Exelon Generation.

Order No. EA-12-049

RS-15-018

February 27, 2015

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: Fourth 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-13-019)
6. Exelon Generation Company, LLC 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), dated August 28, 2013 (RS-13-117)
7. Exelon Generation Company, LLC Second 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), dated February 28, 2014 (RS-14-009)

8. Exelon Generation Company, LLC Third 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), dated August 28, 2014 (RS-14-207)
9. NRC letter to Exelon Generation Company, LLC, Clinton Power Station, Unit 1 – Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Order EA-12-049 (Mitigation Strategies) (TAC No. MF0901), dated December 17, 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 Clinton Power Station, Unit 1 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. References 6, 7, and 8 provided the first, second, and third six-month status reports, respectively, pursuant to Section IV, Condition C.2, of Reference 1 for Clinton Power Station. The purpose of this letter is to provide the fourth 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. The enclosed report also addresses the NRC Interim Staff Evaluation Open and Confirmatory Items contained in Reference 9.

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 27th day of February 2015.

Respectfully submitted,

Glen T. Kaegi

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

Enclosure:

1. Clinton Power Station, Unit 1 Fourth 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
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Enclosure

Clinton Power Station, Unit 1

Fourth 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

(20 pages)

Enclosure

Clinton Power Station, Unit 1 Fourth 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

Clinton Power Station developed an Overall Integrated Plan (Reference 1), documenting the diverse and flexible strategies (FLEX), in response to NRC Order EA-12-049 (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

Staffing study completed, per Exelon letter (RS-14-344) submitted to NRC on 12/17/14.

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.

Original Target Completion Date	Activity	Status	Revised Target Completion Date
	Submit 60 Day Status Report	Complete	
	Submit Overall Integrated Implementation Plan	Complete	
	Contract with RRC	Complete	
Aug 2013	Submit 6 month update	Complete	
Feb 2014	Submit 6 month update	Complete	
Aug 2014	Submit 6 month update	Complete	
Feb 2015	Submit 6 month update	Complete with this submittal	
	Modification Development		
Mar 2014	• Phase 2 modifications	Started	May 2015
Dec 2014	Regional Response Center Operational	Started	May 2015
	Procedure development		
Feb 2015	Strategy procedures	Started	

Feb 2015	Validate Procedures (NEI 12-06, Sect. 11.4.3)	Not Started	May 2015
May 2015	Maintenance procedures	Not Started	
Feb 2015	Staffing analysis	Complete	
	Modification Implementation		
May 2015	• Phase 2 modifications	Started	
May 2015	Storage plan and construction	Started	
May 2015	FLEX equipment acquisition	Started	
May 2015	Training completion	Started	
May 2015	Unit 1 Implementation date	Not Started	

4 Changes to Compliance Method

Change 1

General Integrated Plan Elements BWR - Provide a sequence of events and identify any time constraint required for success including the technical basis for the time constraint. – Item 2 Containment Analysis.

Reason for Change:

- The MAAP analysis used to predict the peak containment and suppression pool temperatures and establish the timing for placing suppression pool cooling in service did not include initiation of ADS when suppression pool temperature and RPV pressure reached the heat capacity temperature limit.
- Additionally, the ability to makeup to the suppression pool from a FLEX pump is reached at t_0 + 6 hrs instead of t_0 + 8 hrs.
- Finally, Suppression Pool Makeup (SPMU) from the upper containment pool was previously triggered by suppression pool temperature. It should be triggered by the availability of AC power to the SPMU valves (t_0 + 5.5 hrs).

Change:

An additional MAAP case [Reference 3] was performed and the report is included on the ePortal. The blowdown had a negligible affect on containment and suppression pool temperature, and RPV water level remained above top of active fuel.

Below is the change to the General Integrated Plan Elements BWR section of the Overall Integrated Plan:

> As part of the implementation plan of NEI 12-06, the BWROG performed evaluations of generic Boiling Water Reactor (BWR) response to Extended Loss of AC Power (ELAP) events to demonstrate the efficacy of the FLEX strategies. Reference 3 provides the results of those evaluations for several representative BWR plant designs.
>
> Several Clinton Modular Accident Analysis Program (MAAP) cases were run to analyze methods of containment heat removal, including containment venting, suppression pool feed and bleed, and suppression pool cooling using a FLEX strategy. The MAAP cases indicate an alternate suppression pool cooling method provides the fewest operational challenges while providing margin to the

primary containment design pressure limit. UHS temperature was designated at 91.4°F in the alternate suppression pool cooling cases.

The following time constraints were used as MAAP input parameters, or were identified in the FLEX suppression pool cooling MAAP Case 18 results:

a. RPV pressure is reduced to a pressure band of 150-250 psig at a rate of 50°F/hr starting at t_0 + 1 hr.

b. Suppression Pool Heat Capacity Temperature Limit (HCTL) is reached in t_0 + 3.4 hours. A partial Emergency Depressurization is performed per CPS 4402.01, EOP-6 PRIMARY CONTAINMENT CONTROL.

c. Suppression Pool Makeup (SPMU) from the upper containment pool is designated to occur at t_0 + 5.5 hours when FLEX AC power is expected to be available to the SPMU valves in the containment.

d. The suppression pool cooling lineup is designated to occur at t_0 + 8 hrs to provide the maximum time for establishing a suppression pool cooling lineup using a FLEX strategy, while maintaining acceptable containment parameter values. The service water tube side flow from the FLEX pump was designated at 2000 gpm, and the shell side suppression pool flow was designated at 1500 gpm. The peak suppression pool temperature in this case is 209°F, well below the acceptable suction temperature established in BWROG-TP-14-018, Revision 0, December 2014, BWROG Fukushima Response Committee, Beyond Design Basis RCIC Elevated Temperature Functionality Assessment [Reference 4 in this document]. Peak containment pressure is 24.9 psia, compared to containment design pressure of 29.7 psia.

e. Suppression pool makeup from an external source was designated to maintain level between the values of 23 ft. and 23 ft 9 in. The first injection of makeup occurs at t_0 + 6 hours.

Change 2

General Integrated Plan Elements BWR - Extent to which the guidance, JLD-ISG-2012-01 and NEI 12-06, are being followed. Identify any deviations to JLD-ISG-2012-01 and NEI 12-06.

Reason for Change:

Clinton is taking an alternate approach to the N+1 requirement applicable to hoses and cables as stated in Section 3.2.2 of NEI 12-06.

Change:

NEI 12-06 currently requires N+1 sets of hoses and cables. As an alternative, the spare quantity of hose and cable is adequate if it meets either of the two methods described below:

Method 1: Provide additional hose or cable equivalent to 10% of the total length of each type/size of hose or cable necessary for the "N" capability. For each type/size of hose or cable needed for the "N" capability, at least 1 spare of the longest single section/length must be provided.

Example 1-1: An installation requiring 5,000 ft. of 5 in. diameter fire hose consisting of 100 50 ft. sections would require 500 ft. of 5 in. diameter spare fire hose (i.e., ten 50 ft. sections).

Example 1-2: A pump requires a single 20 ft. suction hose of 4 in. diameter, its discharge is connected to a flanged hard pipe connection. One spare 4 in. diameter 20 ft. suction hose would be required.

Example 1-3: An electrical strategy requires 350 ft. cable runs of 4/0 cable to support 480 volt loads. The cable runs are made up of 50 ft. sections coupled together. Eight cable runs (2 cables runs per phase and 2 cable runs for the neutral) totaling 2800 ft. of cable (56 sections) are required. A minimum of 280 ft. spare cable would be required or 6 spare 50 ft. sections.

Example 1-4: An electrical strategy requires 100 ft. of 4/0 cable (4 cables, 100 ft. each) to support one set of 4 kv loads and 50 ft. of 4/0 (4 cables, 50 ft. each) to support another section of 4 kv loads. The total length of 4/0 cable is 600 ft. (100 ft. x 4 plus 50 ft. x 4). One spare 100' 4/0 cable would be required representing the longest single section/length.

Method 2: Provide spare cabling and hose of sufficient length and sizing to replace the single longest run needed to support any single FLEX strategy.

Example 2-1 – A FLEX strategy for a two unit site requires 8 runs each of 500 ft. of 5 in. diameter hose (4000 ft. per unit). The total length of 5 in. diameter hose required for the site is 8000 ft. with the longest run of 500 ft. Using this method, 500 ft. of 5 in. diameter spare hose would be required.

For either alternative method, both the N sets of hoses or cables and the spare set of hoses or cables would all be kept in a location that meets the reasonable protection requirements for the site.

Basis for an alternative approach:

Hoses and cables are passive devices unlikely to fail provided they are appropriately inspected and maintained. The most likely cause of failure is mechanical damage during handling provided that the hoses and cables are stored in areas with suitable environmental conditions (e.g., cables stored in a dry condition and not subject to chemical or petroleum products). The hoses and cables for the FLEX strategies will be stored and maintained in accordance with manufacturers' recommendations including any shelf life requirements. Initial inspections and periodic inspections or testing will be incorporated in the site's maintenance and testing program implemented in accordance with Section 11.5 of NEI 12-06.

Therefore, the probability of a failure occurring during storage is minimal, resulting in the only likely failure occurring during implementation. Mechanical damage will likely occur in a single section versus a complete set of hose or cable. Therefore, the N+1 alternative addresses the longest individual section/length of hose or cable.

Providing either a spare cable or hose of a length of 10% of the total length necessary for the "N" capability or alternatively providing spare cabling or hose of sufficient length and sizing to replace the single longest run needed to support any single FLEX strategy is sufficient to ensure a strategy can be implemented. Mechanical damage during implementation can be compensated for by having enough spares to replace any damaged sections with margin. It is reasonable to expect that an entire set of hoses or cables would not be damaged provided they have been reasonably protected.

Change 3

Attachment 1A - Sequence of Events Timeline

Reason for Change:

A calculation of Spent Fuel Pool area temperature following a BDBEE indicates the need to deploy hoses and monitor nozzles for the Spent Fuel Pool Spray strategy during the first 11 hours of the loss of power.

Change:

The time "Setup hoses and nozzles for the Spent Fuel Pool Spray strategy" occurs on the timeline at t_0 + 11 hrs, and is identified as a time constraint.

Action item	Elapsed Time	Action	Time Constraint Y/N	Remarks / Applicability
	0	Event starts, Scram, Recirc Pumps Trip	NA	
1	Level 2 +30 sec	RCIC has started and begins to inject	NA	
2	10 min	Control level and pressure per procedures	Y	
3	29 min	Bypass RCIC leak detection isolation logic	Y	
4	1 hr	Defeat Low RCIC Steam Supply Pressure Isolation per CPS 4410.01C001, Defeating RCIC Interlocks	N	
5	1 hr	Initiate CPS 4200.01C003, Monitoring CNMT Temperatures During A SBO	N	
6	1 hr	Complete CPS 4200.01C002, DC Load Shedding During A SBO	Y	
7	1 hr	Initiate Beyond Design Basis FLEX Strategies	Y	
8	1 hr	Begin RPV depressurization to 150 psig with SRVs at 50°F/hr. Control RPV pressure between 150 and 250 psig.	Y	
9	1 hr	Commence Lining Up FLEX generator	N	
10	1 hr	Commence UHS Pump Deployment	N	
11	2 hr	Place ADS Backup Air Bottles in service per CPS 3101.01, Main Steam (MS, IS & ADS).	Y	
12	5.5 hr	Energize MCC 1A3	N	
13	5.5 hr	Open the SPMU valves	Y	
14	5.5 hr	Energize MCC 1A1	N	
15	5.5 hr	Startup Div 1 Battery Charger and supply DC MCC 1A	Y	
16	5.5 hr	Energize Hydrogen Igniter Distribution Panel (MCC 1A1)	N	

17	5.5 hr	Energize DG MCC 1A and Standby Lighting Cabinet 1LL70EA	N	
18	6 hr	FLEX pump available for RPV makeup	Y	
19	6 hr	Open RCIC room doors	Y	
20	8 hr	Place FLEX suppression pool cooling strategy in service	Y	
21	8 hr	Makeup to Suppression Pool as needed	Y	
22	**11 hr**	**Setup hoses and nozzles for the Spent Fuel Pool Spray strategy**	Y	**Based on SFP Area Conditions Following BDBEE calculation VF-54.**
23	12 hr	Initiate supplemental MCR ventilation per CPS 4200.01C001, MCR Cooling During A SBO	N	
24	12 hr	Commence Spent Fuel Pool makeup (>86 gpm) as needed	Y	
25	12 hr	Establish Fuel Bldg steam vent path	N	
26	14 hr	Commence FLEX generator and pump refueling operations	Y	
27	24 hr	Commence recharging the ADS backup air bottles with a FLEX air compressor	Y	
28	24 hr	First piece of RRC equipment arrives at the staging area	N	
29	30 hr	Establish RCIC Pump Room compensatory action (portable fan)	Y	
30	24-72 hr	Continue to maintain critical functions of core cooling (via RCIC), containment (via alternate suppression pool cooling) and SFP cooling (FLEX pump injection to SFP). Utilize initial RRC equipment in spare capacity.	N	

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

Clinton Power Station expects to comply with the order implementation date and no relief/relaxation is required at this time.

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 or the Draft Safety Evaluation (SE) and the status of each item.

Overall Integrated Plan Open Item	Status
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 design, and will be provided in a future six (6) month update.	An evaluation is performed each cycle that predicts the Spent Fuel Pool "time to boil" and "time to TAF" for various scenarios, including a scenario for loss of all cooling to the Spent Fuel Pool. [Complete]
Analysis of deviations between Exelon's engineering analyses and the analyses contained in BWROG document is expected to be completed, documented on Attachment 1B, and provided to the NRC in the August 2013 six (6) month status update.	See the February 2014 OIP Update for closure information. [Complete]
The times to complete actions in the Events Timeline are based on operating judgment, the conceptual designs, and the current supporting analyses. The final timeline will be time validated once detailed designs are completed, procedures are developed, and the results will be provided in a future six (6) month update.	An initial timeline assessment was performed in a tabletop setting for the Phase 2 Staffing Assessment. The timeline will be further validated when a sufficient amount of equipment is installed in the plant to support the FSG validation process. [Complete]
Identification of storage locations and creation of the administrative program are open items. Closure of these items will be documented in a six (6) month update.	The site specific program document, CC-CL-118 is drafted. When complete, this document will address storage locations and the administrative program governing FLEX. [Complete]
Habitability conditions will be evaluated and a strategy will be developed to maintain Main Control Room habitability. The strategy and associated support analyses will be submitted in a future six (6) month update.	Will be tracked under Confirmatory Items 3.2.4.2.B and 3.2.4.6.A. [Closed]
Battery room conditions will be evaluated and a strategy will be developed to maintain acceptable conditions. The strategy and associated support analyses will be submitted in a future six (6) month update.	Will be tracked under Confirmatory Item 3.2.4.2.A. [Closed]

Inverter room conditions will be evaluated and a strategy will be developed to maintain acceptable conditions. The strategy and associated support analyses will be submitted in a future six (6) month update.	Will be tracked under Confirmatory Item 3.2.4.2.C. [Closed]
The need for further analysis of fuel building conditions during an ELAP/LUHS and mitigating actions is an open item. Closure of this item will be documented in a future six (6) month update.	Will be tracked under Confirmatory Item 3.2.2.A. [Closed]
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 Clinton Power Station.	The site specific program document, CC-CL-118 is drafted. When complete, this document will address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to Clinton Power Station. [Complete]

Draft Safety Evaluation Open Items		
Item Number	**Description**	**Status**
3.1.4.2.C	No information was provided in the Integrated Plan to address the ultimate heat sink and the potential that the flow path may be affected by ice blockage or formation of frazil ice due to extreme low temperatures.	See the August 2014 OIP Update for closure information. [Complete]
3.2.4.8.A	On page 6 of their six-month update, dated August 28, 2013 (Agencywide Documents Access and Management System (ADAMS) ML 13241 A241), the licensee states that they are proposing to pre-stage both the primary and alternate FLEX generator in the Unit 2 side of the Control/Diesel Generator building. This use of pre-staged generators appears to be an alternative to NEI 12-06. In a future submittal update the licensee will need to document the proposed method as an alternate to NEI 12-06, along with a stronger justification addressing how the approach maintains the flexibility to respond to an undefined event and provide power to the necessary equipment.	See the August 2014 OIP Update for closure information. [Complete]

Draft Safety Evaluation Confirmatory Items		
Item Number	**Description**	**Status**
3.1.1.1.A	Each section of the Integrated Plan describing protection of equipment from the hazards makes reference to NEI 12-06, Section 11 rather than to the protection guidance described in NEI 12-06 for the applicable hazard; that is 6.2.3.1 for floods, 7.3.1 for wind, etc. The licensee's proposed protection strategy needs to be specific for each hazard.	See the August 2014 OIP Update for closure information. [Complete]
3.1.1.2.A	The Integrated Plan did not provide sufficient information to conclude that for each mitigation strategy discussed, operators would have access only through seismically robust structures to deploy the strategy. As an example, on page 27 of the Integrated Plan, the deployment plan describes using hoses to connect the FLEX alternate suppression pool cooling pump to the suppression pool and RHR heat exchanger connections. Licensee needs to address this issue generically.	See the February 2014 OIP Update for closure information. [Complete]
3.1.1.2.B	It was not evident from the review of the Integrated Plan whether or not electrical power would be necessary to move or to deploy mitigation strategies (e.g., to open the door from a storage location). If necessary, provisions would be necessary to provide that power source.	See the February 2014 OIP Update for closure information. [Complete]
3.1.1.3.A	The licensee should develop a reference source that provides approaches for obtaining necessary instrument readings for instruments in addition to the existing guidance for the suppression pool temperature instrument. The suppression pool cleanup and transfer pumps will require a strategy to provide control power to the pump motor supply breakers.	See the February 2014 OIP Update for closure information. [Complete]
3.1.1.3.B	The licensee discussed how internal flooding is mitigated for ECCS pump cubicles, but it is not clear whether or not other mitigation strategies may be susceptible to the internal flooding hazard.	See the August 2014 OIP Update for closure information. [Complete]
3.1.1.4.A	With regard to the use of off site resources, no information was provided regarding the identification of the local arrival staging area or a description of the methods to be used to deliver the equipment to the site. During the audit process, the licensee stated that information will be provided in a future 6-month update to address the issue.	See the August 2014 OIP Update for closure information. [Complete]

3.1.2.1.A	On page 4, in the section of its Integrated Plan regarding key assumptions associated with implementation of FLEX strategies, the licensee explained that primary and secondary storage locations for FLEX equipment have not been selected. Storage locations must be selected that protect FLEX equipment from all hazards.	See the August 2014 OIP Update for closure information. [Complete]
3.1.2.2.A	With regard to deployment during flood conditions, the licensee stated that transportation routes from the equipment storage area to the FLEX staging areas are not yet identified. The licensee also stated that the identification of storage areas is part of a self identified open item.	See the February 2014 OIP Update for closure information. [Complete]
3.1.2.2.B	The Integrated Plan did not address the potential need to remove accumulated water from structures in the event that installed sump pumps are not available.	See the August 2014 OIP Update for closure information. [Complete]
3.1.2.3.A	The administrative program and procedures for deployment from storage and staging areas in flood conditions or after a tornado are not yet developed.	The site specific program document, CC-CL-118 is drafted. When complete, this document will address the administrative program and procedures for deployment from storage and staging areas in flood conditions or after a tornado. [Complete]
3.1.4.2.A	The licensee does not address the effects of snow, ice, and extreme cold on the ability of plant personnel to perform manual operations.	See the August 2014 OIP Update for closure information. [Complete]
3.1.4.2.B	Although debris removal and haul requirements are addressed as previously discussed in this report, there is insufficient information in the Integrated Plan to conclude the licensee will conform to guidance with respect to the removal of snow and ice from haul pathways and staging areas.	See the August 2014 OIP Update for closure information. [Complete]
3.2.1.1.A	Need benchmarks to demonstrate that the Modular Accident Analysis Program (MAAP4) is the appropriate code for simulation of ELAP.	See the August 2014 OIP Update for closure information. [Complete]
3.2.1.1.B	Collapsed level must remain above Top of Active Fuel and cool down rate must meet technical specifications.	See the August 2014 OIP Update for closure information. [Complete]
3.2.1.1.C	MAAP4 use must be consistent with June 2013 position	See the August 2014 OIP Update for

	paper.	closure information. [Complete]
3.2.1.1.D	In using MAAP4, the licensee must identify and justify the subset of key modeling parameters cited from Tables 4-1 through 4-6 of the "MAAP4 Application Guidance, Desktop Reference for Using MAAP4 Software, Revision 2" (Electric Power Research Institute Report 1 020236).	See the August 2014 OIP Update for closure information. [Complete]
3.2.1.1.E	The specific MAAP4 analysis case that was used to validate the timing of mitigating strategies in the Integrated Plan must be identified and should be available on the ePortal for NRC staff to view. Alternately, a comparable level of information may be included in the supplemental response.	See the August 2014 OIP Update for closure information. [Complete]
3.2.1.3.A	The sequence of events timeline is not final. The licensee stated that the final sequence of events timeline will be time validated once detailed designs are completed and procedures are developed. The licensee stated that the results will be provided in a future 6-month update.	An initial timeline assessment was performed in a tabletop setting for the Phase 2 Staffing Assessment. The timeline will be further validated when a sufficient amount of equipment is installed in the plant to support the FSG validation process. [Complete]
	Also, the final sequence of events timeline needs to identify when the FLEX pump is staged to supply backup for RCIC.	See the August 2014 OIP Update for closure information. [Complete]
3.2.1.4.A	The licensee has not yet completed the analyses to demonstrate adequate head and flow will be provided by the FLEX pumps for cooling strategies.	FLEX pump hydraulic analysis is in calculation IP-M-0809. Rev. 1 documents that the FLEX pump will need a minimum of 330 ft of head at 3000 gpm to meet the flow requirements for the site FLEX strategy. As specified in TODI CPS-14-008, Rev. 2, the pumps must provide 3000 gpm at a minimum of 343 ft of head, which is bounding for all flow scenarios analyzed in IP-M-0809. The FLEX pump hydraulic analysis is available on the ePortal. [Complete]
3.2.1.4.B	The concerns related to raw water injection by FLEX strategies are being addressed by the Boiling Water	See the February 2014 OIP Update for closure information.

	Reactor Owners Group and the resulting evaluation will be included in a future 6-month update.	[Complete]
3.2.1.5.A	Additional information is needed to address the associated measurement tolerances/accuracy of instrumentation used to monitor portable/FLEX electrical power equipment to ensure that: 1) the electrical equipment remains protected (from an electrical power standpoint- e.g., power fluctuations) and 2) the operator is provided with accurate information to maintain core cooling, containment, and spent fuel cooling.	See the August 2014 OIP Update for closure information. [Complete]
3.2.2.A	The licensee stated that evaluation of the spent fuel pool area for steam and condensation had not yet been performed. The results of this evaluation and the vent path strategy, if needed, will be provided in a future 6-month update.	Calculation VF-54, SFP Area Conditions Following a BDBEE, indicates the need to deploy hoses and monitor nozzles for the Spent Fuel Pool Spray strategy during the first 11 hours of the loss of power. This has been included in the FLEX timeline and draft procedures have been changed accordingly. The calculation is available on the ePortal. [Complete]
3.2.3.A	The licensee plans to circulate suppression pool water through the shell side of an RHR heat exchanger using abandoned RHR steam condensing mode piping. It is not clear how the abandoned RHR piping used will be returned to an operable status. The licensee stated the plan to restore and maintain the RHR piping to operable status will be provided in a future 6-month update.	The RHR steam condensing mode piping was installed during initial construction as safety related piping. This piping was tested and certified in accordance with ASME code requirements. The station then decided not to use this function of the RHR system and abandoned this piping in place (plant modification RH-033). The only piping change was to install a blind flange to block steam (from the reactor) from entering this piping. Motor operated valves were disabled by lifted leads; these valves are still able to be manually stroked. The steam condensing mode piping design pressures and temperatures exceed the temperature and pressure of the suppression pool water that will be circulated through the RHR heat exchanger. Several valves that are part of the

		steam condensing mode piping will be used for cooling the suppression pool water. These valves will be manually opened/closed to verify that they are functional and can be used for the FLEX strategies. Also, several of these valves are part of Closed Loop Outside Containment (CLOC) boundaries and are periodically tested to verify leak tightness. [Complete]
3.2.3.B	It is not clear from the licensee's Integrated Plan that current maintenance and testing for the suppression pool cleanup and transfer pumps would conform to the standards for FLEX equipment because the pumps are not currently relied upon to mitigate accidents or transients or the consequences of a beyond-design-basis event.	The Suppression Pool Cooling and Cleanup (SF) system is a non-seismic Category 1 system. The portion of the system that will be used for cooling the suppression pool water has been evaluated to be seismically robust (calculation IP-S-0295). The maximum design temperature of the SF piping is 212°F and the rated capacity of each SF pump is 1750 gpm (SF design criteria DC-SF-01-CP). Calculation IP-S-0295 and the SF Design Criteria are posted on the ePortal. [Complete]
3.2.3.C	The expected peak temperatures predicted by MAAP4 calculations are 185.06 degrees F for the wetwell air space and 253.8 degrees F for the drywell. The wetwell air space peak is marginally above the 185 degree F limit for the containment. Because there are unresolved concerns with the MAAP4 analyses, the licensee will need to address the potential for wetwell air space temperatures exceeding the 185 degree F design limit.	The calculated wetwell temperature is equal to the containment design temperature (185°F) during an ELAP. Note that the containment design temperature is a set value. Calculated containment temperature during an ELAP at the design limit for a short period of time (i.e., a few hours) will not have a negative impact on containment structures and equipment. Environmental qualification for the equipment in containment is typically performed at 200 F (15 degrees above the design limit) and for durations that are much longer than the MAAP case. This provides assurance that the equipment

		and structures in containment would not be adversely impacted in the event of an ELAP. [Complete]
3.2.4.2.A	The information provided in the Integrated Plan regarding battery room ventilation did not address potential temperature increases/decreases on the station batteries due to loss of battery ventilation resulting from an ELAP. A discussion is also needed on hydrogen limits in battery room while charging the batteries during Phase 2 and 3.The licensee stated that battery room ventilation information will be provided in a future 6-month update.	Calculation VX-050, Inverter Room Heatup and Battery Room H2 Generation Following a BDBEE, indicates the time at which concentration would exceed 2% with no operator action. The FSG governing battery charger operation will incorporate the appropriate actions to control hydrogen concentration below 2%. Calculation VX-050 is posted on the ePortal. Battery room temperature will be controlled using a "toolbox approach", e.g. opening doors and providing ventilation with a portable fan. An FSG will provide guidance on controlling battery room temperature. [Complete]
3.2.4.2.B	The licensee stated on page 41 regarding phase 2 main control room cooling that further analysis is needed to develop strategies. These strategies and supporting analysis are to be provided in a future 6-month update	Calculation 3C10-0390-001, Main Control Room Temperature Transient Following Station Blackout, determined the Main Control Room (MCR) temperature transient when all MCR cooling is lost due to an SBO. The MCR temperature reaches a peak value of 119°F at a time of 30 minutes after the SBO. A portable exhaust fan is then turned on and MCR temperature reduces to ~110°F and stays at ~110°F for the duration of the SBO. Calculation IP-M-0409, Main Control Room Temperature Rise During Station Blackout (SBO) Based on Temperature Survey, determined the MCR temperature for SBO conditions based on actual temperature data obtained when both trains of the control room HVAC were off and with no exhaust fan

		assumed to operate. This calculation determined that MCR temperature would be 107°F at the end of an SBO. Base on the above, it is reasonable to assume that using the exhaust fan during an ELAP will keep MCR temperature < 110°F. Deployment of the exhaust fan is covered by plant procedure CPS 4200.01, Loss of AC Power. Main Control Room habitability conditions will be supported by implementing the existing SBO strategy for cooling the room. A toolbox approach, e.g., rotation of personnel, will be employed if further mitigating actions are required. Calculation 3C10-0390-001 and IP-M-0409 are posted on the ePortal. [Complete]
3.2.4.2.C	On page 41, in the section of the Integrated Plan regarding safety function support, phase 2, the licensee stated that inverter room conditions will be evaluated and a strategy will be developed to maintain acceptable conditions. The strategy and associated support analyses will be submitted in a future 6-month update	Calculation VX-050, Inverter Room Heatup and Battery Room H2 Generation Following a BDBEE, indicates the time at which operator actions are required to maintain acceptable temperature inside the room. The FSG governing inverter operation will incorporate the appropriate actions to control inverter room temperature. Calculation VX-050 is posted on the ePortal. [Complete]
3.2.4.2.D	In general, the discussion of ventilation in the submittal provides insufficient information on the impact of elevated temperatures, as a result of loss of ventilation and/or cooling, on the support equipment being credited as part of the ELAP strategies (e.g., electrical equipment in the RCIC pump rooms). As an example, there is no discussion regarding whether the initial temperature condition assumed the worst-case outside temperature with the plant operating at full power. No list was provided or	1. RCIC Room The Transient Analysis of RCIC Pump Room for Extended Loss of AC Power, included on the ePortal, is a GOTHIC analysis that provided recommendations for maintaining the room below the equipment qualification limit of 145°F. Those recommendations are incorporated

	referenced of electrical components located in the pump rooms that are necessary to ensure successful operation of required pumps. Also, no information was provided regarding the qualification level for temperature and pressure for these electrical components for the duration that the pumps are assumed to perform its mitigating strategies function. During the audit process, the licensee explained that these issues will be addressed by providing information in a 6-month update.	in a FLEX Support Guide to ensure RCIC will remain operational for as long as required. The FLEX pump backup core cooling method uses a flowpath that contains only one motor operated valve. The valve is accessible for manual operation if needed, and habitability of that area would be a factor in the decision to transition to the FLEX pump. 2. Inverter Rooms and Battery Rooms Calculation VX-050, Inverter Room Heatup and Battery Room H2 Generation Following a BDBEE, determined that propping open the inverter room doors and using a portable fan to blow cooler air into the room would result in a steady state temperature of 106°F. The maximum temperature expected in this room for a DBA event is 122°F (M01-1600 & DE-ME-09-CP). Therefore equipment in the inverter rooms is bounded by current EQ designs. For the battery rooms, this calculation determined that propping open the battery room doors would be sufficient to keep the H2 concentration less than 2%. In addition to propping open the battery room doors, a portable fan will be available to help maintain the room temperature (battery room EQ temp limit is 95°F). 3. FLEX Diesel Generator (762' Diesel Building) The FLEX Diesel Generator will have its own HVAC to maintain acceptable temperatures (EC 392335). 4. SF Pumps The SF pumps are in the LPCS pump room, Auxiliary Building el. 707'. For a BDBEE, the only heat load in this

		room would be from a running SF pump and the suppression pool water at 210°F. This room is ~20' W X ~85' L X ~20' H therefore the general area heat-up should not be too extreme. The pumps are designed to pump with 250°F water. In addition, room access doors can be propped open to provide some area cooling. [Complete]
3.2.4.4.A	Confirm upgrades to communication system that resulted from the licensee communications assessment. Reference assessment correspondence (ADAMS Accession Nos. ML 12306A 199 and ML 13056A 135).	In lieu of a satellite trailer, Clinton has obtained four (4) satellite telephone systems; one with a permanently mounted satellite dish and three (3) with portable dishes. A commitment change letter was submitted on 10/14/2014. Reference Exelon letter RS-14-246. The permanently mounted dish will be installed on a non-robust structure, and the portable systems will be stored in robust structures expected to survive a BDBEE. These systems will provide communication links to and from the Main Control Room, the Operations Support Center, and the Technical Support Center. The portable satellite systems will have portable generators that are able to supply power in the event of a loss of AC power. The portable generators will also be stored in robust structures. The satellite communication systems will be operational along with FLEX implementation in May 2015. Clinton has twenty two (22) additional radios available to be used in radio-to-radio (talkaround) mode for communications within the plant. For areas where radio communications are ineffective, Clinton has twelve (12) additional sound-powered telephones with 100 foot cables. These will be stored in a robust structure in an area

		central to the FLEX mitigating strategy locations. Clinton has an extensive sound-powered communications network. Twelve (12) drop stations have been identified that are in or near the locations where operator actions are required. A patch panel in the Main Control Room will allow the drop stations to be interconnected in a network using a patch cord staged in the Main Control Room. Procedures governing the enhancements described above will be completed along with FLEX implementation in May 2015. [Complete]
3.2.4.6.A	On page 41 of the Integrated Plan, in the section describing safety function support for phase 2, the licensee stated that habitability conditions will be evaluated and a strategy will be developed to maintain Main Control Room habitability.	See confirmatory action 3.2.4.2.B above. Main Control Room habitability conditions will be supported by implementing the existing SBO strategy for cooling the room. A toolbox approach, e.g., rotation of personnel, will be employed if further mitigating actions are required. [Complete]
3.2.4.8.B	On page 50, in the Integrated Plan, the submittal includes a table that lists additional equipment, "Medium Voltage and Low Voltage Diesel Generators", for phase 3; however, this equipment is not discussed in the body of the Integrated Plan. It is not clear from the information presented in the plan regarding; when and how the "Medium Voltage and Low Voltage Diesel Generators" identified in the table would be used, what loads would be served, or what generating capacity would be provided. The licensee stated the strategies for the deployment of phase 3 equipment would be developed and incorporated into pre-planned guidance. The guidance will provide flexible and diverse direction for the acquisition, deployment, connection, and operation of the equipment.	See the August 2014 OIP Update for closure information regarding the 500 KW "Low Voltage Diesel Generator" . [Complete] General guidance for deployment of planned "Medium Voltage Diesel Generator" (4 kV) generators will be included in a FLEX Support Guide that addresses recovery considerations. [Complete]
3.2.4.8.C	The Integrated Plan does not provide information or references regarding sizing calculations for the FLEX	See the August 2014 OIP Update for closure information.

	generators to demonstrate they can adequately provide power to the assumed loads. The licensee's response addressed this issue by stating that the FLEX generator sizing calculations will be submitted in a future 6-month update.	[Complete]
3.2.4.9.A	The licensee did not address assessing and maintaining fuel quality for fuel oil supplies to the FLEX equipment.	Quality of fuel oil stored in the various pieces of FLEX equipment will be confirmed through a periodic testing program. Fuel oil for FLEX equipment is replenished from the installed emergency diesel generator fuel oil storage tanks. This fuel oil is subject to periodic surveillance testing to ensure its quality. [Complete]
	Also, the licensee did not address a concern with regard to providing an indefinite fuel supply.	See the February 2014 OIP Update for closure information. [Complete]
3.4.A	The Integrated Plan failed to provide any information as to how conformance with NEI 12-06, Section 12.2 guidelines 2 through 10 will be met regarding the capabilities of the off site resources.	See the February 2014 OIP Update for closure information. [Complete]

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. Clinton Power Station's 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. CL-MISC-009 R4 MAAP Analysis to Support Initial FLEX Strategy.
4. BWROG-TP-14-018, Revision 0, December 2014, BWROG Fukushima Response Committee, Beyond Design Basis RCIC Elevated Temperature Functionality Assessment.

5. Clinton Power Station's First Six Month Update for the Implementation of Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events, dated August 28, 2013.
6. Clinton Power Station's Second Six Month Update for the Implementation of Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events, dated February 28, 2014.
7. Clinton Power Station's Third Six Month Update for the Implementation of Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events, dated August 28, 2014.
8. Calculation IP-M-0809, Hydraulic Evaluation for FLEX Diesel Pump Sizing.
9. Calculation VF-54, SFP Area Conditions Following a BDBEE.
10. Calculation VX-050, Inverter Room Heatup and Battery Room H2 Generation Following a BDBEE.
11. Calculation IP-M-0409, Main Control Room Temperature Rise During Station Blackout (SBO) Based on Temperature Survey.
12. Calculation 3C10-0390-001, Main Control Room Temperature Transient Following Station Blackout.
13. Clinton Station NEI 12-01 Phase 2 Staffing Assessment Report - FINAL 12-03-14.

9 Attachments

None

10 Figures

None