



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

June 25, 2015

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

SUBJECT: QUAD CITIES NUCLEAR POWER STATION, UNITS 1 AND 2 - 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. MF1048, MF1049, MF1052, AND MF1053)

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. ML13060A420), Exelon Generation Company, LLC (the licensee or Exelon) submitted its OIP for Quad Cities Nuclear Power Station, Units 1 and 2 (Quad Cities) 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. ML13241A287, ML14059A432, ML14248A240, and ML15061A433, 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 Quad Cities interim staff evaluation (ISE) dated November 22, 2013 (ADAMS Accession No. ML13220A351), and continues with in-office and onsite portions of this audit.

By letter dated February 28, 2013 (ADAMS Accession No. ML13060A124), the licensee submitted its OIP for Quad Cities in response to Order EA-12-051. By letters dated June 7, 2013 (ADAMS Accession No. ML13134A093) and November 26, 2013 (ADAMS Accession No. ML13318A953), 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. ML13186A003, ML13241A243, ML14062A063, ML14248A217, and ML15058A631, 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 Quad Cities ISE and RAI dated October 9, 2013 (ADAMS Accession No. ML13275A121). 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 information, identifies additional information necessary for the licensee to supplement its plan, and identifies any staff potential concerns.

In support of the ongoing audit of the licensee's OIPs, as supplemented, the NRC staff conducted an onsite audit at Quad Cities from January 26-29, 2015, per the audit plan dated December 12, 2015 (ADAMS Accession No. ML14339A838). 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.

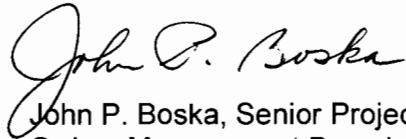
The enclosed audit report provides a summary of the activities for the onsite audit portion. Additionally, this report contains an attachment listing all open audit items currently under NRC staff review.

B. Hanson

- 3 -

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

Sincerely,

A handwritten signature in black ink, reading "John P. Boska". The signature is fluid and cursive, with the first letters of each word being capitalized and prominent.

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

Docket Nos.: 50-254 and 50-265

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  
QUAD CITIES NUCLEAR POWER STATION, UNITS 1 AND 2  
DOCKET NOS. 50-254 and 50-265

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.

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Enclosure

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 Quad Cities interim staff evaluation (ISE) dated November 22, 2013 (ADAMS Accession No. ML13220A351) and continues with in-office and onsite portions of this audit.

By letter dated February 28, 2013 (ADAMS Accession No. ML13060A124), the licensee submitted its OIP for Quad Cities in response to Order EA-12-051. By letters dated June 7, 2013 (ADAMS Accession No. ML13134A093) and November 26, 2013 (ADAMS Accession No. ML13318A953), 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. ML13186A003, ML13241A243, ML14062A063, ML14248A217, and ML15058A631, 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 Quad Cities ISE and RAI dated October 9, 2013 (ADAMS Accession No. ML13275A121). 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 information, identifies additional information necessary for the licensee to supplement its plan, and identifies any staff potential concerns.

In support of the ongoing audit of the licensee's OIPs, as supplemented, the NRC staff conducted an onsite audit at Quad Cities from January 26-29, 2015, per the audit plan dated December 12, 2015 (ADAMS Accession No. ML14339A838). 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 Overall Program Documents (OPDs) and Final Integrated Plans (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 Quad Cities facility from January 26, 2015, through January 29, 2015. The NRC audit team staff was as follows:

<b>Title</b>	<b>Team Member</b>	<b>Organization</b>
Team Lead/Project Manager	John Boska	NRR/JLD
Technical Support – Electrical	Kerby Scales	NRR/JLD
Technical Support – Reactor Systems	Joshua Miller	NRR/JLD
Technical Support – Balance of Plant	Michael Levine	NRR/JLD
Technical Support – Containment	Brian Lee	NRR/JLD
Technical Support – I&C	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 (January 26, 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

The 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. The 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 (wells at the site and the Mississippi River), 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 strategies and makeup strategies.

#### 3.2 Electrical Technical Discussions and Walk-Downs

a. The 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. The NRC staff also walked down panels used for load shedding to evaluate feasibility and timing.

b. The NRC staff walked down connection points and locations for FLEX electrical generators. When construction is completed, three 480 volt (V) FLEX electrical generators will be stored in the new FLEX storage building (FSB). In order to provide electrical power, the three 480V FLEX generators will be moved from the FSB to just outside the reactor building, and temporary cables will be connected from two of the generators to a safety bus for each reactor, with the third 480V FLEX generator powering the deepwell pump in the seismic well. Two other 480V generators will be stored in an N+1 storage building as backups. The staff reviewed the licensee's load and sizing calculations for the FLEX generators.

#### 3.3 SFPI Technical Discussions and Walk-Downs

The NRC staff walked down instrument, transmitter, electronics, and display locations for the SFP level instrumentation, along with the associated cable runs. No concerns were

identified during the walkdown. The NRC staff also reviewed the associated calibration, maintenance and test procedures for the SFP level instrumentation.

### 3.4 Other Technical Discussion Areas and Walk-Downs

a. The NRC staff toured the construction area for the FSB and reviewed the building plans. The FSB is designed to survive all site hazards. The commercial storage for the N+1 equipment is not protected from all hazards. The NRC staff expressed a concern that this was an alternative to the storage configurations listed in the NEI 12-06 guidance. The NRC 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 National SAFER Response Center (NSRC). Until construction is completed on the FSB, the licensee will utilize two seismically qualified concrete pads with considerable separation which makes it very unlikely that both pads could be affected by a tornado. Each pad will have sufficient FLEX equipment to implement the FLEX strategy for Unit 1. The FSB will be completed prior to the order compliance date for Unit 2. Once the FSB is completed, the concrete pads will not be needed.

b. The NRC staff walked down the FLEX strategies for core cooling, RCS inventory, and SFP inventory functions. This included the point of deployment for the portable FLEX pumps, hose routing and deployment connection points (primary and alternate).

c. The 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 electromatic relief valves (ERVs). The NRC staff reviewed the capability to operate the ERVs 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 NRC staff interviewed plant personnel responsible for these areas, and observed lighting and communication needs during plant walkdowns.

### 4.0 Exit Meeting (January 29, 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 no SFPI issues open at the conclusion of the audit and they were discussed at the exit meeting. Three of the open issues were closed by the NRC audit team subsequent to the onsite visit. 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 (SE) 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 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 December 12, 2014, 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
Kerby Scales	NRR/JLD/JERB
Joshua Miller	NRR/JLD/JERB
Brian Lee	NRR/JLD/JCBB

Michael Levine	NRR/JLD/JCBB
Khoi Nguyen	NRR/JLD/JERB

### Quad Cities Staff:

Jim Guest	Fukushima Team Lead
Jason Swain	Operations
Richard Swart	Electrical Engineering
Brian Edmark	Electrical Engineering (SFPI)
Koua Moua	Mechanical Engineering
Jason Hawman	Mechanical Engineering
Jeff Kopacz	Mechanical Engineering
Tom Petersen	Regulatory Assurance
Joseph Bellich	Operations
Jim Wethington	Project Manager
Thomas Hancock	Operations
Leslie Holden	Corporate (EP, Communications)
Jay Lyter	Corporate (Severe Accident Management)

## Documents Reviewed

- QDC-0000-M-2097, "PIPE FLO Analysis of FLEX Strategy"
- QDC-0000-S-2134, "FLEX Travel Path Liquefaction Evaluation"
- QDC-1300-M-2074, "Determination of RCIC NPSH during a BDB FLEX Event"
- QDC-1900-S-2108, "Evaluation of SFPI Sensor Mounting Detail Anchorage"
- CN-PEUS-14-5, "Seismic Analysis of the SFP Mounting Bracket at LaSalle and Quad Cities Nuclear Generating Stations"
- QDC-1900-S-2109, "Seismic Calculation of the Spent Fuel Pool Instrumentation System Equipment"
- QDC-7300-E-2099, "Unit 1(2) 480 VAC FLEX Diesel Generator and Cable Sizing for Beyond Design Basis FLEX Event," Rev. 0
- QDC-8300-E-2100, "Unit 1(2) 125 VDC Battery Coping Calculation for Beyond Design Basis Flex Event," Rev. 0
- QDC-8350-E-2101, "Unit 1(2) 250 VDC Battery Coping Calculation for Beyond Design Basis Flex Event," Rev. 0
- QC-1ET-E-001, "Battery Room Minimum Air Flow Requirements," Rev. 0
- 2014-02948, "Reactor Building Temperature Analysis Resulting from Extended Loss of AC Power" (Draft)
- 2014-05860, "Battery and Charger Room Temperature Response for FLEX Evaluation," Rev. 0
- 4E-1306, "Key Diagram Reactor Building 480V SW Groups 18 and 19"
- 4E-1318A, "Key Diagram Turbine Building 125V DC Main Bus Distribution Panel," Rev. X
- 4E-1318B, "Overall Key Diagram 125V DC Distribution Centers"
- 4E-1318, Sheet 1, "Key Diagram 125V DC Turbine Building Reserve Bus Distribution Panel and 125V DC Reactor Building Distribution Panel 1," Rev. M
- 4E-1318, Sheet 2, "Key Diagram Turbine Building 125V DC Reserve Bus Distribution Panel," Rev. M
- 4E-2306, Sheet 1, "Key Diagram Reactor Building 480V SWGR 28," Rev. 2
- 4E-2306, Sheet 2, "Key Diagram Reactor Building 480V SW GRPS 28, 29"
- 4E-2317, "Key Diagram 250V DC Motor Control Centers," Rev. N
- 4E-2791, "External Wiring Diagram Spent Fuel Pool Level Instrumentation"
- EC 393703, "Install Remote Readout Capability for Spent Fuel Pool Level Instrumentation – Fukushima"
- EC 394892, "Modify the Battery Room Exhaust Fan Electrical Supply from ELC"
- 
- EC 395571, "U1 ECCS Room Cooler Modification [RCIC]"
- EC 395572, "U2 ECCS Room Cooler Modification [RCIC]"
- EC 399944, "Quad Cities FLEX Diesel Fuel Oil Plan," Rev. 0
- EC 399998, "Operation of RCIC and HPCI During FLEX (250 VDC Load Profile)," Rev. 0
- CC-QC-118, "Site Implementation of Diverse and Flexible Coping Strategies (FLEX) and Spent Fuel Pool Instrumentation Program," (Draft)

- EOP QGA 100, "RPV Control," (Draft)
- EOP QGA 200, "Primary Containment Control," (Draft)
- EOP QGA 500-1, "RPV Blowdown," (Draft)
- QCOA 0010-16, "Flood Emergency Procedure," Rev. 21
- QCOA 0010-22, "Local Intense Precipitation Response Procedure," (Draft)
- QCOA 6100-03, "Loss of Offsite Power," (Draft)
- QCOA 6100-04, "Station Blackout," (Draft)
- QCOA 6100-04, Attachment D, "Extended Loss of AC Power (ELAP) Actions," (Draft)
- QCOA 1900-01, "Loss of Water Level in the Fuel Storage Pool or Reactor Cavity," (Draft)
- QCOP 0050-01, "Unit 1 FLEX DC Load Shed," (Draft)
- QCOP 0050-02, "Unit 2 FLEX DC Load Shed," (Draft)
- QCOP 0050-03, "FLEX Site Damage Assessment," (Draft)
- QCOP 0050-04, "FLEX Refuel Floor Actions," (Draft)
- QCOP 0050-05, "FLEX Fire Hose Deployment," (Draft)
- QCOP 0050-06, "FLEX RPV, Suppression Pool, and Spent Fuel Pool Level Control," (Draft)
- QCOP 0050-07, "FLEX Generator and Power Cable Deployment," (Draft)
- QCOP 0050-08, "FLEX Electrical Restoration," (Draft)
- QCOP 0050-09, "FLEX Response Instrumentation," (Draft)
- QCOP 0050-10, "FLEX Battery Room Ventilation," (Draft)
- QCOP 0050-11, "FLEX Control Room Ventilation," (Draft)
- QCOP 0050-12, "FLEX RCIC System Operation," (Draft)
- QCOP 0050-13, "FLEX Generator/Pump Refueling," (Draft)
- QCOP 0050-15, "FLEX 125/250 DC Operation," (Draft)
- QCOP 0050-16, "FLEX National SAFER Response Center Interface," (Draft)
- QCOP 0050-17, "FLEX RCIC Room Cooler Lineup," (Draft)
- QCOS 0010-03, "Safe Shutdown Equipment Inspection"
- QCOS 0050-01, "FLEX Diesel Generator Test," (Draft)
- QCOS 0050-02, "FLEX Haul Path Inspection," (Draft)
- QCOS 0050-03, "FLEX Equipment Check Surveillance," (Draft)
- QCOS 0050-04, "FLEX Sound Powered Phone Surveillance," (Draft)
- QCAP 1500-07, "Administrative Tracking Requirements for Non-Functional FLEX Equipment," (Draft)
- QCIPM 1900-01, "SFP Level Instrumentation Calibration"
- SA-AA-111, "Heat Stress Control"
- SY-QC-101-411, "Active Vehicle Barrier System/Motorized Gate Manual Operation," Rev. 1
- OU-AA-103, "Shutdown Safety Management Program," Rev. 15
- EP-AA-112-100-F-01, "Shift Emergency Director Checklist"
- EP-AA-112-400-F-01, "Nuclear Duty Officer Checklist," Rev. F
- EP-AA-112-400-F-02, "Corporate Emergency Director Checklist"
- EP-AA-112-400-F-04, "EOF Logistics Manager Checklist," Rev. K
- AREVA Document No. 51-9233428, "Quad Cities Nuclear Generating Station SAFER Response Plan," (Draft)

**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 3.1.1.2.B	A postulated downstream dam failure from a seismic event is still being evaluated. This may result in river water level being low at Quad Cities, causing an inability to take water from the river. For that case, the licensee has installed a seismically qualified deepwell capable of supplying the water needed for cooling of both reactors and SFPs. However, there is no backup strategy if the deepwell pump fails or is out of service, contrary to the policy stated in NEI 12-06.	The planned configuration is an alternative to NEI 12-06. The staff requests that the licensee make available for audit a strategy for a water supply that conforms to NEI 12-06, or provide justification for an alternative to NEI 12-06.
AQ 28-B	The licensee stated that it can mitigate the effects of an ELAP indefinitely using phase two portable equipment and utilizing the Phase 3 NSRC equipment as back-up for reliability if needed. However, for a seismic event the licensee only has one seismically qualified well pump, and there is no NSRC equipment that can substitute for the well pump. Although there will be a spare well pump at the site, the replacement time of 72 hours	The staff requests that the licensee make available for audit a method of providing cooling water to the RPV and SFP should the well pump fail following a seismic event that damages the downstream dam and lowers the river level at the site. The NRC staff considers this an alternative to NEI 12-06, as there is potentially no N+1 backup for the well pump for a seismic event.
AQ 49-B	Provide details of the maintenance and testing plan for portable/FLEX electrical equipment that is credited for events that require mitigating strategies.	The site specific Quad Cities FLEX Program Document which contains PMs and Surveillances has been completed and is being reviewed by the NRC.

Audit Item Reference	Item Description	Licensee Input Needed
SE 9-E	<p>For the design-basis Mississippi River flood, most of the site will have several feet of water. The licensee should get about 4 days advance warning from the Army Corps of Engineers, but the licensee had no plans to bring in NSRC Phase 3 equipment prior to the arrival of the flood waters.</p>	<p>The staff requests that the licensee make available for audit an analysis discussing the reliability of performing the planned functions (removing both heads and flooding up). Also, discuss the expected availability of power sources given the reasonably-well-defined flood hazard, the time required to take the actions, and the ability to get backup power or replacement stud detensioners.</p>
SE 10-E	<p>For storage of FLEX equipment, the licensee's current plan is to use one robust building with N equipment and one commercial building with the +1 equipment. This is an alternative strategy approach to the guidelines of NEI 12-06. When the first unit reaches the compliance date, it may be satisfactory if the N+1 equipment will fit in the FSB. However, the FSB is not large enough to fit all the FLEX equipment when both units need to be in compliance.</p>	<p>The NRC staff understands that most Exelon plants are using this approach. However, the NRC will need to approve an alternative strategy as proposed by the licensee for this approach.</p>

B. Hanson

- 3 -

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  
Orders Management Branch  
Japan Lessons-Learned Division  
Office of Nuclear Reactor Regulation

Docket Nos.: 50-254 and 50-265

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