Exelon Generation.

Order No. EA-12-049

RS-13-117

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

References:

1. NRC Order Number EA-12-049, " Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," dated March 12, 2012
2. NRC Interim Staff Guidance JLD-ISG-2012-01, "Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," Revision 0, dated August 29, 2012
3. NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," Revision 0, dated August 2012
4. Exelon Generation Company, LLC's Initial Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049), dated October 25, 2012
5. Exelon Generation Company, LLC Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049), dated February 28, 2013 (RS-13-019)

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 directed EGC to develop, implement, and maintain guidance and strategies to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities in the event of a beyond-design-basis external event. Specific requirements are outlined in Attachment 2 of Reference 1.

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

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

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

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

Respectfully submitted,

Glen T. Kaegi

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

Enclosure:

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

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Enclosure

Clinton Power Station, Unit 1

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

(22 pages)

Enclosure

Clinton Power Station, Unit 1 First Six Month Status Report for the Implementation of Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events

1 Introduction

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

2 Milestone Accomplishments

None

3 Milestone Schedule Status

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

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
Aug 2013	Submit 6 month update	Complete with this submittal
Feb 2014	Submit 6 month update	Not Started
Aug 2014	Submit 6 month update	Not Started
Feb 2015	Submit 6 month update	Not Started
	Modification Development	
Mar 2014	• Phase 2 modifications	Started
Dec 2014	Regional Response Center Operational	Started
	Procedure development	
Feb 2015	Strategy procedures	Started

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

4 Changes to Compliance Method

Note:

In the discussions below, italics are used to highlight the significant changes.

Change 1

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

Reason for Change: This discussion is updated to include results from MAAP analysis of the containment strategy using a slightly higher suppression pool level band. The increased suppression pool volume allowed suppression pool temperature to peak at a lower value and provided more margin to containment design pressure.

Change: As part of the implementation plan of NEI 12-06, the BWROG performed evaluations of generic Boiling Water Reactor (BWR) response to Extended Loss of AC Power (ELAP) events to demonstrate the efficacy of the FLEX strategies. Reference 3 provides the results of those evaluations for several representative BWR plant designs.

Several Clinton Modular Accident Analysis Program (MAAP) [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 designated at 91.4°F in the alternate suppression pool cooling cases.

The following time constraints were used as MAAP input parameters, or were identified in the FLEX suppression pool cooling *MAAP Case 16* results:

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

b. Suppression Pool Heat Capacity Temperature Limit (HCTL) is reached in $t_0 + 3.5$ 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 5].

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. *Electrical power to the SPMU valves is available at t_0+ 6 hrs.*

d. The suppression pool cooling lineup is designated to occur at t_0 + 8 hrs to provide the maximum time for establishing a suppression pool cooling lineup using a FLEX strategy, while maintaining acceptable containment parameter values. The service water tube side flow from the FLEX pump was designated at 2000 gpm, and the shell side suppression pool flow was designated at 1500 gpm. The peak suppression pool temperature in this case is *209.44°F at t_0 + 19.02 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 6]. Peak containment pressure is *24.9 psia at t_0 + 45.9 hours*, compared to containment design pressure of 29.7 psia.

e. Suppression pool makeup from an external source was designated to maintain level between the values of *23 ft. and 23 ft 9 in.* The first injection of makeup occurs at *t_0 + 8.02 hours.*

Change 2

Maintain Core Cooling - BWR Portable Equipment Phase 2

Reason for Change: This discussion is updated to include improvements in the conceptual design. First, the RCIC pump suction is shifted to a cooler water source at t_0 + 8 hours, and second, the primary source of water for low pressure RPV makeup is changed to the suppression pool (Figure 2). The UHS remains the alternate source of RPV makeup water (Figure 3).

Change: 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 energized [Reference 7].

Once the suppression pool lineup is completed, RCIC suction will be shifted to the RHR heat exchanger shell outlet using installed RHR steam condensing mode piping (Figure 1). This action limits the RCIC system exposure to elevated suppression pool temperature to the first eight hours of the event. The maximum water temperature the RCIC pump is exposed to is 200.7°F according to the MAAP analysis. Once the RCIC suction is shifted the RCIC suction water temperature is 138°F.

To accomplish low pressure RPV makeup when RCIC is no longer available, the suppression pool cooling return path can be directed to the RPV using installed RHR system LPCI valve. Additionally, external water connections will be provided to a location that supports connection to the modified Low Pressure Core Spray (LPCS) [Reference 8] and the Residual Heat Removal (RHR) C [Reference 9] injection header. A pre-staged section of fire hose allows the final connection from the external water supply to the injection header (see Figure 3). 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 Suppression Pool Cleanup and Transfer Pump and the external connection will each 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 suppression pool cooling pump with SRVs controlling RPV pressure, and finally the *pre-staged* diesel driven pump with SRVs controlling RPV pressure [Reference 4].

Change 3

Maintain Containment - BWR Portable Equipment Phase 2

Reason for Change: This discussion is updated to include the chosen method of supplying suppression pool water to an RHR heat exchanger. The installed Suppression Pool Cleanup and Transfer system will be modified to allow a flowpath to be established through either RHR heat exchanger.

Change: 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 10]. 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 one of two installed Suppression Pool Cleanup and Transfer (SF) pumps* 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 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 4].

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 8] or 1E12-F021 RHR C Test Valve To Suppression Pool [Reference 9]. 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 [Reference 11], to allow igniter operation as prescribed by the EOPs.

Change 4

Maintain Containment - BWR Portable Equipment Phase 2 – Identify Modifications

Reason for Change: This discussion is updated to include the chosen method of supplying suppression pool water to an RHR heat exchanger. The installed Suppression Pool Cleanup and Transfer system will be modified to allow a flowpath to be established through either RHR heat exchanger using a hard-piped connection to the RHR steam condensing mode piping.

Additionally, the external water connection to the Shutdown Service Water (SX) system is changed to a tee that will be installed in the Division 1 and Division 2 SX supply headers. The February submittal discussed a connection at the Division 1 and Division 2 Control Room Ventilation (VC) chillers.

Change:

Identify modifications	*List modifications* • Two diverse external connections for a portable diesel powered pump to supply cooling water to an RHR heat exchanger. • *A tee will be installed in the Division 1 and Division 2 SX system to support the connection of the external water connection to the SX supply headers.* • *Adapt the RHR Steam Condensing Mode (currently abandoned) heat exchanger supply piping to provide a discharge path for the Suppression Pool Cleanup and Transfer pumps.* • The electrical support and cooling/makeup water support modifications needed for the containment function are discussed in the Safety Function Support section.

Change 5

Maintain Containment - BWR Portable Equipment Phase 2 – Deployment Conceptual Design

Reason for Change: This discussion is updated to include the chosen method of supplying suppression pool water to an RHR heat exchanger. The installed Suppression Pool Cleanup and Transfer system will be modified to allow a flowpath to be established through either RHR heat exchanger using a hard-piped connection to the RHR steam condensing mode piping.

Additionally, the external water connection to the Shutdown Service Water (SX) system is changed to a tee that will be installed in the Division 1 and Division 2 SX supply headers. The February submittal discussed a connection at the Division 1 and Division 2 Control Room Ventilation (VC) chillers.

Change:

Deployment Conceptual Design (Figures 7 and 8 contain deployment 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	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	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.

fuel pool makeup functions. The discussion is in the Safety Function Support section.	Function Support section.	
Mechanical jumpers will be pre-staged to connect piping from the external water connection to the Division 1 and Division 2 SX supply headers.	None	*Mechanical jumpers will be staged in a structure protected from external hazards.*

Change 6

Safety Functions Support - BWR Portable Equipment Phase 2

Reason for Change: This discussion is updated to include:

- The proposal to pre-stage both the primary and alternate FLEX generator in the Unit 2 side of the Control/Diesel Generator building.
- The chosen method of supplying suppression pool water to an RHR heat exchanger. The installed Suppression Pool Cleanup and Transfer system will be modified to allow a flowpath to be established through either RHR heat exchanger using a hard-piped connection to the RHR steam condensing mode piping.
- The proposal to pre-stage the primary and alternate diesel driven FLEX pumps on the Unit 2 side of the Screen House and to size the pumps such that a second pump at grade elevation is not required.
- The external water connection to the Shutdown Service Water (SX) system is changed to a tee that will be installed in the Division 1 and Division 2 SX supply headers. The February submittal discussed a connection at the Division 1 and Division 2 Control Room Ventilation (VC) chillers.

Change:

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 or 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 Cleanup and Transfer pumps (Figure 4).

The primary and alternate FLEX generator and switchgear will be permanently housed in the Unit 2 side of the Control and Diesel Generator buildings, so deployment will not be impeded by a beyond design basis external event (BDBEE). Where necessary to meet the requirements of the timeline, some connecting cabling may be pre-routed from the vicinity of the primary and alternate FLEX switchgear to the vicinity of the required 480 VAC unit substations which will have connection points for an external source of power. Where supported by the timeline and staffing, some cabling may be manually deployed at the time of the event.

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+6 hrs*.

Cooling/Makeup Water Support

A diesel driven pump will be pre-staged at the Unit 2 side of the Circulating Water Screen House (699' elevation) to enable access to the Ultimate Heat Sink (UHS). The FLEX pumps will have deployable booster pumps to enable access to the UHS if the the main dam has failed (675' elevation). The pump will take its suction from the UHS and discharge to the Unit 2 Division 1 SX Supply header at the Screenhouse. The Unit 2 Division 1 SX Supply header terminates in the Unit 2 side of the Diesel Generator Building. A modification to this line will be routed outside the Diesel Generator building where the FLEX pump supply can be connected to either of two external water connections.

The external water connections will be routed to the vicinity of tees in the Division 1 and Division 2 Shutdown Service Water (SX) System supply headers on the 762' elevation of the Control building. Mechanical jumpers will allow the external connections to supply the SX supply headers. 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.

Change 7

Safety Functions Support - BWR Portable Equipment Phase 2 – Identify Modifications

Reason for Change: This discussion is updated to include:

- The proposal to pre-stage both the primary and alternate FLEX generator in the Unit 2 side of the Control/Diesel Generator building.
- The proposal to pre-stage the primary and alternate diesel driven FLEX pumps on the Unit 2 side of the Screen House and to size the pumps such that a second pump at grade elevation is not required.

Change:

Identify modifications	*List modifications necessary for phase 2* **Electrical Support** • *A 480 VAC primary and alternate FLEX generator will be pre-staged in the Unit 2 side of the Control/Diesel Generator building. Electrical switchgear will be installed for the primary and the alternate FLEX generators.* • Cabling will be installed *or staged* for connecting the generators to the 480 VAC distribution system. • 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. • An external electrical connection point for an external generator will be installed on the south side of the Diesel Generator Building. **Cooling/Makeup Water Support** • *A suction source for a pre-staged diesel powered pump from the UHS*

	will be installed at the Screen House, including UHS access modifications. • Two external connections for a diesel powered pump to supply low pressure makeup and cooling water in the plant will be installed. • A connection to the Division 1 and Division 2 Shutdown Service Water (SX) systems from the external water connections will be installed.

Change 8

Safety Functions Support - BWR Portable Equipment Phase 2 – Deployment Conceptual Design

Reason for Change: This discussion is updated to include:

- The proposal to pre-stage both the primary and alternate FLEX generator in the Unit 2 side of the Control/Diesel Generator building.
- The proposal to pre-stage the primary and alternate diesel driven FLEX pumps on the Unit 2 side of the Screen House and to size the pumps such that a second pump at grade elevation is not required.

Change:

Deployment Conceptual Design (Figures 7 and 8 contain deployment 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 (Figure 4)		
The primary and alternate FLEX generator will be permanently staged and do not require deployment. *Pre-staged cabling will be deployed from the FLEX generator to the Unit Substations that supply the components needed to meet the FLEX timeline.*	• *A permanently staged primary and alternate 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.* • 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 Division 1 battery charger or the swing battery charger to supply DC	FLEX piping, valves, and connections (electrical & fluid) will meet NEI 12-06 Rev.0 protection requirements.

	MCC 1A, and other needed AC loads. • Pre-routed cabling with cam-lock connectors	
Cooling/Makeup Water Support (Figure 3)		
The diesel driven pumps will be housed in a storage structure that meets NEI 12-06 Rev.0 storage requirements. A heavy duty truck capable of clearing debris will be stored in the same location.	Two external water connections.	FLEX piping, valves, and connections (electrical & fluid) will meet NEI 12-06 Rev.0 protection requirements.
The proposed means of routing the water from the UHS to the plant is via the unused seismically robust Unit 2 SX piping.	Connection to the Unit 2 SX supply piping from the UHS FLEX pump (proposed).	

Change 9

Attachment 1A - Sequence of Events Timeline

Reason for Change:

1. The timeline for energizing key components from a FLEX generator was set at t_0 + 5 hrs. This was overly restrictive since the DC coping analysis [Reference 12] extended Division 1 battery life to 6 hours. The coping analysis itself was conservative in that 6 hours includes consideration of a battery aging factor. Eliminating the battery aging factor extends the coping time further to 8 hours.
2. An additional MAAP run was performed to analyze the effect on peak suppression pool temperature by controlling suppression pool level at a higher level and in a narrower band.

Change:

1. The time to energize the following key components moved down on the timeline from t_0 + 5 hrs to t_0 + 6 hrs.
   - Energize MCC 1A1
   - Startup Div 1 Battery Charger and supply DC MCC 1A
   - Energize Hydrogen Igniter Distribution Panel (MCC 1A1)
   - Energize MCC 1A3
   - Open the SPMU valves
   - Energize DG MCC 1A and Standby Lighting Cabinet 1LL70EA
2. The time to begin making up to the suppression pool moved up on the timeline from t_0 + 12 hrs to t_0 + 8 hrs. This change lowered peak suppression pool temperature from 213°F to 209°F.

Change 10

Attachment 3 – Conceptual Sketches

Reason for Change: Changes to deployment plan and system alignments required updated sketches.

Change:

Figures 1 through 8 of this document.

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

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

6 Open Items from Overall Integrated Plan and Draft Safety Evaluation

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

Section Reference	Overall Integrated Plan Open Item	Status
Sequence of Events (p. 6)	Initial calculations were used to determine the fuel pool timelines. Formal calculations will be performed to validate this information during development of the spent fuel pool cooling strategy detailed design, and will be provided in a future six (6) month update.	Not Started
Sequence of Events (p. 5)	Analysis of deviations between Exelon's engineering analyses and the analyses contained in BWROG document is expected to be completed, documented on Attachment 1B, and provided to the NRC in the August 2013 six (6) month status update.	Completed. Attached to this 6-month update (Attachment 1)
Sequence of Events (p. 5)	The times to complete actions in the Events Timeline are based on operating judgment, the conceptual designs, and the current supporting analyses. The final timeline will be time validated once detailed designs are completed, procedures are developed, and the results will be provided in a future six (6) month update.	Not Started
Identify how strategies will be deployed (p. 10)	Identification of storage locations and creation of the administrative program are open items. Closure of these items will be documented in a six (6) month update.	Not Started
Safety Function Support (p. 41)	Habitability conditions will be evaluated and a strategy will be developed to maintain Main Control Room habitability. The strategy and associated support analyses will be submitted in a future six (6) month update.	Not Started

Safety Function Support (p. 41)	Battery room conditions will be evaluated and a strategy will be developed to maintain acceptable conditions. The strategy and associated support analyses will be submitted in a future six (6) month update.	Not Started
Safety Function Support (p. 41)	Inverter room conditions will be evaluated and a strategy will be developed to maintain acceptable conditions. The strategy and associated support analyses will be submitted in a future six (6) month update.	Not Started
Safety Function Support (p. 41)	The need for further analysis of fuel building conditions during an ELAP/LUHS and mitigating actions is an open item. Closure of this item will be documented in a future six (6) month update.	Not Started
Multiple Sections	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.	Not Started

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

7 Potential Draft Safety Evaluation Impacts

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

8 References

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

1. Clinton Power Station's Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)," dated February 28, 2013.
2. NRC Order Number EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," dated March 12, 2012.
3. BWROG report NEDC- 33771P Rev 2, "GEH Evaluation of FLEX Implementation Guidelines Rev 2"
4. CL-MISC-009 Rev 2 MAAP Analysis to Support FLEX Initial Strategy
5. CPS 4402.01, EOP-6 PRIMARY CONTAINMENT CONTROL
6. 0000-0143-0382-R1, DRF 0000-0143-0380, "BWROG RCIC System Operation in Prolonged Station Blackout – Feasibility Study"
7. Clinton UFSAR Section 8.1.3.4

8. CPS Drawing M05-1073, Sheet 001, Rev AG, LOW-PRESSURE CORE SPRAY (LPCS) (LP)
9. CPS Drawing M05-1075, Sheet 003, Rev AG, RESIDUAL HEAT REMOVAL (RH)
10. 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
11. 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
12. EC 391824 FLEX Battery Coping Study

9 Attachments

1. NSSS Significant Reference Analysis Deviation Table (Attachment 1B in the Overall Integrated Plan Report Template).

10 Figures

1. RCIC Operation During Phase 2 (Conceptual)
2. Suppression Pool Cooling and Low Pressure RPV Makeup from Suppression Pool (Conceptual)
3. Low Pressure RPV Makeup from External Source (Conceptual)
4. Electrical Strategy (Conceptual)
5. Spent Fuel Pool Makeup (Conceptual)
6. Spent Fuel Pool Spray (Conceptual)
7. FLEX Deployment Conceptual Sketch
8. RRC Equipment Deployment Conceptual Sketch

Attachment 1
NSSS Significant Reference Analysis Deviation Table
(Attachment 1B in the Overall Integrated Plan Report Template)

Item	Parameter of Interest	NEDC-33771P Rev 2 Value	NEDC-33771P Page	Plant Applied Value	Design Value	Gap and Discussion
NEDC-33771P Rev 2 Appendix S is closest to the Clinton strategy for Maintaining Containment Integrity. Differences between the GEH SHEX case and the MAAP analysis of the Clinton strategy are listed below.						
Input Parameter Values						
1	Core thermal power	Note 1	20	3473 MWT	NA	The GEH model BWR 6 Mark III plant has larger decay heat load than Clinton by 26.9%. The SHEX input parameter values for the GEH model plant differ in some cases from the MAAP input parameter values for Clinton due to differences in assumptions and some design differences. Despite these differences the SHEX case for the model plant and the MAAP case for Clinton demonstrate the effectiveness of suppression pool cooling in reducing suppression pool temperature and stabilizing containment pressure and temperature as shown in Figures S-1, S-2, and S-3 in NEDC-33771P Revision 2.
2	Heat Sink Temperature	Note 1	21	91.4°F	NA	
3	Primary System Leakage	Note 1	20	100 gpm	NA	
4	RPV Depressurization Rate	Note 1	20	50°F/hr	NA	
5	Drywell Free Volume	Note 1	20	215,000 ft^3	NA	
6	Initial Drywell Temperature	Note 1	20	150°F	NA	
7	Initial Drywell Pressure	Note 1	20	15.3 psia	NA	
8	Initial Drywell Humidity	Note 1	20	55%	NA	
9	Wetwell Free Volume	Note 1	20	1,512,341 ft^3	NA	
10	Initial Wetwell Pressure	Note 1	20	14.31 psia	NA	
11	Suppression Pool Volume	Note 1	20	130,000 ft^3	NA	
12	Containment Pool Volume	Note 1	20	15,000 ft^3	NA	
13	Containment Pool Initial Temperature	Note 1	20	100°F	NA	
14	Suppression Pool Temperature	Note 1	20	95°F	NA	

15	Heat Removal (BTU/sec-°F)	Note 1	21	200.8 – 202.4 [Q_{RHRHX} (BTU/hr)/(3600*(Supp Pool Temp-RHR HX Shell Out Temp))]	NA	SHEX uses a heat removal constant to characterize the RHR heat exchanger. MAAP uses Clinton specific RHR heat exchanger details. The Clinton heat removal value was calculated from MAAP data for comparison.
16	RCIC Suction Source	Note 1	21	• < t_0 + 8 hrs – Suppression Pool • ≥ t_0 + 8 hrs – RHR heat exchanger outlet (138°F)	NA	In the Clinton strategy, RCIC suction is shifted from the suppression pool to the RHR heat exchanger shell outlet at t_0 + 8 hrs. This action limits the RCIC system exposure to elevated suppression pool water temperature.
Resultant Parameter Values						
17	Maximum Suppression Pool Temperature	Note 1	33	209.44°F (t_0 + 19.02 hrs)	185°F	The decay heat load of the GEH model BWR 6 Mark III plant drives suppression pool temperature to [Note 1] by the time suppression pool cooling is started at t_0 + 8 hrs. This causes containment and drywell pressure to reach a higher value than the Clinton strategy. In the Clinton strategy, suppression pool temperature is 200.5°F when cooling is started at t_0 + 8 hrs. It continues to rise and peaks at 209.44°F at t_0 + 19.02 hrs, when the heat transfer rate in the RHR heat exchanger matches the decay heat input.
18	Maximum Wetwell Temperature	Note 1	33	185.06°F (t_0 + 43.8 hrs)	185°F	
19	Maximum Wetwell Pressure	Note 1	33	24.9 psia (t_0 + 45.9 hrs)	29.7 psia	
20	Maximum Drywell Temperature	Note 1	33	253.79°F (t_0 + 71.7 hrs)	330°F	
21	Maximum Drywell Pressure	Note 1	33	29.12 psia (t_0 + 47.8 hrs)	44.7 psia	

Note 1: The NEDC-33771P Rev 2 values are proprietary but can be found on the referenced pages of the document.

Figure 1
RCIC Operation During Phase 2
(Conceptual)

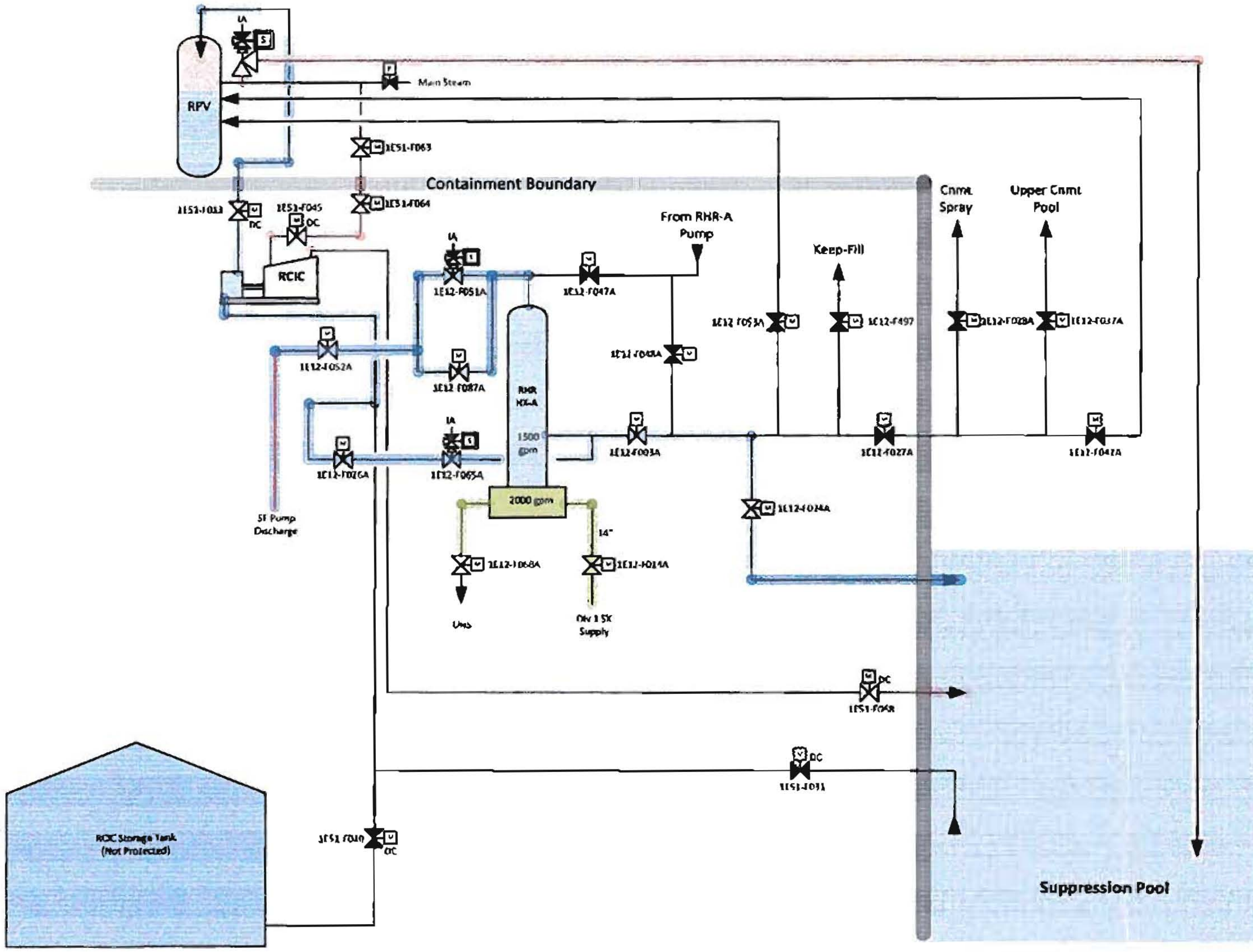

Figure 2
Suppression Pool Cooling and Low Pressure RPV Makeup from Suppression Pool
(Conceptual)

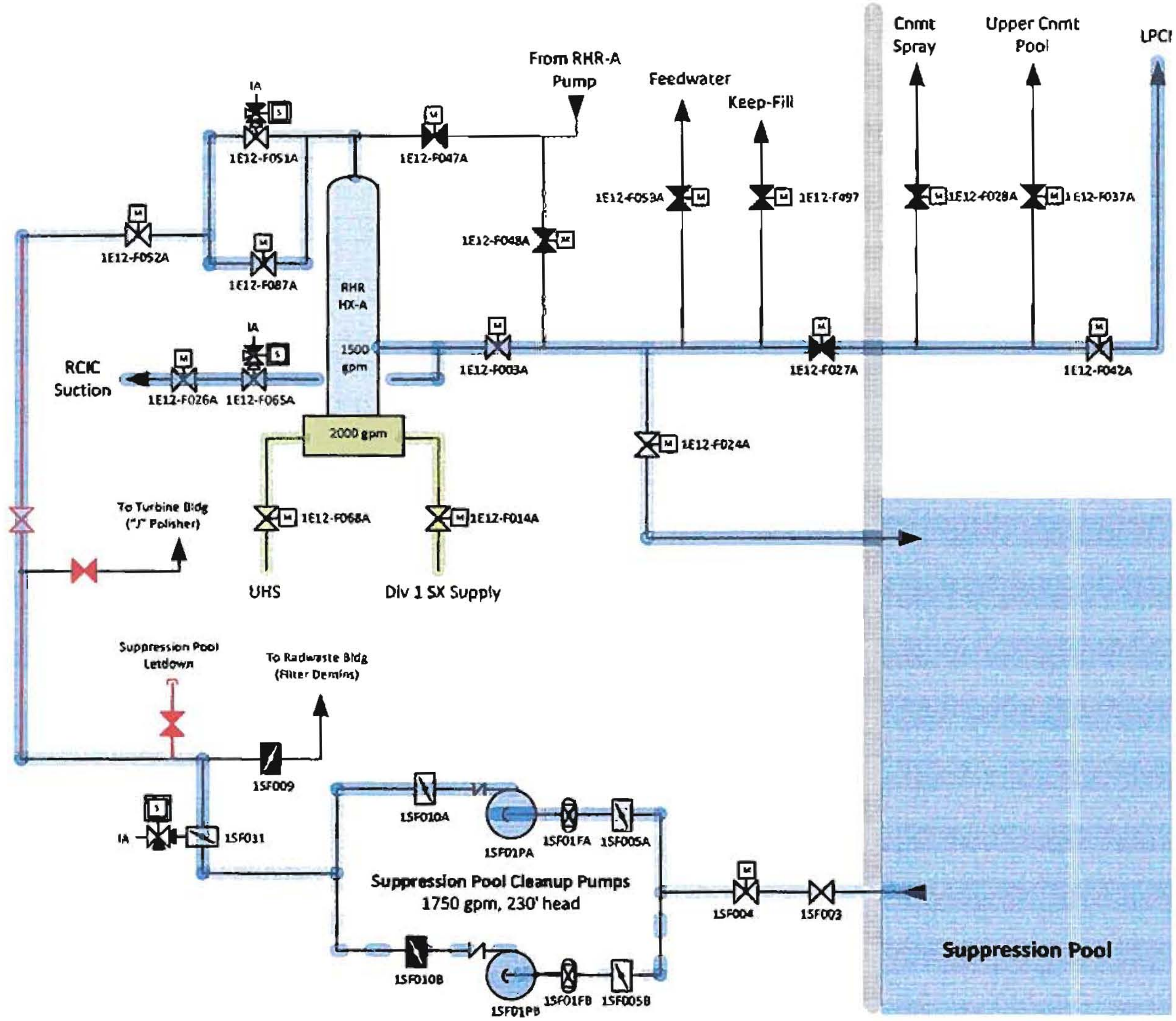

Figure 3
Low Pressure RPV Makeup from External Source
(Conceptual)

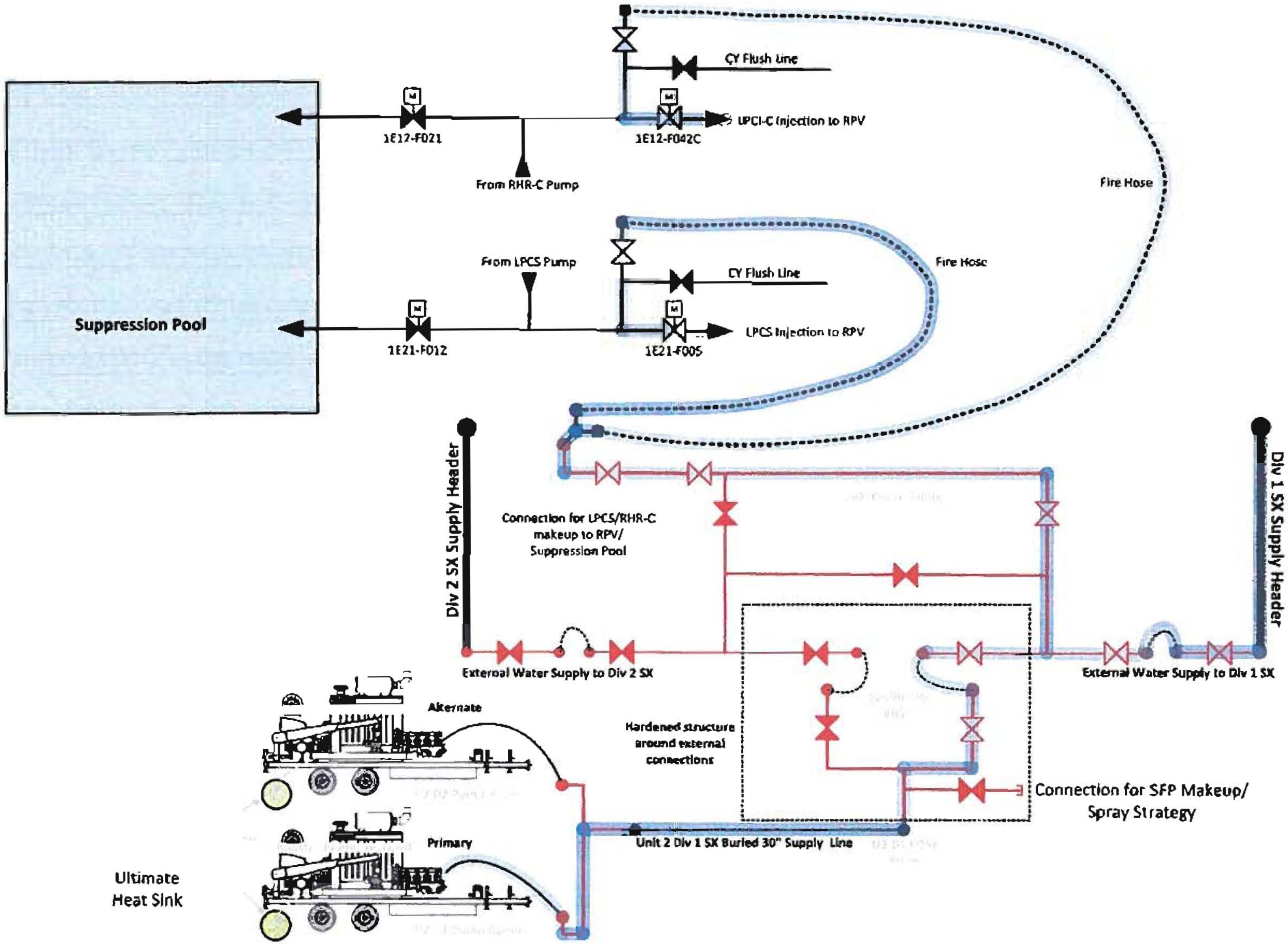

Figure 4
Electrical Strategy
(Conceptual)

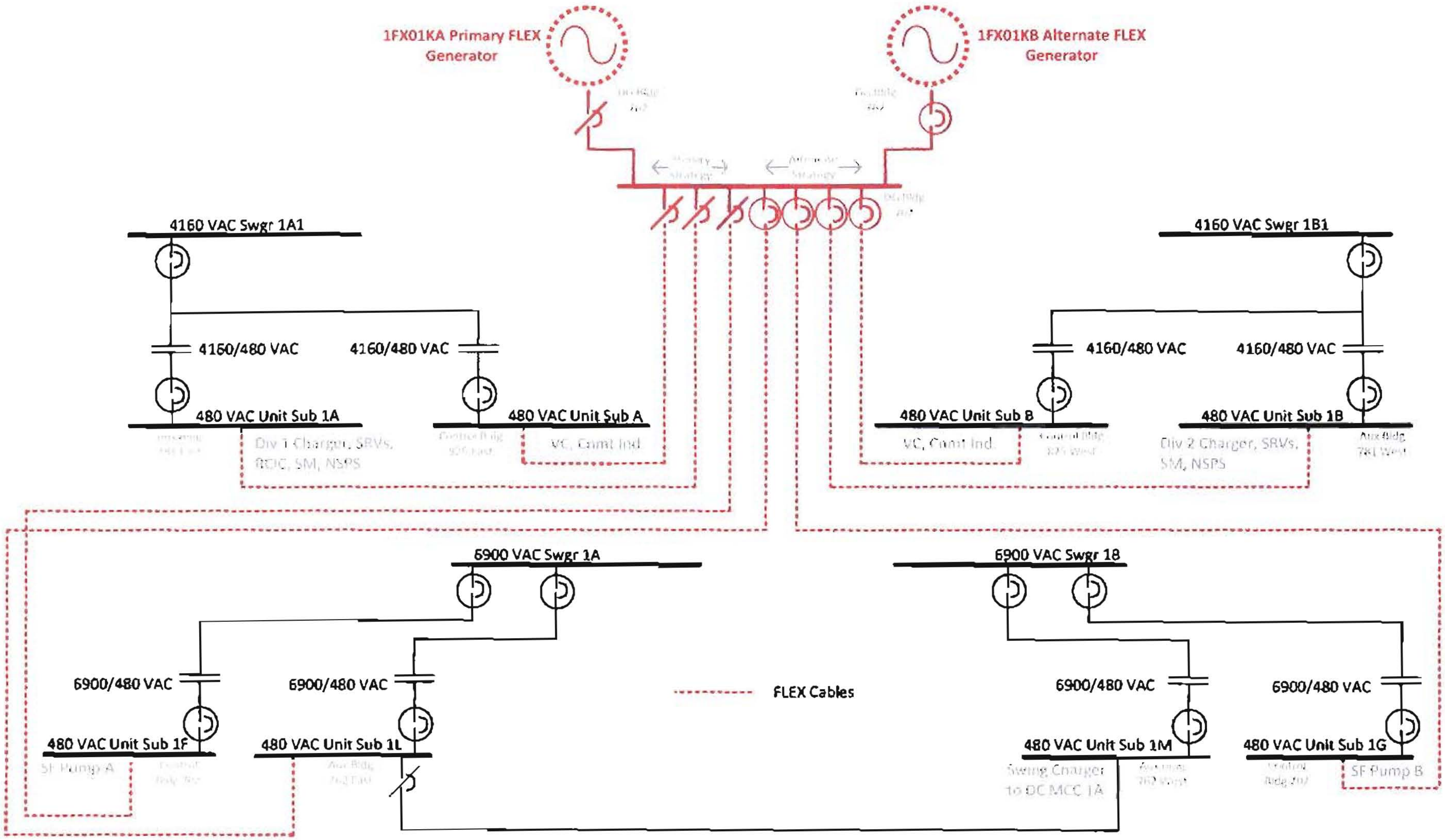

Figure 5
Spent Fuel Pool Makeup
(Conceptual)

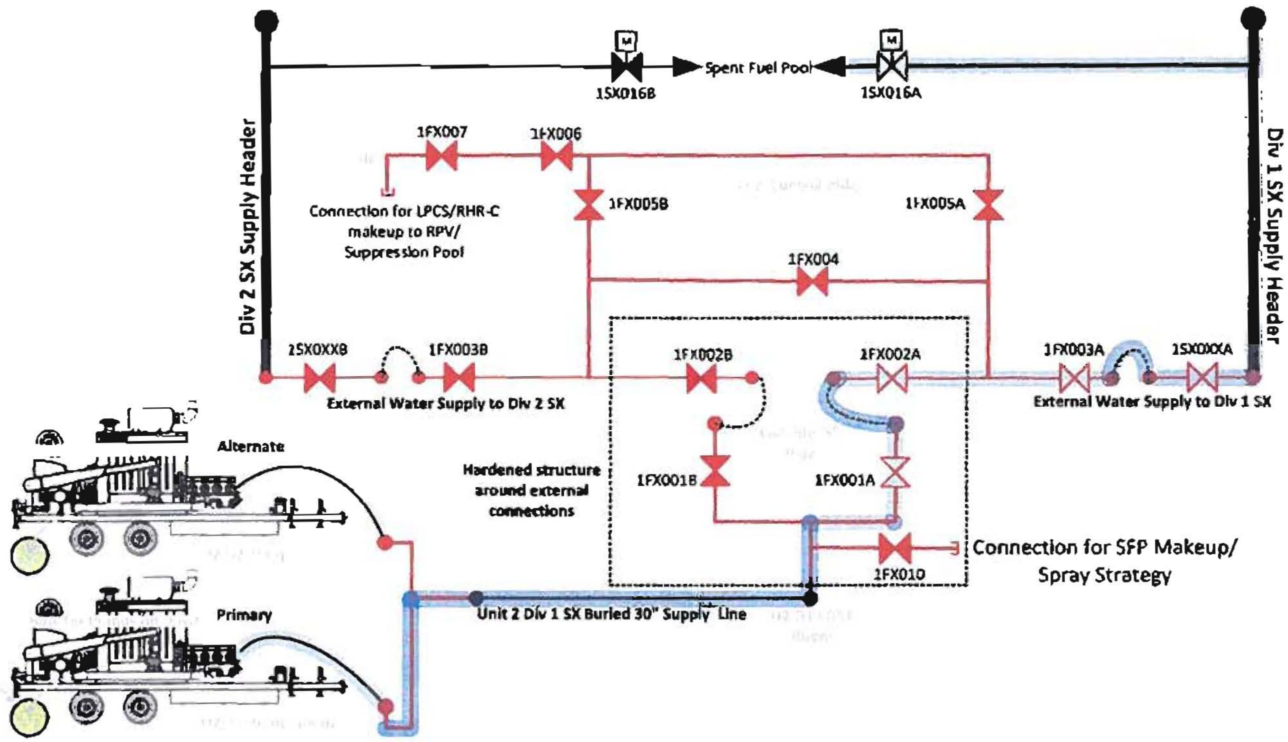

Figure 6
Spent Fuel Pool Spray
(Conceptual)

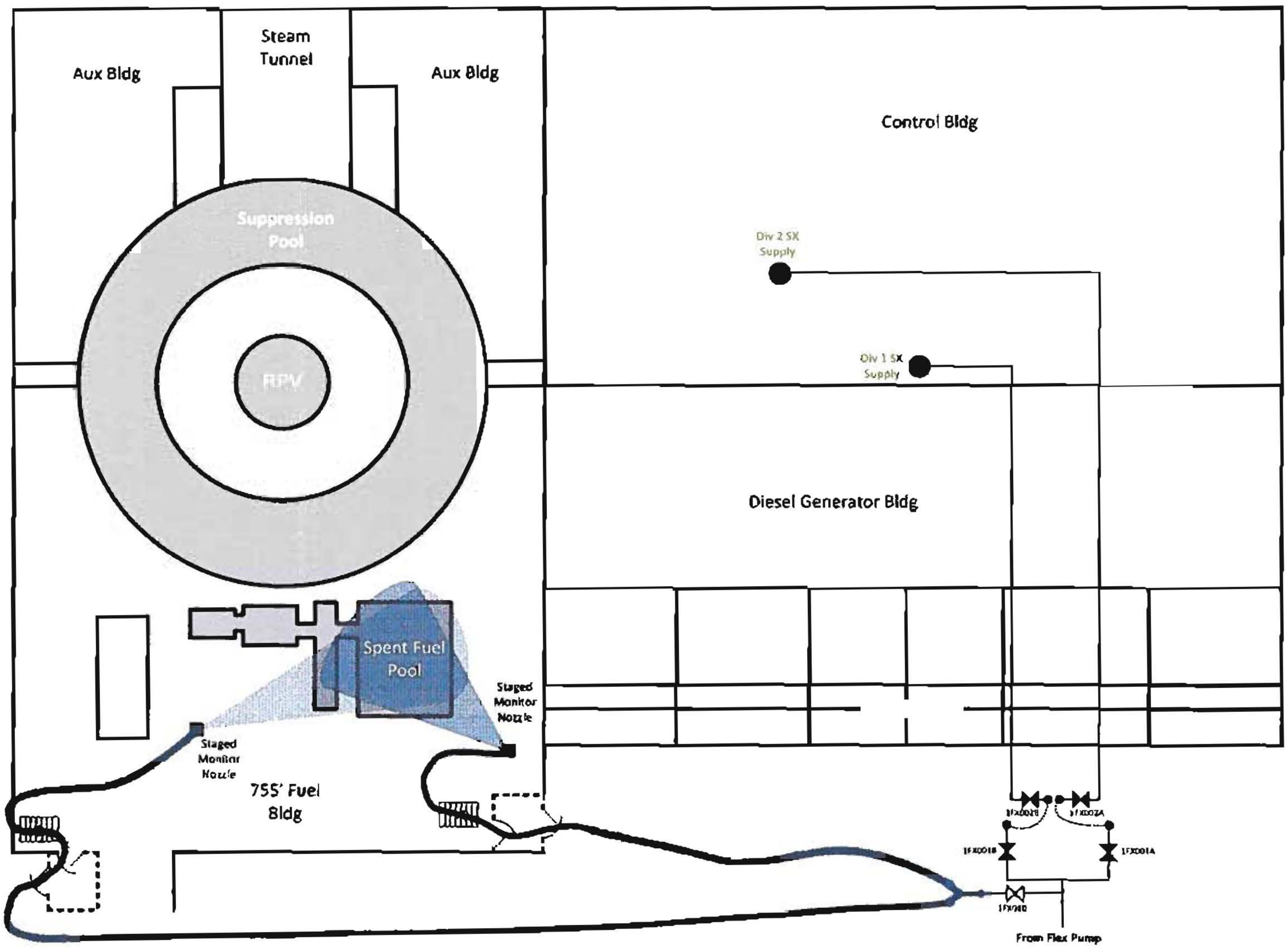

Figure 7
FLEX Deployment Conceptual Sketch

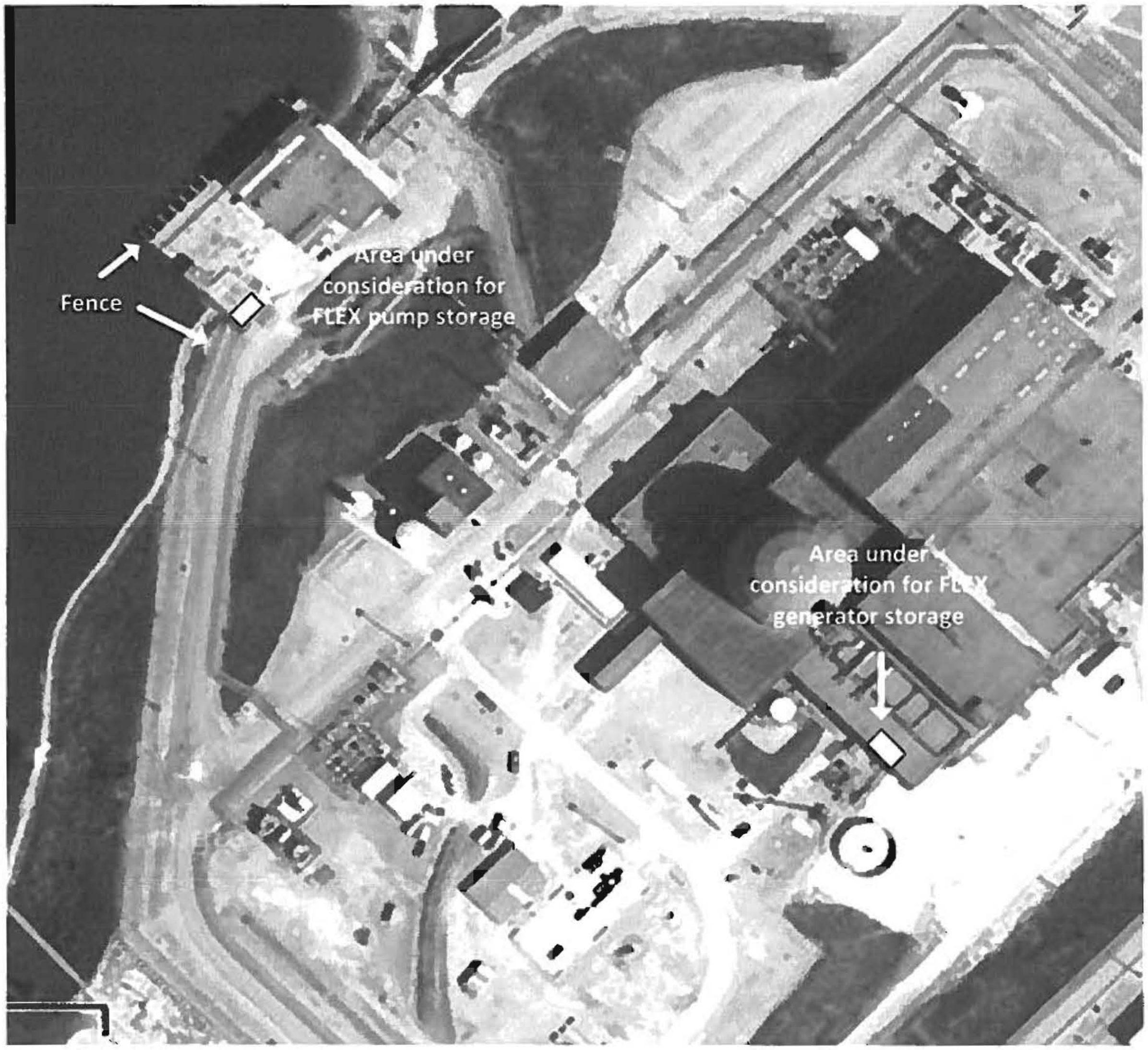

Figure 8
RRC Equipment Deployment Conceptual Sketch