Exelon Generation®

Order No. EA-12-049

RS-13-019

February 28, 2013

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

Clinton Power Station, Unit 1
Facility Operating License No. NPF-62
NRC Docket No. 50-461

Subject: 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)

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

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 requires submission of an Overall Integrated Plan by February 28, 2013. The NRC Interim Staff Guidance (ISG) (Reference 2) was issued August 29, 2012 which endorses industry guidance document NEI 12-06, Revision 0 (Reference 3) with clarifications and exceptions identified in Reference 2. Reference 3 provides direction regarding the content of this Overall Integrated Plan.

Reference 4 provided the EGC initial status report regarding mitigation strategies, as required by Reference 1.

The purpose of this letter is to provide the Overall Integrated Plan pursuant to Section IV, Condition C.1, of Reference 1. This letter confirms EGC has received Reference 2 and has an Overall Integrated Plan developed in accordance with the guidance for defining and deploying strategies that will enhance the ability to cope with conditions resulting from beyond-design-basis external events.

The information in the enclosure provides the Clinton Power Station, Unit 1 Overall Integrated Plan for mitigation strategies pursuant to Reference 3. The enclosed Integrated Plan is based on conceptual design information. Final design details and associated procedure guidance, as well as any revisions to the information contained in the Enclosure, will be provided in the 6-month Integrated Plan updates required by Reference 1.

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 February 2013.

Respectfully submitted,

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

Enclosure:

1. Clinton Power Station, Unit 1 Mitigation Strategies (MS) Overall Integrated Plan

cc: Director, Office of Nuclear Reactor Regulation
NRC Regional Administrator - Region III
NRC Senior Resident Inspector – Clinton Power Station, Unit 1
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# Enclosure 1

**Clinton Power Station, Unit 1**

**Mitigation Strategies (MS)**

**Overall Integrated Plan**

(59 pages)

| General Integrated Plan Elements BWR | |
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| **Site:** | **Clinton Power Station** |
| **Determine Applicable Extreme External Hazard**<br><br>**Ref: NEI 12-06 section 4.0 -9.0**<br>**JLD-ISG-2012-01 section 1.0** | *Input the hazards applicable to the site; seismic, external flood, high winds, snow, ice, cold, high temps.*<br>*Describe how NEI 12-06 sections 5 – 9 were applied and the basis for why the plant screened out for certain hazards.*<br><br>Seismic events, except soil liquefaction; external flooding; severe storms with high winds; snow, ice and extreme cold; and high temperatures were determined to be applicable Extreme External Hazards for Clinton Power Station (CPS) per the guidance of NEI 12-06 and are as follows:<br><br>**Seismic Hazard Assessment:**<br><br>Per the Updated Final Safety Analysis Report (UFSAR) Section 3.7.1.1 [Reference 1], the seismic criteria for CPS include two design basis earthquake spectra: Operating Basis Earthquake (OBE) and the Safe Shutdown Earthquake (SSE).<br><br>UFSAR section 2.5.4.8 [Reference 2] was reviewed to perform a limited evaluation of the liquefaction potential outside the power block area for a safe shutdown earthquake (SSE) event.<br><br>There are no liquefaction susceptible soils within the area of the principle structures for a SSE event with a maximum horizontal acceleration equal to 0.25 g. Therefore, the likelihood of liquefaction at the site for a SSE event with a maximum horizontal acceleration equal to 0.25 g is low.<br><br>Thus the Clinton site screens in for an assessment for seismic hazard except for soil liquefaction.<br><br>**External Flood Hazard Assessment:**<br><br>The cooling lake is designed to withstand the effects of a probable maximum storm occurring over the entire drainage basin upstream of the dam site. Results of the hydrologic analyses discussed in UFSAR sections 2.4.3 [Reference 3] and 2.4.8 [Reference 4] show that a probable maximum flood (PMF) runoff into the lake routed through the spillways will raise the lake water level to elevation 708.8 feet at the dam site. The backwater effect along the North Fork finger will raise the PMF water level at the station site to elevation 708.9 feet. Superimposing the wind wave effect due to a sustained 40 mph wind acting on the PMF water level will result in wave runup elevations of 711.9 feet and 713.8 feet for significant waves and maximum (1%) waves, respectively, at the station site. The station's Seismic Category I structures with grade |

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| | elevation of 736 feet will not be affected by the PMF design conditions. The circulating water screen house is designed to withstand the effects of PMF. [Reference 5]<br><br>The following protection measures are adopted for Seismic Category I systems and components located in the circulating water screen house and located below the PMF level.<br><br>• Water stops are provided in all construction joints up to the maximum flood level.<br>• Water seal rings are provided for all penetrations in exterior walls below the maximum flood level.<br>• Watertight doors designed to withstand the hydrostatic head of the maximum flood level are provided for all doorways located on both the entrance walls and the internal walls of the Shutdown Service Water (SX) pump rooms which are below the maximum flood level.<br>• Hatches are provided on the roof of the SX pump structure (elevation 730 feet) for access during PMF.<br>In accordance with NEI 12-06 section 6.2.1, Susceptibility to External Flooding, CPS screens in for an assessment for external flood hazard since the site is "kept dry" by the measures listed above that protect safety related components in the circulating water screen house below the PMF. [Reference 6]<br><br>**Severe Storms with High Winds Hazard Assessment:**<br><br>Clinton site is located at 40° 10' 19.5" north latitude and 88° 50' 3" west longitude [Reference 7]. NEI 12-06 Figure 7-2, Recommended Tornado Design Wind Speeds for the $10^{-6}$/year Probability Level indicates Clinton is in Region 1 – 200 mph [Reference 8]. Thus the Clinton site screens in for an assessment for high winds and tornados, including missiles produced by these events.<br><br>**Snow, Ice and Extreme Cold Hazard Assessment:**<br><br>The guidelines provided in NEI 12-06 section 8.2.1 generally include the need to consider extreme snowfall at plant sites above the 35th parallel, which includes the Clinton site, located at 40° 10′ 19.5″ North and 88° 50′ 3″ West [Reference 9].<br><br>The Clinton site is located within the region characterized by EPRI as ice severity level 5 (NEI 12-06, Figure 8-2, Maximum Ice Storm Severity Maps) [Reference 10]. Consequently, the Clinton site is subject to severe icing conditions that could also cause catastrophic destruction to electrical transmission lines.<br><br>Thus the Clinton site screens in for an assessment for snow, ice, and extreme cold hazard. |

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| | **High Temperatures Hazard Assessment:**<br><br>NEI 12-06 section 9.2 requires all sites to consider the impact of extreme high temperatures [Reference 11]. Central Illinois summers are warm and humid, with periods of extremely hot weather over 100°F. UFSAR Section 2.3.2 [Reference 12] discusses the local meteorology for CPS.<br><br>Thus the Clinton site screens in for an assessment for extreme high temperature hazard.<br><br>**References**<br>1. UFSAR Section 3.7.1.1<br>2. UFSAR Section 2.5.4.8<br>3. UFSAR sections 2.4.3<br>4. UFSAR sections 2.4.8<br>5. UFSAR section 2.4.2.2<br>6. NEI 12-06 Rev 0, Section 6.2.1, Susceptibility to External Flooding<br>7. UFSAR section 2.1.1.1<br>8. NEI 12-06 Rev 0, Figure 7-2, Recommended Tornado Design Wind Speeds for the $10^{-6}$/year Probability Level<br>9. NEI 12-06 Rev 0, Section 8.2.1 Applicability of Snow, Ice, and Extreme Cold<br>10. NEI 12-06 Rev 0, Figure 8-2, Maximum Ice Storm Severity Maps<br>11. NEI 12-06 Rev 0, Section 9.2 Approach to Extreme High Temperature Conditions<br>12. UFSAR Section 2.3.2 |
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| **Key Site assumptions to implement NEI 12-06 strategies.**<br><br>**Ref: NEI 12-06 section 3.2.1** | *Provide key assumptions associated with implementation of FLEX Strategies:*<br><br>This plan defines strategies capable of mitigating a simultaneous loss of all alternating current (ac) power and loss of normal access to the ultimate heat sink (ELAP/LUHS) resulting from a beyond-design-basis event by providing adequate capability to maintain or restore core cooling, containment, and SFP cooling capabilities at all units on a site. Though specific strategies are being developed, due to the inability to anticipate all possible scenarios, the strategies are also diverse and flexible to encompass a wide range of possible conditions. These pre-planned strategies developed to protect the public health and safety will be incorporated into the unit emergency operating procedures in accordance with established EOP change processes, and their impact to the design basis capabilities of the unit evaluated under 10 CFR 50.59. The plant Technical Specifications contain the limiting conditions for normal unit operations to ensure that design safety features are available to |

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| | respond to a design basis accident and direct the required actions to be taken when the limiting conditions are not met. The result of the beyond-design-basis event may place the plant in a condition where it cannot comply with certain Technical Specifications, and, as such, may warrant invocation of 10 CFR 50.54(x) and/or 10 CFR 73.55(p) [Reference 1].<br><br>**Key Assumptions**<br>• Flood and seismic re-evaluations pursuant to the 10 CFR 50.54(f) letter of March 12, 2012 are not completed and therefore not assumed in this submittal. As the re-evaluations are completed, appropriate issues will be entered into the corrective action system and addressed on a schedule commensurate with other licensing bases changes.<br>• Additional staff resources are assumed to begin arriving at hour 6 and fully staffed by 24 hours.<br>• Plant initial response is the same as Station Blackout (SBO)<br>• Primary and secondary storage locations have not been selected; once locations are finalized implementation routes will be defined.<br>• Storage locations will be chosen in order to support the event timeline.<br>• BWROG EOP Revision EPG/SAG Rev.3, containing items such as guidance to allow early venting and to maintain steam driven injection equipment available during emergency depressurization, is approved and implemented in time to support compliance date.<br>• DC battery banks are available.<br>• AC and DC distribution systems are available.<br>• Maximum environmental room temperatures for habitability or equipment availability are based on NUMARC 87-00 [Reference 2] guidance if other design basis or industry guidance is not available.<br>• No additional single failures of any Structures, Systems, and Components (SSCs) are assumed (beyond the initial failures that define the ELAP/LUHS scenario in NEI 12-06) [Reference 3].<br><br>**References**<br>1. Task Interface Agreement (TIA) 2004-04, "Acceptability of Proceduralized Departures from Technical Specifications (TSs) Requirements at the Surry Power Station," (TAC Nos. MC4331 and MC4332)," dated September 12, 2006. (Accession No. ML060590273)<br>2. NUMARC 87-00, Revision 1, Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors |

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| | 3. Diverse and Flexible Coping Strategies (FLEX) Implementation Guide, NEI 12-06, Revision 0, August 2012. |
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| **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.**<br><br>**Ref: JLD-ISG-2012-01 NEI 12-06 13.1** | *Include a description of any alternatives to the guidance, and provide a milestone schedule of planned action.*<br><br>Full conformance with JLD-ISG-2012-01 and NEI 12-06 is expected with no deviations. |
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| **Provide a sequence of events and identify any time constraint required for success including the technical basis for the time constraint.**<br><br>**Ref: NEI 12-06 section 3.2.1.7 JLD-ISG-2012-01 section 2.1** | *Strategies that have a time constraint to be successful should be identified with a technical basis and a justification provided that the time can reasonably be met (for example, a walk through of deployment).*<br><br>*Describe in detail in this section the technical basis for the time constraint identified on the sequence of events timeline Attachment 1A.*<br><br>The timeline for the event is included in Attachment 1A. The technical bases for time constraints are discussed below.<br><br>Issuance of BWROG document NEDC-33771P, "GEH Evaluation of FLEX Implementation Guidelines Rev 1" [Reference 1] 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 commencing regulatory reviews of the Integrated Plan. This analysis is expected to be completed, documented on Attachment 1B, and provided to the NRC in the August 2013 6-month status update.<br><br>**Note 1**<br><br>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 and procedures are developed. The results will be provided in a future 6-month update.<br><br>The items below provide a technical basis for time constraints listed in Attachment 1A, Sequence of Events Timeline.<br><br>1. Spent Fuel Pool<br><br>Spent Fuel Pool (SFP) makeup is not a time constraint with the initial condition of Mode 1 @ 100% power, since the worst case fuel pool heat load conditions only |

exist during a refueling outage. Under non-outage conditions, the maximum SFP heat load is ~12.5 million Btu/hr. Loss of SFP cooling with this heat load and an initial SFP temperature of 95-100°F results in a time to boil of 16 hours, and ~130 hours to the top of active fuel. Therefore completing the equipment line-up for initiating SFP makeup at 12 hours into the event ensures adequate cooling of the spent fuel is maintained. [Reference 2].

The worst case SFP heat load during an outage is 40.0 million Btu/hr. Loss of SFP cooling with this heat load and an initial SFP temperature of 135°F results in a time to boil of 3.25 hours, and 38.65 hours to the top of active fuel. With the entire core being located in the SFP, manpower resources normally allocated to core cooling along with the Operations outage shift manpower can be allocated to aligning SFP makeup which ensures the system alignment can be established within 8 hours. Initiation within 8 hours of the event ensures adequate cooling of the spent fuel is maintained [Reference 3].

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 6-month update.

2. Containment Analysis

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. BWROG report NEDC-33771P Rev 1, "GEH Evaluation of FLEX Implementation Guidelines" [Reference 1] provides the results of those evaluations for several representative BWR plant designs. Based upon the initial results of this evaluation, the BWROG has initiated additional analyses [Reference 5] for the BWR/6 design with Mark III containments to develop additional strategies for containment cooling that are not currently included in this revision of the report. These additional strategies specifically address actions necessary to mitigate the suppression pool heat-up during ELAP/LUHS events that could challenge containment integrity. These strategies include suppression pool inventory addition/letdown, alternate suppression pool cooling methods, and/or aligning FLEX equipment to provide AC power to installed plant equipment for containment heat removal.

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| | Several Clinton Modular Accident Analysis Program (MAAP) [Reference 4] 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 conservatively designated at 91.4°F in the alternate suppression pool cooling cases.<br><br>The following time constraints were used as MAAP input parameters, or were identified in the alternate suppression pool cooling MAAP Case 14 results:<br><br>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.<br><br>b. Suppression Pool Heat Capacity Temperature Limit (HCTL) is reached in $T_0$+3.5 hours. Emergency Depressurization is not required since RCIC is being used for level control during SBO conditions per CPS 4402.01, EOP-6 PRIMARY CONTAINMENT CONTROL [Reference 6].<br><br>c. Suppression Pool Makeup (SPMU) from the upper containment pool is designated to occur at 180°F suppression pool temperature to extend the time required to establish the suppression pool cooling lineup, and to allow time for a FLEX generator to provide AC power to the SPMU valves in the containment. This occurs at $T_0$+5 hrs.<br><br>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 213°F at $T_0$+ ~24.5 hours. This value is well below the acceptable suction temperature established in the BWROG feasibility study for RCIC operation in a prolonged station blackout [Reference 7]. Peak containment pressure is 25 psia at $T_0$+ ~41 hours, compared to containment design pressure of 29.7 psia.<br><br>e. Suppression pool makeup from an external source |

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| | was designated to maintain level between the values of 19.5 ft. and 22.3 ft. The first injection of makeup occurs at $T_0$+16.8 hrs.<br><br>3. RCIC Room Analysis<br><br>The purpose of this GOTHIC analysis [Reference 8] was to demonstrate the transient RCIC Pump Room, RCIC Instrument Room, and Access Aisle temperature response during an ELAP/LUHS. The temperatures in these areas were reviewed both with and without compensatory actions to provide additional cooling to the pump room.<br><br>The analysis shows that with gland seal steam leakage and no compensatory actions, the RCIC Instrument Room exceeds its temperature limit of 145°F at 42 hours while the RCIC Pump Room is maintained below 145°F indefinitely. Opening the doors at 41 hours and 30 minutes maintains the RCIC Pump Room and RCIC Instrument Room within their temperature limit of 145°F without the need for further compensatory action. The timeline reflects a much earlier time ($T_0$+ 6 hrs) to accomplish this simple but critical task.<br><br>FLEX will provide a compensatory action to supply cooling to the room using a portable blower and ducting to move air through the security door between the Auxiliary and Turbine Buildings and into the RCIC room. The flow rate assumed in the analysis was 9500 cfm. The results also show that when this compensatory action is completed at $T_0$+59.5 hours, the room temperature drops sharply and is maintained at an acceptable temperature indefinitely.<br><br>4. Battery Coping Study<br><br>The coping study performed by Sargent & Lundy [Reference 9] used ELMS-DC to analyze the Division 1 and Division 2 battery responses to a station blackout. The battery of interest in the event timeline is the Division 1 battery. The study concluded that by performing the load shedding specified in procedure CPS 4200.01C002 DC LOAD SHEDDING DURING A SBO [Reference 10], the battery can perform its function for 6 hours. The FLEX strategy for ensuring DC power to RCIC, SRV solenoids, and vital instrumentation will use a 5 hour required deployment time to ensure DC MCC 1A is supplied from its battery charger before the Division 1 Battery is exhausted.<br><br>5. OP-CL-102-106-1001 OPERATOR RESPONSE TIME PROGRAM AT CPS, Attachment 1, CPS Master List of |

Operator Response Times [Reference 11]. Validation of time critical and time sensitive tasks listed below are pending.

a. Section 2, Time Sensitive Actions - TSA 17 - Required Action: Bypass high steam tunnel isolation before isolation of RCIC on high Main Steam Tunnel temperature occurs.

b. Section 1, Time Critical Actions - TCA 3 - Control level and pressure per procedures

c. Section 1, Time Critical Actions - TCA 4 - If SBO is anticipated to last greater than one hour then initiate and complete within 1 hour CPS 4200.01C002, DC Load Shedding During A SBO

6. SRV Pneumatic Supply

Each SRV is provided with an air accumulator located in the drywell capable of providing for a total of thirty-seven (37) lifts without backup. Additionally, nine (9) of the SRVs are capable of being supplied with actuating air from backup air bottles located in the Auxiliary Building, providing enough air for an additional two-hundred (200) lifts [Reference 12]. Since the cooldown begins at $T_0$+ 1 hr, lining up the backup air bottles at $T_0$+ 2 hrs will be needed to ensure a pneumatic supply is maintained for controlling RPV pressure in the specified band. Providing FLEX capability to recharge ADS backup air bottles at $T_0$+ 24 hrs will ensure a long term supply of SRV actuating air.

7. Decision to Initiate ELAP/LUHS Actions

The one (1) hour time constraint placed on declaring that the station is in an ELAP/LUHS is based on the time needed to deploy beyond design basis FLEX equipment. The deployment of the FLEX generator and pump require time and resources, and a delay in beginning the deployment task could impact the timeline.

**References**

1. BWROG report NEDC- 33771P Rev 1, "GEH Evaluation of FLEX Implementation Guidelines Rev 1"
2. EC EVAL 382149, C1R13 Decay Heat
3. USAR Section 9.1.3.3
4. CL-MISC-009 Rev 1, MAAP Analysis #C467130029-10881
5. BWROG report NEDC- 33771P Rev 1, "GEH Evaluation of FLEX Implementation Guidelines Rev 1" Submittal Letter, Dated January 31, 2013

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| | 6. CPS 4402.01, EOP-6 PRIMARY CONTAINMENT CONTROL, Rev 29<br>7. 0000-0143-0382-R1, DRF 0000-0143-0380, "BWROG RCIC System Operation in Prolonged Station Blackout – Feasibility Study"<br>8. S&L Calculation 2013-01301, Revision 0, "Transient Analysis of RCIC Pump Room for Extended Loss of A-C Power"<br>9. EC 391824 FLEX Battery Coping Study<br>10. CPS 4200.01C002 DC LOAD SHEDDING DURING A SBO, Rev 5<br>11. OP-CL-102-106-1001, Rev 001, OPERATOR RESPONSE TIME PROGRAM AT CPS<br>12. Calc EPU-T0903 Rev 0 (GE-NE-A22-00110-59-01 Clinton Power Station Extended Power Uprate, Task T0903: Station Blackout) |
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| **Identify how strategies will be deployed in all modes.**<br><br>**Ref: NEI 12-06 section 13.1.6** | *Describe how the strategies will be deployed in all modes.*<br><br>Deployment of FLEX is expected for all modes of operation. Transportation routes will be developed from the equipment storage area to the FLEX staging areas. An administrative program will be developed to ensure pathways remain clear or compensatory actions will be implemented to ensure all strategies can be deployed during all modes of operation. This administrative program will also ensure the strategies can be implemented in all modes by maintaining the portable FLEX equipment available to be deployed during all modes.<br><br>Identification of storage locations and creation of the administrative program are open items. Closure of these items will be documented in a 6-month update. |
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| **Provide a milestone schedule. This schedule should include:**<br>• **Modifications timeline**<br>o **Phase 1 Modifications**<br>o **Phase 2 Modifications**<br>o **Phase 3 Modifications**<br>• **Procedure guidance development complete**<br>o **Strategies**<br>o **Maintenance**<br>• **Storage plan (reasonable protection)** | *The dates specifically required by the order are obligated or committed dates. Other dates are planned dates subject to change. Updates will be provided in the periodic (six month) status reports.*<br><br>Exelon Generation Company, LLC (Exelon) fully expects to meet the site implementation/compliance dates provided in Order EA-12-049 with no exceptions. Any changes or additions to the planned interim milestone dates will be provided in a future 6-month update.<br><br>See attached milestone schedule (Attachment 2). |

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| • **Staffing analysis completion**<br>• **FLEX equipment acquisition timeline**<br>• **Training completion for the strategies**<br>• **Regional Response Centers operational**<br><br>**Ref: NEI 12-06 section 13.1** | |
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| **Identify how the programmatic controls will be met.**<br><br>**Ref: NEI 12-06 section 11**<br>**JLD-ISG-2012-01 section 6.0** | *Provide a description of the programmatic controls equipment protection, storage and deployment and equipment quality. See section 11 in NEI 12-06. Storage of equipment, 11.3, will be documented in later sections of this template and need not be included in this section.*<br>*See section 6.0 of JLD-ISG-2012-01.*<br><br>Clinton will implement an administrative program for FLEX to establish responsibilities, and testing and maintenance requirements. A plant system designation will be assigned to FLEX equipment which requires configuration controls associated with systems. This will establish responsibilities, maintenance and testing requirements for all components associated with FLEX. Unique identification numbers will be assigned to all components added to the FLEX plant system. Equipment associated with these strategies will be procured as commercial equipment with design, storage, maintenance, testing, and configuration control as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11. Installed structures, systems and components pursuant to 10CFR50.63(a) will continue to meet the augmented quality guidelines of Regulatory Guide 1.155, Station Blackout. Standard industry preventive maintenance (PM) templates will be developed to establish maintenance and testing frequencies based on type of equipment and will be within EPRI guidelines. Testing procedures will be developed based on the industry PM templates and Exelon standards. |
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| **Describe training plan** | *List training plans for affected organizations or describe the plan for training development*<br><br>Training materials for FLEX will be developed for all station staff involved in implementing FLEX strategies. For accredited training programs, the Systematic Approach to Training, SAT, will be used to determine training needs. For other station staff, a training overview will be developed per change management plan. |

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| **Describe Regional Response Center plan** | Clinton has contractual agreements in place with the Strategic Alliance for FLEX Emergency Response (SAFER).<br><br>The industry will establish two (2) Regional Response Centers (RRC) to support utilities during beyond design basis events. Each RRC will hold five (5) sets of equipment, four (4) of which will be able to be fully deployed when requested, the fifth set will have equipment in a maintenance cycle. Equipment will be moved from an RRC to a local Assembly Area, established by the SAFER team and the utility. Communications will be established between the affected nuclear site and the SAFER team and required equipment moved to the site as needed. First arriving equipment, as established during development of the nuclear site's playbook, will be delivered to the site within 24 hours from the initial request. |

Notes:
Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. 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 Clinton during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.

## Maintain Core Cooling

**Determine Baseline coping capability with installed coping[1] modifications not including FLEX modifications, utilizing methods described in Table 3-1 of NEI 12-06:**

- **RCIC/HPCI/IC**
- **Depressurize RPV for injection with portable injection source**
- **Sustained water source**

## BWR Installed Equipment Phase 1:

*Provide a general description of the coping strategies using installed equipment including modifications that are proposed to maintain core cooling. Identify methods (RCIC/HPCI/IC) and strategy(ies) utilized to achieve this coping time.*

### Mode 1, 2, and 3

At $T_0$ in a Station Blackout (SBO) event the reactor will scram on a load reject signal. Following a reactor scram, steam generation will continue at a reduced rate due to core fission product decay heat. Since the reactor vessel is isolated, and the feedwater supply unavailable, Safety Relief Valves (SRVs) will automatically (or remote manually) maintain vessel pressure within desired limits. The water level in the reactor vessel will drop due to continued steam generation by decay heat [Reference 1]. Upon reaching Reactor Vessel Water Level–Low Low, Level 2 the RCIC System will be initiated automatically [Reference 2]. RCIC can also be initiated manually from the Main Control Room or from the Remote Shutdown Panel.

Sixteen (16) SRVs are installed on the main steam lines inside the drywell. The valves can be actuated in two ways: they will relieve pressure by a Nuclear System Protection System (NSPS) pressure transmitter and trip unit actuation with Class 1E DC power (relief mode) or by mechanical actuation without power (safety mode). In addition to the relief and safety modes, seven (7) of the SRVs can be actuated by the Automatic Depressurization System (ADS) logic through NSPS. The suppression pool provides a heat sink for steam relieved by these valves. SRV operation may be controlled manually from the control room to hold the desired reactor pressure [Reference 3]. Each SRV can be actuated from one of two installed DC solenoid valves which open to supply pneumatic pressure to the valve operating piston.

Each SRV is provided with an air accumulator located in the drywell capable of providing for a total of thirty-seven (37) lifts without backup. Additionally, nine (9) of the SRVs are capable of being supplied with actuating air from one of two banks of backup air bottles located in the Auxiliary Building. These bottles are sized to provide for a minimum of an additional one-hundred (100) lifts per bank [Reference 4]. The backup air bottles can be lined up manually in Phase 1, or remotely during Phase 2 after the FLEX generator has been placed in service.

The NSPS power supply system is designed to provide adequate uninterrupted power to all the NSPS loads during all modes of operation including abnormal and accident conditions [Reference 5]. SRV actuation instrumentation is powered from the Division 1 and Division 2 NSPS sub-systems [Reference 6]. Each sub-system is capable of independently actuating the logic that supplies Class 1E DC power to one of two solenoids to each SRV. Additionally, all of the essential parameter instruments needed for the core cooling function are powered from the NSPS system and are available in Phase 1 [Reference 7].

The Class 1E DC power system supplies 125 VDC power to unit Class 1E loads. The primary power sources are battery chargers. The system includes batteries, battery chargers, motor control centers, and DC

[1] Coping modifications consist of modifications installed to increase initial coping time, i.e., generators to preserve vital instruments or increase operating time on battery powered equipment.

distribution panels. The system is divided into four divisions, each with its own independent distribution network, battery, battery charger, and redundant load group. A swing battery charger is also part of the system that can be connected to the 125 VDC buses for supplying backup power during periods when the normal battery charger for the Division 1, 2 or 4 bus is being maintained [Reference 8]. The RCIC system valves required for automatic and manual operation, one solenoid for each of the 16 SRVs, and an NSPS inverter are all supplied from the Division 1 Class 1E DC power system.

During Phase 1, RPV makeup is provided from RCIC with suction from the suppression pool, and RPV pressure control is provided by the SRVs. Since these are loads on the Division 1 battery, shedding of non-essential loads on the battery is performed to extend the DC coping time to a minimum of 6 hours [Reference 9].

A gradual cooldown of the Reactor Pressure Vessel (RPV) will be performed with SRVs, and RPV pressure will be controlled between approximately 150 and 250 psig. RPV makeup will continue to be provided from RCIC until RPV pressure requires a transition to Phase 2 methods. Guidance will be provided to open the RCIC pump room doors and provide air flow to maintain the habitable conditions in the room [Reference 10].

**Mode 4 and 5**

When in Cold Shutdown or Refueling, many variables exist which impact the ability to cool the core. In the event of an ELAP/UHS during these Modes, installed plant systems cannot be relied upon to cool the core, thus transition to Phase 2 will begin immediately. All efforts will be made to expeditiously provide core cooling and minimize heat-up and repressurization. Exelon has a program in place [Reference 11] to determine the time to boil for all conditions during shutdown periods. This time will be used to determine the time required to complete transition to Phase 2.

To accommodate the activities of RPV disassembly and refueling, water levels in the RPV and the reactor cavity are often changed. The most limiting condition is the case in which the reactor head is removed and water level in the RPV is at or below the flange. If an ELAP/LUHS occurs during this condition then (depending on the time after shutdown) boiling in the core may occur quite rapidly.

Deploying and implementing portable FLEX pumps to supply injection flow must commence immediately from the time of the event. This should be plausible because more personnel are on site during outages to provide the necessary resources. Strategies for makeup water include deploying a FLEX pump to take suction from the UHS as described in the Phase 2 Core Cooling section.

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.

**References**

1. Clinton UFSAR Section 5.4.6.1
2. CPS Technical Specifications Table 3.3.5.2-1, Function 1
3. Clinton UFSAR Section 7.3.1.1.1.4.1
4. Calc EPU-T0903 Rev 0 (GE-NE-A22-00110-59-01 Clinton Power Station Extended Power Uprate, Task T0903: Station Blackout)
5. Clinton UFSAR Section 8.1.4.1
6. CPS Drawing E02-1RP99, Sheet 004, Rev O, REACTOR PROTECTION SYSTEM (RP) REACTOR PROTECTION SYSTEM (NSPS) (1C71-1050)
7. CPS Drawing E02-1LP99, Sheet 004, Rev P, LOW PRESSURE CORE SPRAY, E02-1RP99, Sheet 013, Rev L, REACTOR PROTECTION SYSTEM (RP) REACTOR PROTECTION SYSTEM (NSPS) (1C71-1050)
8. Clinton UFSAR Section 8.1.3.4
9. EC 391824, Rev 0, FLEX Battery Coping Study
10. S&L Calculation 2013-01301, Revision 0, 11332-295, Transient Analysis of RCIC Pump Room for

| Extended Loss of A-C Power<br>11. OU-AA-103, Shutdown Safety Management Program, Rev 12 | |
|---|---|
| **Details:** | |
| **Provide a brief description of Procedures / Strategies / Guidelines** | *Confirm that procedure/guidance exists or will be developed to support implementation*<br><br>Clinton will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs. |
| **Identify modifications** | *List modifications*<br>None |
| **Key Reactor Parameters** | *List instrumentation credited for this coping evaluation.*<br><br>**Wide Range RPV Level**<br>Division 1 ATMs 1B21-N691A, 1B21-N691E<br>**RPV Pressure**<br>Division 1 ATMs 1B21-N697A, 1B21-N697E, 1B21-N678A (wide range)<br><br>Clinton's evaluation of the FLEX strategy may identify additional parameters that are needed in order to support key actions identified in the plant procedures/guidance or to indicate imminent or actual core damage (NEI 12-06 Rev. 0 Section 3.2.1.10) and any differences will be provided in a future 6-month update following identification. |
| **Notes:**<br>Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. 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 Clinton during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan. | |

## Maintain Core Cooling

### BWR Portable Equipment Phase 2:

*Provide a general description of the coping strategies using on-site portable equipment including modifications that are proposed to maintain core cooling. Identify methods (RCIC/HPCI/IC) and strategy(ies) utilized to achieve this coping time.*

During Phase 2, high pressure RPV makeup is provided from RCIC, and RPV pressure control is provided from RCIC and the SRVs. A pre-staged 480 VAC generator will be lined up to the Division 1 AC distribution system to repower the Division 1 battery charger and enable the continued use of RCIC, SRVs, and vital instrumentation. A FLEX air compressor will be staged to make up to the ADS backup air bottles, if required.

Alternatively, a separate generator can be lined up to the swing battery charger to maintain the Division 1 DC bus. [Reference 1]

To accomplish low pressure RPV makeup when RCIC is no longer available, external water connections will be hard-piped to a location that supports connection to the modified Low Pressure Core Spray (LPCS) [Reference 2] or alternatively the Residual Heat Removal (RHR) C [Reference 3] injection header. A pre-staged section of fire hose will allow the final connection from the external water supply to the injection header. The injection valves for these two systems are located outside the primary containment and can be operated manually with the handwheel or electrically via the FLEX generator.

RPV pressure will need to be further reduced to approximately 50 psig with SRVs to achieve the flow rate necessary from the external water connection. The supply to the external water connections is described in the Safety Function Support Phase 2 section. The external connection will be capable of meeting the decay heat boil-off rate, plus the assumed system leakage from reactor recirculation pump seals.

Core cooling can be maintained indefinitely with RCIC first, then the portable diesel driven pump(s) with SRVs controlling RPV pressure. [Reference 4]

**References**

1. Clinton UFSAR Section 8.1.3.4
2. CPS Drawing M05-1073, Sheet 001, Rev AG, LOW-PRESSURE CORE SPRAY (LPCS) (LP)
3. CPS Drawing M05-1075, Sheet 003, Rev AG, RESIDUAL HEAT REMOVAL (RH)
4. CL-MISC-009 Rev 1, MAAP Analysis #C467130029-10881

**Details:**

| | |
|---|---|
| **Provide a brief description of Procedures / Strategies / Guidelines** | *Confirm that procedure/guidance exists or will be developed to support implementation*<br><br>Clinton will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs. |
| **Identify modifications** | *List modifications*<br><br>• Two diverse external connections for a portable diesel powered pump to supply low pressure RPV makeup water in the plant. |

| Maintain Core Cooling | |
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| **BWR Portable Equipment Phase 2:** | |
| | • The LPCS and RHR-C injection header flush line will be modified with a connection point for the low pressure water supply.<br>• Piping will be installed to support the connection of the external connections to the LPCS and RHR-C injection headers.<br>• The high pressure air supply for charging ADS air bottles will be modified to withstand the applicable external hazards.<br>• The electrical support and cooling/makeup water support modifications needed for the core cooling function are discussed in the Safety Function Support section. |
| **Key Reactor Parameters** | *List instrumentation credited or recovered for this coping evaluation.*<br><br>**Wide Range RPV Level**<br>Division 1 ATMs 1B21-N691A, 1B21-N691E<br>**RPV Pressure**<br>Division 1 ATMs 1B21-N697A, 1B21-N697E, 1B21-N678A (wide range)<br><br>Clinton's evaluation of the FLEX strategy may identify additional parameters that are needed in order to support key actions identified in the plant procedures/guidance or to indicate imminent or actual core damage (NEI 12-06 Rev. 0 Section 3.2.1.10) and any differences will be provided in a future 6-month update following identification. |
| | |
| **Storage / Protection of Equipment :**<br>**Describe storage / protection plan or schedule to determine storage requirements** | |
| **Seismic** | *List how equipment is protected or schedule to protect*<br><br>Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Section 11. Schedule to construct permanent buildings is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. 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. |

| Maintain Core Cooling | |
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| **BWR Portable Equipment Phase 2:** | |
| **Flooding**<br>Note: if stored below current flood level, then ensure procedures exist to move equipment prior to exceeding flood level | *List how equipment is protected or schedule to protect*<br><br>Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Section 11. Schedule to construct permanent buildings is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. 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. |
| **Severe Storms with High Winds** | *List how equipment is protected or schedule to protect*<br><br>Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Section 11. Schedule to construct permanent buildings is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. 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. |
| **Snow, Ice, and Extreme Cold** | *List how equipment is protected or schedule to protect*<br><br>Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Section 11. Schedule to construct permanent buildings is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. 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. |
| **High Temperatures** | *List how equipment is protected or schedule to protect*<br><br>Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Section 11. Schedule to construct permanent buildings is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. 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. |

| **Deployment Conceptual Modification** (Attachment 3 contains Conceptual Sketches) | | |
|---|---|---|
| **Strategy** | **Modifications** | **Protection of connections** |
| *Identify Strategy including how the equipment will be deployed to the point of use.* | *Identify modifications* | *Identify how the connection is protected* |
| The electrical support and cooling/makeup water support deployment strategies are common to core cooling, containment, and spent fuel pool makeup functions. The discussion is in the Safety Function Support section. | The electrical support and cooling/makeup water support modifications are common to core cooling, containment, and spent fuel pool makeup functions. The discussion is in the Safety Function Support section. | The external connection points are common to core cooling, containment, and spent fuel pool makeup functions. The protection discussion is in the Safety Function Support section. |
| The FLEX air compressor will be deployed from its storage location to the ADS air charging station. | ADS air charging station | The ADS air charging station will be protected from applicable external hazards. |
| Hoses will be pre-staged to connect piping from the external water connection to the LPCS and RHR-C injection headers. | None | Hoses will be staged in a structure protected from external hazards. |
| **Notes:** Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. 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 Clinton during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan. | | |

| Maintain Core Cooling | |
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| **BWR Portable Equipment Phase 3:** | |
| *Provide a general description of the coping strategies using phase 3 equipment including modifications that are proposed to maintain core cooling. Identify methods (RCIC/HPCI/IC) and strategy(ies) utilized to achieve this coping time.*<br><br>Phase 1 and 2 strategy will provide sufficient capability that no additional Phase 3 strategies are required.<br><br>Phase 3 equipment for Clinton includes backup portable pumps and generators. The portable pumps will be capable of providing the necessary flow and pressure as outlined in Phase 2 response for Core Cooling, Containment, and Spent Fuel Pool Cooling. The portable generators will be capable of providing the necessary 480 volt power requirements as outlined in Phase 2 response for Safety Functions Support. | |
| **Details:** | |
| **Provide a brief description of Procedures / Strategies / Guidelines** | *Confirm that procedure/guidance exists or will be developed to support implementation*<br><br>Clinton will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs. |
| **Identify modifications** | *List modifications*<br><br>None |
| **Key Reactor Parameters** | *List instrumentation credited or recovered for this coping evaluation.*<br><br>Clinton's evaluation of the FLEX strategy may identify additional parameters that are needed in order to support key actions identified in the plant procedures/guidance or to indicate imminent or actual core damage (NEI 12-06 Rev. 0 Section 3.2.1.10) and any differences will be provided in a future 6-month update following identification. |

| **Deployment Conceptual Modification**<br>**(Attachment 3 contains Conceptual Sketches)** | | |
|---|---|---|
| **Strategy** | **Modifications** | **Protection of connections** |
| *Identify Strategy including how the equipment will be deployed to the point of use.* | *Identify modifications* | *Identify how the connection is protected* |
| None | None | None |

| Maintain Core Cooling |
| --- |
| **BWR Portable Equipment Phase 3:** |
| **Notes:**<br>Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. 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 Clinton during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan. |

## Maintain Containment

**Determine Baseline coping capability with installed coping[2] modifications not including FLEX modifications, utilizing methods described in Table 3-1 of NEI 12-06:**

- **Containment Venting or Alternate Heat Removal**
- **Hydrogen Igniters (Mark III containments only)**

### BWR Installed Equipment Phase 1:

*Provide a general description of the coping strategies using installed equipment including modifications that are proposed to maintain containment. Identify methods (containment vent or alternative / Hydrogen Igniters) and strategy(ies) utilized to achieve this coping time.*

During Phase 1, containment integrity is maintained by normal design features of the containment, such as the containment isolation valves. In accordance with NEI 12-06, the containment isolation actions delineated in the SBO procedure are sufficient.

RPV pressure will be gradually reduced with SRVs to approximately 150 psig while the suppression pool has sufficient heat capacity to absorb a portion of the sensible heat in the reactor. RPV pressure will be controlled between 150 – 250 psig. Decay heat will continue to heat up the suppression pool during the initial phase through RCIC exhaust and SRV operation. The water in the upper containment pool is transferred to the suppression pool once a FLEX generator has been lined up to the 480 VAC distribution system, and power is available to the SPMU valves. This is a Phase 2 action relying on FLEX equipment, expected to occur at 180°F suppression pool temperature, at $T_0$+5 hours [Reference 1].

Suppression Pool Level and Containment Pressure instruments remain available during Phase 1 since they are powered from Division 1 NSPS [Reference 2]. Suppression Pool Temperature is manually obtained using procedure CPS 4200.01C003 MONITORING CNMT TEMPERATURES DURING A SBO [Reference 3].

The Hydrogen Igniter System (HIS) is designed to ignite hydrogen in the unlikely occurrence of a degraded core event which results in the generation of excessive quantities of hydrogen from a large metal-water reaction in the RPV. The HIS is designed to burn hydrogen at low concentrations, thereby maintaining the concentration of hydrogen below which, if ignited, could lead to containment overpressurization failure [Reference 4].

Containment heat removal and hydrogen igniter operation are not possible during Phase 1 since they both rely on the availability of 480 VAC power. These functions rely on deployment of portable equipment to meet the water and power requirements. These requirements are met in Phase 2.

**References**

1. CL-MISC-009 Rev 1, MAAP Analysis #C467130029-10881
2. CPS Drawing E02-1RI99, Sheet 010, Rev F, REACTOR CORE ISOLATION COOLING SYS (RI) NSPS 1E51-1050 SCHEMATIC DIAGRAM, E02-1RH99, Sheet 010, Rev L, SCHEMATIC DIAGRAM RESIDUAL HEAT REMOVAL SYS (RH) 1E12-1050 NSPS
3. CPS 4200.01C003 MONITORING CNMT TEMPERATURES DURING A SBO, Rev 1a
4. Clinton UFSAR Section 6.2.5.2.1

[2] Coping modifications consist of modifications installed to increase initial coping time, i.e., generators to preserve vital instruments or increase operating time on battery powered equipment.

| Details: | |
|---|---|
| **Provide a brief description of Procedures / Strategies / Guidelines** | *Confirm that procedure/guidance exists or will be developed to support implementation*<br><br>• Clinton will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs. |
| **Identify modifications** | *List modifications*<br><br>None |
| **Key Containment Parameters** | *List instrumentation credited for this coping evaluation.*<br><br>**Suppression Pool Temperature**<br>Manually obtained using procedure CPS 4200.01C003 MONITORING CNMT TEMPERATURES DURING A SBO<br>**Suppression Pool Level**<br>1E51-N636A/E<br>**Containment Pressure**<br>1E12-N662A/C<br><br>Clinton's evaluation of the FLEX strategy may identify additional parameters that are needed in order to support key actions identified in the plant procedures/guidance or to indicate imminent or actual core damage (NEI 12-06 Rev. 0 Section 3.2.1.10) and any differences will be provided in a future 6-month update following identification. |
| **Notes:**<br>Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. 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 Clinton during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan. | |

## Maintain Containment

### BWR Portable Equipment Phase 2:

*Provide a general description of the coping strategies using on-site portable equipment including modifications that are proposed to maintain containment. Identify methods (containment vent or alternative / Hydrogen Igniters) and strategy(ies) utilized to achieve this coping time.*

During Phase 2, a pre-staged 480 VAC generator will be lined up to the Division 1, or alternatively Division 2 AC distribution to repower 1SM001A and 1SM002A, or alternatively 1SM001B and 1SM002B Upper Containment Pool Makeup to Suppression Pool Valves [Reference 1]. The added inventory from the upper pools will extend the time before suppression pool cooling is required to avoid significant containment pressurization. Suppression pool cooling will be accomplished using a 480 VAC FLEX pump lined up to circulate suppression pool water through the shell side of an RHR heat exchanger using abandoned RHR Steam Condensing Mode Piping, and water from the external connections will supply the heat exchanger tube side. The proposed SX connection points are discussed in the Safety Functions Support Phase 2 section.

Either RHR heat exchanger can be used for the alternate suppression pool cooling strategy. The RHR heat exchanger chosen will depend on the SX division supplied from the external connection and the electrical division aligned to the FLEX generator. This strategy will provide an unlimited coping period for the containment [Reference 2].

Suppression pool water addition is required to maintain RCIC pump NPSH, makeup for reactor recirculation pump seal leakage into the drywell, and makeup for evaporative losses. The external water connection will supply the LPCS injection header or alternatively the RHR-C injection header. Water can be added as needed to the suppression pool using 1E21-F012 LPCS Test Return To Suppression Pool Valve [Reference 3] or 1E12-F021 RHR C Test Valve To Suppression Pool [Reference 4]. These two valves are located outside the primary containment and can be operated manually with the handwheel or electrically via the FLEX generator.

The pre-staged 480 VAC FLEX generator will also repower the Division 1, or alternatively the Division 2, hydrogen igniter distribution panel from Aux Building MCC 1A1, or alternatively Aux Building MCC 1B1, to allow igniter operation as prescribed by the EOPs [Reference 5].

**References**

1. E02-1AP49, Sheet 001, AUXILIARY BUILDING MCC 1A3, Rev Z, and E02-1AP50, Sheet 001, KEY DIAGRAM AUX BUILDING MCC 1A4 AND 1B4 (1AP93E) (1AP94E), Rev R
2. CL-MISC-009 Rev 1, MAAP Analysis #C467130029-10881
3. CPS Drawing M05-1073, Sheet 001, Rev AG, LOW-PRESSURE CORE SPRAY (LPCS) (LP)
4. CPS Drawing M05-1075, Sheet 003, Rev AG, RESIDUAL HEAT REMOVAL (RH)
5. CPS Drawing E02-1AP47, Sheet 001, Rev AF, KEY DIAGRAM AUXILIARY BLDG MCC 1A1 (1AP72E), E02-1AP51, Sheet 002, Rev M, KEY DIAGRAM AUX BLDG MCC 1B1

### Details:

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| **Provide a brief description of Procedures / Strategies / Guidelines** | *Confirm that procedure/guidance exists or will be developed to support implementation*<br><br>• Clinton will use the industry developed guidance from the Owners |

| Maintain Containment | |
|---|---|
| **BWR Portable Equipment Phase 2:** | |
| | Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.<br>• EOPs provide guidance on hydrogen igniter operation. |
| **Identify modifications** | *List modifications*<br><br>• Two diverse external connections for a portable diesel powered pump to supply cooling water to an RHR heat exchanger.<br>• Piping will be installed to support the connection of the external water connection to the Unit 1 Shutdown Service Water (SX) system using the Unit 2 SX supply to the Division 1 or Division 2 Control Room Ventilation (VC) Chillers (currently blind-flanged).<br>• Modify an ECCS pump suction spool piece to provide suppression pool suction for a 480 VAC pump.<br>• Adapt the RHR Steam Condensing Mode (currently abandoned) heat exchanger supply piping to provide a discharge path for the 480 VAC pump.<br>• The electrical support and cooling/makeup water support modifications needed for the containment function are discussed in the Safety Function Support section. |
| **Key Containment Parameters** | *List instrumentation credited or recovered for this coping evaluation.*<br><br>**Suppression Pool Temperature**<br>Manually obtained using procedure CPS 4200.01C003 MONITORING CNMT TEMPERATURES DURING A SBO<br>**Suppression Pool Level**<br>1E51-N636A/E<br>**Containment Pressure**<br>1E12-N662A/C<br><br>Clinton's evaluation of the FLEX strategy may identify additional parameters that are needed in order to support key actions identified in the plant procedures/guidance or to indicate imminent or actual core damage (NEI 12-06 Rev. 0 Section 3.2.1.10) and any differences will be provided in a future 6-month update following identification. |
| | |
| **Storage / Protection of Equipment :**<br>**Describe storage / protection plan or schedule to determine storage requirements** | |
| **Seismic** | *List how equipment is protected or schedule to protect* |

| Maintain Containment | |
|---|---|
| **BWR Portable Equipment Phase 2:** | |
| | Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Section 11. Schedule to construct permanent buildings is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. 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. |
| **Flooding**<br>Note: if stored below current flood level, then ensure procedures exist to move equipment prior to exceeding flood level. | *List how equipment is protected or schedule to protect*<br><br>Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Section 11. Schedule to construct permanent buildings is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. 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. |
| **Severe Storms with High Winds** | *List how equipment is protected or schedule to protect*<br><br>Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Section 11. Schedule to construct permanent buildings is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. 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. |
| **Snow, Ice, and Extreme Cold** | *List how equipment is protected or schedule to protect*<br><br>Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Section 11. Schedule to construct permanent buildings is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. 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. |
| **High Temperatures** | *List how equipment is protected or schedule to protect*<br><br>Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Section 11. Schedule to construct permanent buildings is contained in Attachment 2, and will satisfy the site |

| Maintain Containment | | |
|---|---|---|
| **BWR Portable Equipment Phase 2:** | | |
| | compliance date. Temporary locations will be used until building construction completion. 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. | |
| **Deployment Conceptual Design** (Attachment 3 contains Conceptual Sketches) | | |
| **Strategy** | **Modifications** | **Protection of connections** |
| *Identify Strategy including how the equipment will be deployed to the point of use.* | *Identify modifications* | *Identify how the connection is protected* |
| The electrical support and cooling/makeup water support deployment strategies are common to core cooling, containment, and spent fuel pool makeup functions. The discussion is in the Safety Function Support section. | The electrical support and cooling/makeup water support modifications are common to core cooling, containment, and spent fuel pool makeup functions. The discussion is in the Safety Function Support section. | The external connection points are common to core cooling, containment, and spent fuel pool makeup functions. The protection discussion is in the Safety Function Support section. |
| Hoses will be pre-staged to connect the FLEX alternate suppression pool cooling pump to the suppression pool and RHR heat exchanger connections. | None | Hoses will be staged in a structure protected from external hazards. |
| Hoses will be pre-staged to connect piping from the external water connection to the Unit 2 SX supply to the VC chillers. | None | Hoses will be staged in a structure protected from external hazards. |
| **Notes:** Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. 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 Clinton during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan. | | |

| Maintain Containment | |
|---|---|
| **BWR Portable Equipment Phase 3:** | |
| *Provide a general description of the coping strategies using phase 3 equipment including modifications that are proposed to maintain containment. Identify methods (containment vent or alternative / Hydrogen Igniters) and strategy(ies) utilized to achieve this coping time.*<br><br>Phases 1 and 2 strategy will provide sufficient capability such that no additional Phase 3 strategies are required.<br><br>Phase 3 equipment for Clinton includes backup portable pumps and generators. The portable pumps will be capable of providing the necessary flow and pressure as outlined in Phase 2 response for Core Cooling, Containment, and Spent Fuel Pool Cooling. The portable generators will be capable of providing the necessary 480 volt power requirements as outlined in Phase 2 response for Safety Functions Support. | |
| **Details:** | |
| **Provide a brief description of Procedures / Strategies / Guidelines** | *Confirm that procedure/guidance exists or will be developed to support implementation*<br><br>Clinton will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs. |
| **Identify modifications** | *List modifications*<br><br>None |
| **Key Containment Parameters** | *List instrumentation credited or recovered for this coping evaluation.*<br><br>Clinton's evaluation of the FLEX strategy may identify additional parameters that are needed in order to support key actions identified in the plant procedures/guidance or to indicate imminent or actual core damage (NEI 12-06 Rev. 0 Section 3.2.1.10) and any differences will be provided in a future 6 month update following identification. |

| **Deployment Conceptual Design**<br>**(Attachment 3 contains Conceptual Sketches)** | | |
|---|---|---|
| **Strategy** | **Modifications** | **Protection of connections** |
| *Identify Strategy including how the equipment will be deployed to the point of use.* | *Identify modifications* | *Identify how the connection is protected* |
| None | None | None |

| Maintain Containment |
| --- |
| **BWR Portable Equipment Phase 3:** |
| **Notes:**<br>Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. 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 Clinton during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan. |

**Maintain Spent Fuel Pool Cooling**

**Determine Baseline coping capability with installed coping[3] modifications not including FLEX modifications, utilizing methods described in Table 3-1 of NEI 12-06:**

- **Makeup with Portable Injection Source**

**BWR Installed Equipment Phase 1:**

*Provide a general description of the coping strategies using installed equipment including modifications that are proposed to maintain spent fuel pool cooling. Identify methods (makeup with portable injection source)and strategy(ies) utilized to achieve this coping time*

There are no Phase 1 actions required. Below is a description of the SFP and the decay heat loading for the pool. Effects from loss of cooling are also included which indicate no operator action is required for 38.65 hours (time to boil off to the top of fuel racks) after loss of cooling using the Maximum Abnormal Heat Load (MAHL) from Reference 2.

The CPS spent fuel pool has a capacity of 3796 fuel storage cells. On an as-needed basis the cask storage pool may be utilized for storage of up to 2 racks with 264 cells capacity which increases the pool total storage capacity to 4060 fuel assemblies. CPS is licensed to store 3,796 fuel assemblies in the spent fuel pool and an additional 363 in the fuel cask storage pool, as needed.

Reference 1 discusses the peak fuel pool temperature for two decay heat load cases with the Fuel Pool Cooling and Cleanup System (FC) in service and also with a sudden loss of the FC system. The basis for the UFSAR discussion is contained in Reference 2.

Case 1 Maximum Normal Heat Load (MNHL) - This normal batch discharge case conservatively assumes more fuel cells are occupied than available. The MNHL case assumes that the spent fuel pool and cask storage pool has a combined total of 4159 cells to store spent fuel bundles and 4056 cells have already been filled with spent fuel bundles from 13 previous 18 month long operating cycles. The normal batch discharge of 312 bundles with an average exposure of 43.0 GWd/MT is initiated 24 hours after reactor shutdown from a 24 month long operating cycle. So the spent fuel storage is conservatively overfilled after this batch discharge. The MNHL is calculated to be 27.7 million Btu/hr.

Case 2 Maximum Abnormal Heat Load (MAHL) - This full-core discharge case is an extension from the MNHL case after 24 months of full power operation from the last outage. This case assumes that a full-core discharge of 624 fuel bundles with an average exposure of 43.0 GWd/MT is initiated 24 hours after shutdown. The previous batch of 312 fuel bundles discharged in the spent fuel storage pool mentioned in Case 1 has just decayed for 24 months. So the spent fuel storage is conservatively overfilled after this full-core discharge. The MAHL is calculated to be 40.0 million Btu/hr.

The analysis of Case 1 shows that the spent fuel pool and cask storage pool bulk temperature will peak at 125.8°F if the batch discharge of 312 bundles is initiated 24 hours after reactor shutdown with one train of FC in operation. The highest evaporation heat loss rate reaches 0.4 million Btu/hr. Additionally for Case 1, it is assumed that all pool cooling is lost when spent fuel pool temperature is at its peak. It would take 5.3 hours for the pool temperature to reach boiling, and the peak boil-off rate at about 60 gpm, which is less than the Seismic Category I spent fuel pool emergency water makeup system capability of 100 gpm. Calculation 01FC43 shows that for Case 1 the time to reach the top of the fuel racks with no

[3] Coping modifications consist of modifications installed to increase initial coping time, i.e., generators to preserve vital instruments or increase operating time on battery powered equipment.

makeup is 55.81 hours.

The analysis of Case 2 shows that the spent fuel pool and cask storage pool bulk temperature reaches a maximum of 134.9°F with only one train of FC operating (both trains available) if a full core discharge 624 bundles (after 24 months of full power operation) is initiated 24 hours after reactor shutdown. The worst evaporation heat loss rate is about 0.6 million Btu/hr. Additionally for Case 2, it is also assumed that all pool cooling is lost when spent fuel pool temperature is at its peak. The pool temperature rises to boiling in 3.2 hours. The peak boil-off rate is about 86 gpm, which is less than the Seismic Category I spent fuel pool emergency water makeup system capability of 100 gpm. Calculation 01FC43 shows that for Case 2 the time to reach the top of the fuel racks with no makeup is 38.65 hours.

**References**

1. CPS UFSAR section 9.1.3.3.1
2. Calculation 01FC43, Rev 1

| Details: | |
|---|---|
| **Provide a brief description of Procedures / Strategies / Guidelines** | N/A |
| **Identify any equipment modifications** | SFP Level Modification as required by EA-12-051 |
| **Key SFP Parameter** | SFP Level provided by modification required by EA-12-051<br>Clinton's evaluation of the FLEX strategy may identify additional parameters that are needed in order to support key actions identified in the plant procedures/guidance or to indicate imminent or actual core damage (NEI 12-06 Rev. 0 Section 3.2.1.10) and any differences will be provided in a future 6-month update following identification. |

**Notes:**

Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. 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 Clinton during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.

## Maintain Spent Fuel Pool Cooling

### BWR Portable Equipment Phase 2:

*Provide a general description of the coping strategies using on-site portable equipment including modifications that are proposed to maintain spent fuel pool cooling. Identify methods (makeup with portable injection source) and strategy(ies) utilized to achieve this coping time.*

After the SFP reaches the boiling point a source of makeup water will need to be provided to ensure the fuel in the SFP remains cool and radiological conditions on the fuel handling floor do not degrade. The seismically qualified emergency SFP makeup supply from the SX system will be used to supply >86 gpm to the SFP. Motor operated valve 1SX016A [Reference 1] and 1SX016B [Reference 2] SX To Fuel Pool Make-Up Valves can be operated manually with the handwheel, or with AC power supplied from the FLEX Diesel Generator. The valve used will depend on which SX division the external water connection is supplying.

The supply to the SX system from the external water connections is described in the Safety Function Support Phase 2 section.

Alternatively, a fire hose can be connected to the external water connection and routed up the Fuel Building east or west stairwell to the fuel handling floor, utilizing a nozzle restrained at the SFP handrail.

By $T_0$+12 hours the SX supply header will be pressurized from the external water connection, and makeup flow can then be established via 1SX016A or 1SX016B. If needed, a fire hose on the fuel handling floor will also be available as an alternate SFP makeup supply.

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 6-month update.

**SFP Spray**

A fire hose will be connected to the external water connection and routed up the Fuel Building east or west stairwell to the fuel handling floor. This fire hose can supply a monitor nozzle staged on the fuel handling floor to provide the SFP with 250 gpm of spray.

**References**

1. CPS Drawing M05-1052, Sheet 001, Rev AX, SHUTDOWN SERVICE WATER (SX)
2. CPS Drawing M05-1052, Sheet 002, Rev AQ, P AND ID SHUTDOWN SERVICE WATER (SX)

### Schedule:

| | |
|---|---|
| **Provide a brief description of Procedures / Strategies / Guidelines** | *Confirm that procedure/guidance exists or will be developed to support implementation*<br><br>Clinton will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs. Procedural changes will include reference to level indication that will be provided in accordance with EA-12-051. |
| **Identify modifications** | *List modifications*<br><br>The electrical support and cooling/makeup water support modifications |

| Maintain Spent Fuel Pool Cooling | |
|---|---|
| **BWR Portable Equipment Phase 2:** | |
| | required to provide UHS water for SFP makeup are discussed in the Safety Function Support section. |
| **Key SFP Parameter** | SFP Level provided by modification required by EA-12-051<br>Clinton's evaluation of the FLEX strategy may identify additional parameters that are needed in order to support key actions identified in the plant procedures/guidance or to indicate imminent or actual core damage (NEI 12-06 Rev. 0 Section 3.2.1.10) and any differences will be provided in a future 6-month update following identification. |
| | |
| **Storage / Protection of Equipment :**<br>**Describe storage / protection plan or schedule to determine storage requirements** | |
| **Seismic** | *List how equipment is protected or schedule to protect*<br><br>Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Section 11. Schedule to construct permanent buildings is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. 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. |
| **Flooding**<br>Note: if stored below current flood level, then ensure procedures exist to move equipment prior to exceeding flood level. | *List how equipment is protected or schedule to protect*<br><br>Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Section 11. Schedule to construct permanent buildings is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. 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. |
| **Severe Storms with High Winds** | *List how equipment is protected or schedule to protect*<br><br>Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Section 11. Schedule to construct permanent buildings is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. 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. |

| Maintain Spent Fuel Pool Cooling | |
|---|---|
| **BWR Portable Equipment Phase 2:** | |
| **Snow, Ice, and Extreme Cold** | *List how equipment is protected or schedule to protect*<br><br>Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Section 11. Schedule to construct permanent buildings is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. 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. |
| **High Temperatures** | *List how equipment is protected or schedule to protect*<br><br>Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Section 11. Schedule to construct permanent buildings is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. 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. |

**Deployment Conceptual Design**
**(Attachment 3 contains Conceptual Sketches)**

| Strategy | Modifications | Protection of connections |
|---|---|---|
| *Identify Strategy including how the equipment will be deployed to the point of use.* | *Identify modifications* | *Identify how the connection is protected* |
| The electrical support and cooling/makeup water support deployment strategies are common to core cooling, containment, and spent fuel pool makeup functions. The discussion is in the Safety Function Support section. | The electrical support and cooling/makeup water support modifications are common to core cooling, containment, and spent fuel pool makeup functions. The discussion is in the Safety Function Support section. | The external connection points are common to core cooling, containment, and spent fuel pool makeup functions. The protection discussion is in the Safety Function Support section. |
| Hoses will be pre-staged to supply makeup water to the Spent Fuel Pool. | None | Hoses will be staged in a structure protected from external hazards. |

| Maintain Spent Fuel Pool Cooling |
| --- |
| **BWR Portable Equipment Phase 2:** |
| **Notes:**<br>Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. 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 Clinton during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan. |

| Maintain Spent Fuel Pool Cooling | |
|---|---|
| **BWR Portable Equipment Phase 3:** | |
| *Provide a general description of the coping strategies using phase 3 equipment including modifications that are proposed to maintain spent fuel pool cooling. Identify methods (makeup with portable injection source)and strategy(ies) utilized to achieve this coping time.*<br><br>Phase 1 and 2 strategy will provide sufficient capability such that no additional Phase 3 strategies are required.<br><br>Phase 3 equipment for Clinton includes backup portable pumps and generators. The portable pumps will be capable of providing the necessary flow and pressure as outlined in Phase 2 response for Core Cooling, Containment, and Spent Fuel Pool Cooling. The portable generators will be capable of providing the necessary 480 volt power requirements as outlined in Phase 2 response for Safety Functions Support. | |
| **Schedule:** | |
| **Provide a brief description of Procedures / Strategies / Guidelines** | *Confirm that procedure/guidance exists or will be developed to support implementation*<br><br>Clinton will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs. |
| **Identify modifications** | *List modifications*<br><br>None |
| **Key SFP Parameter** | Clinton's evaluation of the FLEX strategy may identify additional parameters that are needed in order to support key actions identified in the plant procedures/guidance or to indicate imminent or actual core damage (NEI 12-06 Rev. 0 Section 3.2.1.10) and any differences will be provided in a future 6 month update following identification. |

| Deployment Conceptual Design (Attachment 3 contains Conceptual Sketches) | | |
|---|---|---|
| **Strategy** | **Modifications** | **Protection of connections** |
| *Identify Strategy including how the equipment will be deployed to the point of use.* | *Identify modifications* | *Identify how the connection is protected* |
| None | None | None |

| Maintain Spent Fuel Pool Cooling |
| --- |
| **BWR Portable Equipment Phase 3:** |
| **Notes:**<br>Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. 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 Clinton during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan. |

| Safety Functions Support |
|---|
| **Determine Baseline coping capability with installed coping[4] modifications not including FLEX modifications.** |
| **BWR Installed Equipment Phase 1** |
| *Provide a general description of the coping strategies using installed equipment including station modifications that are proposed to maintain and/or support safety functions. Identify methods and strategy(ies) utilized to achieve coping times.*<br>**DC Power Support**<br>125 VDC power will be available from station batteries during Phase 1. Division 1 DC MCC 1A will continue to supply the RCIC system controls and indications, SRV solenoid power, and NSPS Inverter for vital instrumentation.<br>**RCIC Room Ventilation**<br>The RCIC pump room will heat up during Phase 1 from the steam piping and suppression pool piping inside the room. GOTHIC analysis [Reference 1] has shown that opening the RCIC room doors and supplying air to the room will maintain habitable conditions. Compensatory actions are described in Phase 2.<br>**Main Control Room Habitability**<br>CPS 4200.01C001, MCR COOLING DURING A SBO [Reference 2] provides a method for maintaining control room habitability during a station blackout for the station's designed four (4) hour coping period. The method utilizes a portable fan and establishes a flowpath to bring outside air into the control room. The need for further analysis is discussed in Phase 2.<br>**Battery Room Ventilation**<br>Hydrogen buildup in the battery rooms will not begin until a 480 VAC generator is used to charge batteries in Phase 2. The need for further analysis of battery room conditions during an ELAP/LUHS is an open item. Closure of this item will be documented in a future 6-month update.<br>**Inverter Room Ventilation**<br>The Division 1 NSPS inverter will be energized during Phase 1 without normal cooling from the room cooler. The inverter room door will be propped open during Phase 1 to prevent overheating the inverter. The need for further analysis of inverter room heatup during an ELAP/LUHS is an open item. Closure of this item will be documented in a future 6-month update.<br>**Fuel Building Habitability**<br>Environmental conditions in the fuel building will remain acceptable during Phase 1 since boiling in the SFP will not occur for 16 hours [Reference 3]. |

[4] Coping modifications consist of modifications installed to increase initial coping time, i.e., generators to preserve vital instruments or increase operating time on battery powered equipment.

**References**

1. S&L Calculation 2013-01301, Revision 0, 11332-295, "Transient Analysis of RCIC Pump Room for Extended Loss of A-C Power"
2. CPS 4200.01C001, MCR COOLING DURING A SBO, Rev 4c
3. EC EVAL 382149 Rev 0, C1R13 Decay Heat

| **Details:** | |
|---|---|
| **Provide a brief description of Procedures / Strategies / Guidelines** | *Confirm that procedure/guidance exists or will be developed to support implementation.*<br><br>Clinton will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs. |
| **Identify modifications** | *List modifications and describe how they support coping time.*<br><br>None |
| **Key Parameters** | *List instrumentation credited for this coping evaluation phase.*<br><br>None<br><br>Clinton's evaluation of the FLEX strategy may identify additional parameters that are needed in order to support key actions identified in the plant procedures/guidance or to indicate imminent or actual core damage (NEI 12-06 Rev. 0 Section 3.2.1.10) and any differences will be provided in a future 6-month update following identification. |

**Notes:**

Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. 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 Clinton during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.

| Safety Functions Support |
|---|
| **BWR Portable Equipment Phase 2** |

*Provide a general description of the coping strategies using on-site portable equipment including station modifications that are proposed to maintain and/or support safety functions. Identify methods and strategy(ies) utilized to achieve coping times.*

**Electrical Support**

Key portions of the Division 1, Division 2, and non-divisional 480 VAC distribution system will be able to be re-energized from a pre-staged primary FLEX generator or a portable alternate FLEX generator. Either generator independently will enable maintaining DC power for RCIC, SRV controls and vital instrumentation, and provide AC power for hydrogen igniters, SPMU valves and suppression pool cooling FLEX pump.

- The primary FLEX generator and switchgear will be permanently housed in the Unit 2 side of the Control and Diesel Generator buildings; therefore, deployment will not be impeded by a beyond design basis external event (BDBEE). The connecting cabling will be pre-routed from the vicinity of the primary FLEX switchgear to the vicinity of the Division 1 480 VAC unit substations which will have connection points for an external source of power.
- The alternate (N+1) portable FLEX generator will able to be deployed to an external electrical connection point. A heavy duty truck capable of clearing debris from the travel path will be stored in the same location. The switchgear for the alternate generator will be housed in the Unit 2 side of the Diesel Generator Building. The connecting cabling will be pre-routed from the vicinity of the alternate FLEX switchgear to the vicinity of the Division 2 480 VAC unit substations and the swing battery charger. The unit substations will have connection points for an external source of power.

Once the event is identified as an ELAP/LUHS, operations personnel will line up and start the primary or alternate FLEX generator and perform a lineup that enables key 480 VAC components, including the Division 1 battery charger, to be re-energized by $T_0$+5 hrs.

**Cooling/Makeup Water Support**

A portable diesel driven pump will be able to be deployed to the Ultimate Heat Sink (UHS) at the Circulating Water Screen House (699' elevation). The pump will take its suction from the UHS and discharge to the suction of a second portable diesel driven pump stored in the same storage structure and deployed at grade elevation (736' elevation) in the vicinity of external water connections. The second pump will discharge to one of two external water connections.

Provisions will be made for accessing the UHS should the downstream main dam fail during a seismic event. In this event the surface of the lake could drop from approximately 690' elevation to 675' elevation.

The external water connections will be hard-piped to both the Division 1 and Division 2 Shutdown Service Water (SX) System. The Control Room Ventilation (VC) chillers were designed for a Unit 1 or Unit 2 SX supply, and the Unit 2 supply (currently blind-flanged) is the proposed connection point for cross-tying to Unit 1 SX. The Division 1 VC chiller will enable the supply to Division 1 SX, and the Division 2 VC chiller will enable the supply to Division 2 SX. The SX system will allow cooling water to be supplied to the associated RHR Heat Exchanger for suppression pool cooling and to supply makeup water to the Spent Fuel Pool.

The external connections will also supply makeup water to the RPV and suppression pool using the LPCS and RHR-C modifications described in Core Cooling Phase 2.

| Safety Functions Support |
|---|
| **BWR Portable Equipment Phase 2** |

**RCIC Room Ventilation**

The RCIC pump room will reach 145°F within 42 hours if no action is taken. To improve conditions in the pump room for equipment protection and personnel access, the doors between the pump room and the access aisle will be opened and a portable blower will inject air into the room. The security door between the Auxiliary and Turbine Building basement will be opened to provide a source of air for the blower. With these actions taken, the temperature in the room will remain below 145°F [Reference 1].

**Main Control Room Habitability**

Exelon Generation Company, LLC (Exelon) intends to maintain Operational command and control within the Main Control Room. 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 6-month update.

**Battery Room Ventilation**

Battery room doors will be blocked open when battery charging commences to minimize the potential for an explosive hydrogen concentration to build up inside the rooms. 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 6-month update.

**Inverter Room Ventilation**

The Division 1 NSPS inverter will be energized during Phase 2 without room cooling. 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.

**Fuel Building Habitability**

Evaluation of the spent fuel pool area for steam and condensation has not yet been performed. 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 6-month update.

**Fuel Oil Supply**

Fuel oil to diesel driven pumps and generators will be supplied by the quantity of fuel in the tanks located on the skids of the portable equipment and by fuel tanks contained on the back of the FLEX truck. When required, fuel oil will be obtained from the Division 1, or alternatively the Division 2 DG Fuel Oil Storage Tank. The 480 VAC FLEX generator will supply power to the DG Fuel Oil Transfer Pump which will provide the DG Day Tank with a continuous supply of fuel oil. The DG Day Tank drain line will be used to supply a portable 120 VAC pump via a flexible hose connected to the drain line.

**References:**

1. S&L Calculation 2013-01301, Revision 0, 11332-295, Transient Analysis of RCIC Pump Room for Extended Loss of A-C Power

| Details: | |
|---|---|
| **Provide a brief description of Procedures** | *Confirm that procedure/guidance exists or will be developed to support implementation with a description of the procedure / strategy* |

| Safety Functions Support | |
|---|---|
| **BWR Portable Equipment Phase 2** | |
| **/ Strategies / Guidelines** | */ guideline.*<br><br>Clinton will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs. |
| **Identify modifications** | *List modifications necessary for Phase 2*<br><br>**Electrical Support**<br>• A 480 VAC primary FLEX generator will be pre-staged in the Unit 2 side of the diesel generator building. An alternate (N+1) portable FLEX generator will be housed separately in a storage structure.<br>• Electrical switchgear will be installed for the primary and the alternate FLEX generators.<br>• Cabling will be installed for connecting the generators to the 480 VAC distribution system.<br>• Unit Substations will be modified to enable cabling from the generators to supply power to the bus and feed the Motor Control Centers (MCCs) supplying the required 480 VAC components.<br>• An external electrical connection point for the alternate generator will be installed on the south side of the Diesel Generator Building.<br><br>**Cooling/Makeup Water Support**<br>• A suction source for a portable diesel powered pump from the UHS will be installed at the Screen House, including UHS access modifications.<br>• Two external connections for a portable diesel powered pump to supply low pressure makeup and cooling water in the plant will be installed.<br>• A connection to the Division 1 and Division 2 Shutdown Service Water (SX) systems from the external water connections will be installed. |
| **Key Parameters** | *List instrumentation credited or recovered for this coping evaluation.*<br><br>None<br><br>Clinton's evaluation of the FLEX strategy may identify additional parameters that are needed in order to support key actions identified in the plant procedures/guidance or to indicate imminent or actual core damage (NEI 12-06 Rev. 0 Section 3.2.1.10) and any differences will be provided in a future 6-month update following identification. |
| | |
| **Storage / Protection of Equipment :**<br>**Describe storage / protection plan or schedule to determine storage requirements** | |
| **Seismic** | *List how equipment is protected or schedule to protect* |

| Safety Functions Support | |
|---|---|
| **BWR Portable Equipment Phase 2** | |
| | Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Section 11. Schedule to construct permanent buildings is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. 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. |
| **Flooding**<br>Note: if stored below current flood level, then ensure procedures exist to move equipment prior to exceeding flood level. | *List how equipment is protected or schedule to protect*<br><br>Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Section 11. Schedule to construct permanent buildings is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. 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. |
| **Severe Storms with High Winds** | *List how equipment is protected or schedule to protect*<br><br>Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Section 11. Schedule to construct permanent buildings is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. 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. |
| **Snow, Ice, and Extreme Cold** | *List how equipment is protected or schedule to protect*<br><br>Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Section 11. Schedule to construct permanent buildings is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. 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. |
| **High Temperatures** | *List how equipment is protected or schedule to protect*<br><br>Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Section 11. Schedule to construct permanent buildings is contained in Attachment 2, and will |

| Safety Functions Support | | |
|---|---|---|
| **BWR Portable Equipment Phase 2** | | |
| | satisfy the site compliance date. Temporary locations will be used until building construction completion. 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. | |
| **Deployment Conceptual Design** (Attachment 3 contains Conceptual Sketches) | | |
| **Strategy** | **Modifications** | **Protection of connections** |
| *Identify Strategy including how the equipment will be deployed to the point of use.* | *Identify modifications* | *Identify how the connection is protected* |
| **Electrical Support** (Attachment 3 Figure 1) | | |
| The primary FLEX generator will be permanently staged and does not require deployment. | • A permanently staged 480 VAC generator able to supply necessary portions of the 480 VAC distribution system to repower the Division 1 battery charger and other needed AC loads.<br>• Pre-routed cabling with cam-lock connectors | The internal electrical connections are inside the station's seismically robust Control, Auxiliary, and Diesel Generator buildings and are protected against external hazards. |
| The alternate FLEX generator will be housed in a nearby storage structure and will be able to be deployed to the vicinity of the external electrical connection point. A heavy duty truck capable of clearing debris from the travel path will be stored in the same location. | • An external electrical connection able to supply 480 VAC power to switchgear inside the Control/DG building. The switchgear will be able to supply necessary portions of the 480 VAC distribution system to repower the swing battery charger to supply DC MCC 1A, and other needed AC loads.<br>• Pre-routed cabling with cam-lock connectors | FLEX piping, valves, and connections (electrical & fluid) will meet NEI 12-06 Rev.0 protection requirements. |
| **Cooling/Makeup Water Support** (Attachment 3 Figure 2) | | |
| The portable diesel driven pumps will be housed in a storage structure and will be able to be deployed to the UHS and to the vicinity of the external water connection points. A heavy duty truck capable of clearing debris | Two external water connections. | FLEX piping, valves, and connections (electrical & fluid) will meet NEI 12-06 Rev.0 protection requirements. |

| Safety Functions Support | | |
|---|---|---|
| **BWR Portable Equipment Phase 2** | | |
| from the travel path will be stored in the same location (Attachment 3 Figure 3). | | |
| The proposed means of routing the water from the UHS to the plant is via seismically robust unused Unit 2 SX piping. | • Connection to the Unit 2 SX supply piping from the UHS FLEX pump (proposed). | |
| A means will be provided to access UHS water at 675' MSL elevation with a FLEX pump in the event of the loss of the main dam. | • Security fence modifications will be installed to facilitate access to the UHS. | |

**Notes:**

Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. 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 Clinton during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.

| Safety Functions Support |
|---|
| **BWR Portable Equipment Phase 3** |
| *Provide a general description of the coping strategies using phase 3 equipment including modifications that are proposed to maintain and/or support safety functions. Identify methods and strategy(ies) utilized to achieve coping times.*<br>Phase 1 and 2 strategy will provide sufficient capability that no additional Phase 3 strategies are required.<br>Phase 3 equipment for Clinton includes backup portable pumps and generators. The portable pumps will be capable of providing the necessary flow and pressure as outlined in Phase 2 response for Core Cooling, Containment, and Spent Fuel Pool Cooling. The portable generators will be capable of providing the necessary 480 volt power requirements as outlined in Phase 2 response for Safety Functions Support. |

| Details: | |
|---|---|
| **Provide a brief description of Procedures / Strategies / Guidelines** | *Confirm that procedure/guidance exists or will be developed to support implementation with a description of the procedure / strategy / guideline.*<br>Clinton will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs. |
| **Identify modifications** | *List modifications necessary for Phase 3*<br>None |
| **Key Parameters** | *List instrumentation credited or recovered for this coping evaluation.*<br>None<br>Clinton's evaluation of the FLEX strategy may identify additional parameters that are needed in order to support key actions identified in the plant procedures/guidance or to indicate imminent or actual core damage (NEI 12-06 Rev. 0 Section 3.2.1.10) and any differences will be provided in a future 6 month update following identification. |

| Deployment Conceptual Design<br>(Attachment 3 contains Conceptual Sketches) | | |
|---|---|---|
| **Strategy** | **Modifications** | **Protection of connections** |
| *Identify Strategy including how the equipment will be deployed to the point of use.* | *Identify modifications* | *Identify how the connection is protected* |
| None | None | None |

| Safety Functions Support |
| --- |
| **BWR Portable Equipment Phase 3** |
| **Notes:**<br>Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. 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 Clinton during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan. |

| **BWR Portable Equipment Phase 2** | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Use and (potential / flexibility) diverse uses* | | | | | | *Performance Criteria* | *Maintenance* |
| *List portable equipment* | Core | Containment | SFP | Instrumentation | Accessibility | | Maintenance / PM requirements |
| Four (4) Diesel Driven self prime pumps | X | X | X | | | 2700 gpm, 150 psig | Equipment maintenance and testing will be performed in accordance with the industry templates, as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11. |
| Two (2) 480 VAC Generators (one is pre-staged) | X | X | X | X | X | 750 kW | Equipment maintenance and testing will be performed in accordance with the industry templates, as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11. |
| Diesel powered air compressors (2) for ADS backup air bottles | X | | | | | 2800 psig | Equipment maintenance and testing will be performed in accordance with the industry templates, as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11. |
| Portable blower and ducting for RCIC room cooling (2) | X | X | | | X | 9500 cfm | Equipment maintenance and testing will be performed in accordance with the industry templates, as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11. |

| **BWR Portable Equipment Phase 2** | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Use and (potential / flexibility) diverse uses* | | | | | | *Performance Criteria* | *Maintenance* |
| *List portable equipment* | Core | Containment | SFP | Instrumentation | Accessibility | | Maintenance / PM requirements |
| Hose trailers (2) equipped with hoses, fittings, and tools need for the FLEX pumps | X | X | X | X | X | N/A | Equipment maintenance and testing will be performed in accordance with the industry templates, as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11. |
| A heavy duty truck capable of debris removal and hauling FLEX equipment | X | X | X | X | X | N/A | Equipment maintenance and testing will be performed in accordance with the industry templates, as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11. |

| BWR Portable Equipment Phase 3 | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Use and (potential / flexibility) diverse uses* | | | | | | *Performance Criteria* | *Notes* |
| *List portable equipment* | Core | Containment | SFP | Instrumentation | Accessibility | | |
| **Note: The RRC equipment has not been procured at the time of this submittal. Once the SAFER committee determines the equipment specifications for bid, updates will be made as necessary to this table. The Phase 3 portable equipment table will be updated once all of the equipment has been procured and placed in inventory.** | | | | | | | |
| Medium Voltage Diesel Generator | X | X | X | X | X | 2 MW output at 4160 VAC, three phase | • Generator must be common commercially available.<br>• Must run on diesel fuel. |
| Low Voltage Diesel Generator | X | X | X | X | X | 500 kW output at 480 VAC, three phase | • Generator must be common commercially available.<br>• Must run on diesel fuel. |
| Low Pressure Pump | X | X | X | | | 300 psi shutoff head, 2500 gpm max flow | |
| Low Pressure Pump | X | | X | | | 500 psi shutoff head, 500 gpm max flow | |
| Low Pressure Pump | | | | | X | 110 psi shutoff head, 400 gpm max flow submersible | |
| Low Pressure Pump | X | X | | | | 150 psi shutoff head, 5000 gpm max flow | |
| Air Compressor | | X | | | | 120 psi minimum pressure, 2000 scfm | |

| Phase 3 Response Equipment/Commodities | |
|---|---|
| **Item** | **Notes** |
| **Radiation Protection Equipment**<br>• Survey instruments<br>• Dosimetry<br>• Off-site monitoring/sampling | The RRC will not stock this type of equipment but this equipment will be requested from site-to-site and utility-to-utility on an as required basis. |
| **Commodities**<br>• Food<br>• Potable water | The RRC will not stock this type of equipment but this equipment will be requested from site-to-site and utility-to-utility on an as required basis. |
| **Fuel Requirements** | 300 – 500 gallon bladders that can be delivered by air |
| **Heavy Equipment**<br>• Transportation equipment<br>• Debris clearing equipment | • TBD during site specific playbook development<br>• Redundant Phase 2 equipment to be located at RRC |

# Attachment 1A
# Sequence of Events Timeline
(insert site specific time line to support submittal)

| Action item | Elapsed Time | Action | Time Constraint Y/N [5] | Remarks / Applicability |
|---|---|---|---|---|
| | 0 | Event starts, Scram, Recirc Pumps Trip | NA | Calc EPU-T0903 Clinton Power Station Extended Power Uprate, Task T0903: Station Blackout |
| 1 | Level 2 +30 sec | RCIC has started and begins to inject | NA | Calc EPU-T0903 Clinton Power Station Extended Power Uprate, Task T0903: Station Blackout |
| 2 | 10 min | Control level and pressure per procedures | Y | SBO procedure action<br>See Item 5.b in "General Integrated Plan" section. |
| 3 | 29 min | Bypass RCIC leak detection isolation logic | Y | SBO procedure action<br>See Item 5.a in "General Integrated Plan" section. |
| 4 | 1 hr | Defeat Low RCIC Steam Supply Pressure Isolation per CPS 4410.01C001, Defeating RCIC Interlocks | N | SBO procedure action driven by a parameter value |
| 5 | 1 hr | Initiate CPS 4200.01C003, Monitoring CNMT Temperatures During A SBO | N | SBO procedure action<br>Key Parameter for monitoring containment conditions, but does not drive a time critical action |
| 6 | 1 hr | Complete CPS 4200.01C002, DC Load Shedding During A SBO | Y | SBO procedure action<br>See Item 5.c in "General Integrated Plan" section. |
| 7 | 1 hr | Initiate Beyond Design Basis FLEX Strategies | Y | See Item 7 in "General Integrated Plan" section. |
| 8 | 1 hr | Begin RPV depressurization to 150 psig with SRVs at 50°F/hr. Control RPV pressure between 150 and 250 psig. | Y | Input assumption for MAAP analysis. See Item 2.a in "General Integrated Plan" section. |
| 9 | 1 hr | Commence Lining Up FLEX generator | N | Time selected to meet completion timeline. (Line 13) |
| 10 | 2 hr | Commence UHS Pump Deployment | N | Time selected to meet completion timeline. (Line 20) |
| 11 | 2 hr | Place ADS Backup Air Bottles in service per CPS 3101.01, Main Steam (MS, IS & ADS). | Y | See Item 6 in "General Integrated Plan" section. |
| 12 | 5 hr | Energize MCC 1A1 | N | Needed for Div 1 Battery Charger. (Line 13, 14) |
| 13 | 5 hr | Startup Div 1 Battery Charger and supply DC MCC 1A | Y | See Item 4 in "General Integrated Plan" section. |

[5] Instructions: Provide justification if No or NA is selected in the remarks column
If yes, include technical basis discussion as required by NEI 12-06 section 3.2.1.7

| | | | | |
|---|---|---|---|---|
| 14 | 5 hr | Energize Hydrogen Igniter Distribution Panel (MCC 1A1) | N | NEI 12-06 Table C-2 requirement, driven by EOP) |
| 15 | 5 hr | Energize MCC 1A3 | N | Needed for SPMU valves and Standby Lighting Cabinet 1LL70EA (Line 19, 22) |
| 16 | 5 hr | Open the SPMU valves | Y | See Item 2.c in "General Integrated Plan" section. |
| 17 | 5 hr | Energize DG MCC 1A and Standby Lighting Cabinet 1LL70EA | N | Provide receptacle power for DG fuel oil transfer pump and portable fuel oil pump (Line 19) |
| 18 | 6 hr | Open RCIC room doors | Y | See Item 3 in "General Integrated Plan" section. Time critical at $T_0$+42 hours. |
| 19 | 8 hr | Connect Div 1 Day Tank 120 VAC portable pump | Y | Provide fuel oil transfer capability. Fuel consumption rate is not yet determined. See Note 1 in "General Integrated Plan" section. |
| 20 | 8 hr | Place FLEX suppression pool cooling strategy in service | Y | See Item 2.d in "General Integrated Plan" section. |
| 21 | 12 hr | Initiate supplemental MCR ventilation per CPS 4200.01C001, MCR Cooling During A SBO | N | The need for further analysis of control room habitability during an ELAP/LUHS is an open item. Closure of this item will be documented in a future 6-month update. |
| 22 | 12 hr | Makeup to Suppression Pool as needed | Y | See Item 2.e in "General Integrated Plan" section. Bottom of operating band expected at $T_0$+16.8 hours. |
| 23 | 12 hr | Commence Spent Fuel Pool makeup (>86 gpm) as needed | Y | See item 1 in "General Integrated Plan" section. Top of fuel racks expected at $T_0$+130 hours. |
| 24 | 12 hr | Establish Fuel Bldg steam vent path | N | The need for further analysis of fuel building heatup during an ELAP/LUHS is an open item. Closure of this item will be documented in a future 6-month update. |
| 25 | 24 hr | Commence recharging the ADS backup air bottles with a FLEX air compressor | Y | See Item 6 in "General Integrated Plan" section. |
| 26 | 24 hr | First piece of RRC equipment arrives at the staging area | N | Assumption from NEI 12-06. |
| 27 | 30 hr | Establish RCIC Pump Room compensatory action (portable fan) | Y | See item 3 in "General Integrated Plan" section. Time critical at $T_0$+59.5 hours |
| 28 | 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 | General comment |

# Attachment 2
# Milestone Schedule

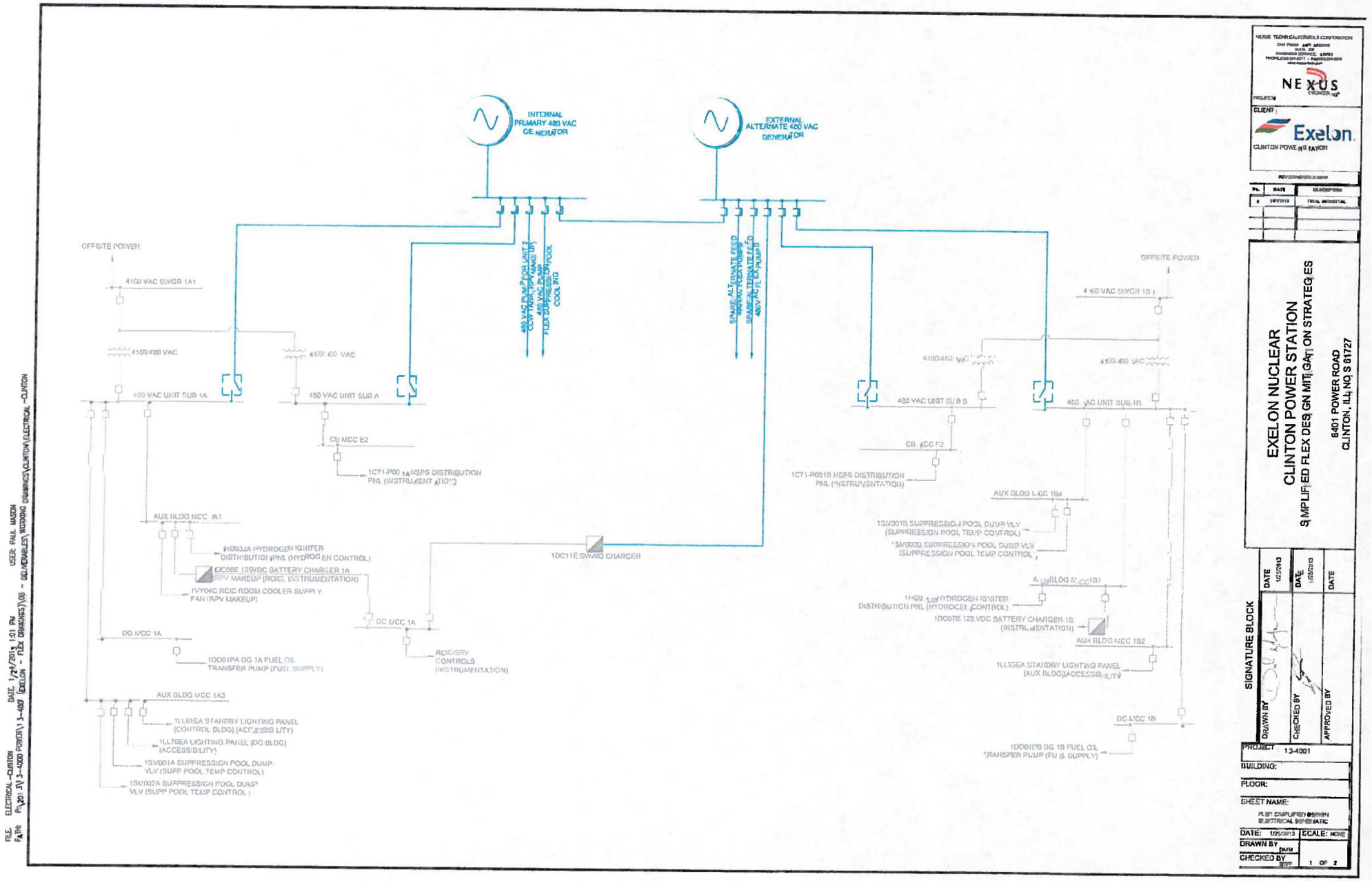
| Original Target Completion Date | Activity | Status {Include date changes in this column} |
|---|---|---|
| | Submit 60 Day Status Report | Complete |
| | Submit Overall Integrated Implementation Plan | Complete |
| | Contract with RRC | Complete |
| Recurring action, Aug and Feb | Submit 6-month updates | Ongoing |
| | Modification Development | |
| Mar 2014 | • Phase 2 modifications | Note 1 |
| | Modification Implementation | |
| May 2015 | • Phase 2 modifications | Note 1 |
| | Procedure development | |
| May 2015 | • Strategy procedures | Note 1 |
| May 2015 | • Maintenance procedures | Note 1 |
| May 2015 | Staffing analysis | Note 1 |
| May 2015 | Storage Plan and construction | Note 1 |
| May 2015 | FLEX equipment acquisition | Note 1 |
| May 2015 | Training completion | Note 1 |
| Dec 2014 | Regional Response Center Operational | (will be a standard date from RRC) |
| May 2015 | Unit 1 Implementation date | Note 1 |

Note(s):

1. Exelon will update the status of ongoing and future milestones in the Integrated Plan for Clinton during a scheduled 6-month update. This update will include any changes to the milestone schedule as submitted in the February 28, 2013 Integrated Plan.

# Attachment 3
# Conceptual Sketches

## Figure 1 - Electrical Conceptual Sketch



## Figure 2 - Mechanical Conceptual Sketch

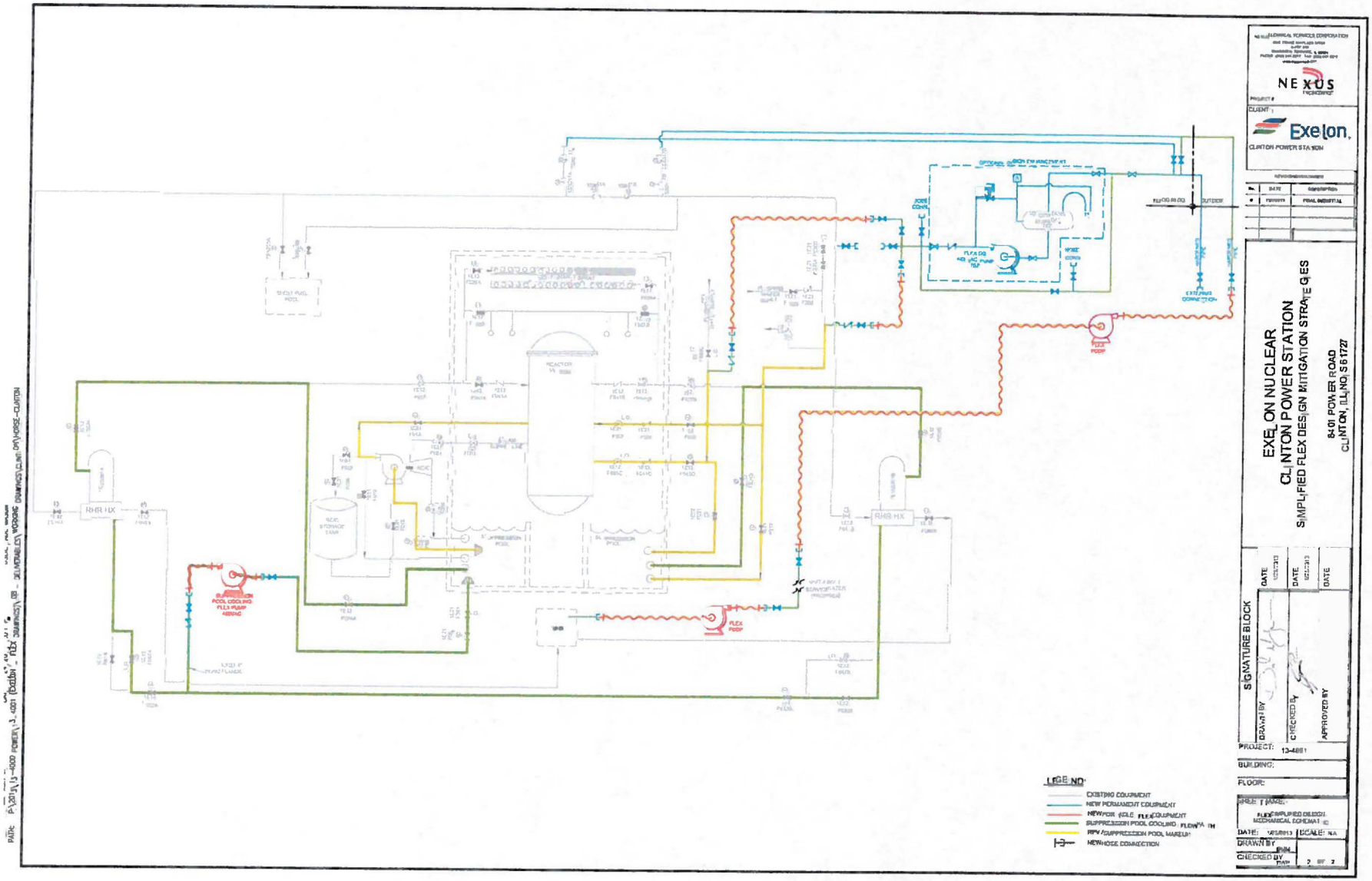


Figure 3 - FLEX Deployment Conceptual Sketch

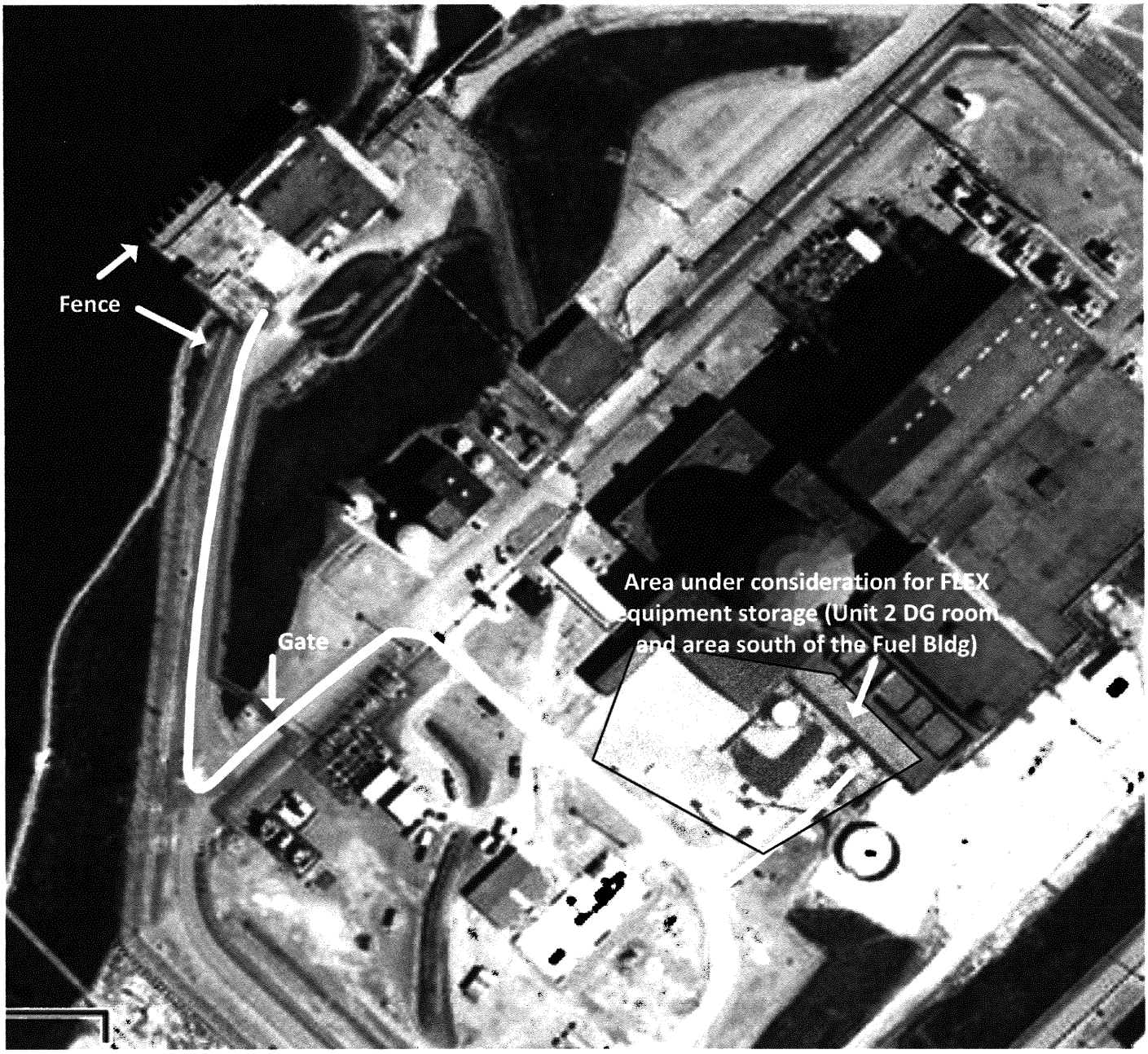


Figure 4 - RRC Equipment Deployment Conceptual Sketch