



Order No. EA-12-049

RS-13-129

August 28, 2013

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

Quad Cities Nuclear Power Station, Units 1 and 2
Renewed Facility Operating License Nos. DPR-29 and DPR-30
NRC Docket Nos. 50-254 and 50-265

Subject: First Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)

References:

1. NRC Order Number EA-12-049, "Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," dated March 12, 2012
2. NRC Interim Staff Guidance 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," Revision 0, dated August 29, 2012
3. NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," Revision 0, dated August 2012
4. Exelon Generation Company, LLC's Initial Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049), dated October 25, 2012
5. Exelon Generation Company, LLC Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049), dated February 28, 2013 (RS-13-025)
6. NRC Order Number EA-12-050, "Issuance of Order to Modify Licenses with Regard to Reliable Hardened Containment Vents," dated March 12, 2012
7. NRC Order Number EA-13-109, "Issuance of Order to Modify Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," dated June 6, 2013

On March 12, 2012, the Nuclear Regulatory Commission ("NRC" or "Commission") issued an order (Reference 1) to Exelon Generation Company, LLC (EGC). Reference 1 was immediately effective and directs EGC to develop, implement, and maintain guidance and strategies to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities in the event of a beyond-design-basis external event. Specific requirements are outlined in Attachment 2 of Reference 1.

Reference 1 required submission of an initial status report 60 days following issuance of the final interim staff guidance (Reference 2) and an overall integrated plan pursuant to Section IV, Condition C. Reference 2 endorses industry guidance document NEI 12-06, Revision 0 (Reference 3) with clarifications and exceptions identified in Reference 2. Reference 4 provided the EGC initial status report regarding mitigation strategies. Reference 5 provided the Quad Cities Nuclear Power Station, Units 1 and 2 overall integrated plan.

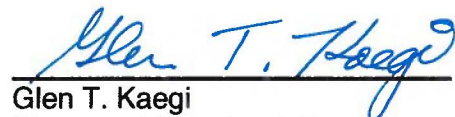
Reference 1 requires submission of a status report at six-month intervals following submittal of the overall integrated plan. Reference 3 provides direction regarding the content of the status reports. The purpose of this letter is to provide the first six-month status report pursuant to Section IV, Condition C.2, of Reference 1, that delineates progress made in implementing the requirements of Reference 1. The enclosed report provides an update of milestone accomplishments since the last status report, including any changes to the compliance method, schedule, or need for relief and the basis, if any.

As described in Reference 5, full implementation of NRC Order EA-12-049 required mitigation strategies is dependent upon implementation of reliable hardened containment venting capability established in accordance with NRC Order EA-12-050 (Reference 6). NRC Order EA-13-109 (Reference 7) issued by the NRC on June 6, 2013, rescinded the requirements of Order EA-12-050 and established revised schedule timelines and implementation dates for reliable hardened containment vents capable of operation under severe accident conditions. The revised schedule and implementation timeline contained in Order EA-13-109 delays the ability to achieve full implementation of the mitigation strategy requirements of Order EA-12-049. This need for relaxation from the implementation requirements of Order EA-12-049 is described in Section 5 of the enclosed update report. The request for relaxation of the full implementation schedule requirements of Order EA-12-049 will be submitted separately.

This letter contains no new regulatory commitments. If you have any questions regarding this report, please contact David P. Helker at 610-765-5525.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 28th day of August 2013.

Respectfully submitted,



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

Enclosure:

1. Quad Cities Nuclear Power Station, Units 1 and 2 First Six-Month Status Report for the Implementation of Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events

cc: Director, Office of Nuclear Reactor Regulation
NRC Regional Administrator - Region III
NRC Senior Resident Inspector - Quad Cities Nuclear Power Station, Units 1 and 2
NRC Project Manager, NRR - Quad Cities Nuclear Power Station, Units 1 and 2
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Illinois Emergency Management Agency - Division of Nuclear Safety

Enclosure

Quad Cities Nuclear Power Station, Units 1 and 2

**First Six-Month Status Report for the Implementation of Order EA-12-049, Order
Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-
Design-Basis External Events**

(9 pages)

Enclosure

Quad Cities Nuclear Power Station, Units 1 and 2 First Six Month Status Report for the Implementation of Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events

1 Introduction

Quad Cities Nuclear Power Station, Units 1 and 2 developed an Overall Integrated Plan (Reference 1 in Section 8), documenting the diverse and flexible strategies (FLEX), in response to Reference 2. This enclosure provides an update of milestone accomplishments since submittal of the Overall Integrated Plan, including any changes to the compliance method, schedule, or need for relief/relaxation and the basis, if any.

2 Milestone Accomplishments

None.

3 Milestone Schedule Status

The following provides an update to Attachment 2 of the Overall Integrated Plan. It provides the activity status of each item, and whether the expected completion date has changed. The dates are planning dates subject to change as design and implementation details are developed.

The revised target completion dates impact the order implementation date. An explanation of the impact of these changes is provided in Section 5 of this enclosure.

Milestone Schedule

Milestone	Target Completion Date	Activity Status	Revised Target Completion Date
Submit 60 Day Status Report	Oct 2012	Complete	
Submit Overall Integrated Plan	Feb 2013	Complete	
Contract with RRC		Complete	
Submit 6 Month Updates:			
Update 1	Aug 2013	Complete with this submittal	
Update 2	Feb 2014	Not Started	
Update 3	Aug 2014	Not Started	

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Milestone	Target Completion Date	Activity Status	Revised Target Completion Date
Update 4	Feb 2015	Not Started	
Update 5	Aug 2015	Not Started	
Update 6	Feb 2016	Not Started	
Update 7	Aug 2016	Not Started	
Submit Completion Report		Not Started	See Section 5 of this enclosure.
Modifications Development & Implementation:			
Unit 1 Modification Development (All FLEX Phases)	Feb 2014	Started	April 2014
Unit 1 Modification Implementation (All FLEX Phases)	Apr 2015	Not Started	
Unit 2 Modification Development (All FLEX Phases)	Mar 2015	Started	
Unit 2 Modification Implementation (All FLEX Phases)	Apr 2016	Not Started	
Procedures:			
Create Site-Specific Procedures	Apr 2015	Not Started	
Validate Procedures (NEI 12-06, Sect. 11.4.3)	Apr 2015	Not Started	
Create Maintenance Procedures	Apr 2015	Not Started	
Perform Staffing Analysis	Nov 2014	Not Started	
Storage Plan and Construction	Apr 2015	Started	
FLEX Equipment Acquisition	Apr 2015	Started	
Training Completion	Apr 2015	Not Started	
Regional Response Center Operational	Dec 2014	Started	
Unit 1 FLEX Implementation	Apr 2015	Started	See Section 5 of this enclosure.
Unit 2 FLEX Implementation	Apr 2016	Started	See Section 5 of this enclosure.

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Milestone	Target Completion Date	Activity Status	Revised Target Completion Date
Full Site FLEX Implementation	Apr 2016	Started	See Section 5 of this enclosure.

4 Changes to Compliance Method

There are no changes to the compliance method as documented in the Overall Integrated Plan (Reference 1).

5 Need for Relief/Relaxation and Basis for the Relief/Relaxation

NRC Order EA-12-049 (Reference 2) requires implementation of Mitigation Strategies to include procedures, guidance, training, and acquisition, staging, or installing of equipment needed for the strategies. The Overall Integrated Plan (Reference 1) provided the Quad Cities Station response to NRC Order EA-12-049. The cover letter identifies that delays in implementing the Hardened Containment Vent System as required by NRC order EA-12-050 (Reference 5) will also affect implementation of the Mitigation Strategies Order EA-12-049 actions. The Reference 1 enclosure describes the Quad Cities Station Mitigation Strategies that are based on venting the containment using the Hardened Containment Vent System. It also describes that a modification to install a Hardened Containment Vent System (HCVS) is required. Thus the Quad Cities Station NRC Order EA-12-049 response provided in Reference 1 was premised on installation and use of a Hardened Containment Vent System as required by NRC Order EA-12-050.

Upon issuance of NRC Order EA-13-109 (Reference 3), the NRC staff changed technical and schedule requirements applicable to the Hardened Containment Vent System and rescinded the requirements of the NRC Order EA-12-050. As a result, full compliance to the Mitigation Strategies required by NRC Order EA-12-049 and described in Reference 1 for Quad Cities Station Units 1 and 2 will not be achieved until compliance to NRC Order EA-13-109 is achieved. Therefore, relaxation from the Mitigation Strategies (FLEX) full implementation date, as specified in NRC Order 12-049, Section IV.A.2 requirements is needed. The associated request for relaxation will be submitted separately.

In summary, the Quad Cities Overall Integrated Plan for Mitigation Strategies (Reference 1) will be met as planned and scheduled, except for areas impacted by NRC Order EA-13-109 on the Hardened Containment Vent System, which will be discussed in a separate request for relaxation.

6 Open Items from Overall Integrated Plan and Draft Safety Evaluation

The following tables provide a summary of the open items documented in the Overall Integrated Plan (Reference 1) or the Draft Safety Evaluation (SE) (when available), and the status of each item.

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Section Reference	Overall Integrated Plan Open Item	Status
Sequence of Events (p. 4)	1. The times to complete actions in the Events Timeline are based on operating judgment, conceptual designs, and current supporting analyses. The final timeline will be time validated once detailed designs are completed and procedures are developed, and the results will be provided in a future six-month update.	Not Started
Sequence of Events (p. 4,5)	2. Issuance of BWROG document NEDC-33771P, "GEH Evaluation of FLEX Implementation Guidelines," on 01/31/2013 did not allow sufficient time to perform the analysis of the deviations between Exelon's engineering analyses and the analyses contained in the BWROG document prior to submittal of this Integrated Plan. This analysis is expected to be completed, documented on Attachment 1B, and provided to the NRC in the August 2013 six-month status update.	Completed. Attached to this 6-month update (Attachment 1)
Sequence of Events (p. 6)	3. Additional work will be performed during detailed design development to ensure Suppression Pool temperature will support RCIC operation, in accordance with approved BWROG analysis, throughout the event.	Not Started
Sequence of Events (p. 7)	4. Initial calculations were used to determine the fuel pool timelines. Formal calculations will be performed to validate this information during development of the Spent Fuel Pool Cooling strategy detailed designs, and will be provided in a future six-month update.	Not Started
Multiple Sections	5. Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to Quad Cities	Not Started
Programmatic controls (p. 8)	6. Quad Cities Nuclear Power Station will implement an administrative program for FLEX to establish responsibilities, and testing and maintenance requirements.	Not Started

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Section Reference	Overall Integrated Plan Open Item	Status
Multiple Sections	7. Detailed designs based on the current conceptual designs will be developed to determine the final plan and associated mitigating strategies. Analysis will be performed to validate that the plant modifications, selected equipment, and identified mitigating strategy can satisfy the safety function requirements of NEI 12-06. Once these designs and mitigating strategies have been fully developed, Exelon will update the integrated plan for Quad Cities Nuclear Power Station during a scheduled six-month update. This update will include any changes to the initial designs as submitted in this Integrated Plan.	Started
Maintain Core Cooling Phase 1 (p.13)	8. Guidance will be provided to ensure that sufficient area is available for deployment and that haul paths remain accessible without interference from outage equipment during refueling outages.	Started
Maintain Spent Fuel Pool Cooling Phase 1 (p.32)	9. Evaluation of the spent fuel pool area for steam and condensation has not yet been performed. The results of this evaluation and the vent path strategy, if needed, will be provided in a future six-month update.	Not Started
Safety Function Support (p. 42)	10. Habitability conditions will be evaluated and a strategy will be developed to maintain RCIC habitability	Started
Safety Function Support (p. 42)	11. Habitability conditions will be evaluated and a strategy will be developed to maintain Main Control Room habitability.	Not Started
Safety Function Support (p. 43)	12. Battery Room Ventilation: Alternate ventilation will be provided to address Hydrogen generation and cold weather, as required.	Not Started
Safety Function Support (p. 43)	13. Fuel Oil Supply to Portable Equipment: A detailed fuel oil supply plan will be developed.	Not Started

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Section Reference	Overall Integrated Plan Open Item	Status
Attachment 1A, Item 20 (p.59)	14. Provide alternate cooling to the RCIC rooms. Procedure to be developed.	Not Started

Section Reference	Draft Safety Evaluation Open Item	Status
N/A	N/A	N/A

7 Potential Draft Safety Evaluation Impacts

There are no potential impacts to the Draft Safety Evaluation identified at this time.

8 References

The following references support the updates to the Overall Integrated Plan described in this enclosure.

1. Quad Cities Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049),” dated February 28, 2013.
2. NRC Order Number EA-12-049, “Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events,” dated March 12, 2012.
3. NRC Order EA-13-109, “Issuance of Order to Modify Licenses with Regard to reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions,” dated June 6, 2013.
4. Proprietary NEDC-33771P, GEH Evaluation of FLEX Implementation Guidelines, Revision 1, January 2013.
5. NRC Order EA-12-050, “Order to Modify Licenses with Regard to Reliable Hardened Containment Vents,” dated March 12, 2012.

9 Attachments

1. Quad Cities Station FLEX Integrated Plan Analyses Reconciliation to NEDC-33771P, Rev. 1

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ATTACHMENT 1

Quad Cities Station FLEX Integrated Plan Analyses Reconciliation to NEDC-33771P, Rev 1 (Reference 4)

NOTE: NEDC-33771P, Rev 1, Appendices B and D (BWR/4 Mark I with RCIC (No Venting, Suction From Suppression Pool, and Venting Starting at 8 hours, Suction From CST)) are most similar to the Quad Cities Station FLEX Plan strategy for maintaining Containment Integrity. Notable differences between the input parameters used in the Quad Cities Station FLEX analyses and the NEDC-33771P, Rev 1, analyses are noted below in the Gap and Discussion column.

Item	Parameter of Interest	NEDC-33771P Value (Page Reference)*	Quad Cities Analyses Applied Value	Design Value	Gap and Discussion
Input Parameter Values					
1	Core Thermal Power	17	2957 MWT	N/A	
2	Reactor Dome Pressure	17	1020 psia	N/A	
3	Initial RPV Water Level above vessel zero	17	533 inches	N/A	
4	Primary system Leakage	17	38 GPM	N/A	MAAP model configured with Recirc pump leakage 16 gpm/pump
5	RPV Depressurization Time	17	60 minutes	N/A	
6	RPV Depressurization Rate	17	80°F/hr	N/A	
7	RPV Maintained Pressure	17	200-250 psig	N/A	
8	Initial Containment Airspace Temperature	17	82.5-150 °F	N/A	
9	Initial Containment Pressure	17	0-1.2 psig	N/A	
10	Suppression Pool Level	17	14.05 ft	N/A	
11	Initial Suppression Pool Temp	17	92.5°F	N/A	
12	DW Free Volume	17	158,236 ft ³	N/A	

* Actual values are contained in the Proprietary NEDC-33771P, Rev 1 (Reference 4)

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NOTE: NEDC-33771P, Rev 1, Appendices B and D (BWR/4 Mark I with RCIC (No Venting, Suction From Suppression Pool, and Venting Starting at 8 hours, Suction From CST)) are most similar to the Quad Cities Station FLEX Plan strategy for maintaining Containment Integrity. Notable differences between the input parameters used in the Quad Cities Station FLEX analyses and the NEDC-33771P, Rev 1, analyses are noted below in the Gap and Discussion column.

Item	Parameter of Interest	NEDC-33771P Value (Page Reference)*	Quad Cities Analyses Applied Value	Design Value	Gap and Discussion
13	Start of Venting	17	3.7 hours	N/A	MAAP Containment Venting starting when pressure reaches 25 psia
14	Venting Flow Coefficient	17	K = 1.8	N/A	
15	Venting Pipe Size	17	12"	N/A	
Resultant Parameter Values					
	Maximum Suppression Pool Temperature (No venting)	34	329°F at 21.3 hrs	281°F	The Plant (MAAP) analysis performed assumed containment failure at 120 psig. Therefore, the maximum containment temperature values and pressure values are based on differing end points in both analyses.
	Maximum WetWell Temperature (No venting)	34	341°F at 21.3 hrs	281°F	
	Maximum Wetwell Pressure (No venting)	34	120 psia at 21.3 hrs	56psig	
	Maximum Drywell Temperature (No Venting)	34	328°F at 21.3 hrs	281°F	
	Maximum Drywell Pressure (No venting)	34	120 psia at 21.3 hrs	56psig	

* Actual values are contained in the Proprietary NEDC-33771P, Rev 1 (Reference 4)

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ATTACHMENT 1

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Item	Parameter of Interest	NEDC-33771P Value (Page Reference)*	Quad Cities Analyses Applied Value	Design Value	Gap and Discussion
	Maximum Suppression Pool Temperature (Venting, CST Suction)	36	225°F at ~13 hrs	281°F	The differences identified between the SHEX and MAAP analyses are due to the time in which containment venting was initiated. Analyses of the containment pressures and temperature prior to initiation of the venting action are approximately equal. The time for containment venting initiation in the MAAP analysis is based on pressure reaching 25 psia. The SHEX venting was initiated at a longer duration and higher containment pressure than MAAP (refer to NEDC-33771P, page 36).
	Maximum WetWell Temperature (Venting, CST Suction)	36	242°F at > 24 hrs	281°F	
	Maximum Wetwell Pressure (Venting, CST Suction)	36	23.6 psia at 3.4 hrs	56psig	
	Maximum Drywell Temperature (Venting, CST Suction)	36	267°F at > 24 hrs	281°F	
	Maximum Drywell Pressure (Venting, CST Suction)	36	25 psia at 3.4 hrs	56psig	

* Actual values are contained in the Proprietary NEDC-33771P, Rev 1 (Reference 4)