



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 27, 2015

Mr. Bryan Hanson
Senior Vice President
Exelon Generation Company, LLC
President and Chief Nuclear Officer
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: CLINTON POWER STATION, UNIT NO. 1 - REPORT FOR THE ONSITE AUDIT
REGARDING IMPLEMENTATION OF MITIGATING STRATEGIES AND
RELIABLE SPENT FUEL POOL INSTRUMENTATION RELATED TO ORDERS
EA-12-049 AND EA-12-051 (TAC NOS. MF0791 AND MF0901)

Dear Mr. Hanson:

On March 12, 2012, the U.S. Nuclear Regulatory Commission (NRC) issued Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond Design-Basis External Events" and Order EA-12-051, "Order to Modify Licenses With Regard To Reliable Spent Fuel Pool Instrumentation," (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML12054A736 and ML12054A679, respectively). The orders require holders of operating reactor licenses and construction permits issued under Title 10 of the *Code of Federal Regulations* Part 50 to submit for review, Overall Integrated Plans (OIPs) including descriptions of how compliance with the requirements of Attachment 2 of each order will be achieved.

By letter dated February 28, 2013 (ADAMS Accession No. ML13064A274), Exelon Generation Company, LLC (Exelon or the licensee) submitted its OIP for Clinton Power Station, Unit No. 1 (Clinton) in response to Order EA-12-049. By letters dated August 28, 2013, February 28, 2014, August 28, 2014, and February 27, 2015 (ADAMS Accession Nos. ML13241A241, ML14059A429, ML14248A231, and ML15058A513, respectively), Exelon submitted its first four six-month updates to the OIP. By letter dated August 28, 2013 (ADAMS Accession No. ML13234A503), the NRC notified all licensees and construction permit holders that the staff is conducting audits of their responses to Order EA-12-049 in accordance with NRC Office of Nuclear Reactor Regulation (NRR) Office Instruction LIC-111, "Regulatory Audits" (ADAMS Accession No. ML082900195). This audit process led to the issuance of the Clinton interim staff evaluation (ISE) dated December 17, 2013 (ADAMS Accession No. ML13225A571) and continues with in-office and onsite portions of this audit.

By letter dated February 28, 2013 (ADAMS Accession No. ML13059A306), the licensee submitted its OIP for Clinton in response to Order EA-12-051. By letter dated June 7, 2013 (ADAMS Accession No. ML13134A093), the NRC staff sent requests for additional information (RAIs) to the licensee. By letters dated July 3, 2013, August 28, 2013, February 28, 2014, August 28, 2014, and February 27, 2015 (ADAMS Accession Nos. ML13186A002, ML13241A237, ML14062A058, ML14248A213, and ML15058A622, respectively), the licensee submitted its RAI responses and first four six-month updates to the OIP. The NRC staff's review led to the issuance of the Clinton ISE and RAI dated November 15, 2013 (ADAMS

Accession No. ML13280A326). By letter dated March 26, 2014 (ADAMS Accession No. ML14083A620), the NRC notified all licensees and construction permit holders that the staff is conducting in-office and onsite audits of their responses to Order EA-12-051 in accordance with NRC NRR Office Instruction LIC-111, as discussed above.

The ongoing audit process, to include the in-office and onsite portions, allows the staff to assess whether it has enough information to make a safety evaluation of the Integrated Plans. The audit allows the staff to review open and confirmatory items from the mitigation strategies ISE, RAI responses from the spent fuel pool instrumentation (SFPI) ISE, the licensee's integrated plans, and other audit questions. Additionally, the staff gains a better understanding of submitted and updated information, audit information provided on ePortals, and preliminary Overall Program Documents/Final Integrated Plans while identifying additional information necessary for the licensee to supplement its plan and address staff potential concerns.

In support of the ongoing audit of the licensee's OIPs, as supplemented, the NRC staff conducted an onsite audit at Clinton from March 9-12, 2015, per the audit plan dated February 18, 2015 (ADAMS Accession No. ML15042A557). The purpose of the onsite portion of the audit was to provide the NRC staff the opportunity to continue the audit review and gain key insights most easily obtained at the plant as to whether the licensee is on a successful path for compliance with the Mitigation Strategies and SFPI orders. The onsite activities included detailed analysis and calculation discussions, walk-throughs of strategies and equipment laydown, visualization of portable equipment storage and deployment, review of staging and deployment of offsite equipment, and review of installation details for SFPI equipment.

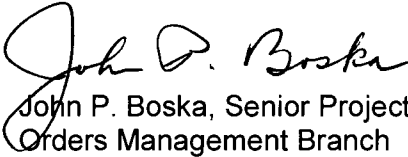
The enclosed audit report provides a summary of the activities for the onsite audit portion. Additionally, this report contains an attachment listing all open audit items currently under NRC staff review.

B. Hanson

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If you have any questions, please contact me at 301-415-2901 or by e-mail at John.Boska@nrc.gov.

Sincerely,


John P. Boska, Senior Project Manager
Orders Management Branch
Japan Lessons-Learned Division
Office of Nuclear Reactor Regulation

Docket No.: 50-461

Enclosure:
Audit report

cc w/encl: Distribution via Listserv



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

AUDIT REPORT BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO ORDERS EA-12-049 AND EA-12-051 MODIFYING LICENSES
WITH REGARD TO REQUIREMENTS FOR
MITIGATION STRATEGIES FOR BEYOND-DESIGN-BASIS EXTERNAL EVENTS
AND RELIABLE SPENT FUEL POOL INSTRUMENTATION
EXELON GENERATION COMPANY, LLC
CLINTON POWER STATION, UNIT NO. 1
DOCKET NO. 50-461

BACKGROUND AND AUDIT BASIS

On March 12, 2012, the U.S. Nuclear Regulatory Commission (NRC) issued Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond Design-Basis External Events" and Order EA-12-051, "Order to Modify Licenses With Regard To Reliable Spent Fuel Pool Instrumentation," (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML12054A736 and ML12054A679, respectively). Order EA-12-049 directs licensees to develop, implement, and maintain guidance and strategies to maintain or restore core cooling, containment, and spent fuel pool (SFP) cooling capabilities in the event of a beyond-design-basis external event (BDBEE). Order EA-12-051 requires, in part, that all operating reactor sites have a reliable means of remotely monitoring wide-range SFP levels to support effective prioritization of event mitigation and recovery actions in the event of a BDBEE. The orders require holders of operating reactor licenses and construction permits issued under Title 10 of the *Code of Federal Regulations* Part 50 to submit for review, Overall Integrated Plans (OIPs) including descriptions of how compliance with the requirements of Attachment 2 of each order will be achieved.

By letter dated February 28, 2013 (ADAMS Accession No. ML13064A274), Exelon Generation Company, LLC (Exelon or the licensee) submitted its OIP for Clinton Power Station, Unit No. 1 (Clinton) in response to Order EA-12-049. By letters dated August 28, 2013, February 28, 2014, August 28, 2014, and February 27, 2015 (ADAMS Accession Nos. ML13241A241, ML14059A429, ML14248A231, and ML15058A513, respectively), Exelon submitted its first four six-month updates to the OIP. By letter dated August 28, 2013 (ADAMS Accession No. ML13234A503), the NRC notified all licensees and construction permit holders that the staff is conducting audits of their responses to Order EA-12-049 in accordance with NRC Office of

Enclosure

Nuclear Reactor Regulation (NRR) Office Instruction LIC-111, "Regulatory Audits" (ADAMS Accession No. ML082900195). This audit process led to the issuance of the Clinton interim staff evaluation (ISE) dated December 17, 2013 (ADAMS Accession No. ML13225A571) and continues with in-office and onsite portions of this audit.

By letter dated February 28, 2013 (ADAMS Accession No. ML13059A306), the licensee submitted its OIP for Clinton in response to Order EA-12-051. By letter dated June 7, 2013 (ADAMS Accession No. ML13134A093), the NRC staff sent requests for additional information (RAIs) to the licensee. By letters dated July 3, 2013, August 28, 2013, February 28, 2014, August 28, 2014, and February 27, 2015 (ADAMS Accession Nos. ML13186A002, ML13241A237, ML14062A058, ML14248A213, and ML15058A622, respectively), the licensee submitted its RAI responses and first four six-month updates to the OIP. The NRC staff's review led to the issuance of the Clinton ISE and RAI dated November 15, 2013 (ADAMS Accession No. ML13280A326). By letter dated March 26, 2014 (ADAMS Accession No. ML14083A620), the NRC notified all licensees and construction permit holders that the staff is conducting in-office and onsite audits of their responses to Order EA-12-051 in accordance with NRC NRR Office Instruction LIC-111, as discussed above.

The ongoing audit process, to include the in-office and onsite portions, allows the staff to assess whether it has enough information to make a safety evaluation of the Integrated Plans. The audit allows the staff to review open and confirmatory items from the mitigation strategies ISE, RAI responses from the spent fuel pool instrumentation (SFPI) ISE, the licensee's integrated plans, and other audit questions. Additionally, the staff gains a better understanding of submitted and updated information, audit information provided on ePortals, and preliminary Overall Program Documents (OPDs)/Final Integrated Plans (FIPs) while identifying additional information necessary for the licensee to supplement its plan and address staff potential concerns.

In support of the ongoing audit of the licensee's OIPs, as supplemented, the NRC staff conducted an onsite audit at Clinton from March 9-12, 2015, per the audit plan dated February 18, 2015 (ADAMS Accession No. ML15042A557). The purpose of the onsite portion of the audit was to provide the NRC staff the opportunity to continue the audit review and gain key insights most easily obtained at the plant as to whether the licensee is on a successful path for compliance with the Mitigation Strategies and SFPI orders. The onsite activities included detailed analysis and calculation discussions, walk-throughs of strategies and equipment laydown, visualization of portable equipment storage and deployment, review of staging and deployment of offsite equipment, and review of installation details for SFPI equipment.

Following the licensee's declarations of order compliance, the NRC staff will evaluate the OIPs, as supplemented; the resulting site-specific OPDs/FIPs; and, as appropriate, other licensee submittals based on the requirements in the orders. For Order EA-12-049, the staff will make a safety determination using the Nuclear Energy Institute (NEI) developed guidance document NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide" issued in August 2012 (ADAMS Accession No. ML12242A378), as endorsed by NRC Japan Lessons-Learned Directorate (JLD) interim staff guidance (ISG) JLD-ISG-2012-01 "Compliance with Order EA-12-049, 'Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events'" (ADAMS Accession No. ML12229A174). For Order EA-12-051, the staff will make a safety determination using the NEI developed

guidance document NEI 12-02, Revision 1, "Industry Guidance for Compliance with NRC Order EA-12-051, 'To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation'" (ADAMS Accession No. ML12240A307), as endorsed, with exceptions and clarifications, by NRC ISG JLD-ISG-2012-03 "Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation," (ADAMS Accession No. ML12221A339) as providing one acceptable means of meeting the order requirements. Should the licensee propose an alternative strategy for compliance, additional staff review will be required to evaluate the alternative strategy in reference to the applicable order.

AUDIT ACTIVITIES

The onsite audit was conducted at the Clinton facility from March 9, 2015, through March 12, 2015. The NRC audit team staff was as follows:

Title	Team Member	Organization
Team Lead/Project Manager	John Boska	NRR/JLD
Technical Support – Electrical	Matthew McConnell	NRR/JLD
Technical Support – Reactor Systems	Matthew Hardgrove	NRR/DSS
Technical Support – Balance of Plant	Kevin Roche	NRR/JLD
Technical Support – Containment	Brett Titus	NRR/JLD
Technical Support - SFPI	Khoi Nguyen	NRR/JLD

The NRC staff executed the onsite portion of the audit per the three part approach discussed in the audit plan, to include conducting a tabletop discussion of the site's integrated mitigating strategies (MS) compliance program, a review of specific technical review items, and discussion of specific program topics. Activities that were planned to support the above included detailed analysis and calculation discussions, walk-throughs of strategies and equipment laydown, visualization of portable equipment storage and deployment, staging and deployment of offsite equipment, and physical sizing and placement of SFPI equipment.

AUDIT SUMMARY

1.0 Entrance Meeting (March 9, 2015)

At the audit entrance meeting, the NRC staff audit team introduced itself followed by introductions from the licensee's staff. The NRC audit team provided a brief overview of the audit's objectives and anticipated schedule.

2.0 Integrated Mitigating Strategies Compliance Program Overview

Per the audit plan and as an introduction to the site's program, the licensee provided a presentation to the NRC audit team describing the site's strategies to meet the NRC orders. The licensee reviewed its strategy to maintain core cooling, containment, and SFP cooling in the event of a BDBEE, and the plant modifications being done in order to implement the strategies. Also reviewed was the design and location of the storage facilities for the FLEX equipment, the interface with the National Strategic Alliance for FLEX Emergency Response (SAFER) Response Centers including staging areas, the spent fuel pool level indication modification, the

modifications planned to enhance emergency communications, and procedural enhancements such as development of FLEX support guidelines (FSGs).

3.0 Onsite Audit Technical Discussion Topics

Based on the audit plan, and with a particular emphasis on the Part 2 "Specific Technical Review Items," the NRC staff technical reviewers conducted interviews with licensee technical staff, site walk-downs, and detailed document review for the items listed in the plan. Results of these technical reviews and any additional review items needed from the licensee are documented in the audit item status table in Attachment 3, as discussed in the Conclusion section below.

3.1 Reactor Systems Technical Discussions and Walk-Downs

NRC staff met with licensee staff to discuss the amount of leakage from the reactor recirculation pump seals, the use of the Reactor Core Isolation Cooling (RCIC) system to maintain reactor pressure vessel (RPV) level, the availability of water sources, and the heatup of the suppression pool due to steam release from the RPV. NRC staff reviewed the analysis and flow calculations along with applicable procedures. The NRC staff reviewed the licensee's strategy for utilizing raw water sources (the Clinton lake), including water filtration and monitoring of core parameters to ensure adequate cooling. The NRC staff also walked down the licensee's strategies and reviewed plant procedures for implementing the core cooling and makeup strategies.

3.2 Electrical Technical Discussions and Walk-Downs

- a. NRC staff reviewed the calculations on extending battery life based on load shedding, and walked down the battery rooms to evaluate strategies for hydrogen and temperature control. NRC staff also walked down panels used for load shedding to evaluate feasibility and timing.
- b. NRC staff walked down connection points and locations for FLEX electrical generators. In order to provide electrical power, the primary 480 volt (480 V) FLEX generator is permanently installed on the 762 foot level of the diesel generator building. It has enough diesel fuel for several hours of operation, and will be refueled after that. A FLEX electrical riser (electrical power conductors) has been installed in the west stairwell of the control building, with connection points on the following elevations: 702 foot, 762 foot, 781 foot, and 825 foot. When needed, temporary electrical cables will be placed to connect the FLEX generator to the riser, through a connection box located near the generator. Temporary electrical cables will then be placed to supply power from the riser to several 480 V electrical buses in the plant. Those buses will then be used to reenergize equipment such as battery chargers and the two suppression pool cleanup pumps. The backup (N+1) electrical generator will be stored in the FLEX Storage Building (FSB) located next to the existing greenhouse at the lake. If the backup generator is needed, it will be moved next to the diesel generator building. Temporary electrical cables will be used to connect it to the connection box near the primary FLEX generator using an engineered opening in the building wall. This will also energize the FLEX electrical riser. Likewise, a 480 V FLEX generator supplied by a National SAFER Response Center (NSRC) could be hooked up here to energize the FLEX electrical riser.

The staff reviewed the licensee's load and sizing calculations for the FLEX generators and did not identify any issues.

3.3 SFPI Technical Discussions and Walk-Downs

NRC staff walked down instrument, transmitter, electronics, and display locations for the SFP level instrumentation, along with the associated cable runs. NRC staff identified a concern with the small separation distance of the waveguides for each of the two SFP level channels in the fuel handling building. The licensee agreed to increase the separation distance. NRC staff also reviewed the available calibration, maintenance and test procedures for the SFP level instrumentation, but noted that most of the calibration procedures were not yet available.

3.4 Other Technical Discussion Areas and Walk-Downs

- a. NRC staff toured the construction area for the FSB located next to the screenhouse at the lake. The staff walked down equipment haul routes from the FSB to the designated deployment sites, and walked down haul routes from designated staging areas for equipment that will be delivered from the NSRC.
- b. NRC staff walked down the FLEX strategies for core cooling, reactor coolant system inventory, SFP inventory, and containment cooling functions. This included the usage of the portable FLEX pumps, hose routing and connection points (primary and alternate). One large FLEX pump will take a suction from the Clinton lake and supply water through a newly-designed FLEX manifold to cool the reactor, the SFP, and the suppression pool through the use of a residual heat removal heat exchanger. A backup pump is available. The NRC staff determined that the use of the permanently installed FLEX manifold was an alternative to the conditions endorsed by the NRC in NEI 12-06, but the staff acknowledges the robustness of the design. The staff requests that the licensee make available for audit an explanation of how this alternative to NEI 12-06 is considered to meet the requirements of the order.
- c. NRC staff reviewed the strategy that will be implemented by the licensee to refuel the portable diesel-powered FLEX equipment. The NRC staff reviewed the instructions for refueling the equipment as well as the equipment needed to perform the refueling. Additionally, the staff reviewed the licensee's procedures for ensuring adequate fuel quality.
- d. The licensee's cooldown strategy relies on operation of the RPV safety relief valves (SRVs). The NRC staff reviewed the capability to operate the SRVs during an extended loss of alternating current power (ELAP).
- e. The NRC staff reviewed the licensee's plans to ensure adequate communications, lighting, personnel access, and equipment access, to successfully implement the strategies. The staff interviewed plant personnel responsible for these areas, and observed lighting and communication needs during plant walkdowns.

4.0 Exit Meeting (March 12, 2015)

The NRC staff audit team conducted an exit meeting with licensee staff following the closure of onsite audit activities. The NRC staff highlighted items reviewed and noted that the results of the onsite audit trip will be documented in this report. There were eight FLEX issues and one SFPI issue open at the conclusion of the audit and they were discussed at the exit meeting. Following the onsite audit, the NRC staff was able to close two additional FLEX issues. See Attachment 3 for additional information.

CONCLUSION

The NRC staff completed all three parts of the onsite audit plan. Each audit item listed in Part 2 of the plan was reviewed by NRC staff members while on site. In addition to the list of NRC and licensee onsite audit staff participants in Attachment 1, Attachment 2 provides a list of documents reviewed during the onsite audit portion.

In support of the continuing audit process as the licensee proceeds towards orders compliance for this site, Attachment 3 provides the status of all open audit review items that the NRC staff is evaluating in anticipation of issuance of a combined safety evaluation for both the MS and SFPI orders. The five sources for the audit items referenced below are as follows:

- a. Interim Staff Evaluation (ISE) Open Items (OIs) and Confirmatory Items (CIs)
- b. Audit Questions (AQs)
- c. Licensee-identified Overall Integrated Plan (OIP) Open Items (OIs)
- d. SFPI Requests for Additional Information (RAIs)
- e. Additional information needed to support the Safety Evaluation (SE)

The attachments provide audit information as follows:

- a. Attachment 1: List of NRC staff and licensee staff audit participants
- b. Attachment 2: List of documents reviewed during the onsite audit
- c. Attachment 3: MS/SFPI SE Audit Items currently under NRC staff review (licensee input needed as noted)

While this report notes the completion of the onsite portion of the audit per the audit plan dated February 18, 2015, the ongoing audit process continues as per the letters dated August 28, 2013, and March 26, 2014, to all licensees and construction permit holders for both orders.

Additionally, while Attachment 3 provides a list of currently open items, the status and progress of the NRC staff's review may change based on licensee plan changes, resolution of generic issues, and other NRC staff concerns not previously documented. Changes in the NRC staff review will be communicated in the ongoing audit process.

Attachments:

1. NRC and Licensee Staff Onsite Audit Participants
2. Onsite Audit Documents Reviewed
3. MS/SFPI Audit Items currently under NRC staff review

Onsite Audit Participants

NRC Staff:

John Boska	NRR/JLD/JOMB
Matthew McConnell	NRR/JLD/JERB
Matthew Hardgrove	NRR/DSS/SRXB

Brett Titus	NRR/JLD/JCBB
Khoi Nguyen	NRR/JLD/JERB
Kevin Roche	NRR/JLD/JCBB

Clinton Staff:

Doug Koons	Supervisor
Jim Peterson	Regulatory Affairs
Patrick Ryan	Fukushima Project
Mark Vandermyde	Fukushima Project
Duane Avery	Fukushima Project
Joe Lizewski	Fukushima Project
Adam Lane	Fukushima Project
Steve Scott	Operations
Rudy Barreda	Operations
Sailaja Mokkalapati	Corporate
Leslie Holden	Corporate (EP, Communications)
David Schupp	Corporate SAM Operations Lead

Documents Reviewed

- Engineering Change EC 391824, "FLEX Battery Coping Study," Rev. 0
- Engineering Change EC 392333, "Fukushima Spent Fuel Pool Level Instrumentation," Rev. 0
- Engineering Change EC 392335, "Fukushima FLEX Internal Generator 480 VAC Connections Required to Support NRC EA-12-049 FLEX Response," Rev. 1
- Engineering Change EC 392343, "Fukushima FLEX Install A Seismic Storage Building Including Electrical"
- Engineering Change EC 392540
- Engineering Change EC 394583, "Fukushima FLEX - Evaluation of Unit 2 Div 2 SX Pipe 2SX02AB Buried Piping Integrity in Support of FLEX Strategies – FLEX Makeup Water," Rev. 0
- Calculation 2013-01301, "Transient Analysis of RCIC Pump Room for Extended Loss of AC Power," Rev. 0
- Calculation 3C10-0390-001, "Rev to EC 334887 Extended Power Uprate – Deferred Calcs and Documents," Rev. 001
- Calculation 3C10-0485-001
- Calculation CL-MISC-009, "MAAP Analysis to Support FLEX Initial Strategy," Rev. 4
- Calculation EAD-FLEXGEN-1, "Electrical Loading and Rating in KW for the FLEX Generator," Rev. 0
- Calculation IP-M-0809, "Hydraulic Evaluation for FLEX Diesel Pump Sizing," Rev. 1
- Calculation IP-M-0810, "Piping Analysis of FX Piping in the Diesel Generator Building," Rev. 1
- Calculation IP-M-0812, "Clinton Power Station (CPS) FLEX Suppression Pool (SP) Piping Modifications Fluid Flow Evaluation", Rev. 0
- Calculation VF-54, "SFP Conditions following a BDBEE," Rev. 0
- Calculation VX-50, "Inverter Room Heat-Up and Battery Room H2 Generation Following a BDBEE," Rev. 0
- Calculation BYR13-187, "Radiological Doses in the Vicinity of the Spent Fuel Pool at Reduced Water Level," Rev. 0
- Calculation IP-S-0295, "FLEX Seismic Analysis of SF Components," Rev. 0
- Calculation IP-S-0302, "Evaluation of SFPI Sensor Mounting Bracket Anchor Plate Detail"
- Calculation IP-S-0303, "Evaluate Mounting Details for Level Transmitters, Electronics Enclosures, Pull Box and Non-Standard Conduit Supports"
- Calculation IP-S-0311, "Evaluation of Non-Standard Conduit, Conduit Supports and Cable Tray Hangers in Support of the New Spent Fuel Pool Level Instrumentation," Rev. 1
- Analysis EMD-025440, "Subsystem 1 RH-07A Piping Analysis", Rev. 3
- CN-PEUS-14-13, "Seismic Analysis of the SFP Mounting Bracket at Clinton Power Station," Rev. 0
- LTR-SEE-II-13-47, WNA-TR-03149-GEN – "SFP Sloshing Analysis"

- LTR-SFPIS-13-35, "Basis for Radiation Dose Requirement and Clarification of Production Equivalency of Electronics Enclosure Used for Seismic and EMC Testing"
- EQ-QR-269, WNA-TR-03149-GEN, EQ-TP-353 – "Seismic Qualification of Other Components of SFPI"
- E03-1FC00, "External Wiring Diagram Spent Fuel Pool Level Instrumentation System FC," Rev.0
- E02-1AP03, "Electric Loading Diagram Clinton Power Station Unit 1 Clinton, Illinois," Rev. AB
- E03-1AP00, "External Wiring Diagram Aux Bldg 480V Riser 1A (1AP68A) Aux Bldg 480V Riser 1A (1AP69A) Clinton Power Station Unit 1 Illinois Power Company Clinton, Illinois," Sheet 28, Rev. F
- E03-1AP00, "Control Bldg 480V Riser A (0AP39E) Control Bldg 480V Riser B (0AP40A) Clinton Power Station Unit 1 Clinton, Illinois," Sheet 31, Rev. E
-
- E02-0AP21, "Key Diagram Control BLDG MCC E2 (0AP54EB) Clinton Power Station Unit 1," Rev. AD
- E02-0AP22, "Key Diagram Control BLDG MCC F1 (0AP55EA) Clinton Power Station Unit 1," Rev. M
- E02-0AP23, "Key Diagram Control BLDG MCC F2 (0AP55EB) Clinton Power Station Unit 1," Rev. T
- E02-1AP47, "Key Diagram Auxiliary BLDG MCC 1A1 (1AP72E) Clinton Power Station Unit 1," Sheets 1 Rev. AF and Sheet 2 Rev. S
- E02-1AP48, "Key Diagram Aux. BLDG MCC 1A2 (1AP73E) Clinton Power Station Unit 1," Rev. U
- E02-1AP49, "Key Diagram Auxiliary Building MCC 1A3 (1AP74E) Clinton Power Station Unit 1," Rev. Z
- E02-1AP50, "Key Diagram Auxiliary Building MCC 1A4 (1AP93E) and Auxiliary Building MCC 1B4 (1AP94E) Clinton Power Station Unit 1," Rev. R
- E02-1AP51, "Key Diagram Auxiliary BLDG MCC 1B1 (1AP75E) Clinton Power Station Unit 1," Sheet 1 Rev. AC and Sheet 2 Rev. M
- E02-1AP52, "Key Diagram Auxiliary Building MCC 1B2 (1AC76E) Clinton Power Station Unit 1," Rev. V
- E02-1AP53, "Key Diagram Auxiliary BLDG MCC 1B3 (1AP77E) Clinton Power Station Unit 1," Rev. X
- E02-1AP64, "Key Diagram Diesel Generator MCCs 1A & 1B (1AP60E) & (1AP61E) Clinton Power Station," Rev. Y
- E02-1LP99, "Low Pressure Core Spray," Sheet 4, Rev. P
- CC-AA-118, "Site Implementation of Diverse and Flexible Coping Strategies (FLEX) and Spent Fuel Pool Instrumentation Program," Exelon Corporate Document
- CC-CL-118, "Site Implementation of Diverse and Flexible Coping Strategies (FLEX) and Spent Fuel Pool Instrumentation Program," (Draft)
- FSG CPS 4306.01P001, "FLEX Electrical Connections," (Draft)
- FSG CPS 4306.01P002, "FLEX UHS Water Supply," (Draft)
- FSG CPS 4306.01P003, "FLEX Suppression Pool Cooling," (Draft)
- FSG CPS 4306.01P004, "FLEX Low Pressure RPV Makeup," (Draft)
- FSG CPS 4306.01P005, "FLEX RCIC Operation," (Draft)

- FSG CPS 4306.01P006, "FLEX Suppression Pool Makeup," (Draft)
- FSG CPS 4306.01P007, "FLEX Spent Fuel Pool Makeup," (Draft)
- FSG CPS 4306.01P008, "FLEX Diesel Fuel Oil Supply," (Draft)
- FSG CPS 4306.01P009, "FLEX ADS Air Supply," (Draft)
- FSG CPS 4306.01P010, "FLEX Ventilation," (Draft)
- FSG CPS 4306.01P011, "FLEX Lighting," (Draft)
- FSG CPS 4306.01P012, "FLEX Communications," (Draft)
- FSG CPS 4303.01P015, "Alternate Methods for Obtaining Essential Parameter Values" (Draft)
- FSG CPS 4306.01P016, "FLEX Equipment Storage and Deployment," (Draft)
- FSG CPS 4306.01P017, "ELAP During Modes 4 and 5," (Draft)
- FSG CPS 4306.01P019, "FLEX Dewatering," (Draft)
- FSG CPS 4306.01P020, "FLEX Recovery," (Draft)
- CPS 4306.01C001, "FLEX Electrical Connection Hard Cards," (Draft)
- CPS 4306.01C002, "FLEX UHS Water Supply Hard Cards," (Draft)
- CPS 4306.01C003, "BDBEE Damage Assessment," (Draft)
- CPS 4306.01C021, "FLEX Main Generator Venting Hard Card," (Draft)
- CPS 4200.01, "Loss of AC Power," Draft of Rev. 24
- CPS 4200.01C001, "MCR Cooling During a SBO," Rev. 4c
- CPS 4200.01C002, "DC Load Shedding During a SBO," Draft of Rev. 5a
- CPS 4200.01C003, "Monitoring Containment Temperatures During a SBO," Rev. 1a
- CPS 4200.01C004, Manual CTMT Isolation During a SBO," Rev. 3
- CPS 4303.02, "Abnormal Lake Level," Draft of Rev 13
- Procedure WC-AA-107, "Seasonal Readiness," Rev 14
- OU-AA-103, "Shutdown Safety Management Program," Rev. 15
- OU-CL-104, "Shutdown Safety Management Program," Rev. 13
- EP-AA-112-100-F-01, "Shift Emergency Director Checklist"
- EP-AA-112-400-F-01, "Nuclear Duty Officer Checklist"
- EP-AA-112-400-F-04, "EOF Logistics Manager Checklist," Rev. K
- AREVA Document No. NSRC-005, "SAFER Response Plan for Clinton Power Station," Rev. 001, 2/20/15 (not yet approved by the site)
- Exelon Position Paper, EXC-WP-03, "FLEX Guidance for Shutdown/Refueling Modes," Rev. 1

Mitigation Strategies/Spent Fuel Pool Instrumentation Safety Evaluation Audit Items:

Audit Items Currently Under NRC Staff Review, Requiring Licensee Input As Noted

Audit Item Reference	Item Description	Licensee Input Needed
ISE CI 3.2.4.2.A	The licensee did not address the effect of potential temperature increases or decreases on the capacity of the station batteries due to loss of battery ventilation resulting from an ELAP.	The staff requests that the licensee make available for audit an analysis of the battery room temperatures during an ELAP for both high and low temperatures, and an estimate of the impact on the capacity of the station batteries.
6-SE	The final validation and verification and timeline checks of procedures and operator actions during an ELAP need to be performed when procedures are completed.	The staff requests that the licensee make available for audit the validation and verification of the procedures and timeline that shows the actions for an ELAP can be completed as planned.
13-SE	In some areas the FLEX electrical riser panels are very close to block walls (e.g., Control Building 762'). There is no analysis to show that in a seismic event the block walls will not damage the electrical riser system. Also, the staff finds that the riser is an alternative to NEI 12-06 Section 3.2.2, since there is not a primary and alternate method to repower key equipment.	The staff requests that the licensee make available for audit an engineering analysis that shows the FLEX electrical riser system will remain functional in a seismic event, especially considering the potential for failure of the block walls, and provide an explanation of how this alternative to NEI 12-06 is considered to meet the requirements of the order.
14-SE	The calculated suppression pool maximum temperature of 210°F exceeds the design temperature of 185°F during the ELAP event. (Note: This is currently an issue at all boiling-water reactors with Mark III containments.)	The staff requests that the licensee make available for audit an explanation of why exceeding the design temperature will not result in adverse consequences.

Audit Item Reference	Item Description	Licensee Input Needed
15-SE	The licensee needs to show that the electrical equipment in the containment building will function in the high temperature environment of an ELAP for as long as it is needed to provide the FLEX function. Of special concern are the actuators for the SRVs and the RPV level instruments.	The staff requests that the licensee make available for audit an analysis that shows satisfactory performance of the electrical equipment inside the containment building that is used during an ELAP, considering the elevated temperatures there.
16-SE	The licensee plans to use a single, installed FLEX manifold located in the diesel building to distribute containment, core, and spent fuel pool cooling water. The staff finds that this is an alternative to NEI 12-06 Section 3.2.2. Specifically, Table C-1 provides guidance on primary and alternate connections and states that injection points are, "required to inject through separate divisions/trains, i.e., should not have both connections in one division/train." While the licensee has multiple injection paths for core and spent fuel pool cooling downstream of the manifold, all cooling water delivery paths must be routed through the single FLEX manifold. Therefore, both the primary and alternate methods share a common connection. The staff's review does show that the FLEX manifold has a robust construction.	The staff requests that the licensee make available for audit an explanation of how this alternative to NEI 12-06 is considered to meet the requirements of the order.
SFPI RAI-10-D	The licensee should provide a description of the capability and provisions the proposed level sensing equipment will have to enable periodic testing, calibration, and functional checks, including how this capability enables the equipment to be tested in-situ.	Please make available for staff audit the calibration procedure that includes the following: 1. Acceptance criteria for instrument accuracy and tolerances. 2. Channel check. 3. In-situ testing

B. Hanson

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If you have any questions, please contact me at 301-415-2901 or by e-mail at John.Boska@nrc.gov.

Sincerely,

/RA/

John P. Boska, Senior Project Manager
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Docket No.: 50-461

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