2): Indicated level on either the primary or backup instrument channel of greater than 10 feet (elevation 737.31') plus instrument channel accuracy above the top of the storage racks based on specification of this level as adequate in NRC JLD-ISG-2012-03 and NEI 12-02, the specified design accuracy of the instrument channel, and the relatively low sensitivity of dose rates to changes in water depth at this level. This monitoring level ensures there is an adequate water level to provide substantial radiation shielding for a person standing on the spent fuel pool operating deck from direct gamma radiation from irradiated fuel.

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Level where fuel remains covered (Level 3): Indicated level on either the primary or backup instrument channel of greater than 0 feet (elevation 727.31') plus instrument channel accuracy above the top of the storage racks based upon the design accuracy (which is to be determined) of the instrument channel for both the primary and backup instrument channels. This monitoring level assures that water is covering the irradiated fuel seated 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: The primary instrument channel level sensing components will be located and permanently mounted in the SFP. The primary instrument channel will provide continuous level indication over a minimum range of approximately 26.86 feet from the high pool level elevation of 754.17' to the top of the spent fuel racks at elevation 727.31'. 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: The backup instrument channel level sensing components will also be located and permanently mounted in the SFP. The backup instrument channel will provide continuous level indication over a minimum range of approximately 26.86 feet from the high pool level elevation of 754.17' to the top of the spent fuel racks at elevation 727.31'. This continuous level indication will be provided by the same level sensing technology as the primary instrument channel.

Reliability:

Reliability of primary and backup instrument 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 level instrumentation channels will be functional at all times when there is irradiated 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 (e.g., a process similar to that applied to the site fire protection program).

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Design Features

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

Arrangement: The current proposed plan is to install SFP level sensors in the southwest corner and on the east side of the SFP separated in excess of 20 feet. The sensors themselves 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. Instrument channel electronics and power supplies will be located in seismic and missile protected areas either below the SFP operating floor or in buildings other than the Fuel Building. The areas to be selected will provide suitable radiation shielding and environmental conditions for the equipment consistent with instrument manufacturer's recommendations. Equipment and cabling for power supplies and indication for each channel will be separated equivalent to that provided for redundant safety related services.

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 instrument channel component use for 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.

Temperature, humidity and radiation levels consistent with the conditions in the vicinity of the SFP and the area of use considering 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 (FLEX) (Reference 4) will be addressed in the detailed design engineering phase of the

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project. Examples of post-event (beyond-design-basis) conditions to be considered are:

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

Components of the instrument channels will be qualified for shock and vibration using one or more of the following methods:

- components are supplied by manufacturers using commercial quality programs (such as ISO9001, “Quality management systems – Requirements”) with shock and vibration requirements included in the purchase specification at levels commensurate with portable hand-held devices or transportation applications;
- components have substantial history of operational reliability in environments with significant shock and vibration loadings, such as portable hand-held devices or transportation applications; or
- components are inherently resistant to shock and vibration loadings, such as cables.

For seismic effects on instrument channel components used after a potential seismic event for only installed components (with the exception of battery chargers and replaceable batteries), the following measures will be used to verify that the design and installation is adequate. Applicable components are rated by the manufacturer (or otherwise tested) for seismic effects at levels commensurate with those of postulated design basis event conditions in the area of instrument channel component use using one or more of the following methods:

- 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;

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- 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 demonstrated based on the guidance in Sections 7, 8, 9, and 10 of IEEE Standard 344-2004, "IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations", 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 instrument channel will be independent of the backup instrument channel. This independence will be achieved through physical and electrical separation of each channels' components commensurate with hazard and electrical isolation needs.

Power Supplies: Each channel will be normally powered from a different 120Vac bus. Upon loss of normal ac 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. Additionally, each channel will have provisions for connection to another suitable power source.

Accuracy: The instrument channels will be designed to maintain their design accuracy following a power interruption or change in power source without recalibration. Instrument channel accuracy, to be determined during detailed design, will consider Spent Fuel Pool conditions (e.g., saturated water, steam environment, etc), as well as, other applicable radiological and environmental conditions and include display accuracy. Instrument channel accuracy will be sufficient to allow trained personnel to determine when the actual level exceeds the specified lower

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level of each indicating range (levels 1, 2 or 3) without conflicting or ambiguous indications.

Testing: Instrument channel design will provide for routine testing and calibration consistent with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02. Details will be determined during detailed design engineering.

Display: The primary and backup instrument displays will be located at the control room, alternate 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 performing functions associated with these SFP level instrumentation channels will be trained to perform the job specific functions necessary for their assigned tasks (maintenance, calibration, surveillance, etc.). This training will be 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 determine the initial and continuing elements of the required training. Training will be completed prior to placing the instrumentation in service.

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

Procedures will also address the following situations:

- If, at the time of an event or thereafter until the unit is returned to normal service, an instrument channel ceases to function, its function will be

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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 instrument 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 instrument channel functionality.

Testing and Calibration: The testing and calibration of the instrumentation will be consistent with vendor recommendations or other documented basis. Calibration will be specific to the mounted instruments and the displays as determined during the modification review process.

Need for Relief and Basis: Clinton Power Station 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. 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 24, 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