Exelon Generation®

RS-13-157

Order No. EA-12-051

July 3, 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: 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)

References:

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-13-029)
2. NRC Order Number EA-12-051, Issuance of Order to Modify 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

In Reference 1, Exelon Generation Company, LLC (EGC) provided the Clinton Power Station, Unit 1, Overall Integrated Plan in Response to the March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Reliable Spent Fuel Pool Instrumentation, pursuant to NRC Order No. EA-12-051 (Reference 2).

The purpose of this letter is to provide the response to the NRC request for additional information (Reference 3) regarding the Clinton Power Station, Unit 1 Overall Integrated Plan in Response to the Commission Order Modifying Licenses with Regard to Requirements for Reliable Spent Fuel Pool Instrumentation (Order No. EA-12-051). Subsequent to issuance of Reference 3, the NRC identified that Request for Additional Information Item No. 6.a was also applicable to Clinton Power Station, Unit 1. This item is included and addressed in Enclosure 1 to this letter.

The Clinton Power Station, Unit 1 Spent Fuel Pool Instrumentation design is proceeding on the schedule identified in the Overall Integrated Plan provided in Reference 1. The enclosed responses to the NRC request for additional information are intended not to provide preliminary or conceptual information. The requested information, when fully developed, will be provided upon detailed design completion based on the milestone schedule dates provided in each response.

This letter contains no new regulatory commitments. If you have any questions regarding this response, 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 3rd day of July 2013.

Respectfully submitted,

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

Enclosure:

1. Clinton Power Station, Unit 1- 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)

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
Mr. Blake Purnell, NRC Project Manager, NRR
Illinois Emergency Management Agency – Division of Nuclear Safety

Enclosure 1

Clinton Power Station, Unit 1

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)

(10 pages)

1.0 INTRODUCTION

By letter dated February 28, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13059A306), Exelon Generation Company, LLC, submitted an overall integrated plan (OIP) in response to the March 12, 2012, U.S. Nuclear Regulatory Commission (NRC) Order modifying licenses with regard to reliable spent fuel pool (SFP) instrumentation (Order EA-12-051; ADAMS Accession No. ML12054A679) for Clinton Power Station, Unit No. 1. The NRC staff endorsed Nuclear Energy Institute, NEI 12-02, "Industry Guidance for Compliance with NRC Order EA-12-051, to Modify Licenses with Regard to Reliable SFP Instrumentation," Revision 1, dated August 2012 (ADAMS Accession No. ML12240A307), with exceptions as documented in 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 (ADAMS Accession No. ML12221A339).

The NRC staff has reviewed the February 28, 2013, response by the licensee and determined that the following request for additional information (RAI) is needed to complete its technical review.

2.0 LEVELS OF REQUIRED MONITORING

The OIP states, in part, that:

> 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. . . .
>
> Level adequate to provide substantial radiation shielding for a person standing on the spent fuel pool operating deck (Level 2): Indicated level on 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. . . .
>
> 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.

RAI-1

Please provide the following:

a) 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.

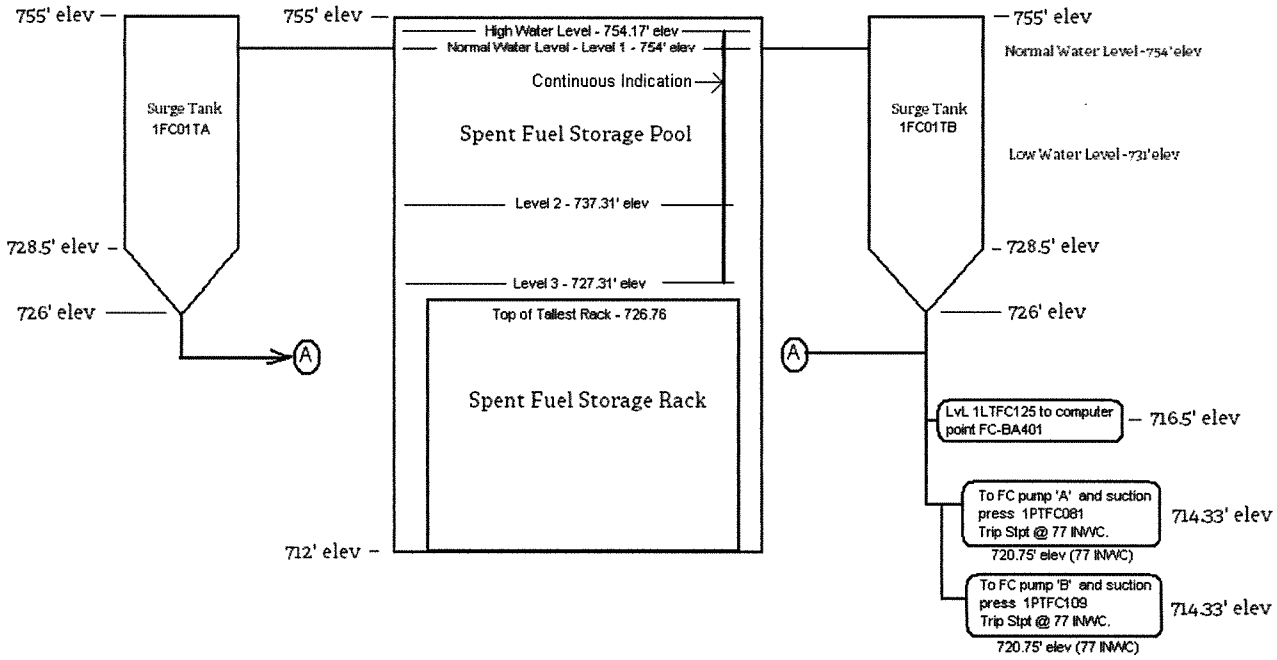
b) A clearly labeled sketch depicting the elevation view of the proposed typical mounting arrangement for the portions of instrument channel consisting of permanent measurement channel equipment (e.g., fixed level sensors and/or stilling wells, and mounting brackets). Indicate on this sketch the datum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

Response

a) The Spent Fuel Pool at Clinton Power Station has skimmers and scuppers located at the 754' elevation that water must flow into. From there the water is routed to surge tanks from which the Fuel Pool Cooling and Cleanup (FC) pumps draw suction. The suction trip is at an approximate 720.75' elevation. Thus the 754' elevation reflects the higher of the two points noted in NEI 12-02, Section 2.3.1.

b) The sketch showing the description above is as follows. Instrument probe mounting details in the Spent Fuel Pool area will be provided in accordance with the response to RAI-3.

Elevation or Side View



3.0 INSTRUMENTATION DESIGN FEATURES

3.2 Arrangement

The OIP states, in part, that:

> 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.

RAI-2

Please 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 back-up 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.

Response

The current plan for the Spent Fuel Pool Instrumentation (SFPI) design of the system based on the current Exelon Nuclear program schedule for Clinton Power Station is to begin the design phase in November 2013 with the design completion and 100% acceptance of the design in June 2014. The requested detail will be provided in the August 2014, 6-month integrated plan update.

3.3 Mounting

The OIP states, in part, that:

> 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.

RAI-3

Please provide the following:

a) The design criteria that will be used to estimate the total loading on the mounting device(s), including static weight loads and dynamic loads. Describe the methodology

that will be used to estimate the total loading, inclusive of design basis maximum seismic loads and the hydrodynamic loads that could result from pool sloshing or other effects that could accompany such seismic forces.

b) A description of the manner in which the level sensor (and stilling well, if appropriate) will be attached to the refueling floor and/or other support structures for each planned point of attachment of the probe assembly. Indicate in a schematic the portions of the level sensor that will serve as points of attachment for mechanical/mounting or electrical connections.

c) A description of the manner by which the mechanical connections will attach the level instrument to permanent SFP structures so as to support the level sensor assembly.

Response

The current plan for the SFPI design of the system based on the current Exelon Nuclear program schedule for Clinton Power Station is to begin the design phase in November 2013 with the design completion and 100% acceptance of the design in June 2014. The requested detail will be provided in the August 2014, 6-month integrated plan update.

3.4 Qualification

The OIP states, in part, that:

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

- components 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;

- 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 [Institute of Electrical and Electronics Engineers] 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.

RAI-4

Please provide the following:

a) A description of the specific method or combination of methods you intend to apply to demonstrate the reliability of the permanently installed equipment under beyond-design-basis 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

The current plan for the SFPI design of the system based on the current Exelon Nuclear program schedule for Clinton Power Station is to begin the design phase in November 2013 with the design completion and 100% acceptance of the design in June 2014. The requested detail will be provided in the August 2014, 6-month integrated plan update.

3.5 Independence

The OIP states, in part, that:

> 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.

RAI-5

Please provide the following:

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

Response

The current plan for the SFPI design of the system based on the current Exelon Nuclear program schedule for Clinton Power Station is to begin the design phase in November 2013 with the design completion and 100% acceptance of the design in June 2014. The requested detail will be provided in the August 2014, 6-month integrated plan update.

3.6 Power supplies

The OIP states, in part, that:

> Each channel will be normally powered from a different 120Vac [120 volts-alternating current] 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.

RAI-6

Please provide the following:

a) A description of the electrical ac power sources and capacities for the primary and backup channels.

b) If the level measurement channels are to be powered through a battery system (either directly or through an uninterruptible power supply), please provide the design criteria that will be applied to size the battery in a manner that ensures, with margin, that the channel will be available to run reliably and continuously following the onset of the beyond-design-basis event for the minimum duration needed, consistent with the plant mitigation strategies for beyond-design-basis external events (Order EA-12-049).

Response

The current plan for the SFPI design of the system based on the current Exelon Nuclear program schedule for Clinton Power Station is to begin the design phase in November 2013 with the design completion and 100% acceptance of the design in June 2014. The requested detail will be provided in the August 2014, 6-month integrated plan update.

3.7 Accuracy

The OIP states, in part, that:

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

RAI-7

Please provide the following:

a) An estimate of the expected instrument channel accuracy performance under both (a) normal SFP level conditions (approximately Level 1 or higher) and (b) at the 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 Level 2 and Level 3 datum points.

b) A description of the methodology that will be used for determining the maximum allowed deviation from the instrument channel design accuracy that will be employed under normal operating conditions as an acceptance criterion for a calibration procedure to flag to operators and to technicians that the channel requires adjustment to within the normal condition design accuracy.

Response

The current plan for the SFPI design of the system based on the current Exelon Nuclear program schedule for Clinton Power Station is to begin the design phase in November 2013 with the design completion and 100% acceptance of the design in June 2014. The requested detail will be provided in the August 2014, 6-month integrated plan update.

3.8 Testing

The OIP states, in part, that:

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.

RAI-8

Please provide the following:

a) A description of the capability and provisions the proposed level sensing equipment will have to enable periodic testing and calibration, including how this capability enables the equipment to be tested in-situ.

b) A description of how such testing and calibration will enable the conduct of regular channel checks of each independent channel against the other, and against any other permanently-installed SFP level instrumentation.

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

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

Response

The current plan for the SFPI design of the system based on the current Exelon Nuclear program schedule for Clinton Power Station is to begin the design phase in November 2013 with the design completion and 100% acceptance of the design in June 2014. Following the issue of the design, procedures will start being developed with a projected October 2014 completion date. The requested detail will be provided in the February 2015, 6-month integrated plan update.

3.9 Display

The OIP states, in part, that:

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.

RAI-9

Please provide the following:

a) The specific location for each 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.

Response

The current plan for the SFPI design of the system based on the current Exelon Nuclear program schedule for Clinton Power Station is to begin the design phase in November 2013 with the design completion and 100% acceptance of the design in June 2014. The requested detail will be provided in the August 2014, 6-month integrated plan update.

4.0 PROGRAM FEATURES

4.2 Procedures

The OIP states, in part, that:

> 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.

RAI-10

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.

Response

The current plan for the SFPI design of the system based on the current Exelon Nuclear program schedule for Clinton Power Station is to begin the design phase in November 2013 with the design completion and 100% acceptance of the design in June 2014. Following the issue of the design, procedures will start being developed with a projected October 2014 completion date. The requested detail will be provided in the February 2015, 6-month integrated plan update.

4.3 Testing and Calibration

The OIP states, in part, that:

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.

RAI-11

Please provide the following:

a) Further information describing the maintenance and testing program the licensee will establish and implement to ensure that regular testing and calibration is performed and verified by inspection and audit to demonstrate conformance with design and system readiness requirements. Include a description of your plans for ensuring that necessary channel checks, functional tests, periodic calibration, and maintenance will be conducted for the level measurement system and its supporting equipment.

b) A description of how the guidance in NEI 12-02 Section 4.3 regarding compensatory actions for one or both non-functioning channels will be addressed.

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

Response

The current plan for the SFPI design of the system based on the current Exelon Nuclear program schedule for Clinton Power Station is to begin the design phase in November 2013 with the design completion and 100% acceptance of the design in June 2014. Following the issue of the design, procedures will start being developed with a projected October 2014 completion date. The requested detail will be provided in the February 2015, 6-month integrated plan update.