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U. S. Nuclear Regulatory Commission
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Washington, D. C. 20555-0001

Vogtle Electric Generating Plant – Units 1 and 2
Southern Nuclear Operating Company'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)

References:

1. NRC Order Number EA-12-049, *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. Southern Nuclear Operating Company letter NL-12-2146 to the NRC, *Vogtle Electric Generating Plant - Units 1 and 2 Southern Nuclear Operating Company'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 23, 2012

Ladies and Gentlemen:

On March 12, 2012, the Nuclear Regulatory Commission ("NRC" or "Commission") issued an order (Reference 1) to Southern Nuclear Operating

Company (SNC). Reference 1 was immediately effective and directs SNC 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, and 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 Vogtle Electric Generating Plant's (VEGP) 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 SNC 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 VEGP 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.

SNC intends to fully implement the requirements of the Order by breaker closure of the Unit 1 Fall 2015 refueling outage and the Unit 2 Fall 2014 refueling outage per Section IV, Condition A.2 of Reference 1. In accordance with Section IV, Condition C.3 of Reference 1, SNC intends to submit notification to the NRC that full compliance of the Order has been achieved within 60 days of full implementation for each unit at VEGP.

This letter contains no new regulatory commitments. If you have any questions, please contact Ken McElroy at (205) 992-7369.

Respectfully submitted,

B. L. Ivey
Vice President – Regulatory Affairs

BLI/CLN

Mr. B. L. Ivey states he is a Vice President of Southern Nuclear Operating Company, is authorized to execute this oath on behalf of Southern Nuclear Operating Company and, to the best of his knowledge and belief, the facts set forth in this letter are true.

Sworn to and subscribed before me this 27th *day of* February, *2013.*

Nancy Louise Henderson
Notary Public

My commission expires: March 23, 2014

Enclosure: Vogtle Electric Generating Plant Units 1 and 2 Mitigation Strategies for Beyond-Design-Basis External Events Overall Integrated Implementation Plan

cc: Southern Nuclear Operating Company
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Mr. T. E. Tynan, Vice President – Vogtle
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Vogtle Electric Generating Plant – Units 1 and 2
Southern Nuclear Operating Company'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)

Enclosure

Vogtle Electric Generating Plant Units 1 and 2 Mitigation Strategies for Beyond-Design-Basis External Events Overall Integrated Implementation Plan

Southern Nuclear Operating Company

Vogtle Electric Generating Plant

Units 1 & 2

Mitigating Strategies (FLEX)

Overall Integrated Implementation Plan

Revision 0, February 27, 2013

Table of Contents

Introduction

The Nuclear Regulatory Commission (NRC) issued Order EA-12-049, *Issuance of Order to Modify Licenses with Regard to Mitigation Strategies for Beyond-Design-Basis External Events*, on March 12, 2012. This order imposes the need for guidance and strategies to prevent fuel damage in the reactor and spent fuel pool (SFP) with a loss of power, motive force and normal access to the Ultimate Heat Sink (UHS) which affect all units at a site simultaneously. The Order is based on Recommendation 4.2 of SECY-11-0093, *Recommendations for Enhancing Reactor Safety in the 21st Century, the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident.*

NRC Order EA-12-049 requires a three-phased approach for mitigating beyond-design-basis external events. The initial phase requires the use of installed equipment and resources to maintain or restore core cooling, containment integrity, and SFP inventory. The transition phase requires providing sufficient, portable, onsite equipment and consumables to maintain or restore these functions until they can be accomplished with resources brought from offsite. The final phase requires obtaining sufficient offsite resources to sustain those functions indefinitely. The three-phased approach outlined by the NRC is consistent with the industry proposal for a Diverse and Flexible Mitigation Capability (FLEX). The Order also requires submittal of an overall integrated plan which will provide a description of how the requirements of the Order will be achieved.

The NRC provided additional details of an acceptable approach for complying with Order EA-12-049 with Interim Staff Guidance (ISG) (JLD-ISG-2012-01) issued in August 2012. The ISG endorses the FLEX approach presented in NEI 12-06 Revision 0, *Diverse and Flexible Coping Strategies (FLEX) Implementation Guide*, with clarifications.

This integrated plan provides the Vogtle Electric Generating Plant (VEGP or Vogtle) Units 1 and 2 approach for complying with Order EA-12-049 using the methods described in NRC JLD-ISG-2012-01. Six month progress reports will be provided consistent with the requirements of Order EA-12-049 and the guidance in NEI 12-06.

General Integrated Plan Elements (PWR & BWR)

Section 1: Determine Applicable Hazards

Determine Applicable Extreme External Hazard **Ref: NEI 12-06 Section 4.0 -9.0** **JLD-ISG-2012-01 Section 1.0**	*Input the hazards applicable to the site; seismic, external flood, high winds, snow, ice, cold, high temps.* *Describe how NEI 12-06 sections 5 – 9 were applied and the basis for why the plant screened out for certain hazards.*

The applicable extreme external hazards for Vogtle Electric Generating Plant (VEGP or Vogtle) are seismic, ice, high winds and high temperature as detailed below:

Seismic Hazard Assessment:

Per the Vogtle Unit 1 and 2 Final Safety Analysis Report (FSAR) (Reference 1), the seismic criteria for VEGP include two design basis earthquake spectra: Operating Basis Earthquake (OBE) and the Safe Shutdown Earthquake (SSE). The OBE and the SSE are 0.12g and 0.20g, respectively; these values constitute the design basis of VEGP. Per Nuclear Energy Institute (NEI) 12-06 Section 5.2 (Reference 2), all sites will consider the seismic hazard.

Thus, the Vogtle site screens in for an assessment for seismic hazard.

External Flood Hazard Assessment:

Not applicable as Vogtle is built above the design basis flood level. Per VEGP FSAR Chapter 2 (Section 2.4), the Probable Maximum Flood (PMF) stage is about 138 ft mean sea level (msl) without wave runup; with wave runup due to coincident upstream dam failure, the water may reach as high as 165 ft msl. Grade elevation of the VEGP control building, containment buildings, diesel generator buildings, and all safety-related structures is approximately 220 ft msl. Contours and grading in the Units 3 and 4 construction area are controlled to prevent impact on flooding analysis. The site is not adjacent to a large, enclosed, or partially enclosed body of water. Therefore, Vogtle is considered a dry site and would not be affected adversely by external flooding events (Reference 1, Chapter 2 and Reference 2, Section 6.2.1).

Thus, the Vogtle site screens out for an assessment for external flooding.

Extreme Cold Hazard Assessment:

The guidelines provided in NEI 12-06 (Section 8.2.1) generally exclude the need to consider extreme snowfall at plant sites in the southeastern U.S. below the 35th parallel. The Vogtle plant site is located at approximately 33°09′ N latitude and 81°46′ W longitude (Reference 1, Section 2.1.1.1) and thus the capability to address hindrances caused by extreme snowfall with snow removal equipment need not be provided.

Icing does not occur on the lower reaches of the Savannah River based on records of minimum temperature from 1961 to 1980 (Reference 1, Section 2.4.7). Therefore, there is no risk of ice blockage of the Savannah River, frazil ice, or freezing of the below-grade Ultimate Heat Sink (UHS) water source in the Nuclear Service Cooling Water (NSCW) basins.

The Vogtle site is located within the region characterized by Electric Power Research Institute (EPRI) as ice severity level 5 (Reference 2, Figure 8-2). As such, the Vogtle site is subject to severe icing

conditions.

Thus, the Vogtle site screens in for an assessment for extreme cold for ice only.

High Wind Hazard Assessment:

VEGP is located at approximately 33°09′ N latitude and 81°46′ W longitude (Reference 1). Per NEI 12-06 guidance, hurricanes and tornado hazards are applicable to Vogtle. NEI 12-06 Figures 7-1 and 7-2 were used for this assessment.

Thus, the Vogtle site screens in for an assessment for High Wind Hazards.

Extreme High Temperature Hazard Assessment:

Per NEI 12-06 Section 9.2, all sites will address high temperatures. The Vogtle site normal daily maximum temperature ranges from 58°F in January to 91°F in July. An extreme maximum of 106°F was recorded in July 1952. Based on a 14-year record, the average number of days in a year on which temperatures are 90°F and above is 62, with approximately one-third of these days occurring in July (Reference 1, Section 2.3.2.1.2).

Thus the Vogtle site screens in for an assessment for extreme High Temperature.

Summary of Extreme External Hazards Assessments:

The hazards applicable to VEGP are seismic, ice, high winds, and high temperature.

References:

1. Vogtle Electric Generating Plant Final Safety Analysis Report (FSAR), Revision 18.
2. Diverse and Flexible Coping Strategies (FLEX) Implementation Guide, NEI 12-06, Revision 0, August 2012

Section 2: Key Site Assumptions

Key Site assumptions to implement NEI 12-06 strategies. **Ref: NEI 12-06 section 3.2.1**	*Provide key assumptions associated with implementation of FLEX Strategies:* • *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.* • *Exceptions for the site security plan or other (license/site specific) requirements of 10CFR may be required.* • *Deployment resources are assumed to begin arriving at hour 6 and fully staffed by 24 hours.* • *Certain Technical Specifications cannot be complied with during FLEX implementation.*

Key assumptions associated with implementation of FLEX Strategies for VEGP are described below:

- The results of flood and seismic re-evaluations pursuant to the 10 CFR 50.54(f) letter of March 12, 2012 are not assumed in this submittal. As these re-evaluations are completed and submitted,

appropriate issues will be entered into the corrective action system and addressed.

- The following conditions exist for the baseline case:
  - Seismically designed DC battery banks are available.
  - Seismically designed AC and DC distribution available.
  - Plant initial response is the same as Station Blackout (SBO) event.
  - Best estimate analysis and decay heat is used to establish operator time and action.
  - No single failure of SSC assumed except those in the base assumptions (i.e., EDG operation). Therefore, TDAFW will perform either via automatic control or with manual operation capability per the guidance in NEI 12-06.
- The designed hardened connections are protected against external events or are established at multiple and diverse locations.
- FLEX components will be designed to be capable of performing in response to the "screened in" hazards in accordance with NEI 12-06. Portable FLEX components will be procured commercially.
- Margin will be added to design FLEX components and hard connection points to address future requirements as re-evaluation warrants. This margin will be determined during the detailed design or evaluation process.
- Phase 2 FLEX components stored at the site will be protected against the "screened in" hazards in accordance with NEI 12-06. At least N sets of equipment will be available after the event they were designed to mitigate.
- Deployment strategies and deployment routes will be assessed for hazards impact.
- Additional staff resources are expected to begin arriving at 6 hours and the site will be fully staffed 24 hours after the event.
- Maximum environmental room temperatures for habitability or equipment availability is based on NUMARC 87-00 (Reference 1) guidance if other design basis information or industry guidance is not available. Extreme high temperatures are not expected to impact the utilization of off-site resources or the ability of personnel to implement the required FLEX strategies.
- 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 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 (EOP) 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 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/or with its Security Plan, and, as such, may warrant invocation of 10 CFR 50.54(x) and/or 10 CFR 73.55(p) (Reference 2).

Exceptions for the site security plan or other (license/site specific) requirements of a nature requiring

NRC approval will be communicated in a future 6 month update following identification.

Open items where SNC does not have clear guidance to complete an action related to this submittal are listed below:

1. Structure, content and details of the Regional Response Center playbook will be determined.

References:

1. NUMARC 87-00, *Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors*, Revision 1
2. 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)

Section 3: Deviations to JLD-ISG-2012-01and NEI 12-06

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. **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.*

SNC has no known deviations to the guidelines in JLD-ISG-2012-01 and NEI 12-06. If deviations are identified, then the deviations will be communicated in a future 6 month update following identification.

Section 4: Sequence of Events and Technical Basis

Provide a sequence of events and identify any time constraint required for success including the technical basis for the time constraint. **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 walkthrough of deployment).* *Describe in detail in this section the technical basis for the time constraint identified on the sequence of events timeline Attachment 1A* *See attached sequence of events timeline (Attachment 1A).* *Technical Basis Support information, see attached NSSS Significant Reference Analysis Deviation Table (Attachment 1B)*

Discussion of time constraints identified in Attachment 1A table.

- 30 minutes, Entry into Extended Loss of AC Power ELAP (table item 4) - Time critical at a time greater than 40 minutes. Time period of 40 minutes is selected conservatively to ensure that ELAP entry conditions can be verified by control room staff and it is validated that emergency diesel generators (EDG) are not available. 40 minutes is a reasonable assumption for system operators to perform initial evaluation of the EDGs. Entry into ELAP provides guidance to operators to perform ELAP actions. Table top evaluation was performed by site personnel to obtain the 40-minute estimate. A formal validation of the timeline will be performed once the procedure guidance is

developed and related staffing study is completed.

- 50 minutes, DC extended load shed complete (table item 5) - Time critical at a time greater than 1 hour. Time period of 20 minutes past ELAP entry is selected to ensure that DC buses are available from battery sources. Phase 2 battery recharging is assumed to begin before 12 hours (table item 8); therefore, there is sufficient conservatism in the life of the DC power source. The DC buses are located in Switchgear Rooms on the Bravo level of the control building and are readily accessible to the operator. Load stripping consists of opening 43 breakers in Unit 1 and 43 breakers in Unit 2 using local control switches. As an operator aid, the breakers/ control switches will be appropriately identified (labeled) to show which are required to be opened to facilitate an extended load shed (Reference 7). From the time that ELAP conditions are declared, it is reasonable to expect that operators can complete the DC bus load shed in approximately 20 minutes. A formal validation of the timeline will be performed once the procedure guidance is developed and related staffing study is completed.
- 8 hours, Depressurize steam generators (SGs) via local operation of Atmospheric Relief Valves (ARVs) (table item 7) - Time critical at 16 hours. Initiating cooldown at 16 hours allows sufficient time for RCS cooldown and depressurization (estimate 4 hours) prior to when borated makeup must be started (table item 10) for maintaining sub-criticality at the most limiting core conditions (Reference 7).
- 10 hours, Power up 480V FLEX switchgear (table item 8) - Time critical after 12 hours. Current battery durations are calculated to be greater than 12 hours (Reference 7). The on-site FLEX diesel generator (DG) will be deployed during the 8-10 hour time frame and be in service within two (2) hours of deployment. Thus, the on-site FLEX DGs will be available at any point after 12 hours as required to restore power to one battery charger on each Class 1E 125 VDC distribution bus and an RCS FLEX pump (Mode 1-4 or Mode 5-6 as needed—dependent on ELAP initial conditions). The on-site FLEX DGs will be maintained in on-site FLEX storage buildings. The on-site FLEX DGs will be transferred and staged via haul routes and staging areas evaluated for impact from external hazards. Modifications to connect credited loads will be implemented to facilitate the connections and operational actions required to supply the battery chargers and RCS FLEX pumps from the on-site FLEX DGs. Programs and training will be implemented to support operation of on-site FLEX DGs.
- 12 hours, Begin supplemental boron injection from the Boric Acid Storage Tank (BAST) using RCS FLEX pump (table item 10) - Time critical after 20 hours. The Westinghouse RCS makeup evaluation for VEGP (References 4 and 8) determined that injecting 5540.7 gallons from the BAST provides sufficient shutdown margin for the worst case boration requirements (i.e., VEGP Unit 1 at beginning-of-life). Initiating makeup from the BAST at 20 hours ensures adequate boration to maintain long-term sub-criticality will be accomplished within 24 hours (i.e., prior to addition of net positive reactivity from xenon decay and cooldown following the reactor trip) with injection rate limited by letdown through the upper head vent flowpath (Reference 7).
- 36 hours, Align second CST for SG injection (table item 12) - Prior to depletion of the first CST, the TDAFW pump (or SG FLEX pump, as applicable) will require makeup from the second CST. The first CST is assumed to contain the minimum volume maintained by the low alarm setpoint (i.e., 87% of the nominal inventory of 480,000 gallons) at the start of the ELAP event. This volume is capable of removing decay heat and RCS stored energy for more than 39 hours (Reference 7).

Technical Basis Support information

1. On behalf of the Pressurized Water Reactor Owners Group (PWROG), Westinghouse developed a document (WCAP-17601-P, Revision 0 (Reference 2)) to supplement the guidance in NEI 12-06 by providing additional PWR-specific information regarding the individual plant response to the Extended Loss of AC Power (ELAP) and loss of Ultimate Heat Sink (UHS) events. The document includes identification of the generic event scenario and expected plant response, the associated analytical bases and recommended actions for performance of a site-specific gap analysis. Guidance regarding plant response for core cooling, containment integrity, and spent fuel pool cooling is generally applicable to all Westinghouse PWRs, including VEGP Units 1 and 2. Supplementary guidance (Reference 3) was utilized as appropriate to develop Core Cooling and RCS Inventory coping strategies and for prediction of the plant's response. The NSSS vendor has performed a site specific evaluation (Reference 4 and 8) associated with RCS makeup and boration requirements for VEGP.
2. VEGP containment integrity for Phases 1 through 3 will be evaluated by use of computer code MAAP 4.05.
3. Environmental conditions within the station areas will be evaluated utilizing methods and tools in NUMARC 87-00 (Reference 5) or Gothic 8.0 (EPRI software).
4. Per the guidance in 10 CFR 50.63 and Regulatory Guide 1.155, VEGP is a four (4) hour coping plant for Station Blackout (SBO) considerations. Applicable portions of the analysis described in the VEGP FSAR (Reference 6, Section 8.4) have been used as starting points for evaluations performed to meet the guidance from NEI 12-06. Key assumptions not addressed in the EA-12-049 order were per the existing SBO evaluations. Some of these SBO based assumptions used for ELAP are:
   a) Credit is taken for operator actions where appropriate.
   b) Equipment needed for the SBO coping duration is available at the site once Phase 2 is implemented.
   c) There is reasonable assurance that the equipment will remain operable during and subsequent to an SBO event.

References:

1. 19100-C, ECA 0.0, Loss of All AC Power
2. WCAP-17601-P, "Reactor Coolant System Response to the Extended Loss of AC Power Event for Westinghouse, Combustion Engineering, and Babcock & Wilcox NSSS Designs".
3. LTR-PSCA-12-78, PA-PSC-0965 Core Team PWROG Core Cooling Management Interim Position Paper, Revision 0, November 2012.
4. LTR-FSE-12-26 Revision 1, "Evaluations to Support SNC FLEX Strategies for Vogtle Electric Generating Plant," January 21, 2013.
5. NUMARC 87-00, *Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors*, Revision 1.
6. Vogtle Electric Generating Plant Final Safety Analysis Report (FSAR), Revision 18.
7. SNCV065-PR-002, Engineering Report, Diverse and Flexible Coping Strategies (FLEX) in Response to NRC Order EA-12-049, Mitigation Strategies for Beyond-Design-Basis External

Events, Revision 1.

8. LTR-FSE-13-3, "Responses to Requested Clarification and Comments Received from the Southern Nuclear Company with Respect to Westinghouse Correspondence LTR-FSE-12-26," January 31, 2013

Section 5: Strategies Deployment

Identify how strategies will be deployed in all modes. **Ref: NEI 12-06 section 13.1.6**	*Describe how the strategies will be deployed in all modes.*

The VEGP deployment strategy will be included within an administrative program.

- VEGP procedures and programs will be developed in accordance with NEI 12-06 to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to VEGP.
- Routes for transporting FLEX equipment from storage location(s) to deployment areas will be developed as the FLEX storage facility details are identified and finalized.
- The identified haul paths and deployment areas will be accessible during all modes of operation. The administrative program will have elements to ensure pathways will be kept clear or will require actions to clear the pathways.
- The chosen pathways will be evaluated for applicable hazards associated with the areas utilized for the deployment path or storage locations for phase 2.

Section 6: Milestone Schedule

Provide a milestone schedule. This schedule should include:
• **Modifications timeline**
  ○ **Phase 1 Modifications**
  ○ **Phase 2 Modifications**
  ○ **Phase 3 Modifications**
• **Procedure guidance development complete**
  ○ **Strategies**
  ○ **Maintenance**
• **Storage plan (reasonable protection)**
• **Staffing analysis completion**
• **FLEX equipment acquisition timeline**
• **Training completion for the strategies**
• **Regional Response Centers operational**
 	
Ref: NEI 12-06 section 13.1
	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.
	See attached milestone schedule Attachment 2

See attached milestone schedule in Attachment 2.

Section 7: Programmatic Controls	
Identify how the programmatic controls will be met. **Ref: NEI 12-06 Section 11** **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.* *See section 6.0 of JLD-ISG-2012-01.*

VEGP will implement an administrative program for implementation and maintenance of the VEGP FLEX strategies in accordance with NEI 12-06 guidance.

- *Equipment quality:* The equipment for ELAP will have unique identification numbers. 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.
- *Equipment protection:* VEGP will construct structures to provide protection of the FLEX equipment to meet the requirements identified in NEI 12-06 section 11. The schedule to construct the structures is still to be determined.
- *Storage and deployment:* VEGP will develop procedures and programs to address storage structure requirements and deployment/haul path requirements relative to the hazards applicable to VEGP.
- *Maintenance and Testing:* VEGP will utilize the standard EPRI industry PM process (Similar to the Preventive Maintenance Basis Database) for establishing the maintenance and testing actions for FLEX components. The administrative program will include maintenance guidance, testing procedures and frequencies established based on type of equipment and considerations made within the EPRI guidelines.
- *Design Control:* VEGP will follow the current programmatic control structure for existing processes such as design and procedure configuration.

Section 8: Training Plan	
Describe training plan	*List training plans for affected organizations or describe the plan for training development*

New training of station staff and emergency response personnel will be performed in 2014, prior to the 1st VEGP unit design implementation. These programs and controls will be implemented in accordance with the Systematic Approach to Training or other standard plant training processes where applicable.

Section 9: Regional Response Plan	
Describe Regional Response Center (RRC) plan	*Discussion in this section may include the following information and will be further developed as the Regional Response Center development is completed.* ▪ *Site-specific RRC plan* ▪ *Identification of the primary and secondary RRC sites* ▪ *Identification of any alternate equipment sites (i.e. another nearby site with compatible equipment that can be deployed)* ▪ *Describe how delivery to the site is acceptable* ▪ *Describe how all requirements in NEI 12-06 are identified*

VEGP will utilize the industry Regional Response Centers (RRC) for Phase 3 equipment. VEGP has contractual agreements in place with the Strategic Alliance for FLEX Emergency Response (SAFER). The two (2) industry RRC will be established to support utilities in response to beyond design-basis external events (BDBEE). 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. Communications will be established between the affected nuclear site and the SAFER team and required equipment mobilized as needed. Equipment will initially be moved from an RRC to a local staging area established by the SAFER team and the utility. The equipment will be prepared at the staging area prior to transportation to the site. 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: None

Section 10: Maintain Core Cooling & Heat Removal

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

- **AFW/EFW**
- **Depressurize SG for Makeup with Portable Injection Source**
- **Sustained Source of Water**

Maintain Core Cooling & Heat Removal: PWR 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 (AFW/EFW) and strategy(ies) utilized to achieve this coping time.

Coping Strategy (Modes 1 through 4, and Mode 5 with Steam Generators Available)

Immediately following the ELAP event, reactor core cooling will be accomplished by natural circulation of the Reactor Coolant System (RCS) through the steam generators and cooled by the Auxiliary Feedwater (AFW) system. This primary core cooling strategy relies on the Turbine-Driven Auxiliary Feedwater (TDAFW) pump, which will be automatically actuated within 1 minute of a loss of AC power, to provide feedwater for the removal of reactor core decay heat following a loss of main feedwater (Reference 1).

The TDAFW pump is designed to supply the feedwater flow required for removal of 200 percent of the decay heat from the reactor. The TDAFW pump supplies flow to all four steam generators through individual dc motor-operated control valves. Control of the valves, as well as manual speed control for the TDAFW pump, is provided in the control room and at the local control panels located in the AFW pump house. Operating status of the TDAFW pump is indicated locally and in the control room.

To support this primary core cooling strategy, suction to the TDAFW pump will be from the seismic category 1 Condensate Storage Tanks (CSTs), which are also protected from tornado missiles (Reference 2). Each unit has two (2) CSTs, each with a normal operating inventory equal to 417,600 gallons (835,200 gallons total) of de-mineralized water (Reference 3, Reference 4). Based on the minimum volume of water available in the CSTs, core decay heat, and RCS sensible heat removal requirements for Modes 1 through 4; the normal operating inventory of the CSTs is available to provide flow to the steam generators for 116 hours (Reference 5).

Note that the initial phase of reactor core cooling will be heavily dependent upon the operation of the TDAFW pump to remove the decay heat from the reactor core. Operation of the TDAFW pump from the MCR is reliant upon an available battery powered source. Thus, the Phase 1 coping strategy includes specified load shed actions outlined in plant procedures. All load shed actions will be addressed by available staff on-site at the time of the event and completed within one hour of event start. Analysis (Reference 5) indicates this strategy permits MCR TDAFW pump operation for more than 19 hours. Local manual operation of the TDAFW pump can be performed without a reliance on battery power per procedural guidance.

[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.

Section 10: Maintain Core Cooling & Heat Removal

Coping Strategy (Mode 6 and Mode 5 without Steam Generators Available)

In the initial phase without the steam generators available, core cooling will be accomplished by maintaining RCS inventory. Refer to the Phase 1 RCS Inventory Control strategy.

References:

1. DC-1302, Auxiliary Feedwater System, Version 14.0
2. DC-2130, Condensate Storage Tanks and Valve Houses, Revision 5
3. 17017-1, Annunciator Response Procedures for ALB 17 on Panel 1B2 on MCB, Version 27.0
4. 17017-2, Annunciator Response Procedures for ALB 17 on Panel 2B2 on MCB, Version 23.0
5. SNCV065-PR-002, Engineering Report, Diverse and Flexible Coping Strategies (FLEX) in Response to NRC Order EA-12-049, Mitigation Strategies for Beyond-Design-Basis External Events, Revision 1

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.*

SNC will utilize 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.*

Label non-critical DC loads to allow operators to more readily identify the loads that will be shed during the Phase 1 extended load shedding activity.

Section 10: Maintain Core Cooling & Heat Removal

Key Reactor Parameters | *List instrumentation credited for this coping evaluation.*

Steam Generator Essential Instrumentation	**Safety Function**
SG Level – NR (LI-551, 519, 529, 552, 539, 553, 554 and 549) (Ref. 1)	Core Cooling
SG Pressure (PI-514A, 515A, 524A, 525A, 534A, 544A, 545A, and PIC-3020A) (Ref. 1)	Core Cooling
Condensate Storage Tank Essential Instrumentation	**Safety Function**
CST Level (LI-5100 and LI 5115) (Ref.1)	Core Cooling
Auxiliary Feed Water Essential Instrumentation	**Safety Function**
TDAFW Pump Flow – (FI-5152A, 5151A, 5150A, and 5153A) (Ref. 1)	Core Cooling
Reactor Coolant System Essential Instrumentation	**Safety Function**
RCS Temperature – T-Cold WR (TI-413B LP1 CL, TI-423B LP2 CL, TI-433B LP3 CL and TI-443B LP4 CL (Ref. 1)	Core Cooling
RCS Temperature – T Hot WR (TI-413A LP1 HL, TI-423A LP2 HL, TI-433A LP3 HL and TI-443A LP4 HL (Ref. 1)	Core Cooling
Core Exit Thermocouples – available Train A or Train B channels as described per Technical Specifications (Ref. 2)	Core Cooling
RCS Loop Pressure – HL WR (PI-405, 428, 438 and 403) (Ref. 1)	Core Cooling
Reactor Neutron Flux Essential Instrumentation	**Safety Function**
Source & Intermediate Range (N31/35 and N32/36)	Reactivity Control

Instruments monitoring the listed parameters remain available following specified load shed actions outlined in plant procedures. Analysis (Reference 1) indicates this strategy provides two (2) channels of required instrumentation for more than 16 hours.

In addition, local indications such as CST tank level will remain available and the Key Reactor Parameters can be determined from a local reading using standard I&C instruments.

Notes:

None

References:

1. SNCV065-PR-002, Engineering Report, Diverse and Flexible Coping Strategies (FLEX) in Response to NRC Order EA-12-049, Mitigation Strategies for Beyond-Design-Basis External Events, Revision 1

Section 10: Maintain Core Cooling & Heat Removal
2. Vogtle Units 1 and 2 Technical Specifications, Amendment No. 168 (Unit 1) and Amendment No 150 (Unit 2)

Section 10: Maintain Core Cooling & Heat Removal

Maintain Core Cooling & Heat Removal: PWR 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 and strategy(ies) utilized to achieve this coping time.

Coping Strategy (Modes 1 through 4, and Mode 5 with Steam Generators Available)

Primary Strategy

Actions are required during Phase 2 following the ELAP event for reactor core cooling. The primary strategy is dependent upon the continued operation of the TDAFW pump, which is only capable of removing reactor core decay heat as long as there is ample Main Steam supply to drive its turbine. Thus, Phase 2 has several additional baseline coping capabilities that provide defense-in-depth based on the guidance of NEI 12-06.

Alternate Strategy

Phase 2 requires a baseline capability for reactor core cooling to connect a portable pump for injection into the steam generators as the alternate core cooling strategy. The method for this capability will be to depressurize the steam generators for makeup with a portable pump. This method will not be required until sufficient Main Steam is no longer available to drive the TDAFW pump turbine. However, to allow for defense-in-depth actions in the event of an unforeseen failure of the TDAFW pump, a portable pump for the Phase 2 strategy of core cooling will be deployed and made ready for use as soon as resources become available following the ELAP event.

Depressurization of the steam generators will require deploying two (2) shift operators (SOs) to complete this activity. Based on operator experience, the main steam valve room is accessible and habitable during the SG depressurization activity. The SOs will be required to depressurize the steam generators via the Atmospheric Relief Valves (ARVs) to a pressure of approximately 300 psig. To conservatively envelop any scenario with an early AFW failure and provide the capability to restore the secondary side heat sink, the portable pump designated for steam generator injection, or SG FLEX pump, will be sized based on the decay heat at one hour after reactor shutdown in accordance with the PWROG position for alternate low pressure feedwater pump requirements (Reference 1). Thus, the SG FLEX pumps are capable of delivering 300 gpm at a discharge pressure equal to the specified steam generator injection pressure of 300 psig (at the SG feedring) in addition to all head losses (*e.g.*, hoses, piping, connections, and elevation of the feed injection point) from the discharge of the SG FLEX pump to the steam generator.

For injection using the SG FLEX Pump, the pump will be deployed at a location near the AFW pump house. The normal supply for the SG FLEX pump will be from the CSTs (*primary*) and the alternate suction source will be from the RMWST (*alternate*).

Discharge of the pump will be directed to all four steam generators via hose and adapters connected to either of two injection points (*primary and alternate*) located in the AFW pump house. The two injection points are from diverse locations. Following depressurization of the steam generators via the ARVs, these injection points are used as the alternate injection pathway for the portable pump core cooling FLEX strategy. Symmetric cooldown of all four SGs will be controlled by the associated DC-

Section 10: Maintain Core Cooling & Heat Removal

powered MOVs when the injection point downstream of the TDAFW pump (*primary*) will be used; if the connection provided in the motor-driven AFW (MDAFW) pump discharge header cross-tie line (*alternate*) will be used, operators will manually align the associated ac-powered MOVs to control feeding all four SGs simultaneously.

As previously stated, the CSTs are capable of providing a minimum of 116 hours (Reference 6) of water for steam generator injection (applicable to both TDAFW pump injection and SG FLEX Pump injection into SGs). Prior to depletion, the CSTs can be provided makeup from the Reactor Makeup Water Storage Tank (RMWST) (*primary*) or one of the Nuclear Service Cooling Water (NSCW) basins (*alternate*), which are protected (*i.e.*, seismic category 1) sources of water. These alternate sources of water are another required baseline capability from NEI 12-06 for core cooling. The preferred source of makeup for SG injection prior to exhausting the inventory of the CSTs is the RMWST. The RMWST also contains de-mineralized water with a minimum inventory of 127,050 gallons (References. 2 and 3) that is capable of providing at least 25 additional hours to the 116 hours of available inventory in the CSTs (Reference 6).

Makeup from the RMWST requires the use of on-site portable FLEX equipment which includes a portable pump (referred to herein as CST FLEX pump). The CST FLEX pump supply will be provided from a valve located in the RMWST valve gallery; the CST FLEX pump discharges to a fill valve located on each of the CSTs (two per unit). Hoses will be used for these supply and discharge connections.

Each NSCW basin contains a nominal inventory of 3,670,000 gallons of water (Reference 4, Section 3.8.4.1.7). The NSCW basins are concrete structures, deeply embedded, and are identical. The water inventory is located within the basin which is a large cylindrical shell that extends 81 ft below the grade elevation. The Technical Specifications (T.S. SR 3.7.9.1) require a minimum inventory of at least 80.25 ft of water, which is 99% of the nominal inventory. The inventory located in one (1) NSCW basin provides approximately 750 hours for SG injection after exhausting the CSTs and RMWST for core cooling. However, since the NSCW basin is over 80 ft deep, a portable submersible pump will be used to provide the required suction lift for the normal FLEX pump to supply the entire inventory from the NSCW basin. Refer to the Phase 3 Core Cooling & Heat Removal strategy.

Coping Strategy (Mode 6 and Mode 5 without Steam Generators Available)

The primary strategy for core cooling without the steam generators available in the transitional phase will be to maintain RCS inventory. Refer to the Phase 2 RCS Inventory Control strategy.

<u>On-site FLEX Diesel Generator</u>

The Phase 2 coping strategy following an ELAP event will be to stage and connect a 600 kW, 480 VAC diesel generator to power select loads. The loads which will be powered by the Phase 2 FLEX Diesel Generator include one battery charger for each of the four Class 1E 125 VDC Switchgear (providing continuity of power for instrumentation and remote operation of the TDAFW pump). The Phase 2 FLEX diesel generators are capable of starting without external equipment and have their own fuel transfer pumps. Other equipment provided for this strategy includes portable switchgear and quick connect power cables for connecting to multiple, separate loads concurrently. Diverse connection

Section 10: Maintain Core Cooling & Heat Removal

points (*primary and alternate*) are provided.

References:

1. LTR-PSCA-12-78, PA-PSC-0965 Core Team PWROG Core Cooling Management Interim Position Paper, Revision 0, November 2012
2. 13733-1, Reactor Makeup Water System, Version 24
3. 13733-2, Reactor Makeup Water System, Version 21.0
4. Vogtle Electric Generating Plant Final Safety Analysis Report (FSAR), Revision 18
5. Vogtle Units 1 and 2 Technical Specifications, Amendment No. 168 (Unit 1) and Amendment No 150 (Unit 2)
6. SNCV065-PR-002, Engineering Report, Diverse and Flexible Coping Strategies (FLEX) in Response to NRC Order EA-12-049, Mitigation Strategies for Beyond-Design-Basis External Events, Revision 1

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.*

SNC will utilize 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*

- Install a 480V distribution panel in the Control Bldg., transfer switches, and route cable to enable connection of On-site FLEX Diesel Generator. Installation will be needed to minimize the time and resource requirements to implement the applicable strategies.
- Designate connections to provide diverse suction locations from seismic category 1 water storage tanks for SG FLEX pump. Requires use of hose to pipe adapters to be stored in FLEX warehouse(s).
- Install primary and alternate SG injection locations downstream of TDAFW and MDAFW pumps (requires connection of FLEX hose from discharge of portable SG FLEX pump) including installation of isolation valves with flanges. Tie-ins to the system piping will be via flexible hose during the event.
- Designate connections to provide diverse fill locations from CST FLEX pump for seismic category 1 water storage tanks. Requires use of hose to pipe adapters to be normally stored in FLEX warehouse(s).

References:

1. SNCV065-PR-002, Engineering Report, Diverse and Flexible Coping Strategies (FLEX) in Response to NRC Order EA-12-049, Mitigation Strategies for Beyond-Design-Basis External Events, Revision 1

Key Reactor Parameters	*List instrumentation credited or recovered for this coping evaluation.*

Section 10: Maintain Core Cooling & Heat Removal

Same as instruments listed in Core Cooling & Heat Removal Phase 1

Phase 2 FLEX equipment will have installed local instrumentation needed to operate the equipment. The use of these instruments will be described in the associated procedures for use of the equipment. These procedures will be based on inputs from the equipment suppliers, operation experience and expected equipment function in an ELAP.

Storage / Protection of Equipment:
Describe storage / protection plan or schedule to determine storage requirements

Seismic	*List how equipment will be protected or scheduled to protect*

Permanent piping systems used to provide water from the storage tanks to the plant is seismically qualified. Installation of new pipes and equipment used to provide core cooling & heat removal to the SG will be installed seismically rugged and protected in structures that are seismically rugged or qualified. Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06 Section 11. The schedule to construct the structures is still to be determined. The storage buildings construction will be completed for 2 sets of FLEX equipment by the date the first unit will reach the Order EA-12-049 implementation completion due date. The remaining FLEX equipment will be available and protected by the implementation completion date for the second unit.

VEGP procedures and programs are being developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to VEGP.

Flooding Note: if stored below current flood level, then ensure procedures exist to move equipment prior to exceeding flood level	*List how equipment will be protected or scheduled to protect*

Not applicable per NEI 12-06 as outlined within the first section of this Integrated Plan.

Severe Storms with High Winds	*List how equipment will be protected or scheduled to protect*

The piping used to provide core cooling and heat removal to the SG will be contained within structures that are protected or designed for protection from storms and high winds. Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06 Section 11. The schedule to construct the structures is still to be determined. The storage structures construction will be completed for 2 sets of FLEX equipment by the date the first unit will reach the Order EA-12-049 implementation completion due date. The remaining FLEX equipment will be available and protected by the implementation completion date for the second unit.

VEGP procedures and programs are being developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to VEGP.

Snow, Ice, and Extreme Cold	*List how equipment will be protected or scheduled to protect*

The piping used to provide core cooling and heat removal to the SG will be contained within structures that are protected or designed for protection from snow, ice, and extreme cold. Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06 Section 11. The schedule to construct the structures is still to be determined. The storage structures construction will be completed for 2 sets of FLEX equipment by the date the first unit will reach the

Section 10: Maintain Core Cooling & Heat Removal

Order EA-12-049 implementation completion due date. The remaining FLEX equipment will be available and protected by the implementation completion date for the second unit.

VEGP procedures and programs are being developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to VEGP.

High Temperatures	*List how equipment will be protected or scheduled to protect*

Storage structures will be ventilated to allow for equipment to function. Active cooling systems are not required as normal room ventilation will be utilized per Reference 1. The schedule to construct structures is still to be determined. The storage structures construction will be completed for 2 sets of FLEX equipment by the date the first unit will reach the Order EA-12-049 implementation completion due date. The remaining FLEX equipment will be available and protected by the implementation completion date for the second unit.

VEGP procedures and programs are being developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to VEGP.

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 will be protected*
Storage location and structure have not yet been decided. After the structure design and location are finalized, the deployment routes will be evaluated for external hazards to demonstrate a clear deployment path.	No modifications identified for Phase 2 deployment issues.	• Plant piping and valves for FLEX connections will be missile protected and enclosed within a Seismic Category 1 or seismically 'rugged' structure, which will inherently protect it from local hazards such as vehicle impact. • Diverse connection points for CST fill capability from the FLEX pumps will be provided with at least one protected from tornado missiles. • New FLEX piping shall be installed to meet necessary seismic requirements. • Electrical connection points for the On-site FLEX 480 VAC DGs will be designed to withstand the applicable hazards.

Section 10: Maintain Core Cooling & Heat Removal

Notes:

None

References:

1. SNCV065-PR-002, Engineering Report, Diverse and Flexible Coping Strategies (FLEX) in Response to NRC Order EA-12-049, Mitigation Strategies for Beyond-Design-Basis External Events, Revision 1
2. NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide", Rev. 0, August 2012

Section 10: Maintain Core Cooling & Heat Removal

Maintain Core Cooling & Heat Removal: PWR 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 and strategy(ies) utilized to achieve this coping time.

Coping Strategy (Modes 1 through 4, and Mode 5 with Steam Generators Available)

Based on Reference 1, reactor decay heat will sustain TDAFW operation for at least 5 days after shutdown from Mode 1 at which point another means of SG makeup will be used to provide cooling of the RCS through the SGs.

Phase 2 of the core cooling strategy is expected to last until the Phase 3 strategies using the new UHS are operational. Since the makeup duration of the CSTs and RMWST is estimated at greater than 140 hours, no other source of SG makeup need be made available prior to the implementation of the long term Phase 3 strategies. However, if extraordinary circumstances dictate the need for an alternative SG makeup source, inventory in the NSCW basins will be available.

The primary Phase 3 strategy requires heat removal equipment delivered from the RRC and a pump capable of removing heat from the reactor core in addition to other loads from the SFP and containment. The flow paths for decay heat removal use piping in the RHR system, Component Cooling Water (CCW) system, Essential Chilled Water (ECW), and NSCW system. Restoring the RHR system to operation requires repowering the RHR pump via a diesel generator delivered from the RRC to establish recirculation in the RCS. Repowering the RHR pumps will be completed by repowering the 4160V distribution system, if available, or by repowering the pump directly. Heat removal will be through the RHR heat exchangers. The RHR heat exchangers are cooled by flow from the CCW system. Instead of repowering the CCW pumps, flow will be established in the CCW system from a portable pump delivered from the RRC. The pump used for establishing flow to CCW will be placed in series with heat removal equipment (*e.g.*, chiller or water to air heat exchanger) delivered from the RRC. This new established heat sink will take its suction from upstream of the selected CCW pumps in either of the CCW trains (CCW Pumps #5 or #6) and will discharge at a point in the CCW system downstream of the CCW pumps. The CCW system provides the benefit of cooling not only the RHR heat exchangers but the SFP heat exchangers and RHR pump seal coolers.

The new heat sink will also be required to deliver cooling water to the RHR pump room coolers and RHR pump motor coolers. The RHR pump room coolers require repowering from the diesel generator delivered from the RRC. The RHR pump motors (as well as the containment coolers) are cooled by the NSCW system. The RHR pump room coolers are cooled by the ECW system. As normal NSCW and ECW will not be available following an ELAP/LUHS event, a new flow path will be established using the existing seismic category 1 NSCW and ECW piping. This strategy includes aligning particular portions of the NSCW and ECW systems piping to the newly established heat sink for decay heat removal. The off-site heat exchangers are sized to remove all decay heat from irradiated fuel located in the reactor cores, SFPs, containment, and other support loads.

Phase 3 of the core cooling strategy includes the use of a portable submersible pump capable of supplying the entire inventory of water from the NSCW basins as an extraordinary backup source of SG makeup water. Water treatment equipment from the RRC will also be used to treat the NSCW inventory to be chemically compatible for SG makeup in addition to treating makeup from an

Section 10: Maintain Core Cooling & Heat Removal

indefinite source of water.

In Phase 3, the ultimate source of water is the Savannah River, which is located approximately 3,600 ft from the Unit 1 reactor and 3,900 ft from the Unit 2 reactor (Reference 2). In addition, the plant is on high ground with entrance to the power block structures at grade El 220 ft, approximately 140 ft above the minimum Savannah River level (Reference 3). Therefore, a pumping system and water treatment equipment must be delivered on-site and ready for operation prior to depletion of the on-site seismic category 1 water inventories.

Coping Strategy (Mode 6 and Mode 5 without Steam Generators Available)

In modes without the steam generators available for decay heat removal (Modes 5 and 6), it will be necessary to use the UHS delivered from off-site to remove heat via the water inventory in the NSCW basin.

References:

1. WCAP-17601-P, "Reactor Coolant System Response to the Extended Loss of AC Power Event for Westinghouse, Combustion Engineering, and Babcock & Wilcox NSSS Designs".
2. CX2D45V002, Location and Vicinity Map, Version 15.0
3. CX2D45V004, System Area Key Plan, Version 4.0
4. SNCV065-PR-002, Engineering Report, Diverse and Flexible Coping Strategies (FLEX) in Response to NRC Order EA-12-049, Mitigation Strategies for Beyond-Design-Basis External Events, Revision 1

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.*
SNC will utilize 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*
No modifications are required for Phase 3	
Key Reactor Parameters	*List instrumentation credited or recovered for this coping evaluation.*
Same as instruments listed in above section, Core Cooling & Heat Removal Phase 1. Phase 3 FLEX equipment will have installed local instrumentation needed to operate the equipment. The use of these instruments will be described in the associated procedures for use of the equipment. These procedures will be based on inputs from the equipment suppliers, operation experience and expected equipment function in an ELAP.	
Deployment Conceptual Design **(Attachment 3 contains Conceptual Sketches)**	

Section 10: Maintain Core Cooling & Heat Removal		
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 will be protected*
Phase 3 equipment will be provided by the Regional Response Center (RRC). Equipment transported to the site will be either immediately staged at the point of use location (pumps and generators) or temporarily stored at the lay down area until moved to the point of use area. After storage structure design and location are finalized, the deployment routes-including deployment routes for off-site RRC equipment—will be evaluated for external hazards to demonstrate a clear deployment path.	No modifications identified for Phase 3 deployment issues	• The FLEX/RRC pump makeup connections will be designed to withstand the applicable hazards or have diverse connections. • All other equipment will be portable.

Notes:

None

References:

1. SNCV065-PR-002, Engineering Report, Diverse and Flexible Coping Strategies (FLEX) in Response to NRC Order EA-12-049, Mitigation Strategies for Beyond-Design-Basis External Events, Revision 1
2. NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide", Rev. 0, August 2012

Section 11: Maintain RCS Inventory Control

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

- **Low Leak RCP Seals or RCS makeup required**
- **All Plants Provide Means to Provide Borated RCS Makeup**

Maintain RCS Inventory Control: PWR 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 (Low Leak RCP Seals and/or borated high pressure RCS makeup) and strategy(ies) utilized to achieve this coping time.

Coping Strategy (Modes 1 through 4, and Mode 5 with Steam Generators Available)

In order to maintain sufficient reactor coolant inventory, Vogtle will implement the new safe shutdown/low leakage seal design for the reactor coolant pumps (RCP). These seals will reduce RCS leakage to a maximum of 1 gpm per RCP. Including an additional 1 gpm of unidentified leakage, the total RCS leak rate for Vogtle with shutdown RCP seals is expected to be a maximum of 5 gpm. This low leakage will delay the need for RCS makeup to prevent core uncovery to well beyond 7 days following an ELAP event (Reference 1). The Westinghouse RCS makeup evaluation for VEGP (Reference 2 and 6) demonstrates that RCS makeup will be required at 46 hours to maintain single phase RCS core cooling using the steam generators; if credit is taken for two-phase RCS core cooling using the steam generators, RCS makeup would not be required until after 72 hours(Reference 2 and 6). However, RCS makeup will be required for supplemental boron addition for reactivity control.

In preparation for RCS inventory control and long term sub-criticality, the phase 1 action will be to cool down and depressurize the RCS for injection of boron and coolant inventory via the SI accumulators. As the RCS is cooled, the level within the RCS will occupy less volume and will require makeup and boron. This borated makeup volume will be injected from the SI accumulators during normal RCS cooldown following an ELAP event. Prior to injection of the entire SI accumulator inventory, the SI accumulators will be vented if necessary to avoid nitrogen injection into the RCS, which has the potential to inhibit natural circulation. Procedural guidance for venting of the SI accumulators will be provided by emergency operating procedures (Reference 5). The Phase 2 RCS Inventory strategy is discussed later.

The FLEX actions listed in this submittal provide assurance the SGs will be available to provide cool down and depressurization of the RCS required for RCS Inventory Control.

Coping Strategy (Mode 6 and Mode 5 without Steam Generators Available)

In the initial phase without the steam generators available, manual action will be required to provide makeup to the RCS via gravity feed from the Refueling Water Storage Tank (RWST). Prior to entering Mode 5, the RWST contains a minimum borated water inventory of 686,000 gallons (Reference 3). Prior to filling the reactor cavity, gravity feed will be available until a pressure of 35 psig is reached in

[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.

Section 11: Maintain RCS Inventory Control

the RCS and will be accomplished via manual valve operation. The gravity feed path will be from the RWST via the Safety Injection (SI) system flow path to the RCS cold legs. Note that gravity feeding to the RCS is currently included in plant procedures at VEGP. Additional gravity feed paths from the RWST to the RCS are also available using the SI flow path to the RCS hot legs and flow paths in the Residual Heat Removal (RHR) System and the Chemical Volume and Control System (CVCS). In Mode 6, the RWST inventory is available in the reactor refueling cavity for core cooling and no Phase 1 actions will be required.

The required makeup flow rate to the RCS following a loss of RHR cooling will be 120 gpm (Reference 2 and 6). While gravity feeding may not achieve the required flow rate necessary to makeup to the RCS short term or long term, it is still a credited action that will mitigate core uncovery. Phase 2 strategies are required; however, the initial response of gravity feeding from the RWST will extend the required Phase 2 response time to prevent or mitigate the consequences of the event (*i.e.,* core damage).

Notes:

The FLEX actions listed in this submittal provide assurance the SG will be available for RCS Inventory Control.

References:

1. WCAP-17601-P, “Reactor Coolant System Response to the Extended Loss of AC Power Event for Westinghouse, Combustion Engineering, and Babcock & Wilcox NSSS Designs”
2. LTR-FSE-12-26 Revision 1, “Evaluations to Support SNC FLEX Strategies for Vogtle Electric Generating Plant,” January 21, 2013
3. Vogtle Units 1 and 2 Technical Specifications, Amendment No. 168 (Unit 1) and Amendment No 150 (Unit 2)
4. SNCV065-PR-002, Engineering Report, Diverse and Flexible Coping Strategies (FLEX) in Response to NRC Order EA-12-049, Mitigation Strategies for Beyond-Design-Basis External Events, Revision 1
5. 19002-C, ES-0.2, Natural Circulation Cooldown, Version 23
6. LTR-FSE-13-3, "Responses to Requested Clarification and Comments Received from the Southern Nuclear Company with Respect to Westinghouse Correspondence LTR-FSE-12-26," January 31, 2013

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.*
SNC will utilize 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.*

Section 11: Maintain RCS Inventory Control

Install RCP Shutdown Seals, which will reduce RCS leakage.

Key Reactor Parameters	*List instrumentation credited for this coping evaluation.*

Reactor Coolant System Essential Instrumentation	**Safety Function**
RCS Temperature – T-Cold WR (TI-413B LP1 CL, TI-423B LP2 CL, TI-433B LP3 CL and TI-443B LP4 CL (Ref. 1)	Core Cooling
RCS Temperature – T Hot WR (TI-413A LP1 HL, TI-423A LP2 HL, TI-433A LP3 HL and TI-443A LP4 HL (Ref. 1)	Core Cooling
RCS Loop Pressure – HL WR (PI-405, 428, 438 and 403) (Ref. 1)	Core Cooling
Pressurizer Level – LI-459A, LI-460A, LI-461 (Ref. 1)	RCS Inventory
Reactor Level – RVLIS (available Train A or Train B channels as described per Technical Specifications) (Ref. 2)	RCS Inventory
Reactor Neutron Flux Essential Instrumentation	**Safety Function**
Source & Intermediate Range (N31/35 and N32/36)	Reactivity Control

Notes:

None

References:

1. SNCV065-PR-002, Engineering Report, Diverse and Flexible Coping Strategies (FLEX) in Response to NRC Order EA-12-049, Mitigation Strategies for Beyond-Design-Basis External Events, Revision 1
2. Vogtle Units 1 and 2 Technical Specifications, Amendment No. 168 (Unit 1) and Amendment No 150 (Unit 2)

Section 11: Maintain RCS Inventory Control

Maintain RCS Inventory Control: PWR 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 (Low Leak RCP Seals and/or borated high pressure RCS makeup) and strategy(ies) utilized to achieve this coping time.

Coping Strategy (Modes 1 through 4, and Mode 5 with Steam Generators Available)

Due to the low leakage seals associated with the Phase 1 core cooling strategy, no additional makeup other than that of the SI accumulators will be required from an RCS inventory standpoint until Phase 3. However, the Westinghouse RCS makeup evaluation for VEGP (Reference 1 and 4) indicates that it will be necessary to initiate supplemental boron injection (with letdown as necessary) to maintain sub-criticality. Therefore, following injection of the SI accumulators (at around 12 hours following shutdown) and prior to the peak reactivity addition resulting from xenon decay (at around 24 hours following shutdown), additional borated water will be injected into the RCS for reactivity control. A portable, electric-motor driven pump designated for RCS injection, or Mode 1-4 RCS FLEX pump, will be sized to provide sufficient borated water at the RCS injection point for meeting makeup needs associated with both primary inventory control and subcriticality requirements (Reference 2). Diverse connections (*primary and alternate*) for discharge of the Mode 1-4 RCS FLEX Pump are located downstream of each RHR pump on the piping that discharges to the RCS cold legs. The Boric Acid Storage Tank (BAST) is the primary source for supplemental boron addition. The minimum volume providing shutdown margin necessary to maintain the core in a subcritical state is maintained in the BAST. Note that the borated water inventory in the RWST will remain available (Tech Spec minimum of 686,000 gallons) as a backup source for RCS injection. This availability is due to the preferred use of other sources of water inventory (CSTs, RMWST, and NSCW basins) during Phases 1 and 2 for core and SFP cooling strategies.

The Phase 2 strategy also consists of venting the RCS as required permitting injection of the necessary borated water inventory. This action relies on remote manual operation of the 125V dc reactor head vent valves.

Coping Strategy (Mode 6 and Mode 5 without Steam Generators Available)

To maintain RCS inventory during Phase 2, the primary strategy will be to utilize a portable, electric-motor driven pump, or Mode 5-6 RCS FLEX Pump, for RCS injection via a connection in the RHR system. This strategy requires deployment of the Mode 5-6 RCS FLEX Pump with suction from the RWST. The Westinghouse RCS makeup evaluation (Reference 1 and 4) indicates that a flow rate of 120 gpm is sufficient to remove the decay heat for Mode 5 and 6 events that occur beyond 48 hours after plant shutdown. Diverse connections (*primary and alternate*) for suction from the RWST are provided upstream of each RHR pump. Diverse connections for discharge of the Mode 5-6 RCS FLEX Pump are located downstream of each RHR pump on the piping that discharges to the RCS cold legs. No venting of the RCS will be required since the Pressurizer Safety Valves (PSV-8010A, PSV-8010B, and PSV-8010C) are removed from the pressurizer during the limiting shutdown condition (*i.e.*, in Mode 5 with the reactor vessel head installed) and the reactor vessel head is removed in Mode 6.

On-site FLEX Diesel Generator

The Phase 2 coping strategy following an ELAP event will be to stage and connect a 600 kW, 480

Section 11: Maintain RCS Inventory Control

VAC diesel generator to power select loads. The loads which will be powered by the Phase 2 FLEX Diesel Generator include a portable, electric-motor driven pump designated for RCS injection (Mode 1-4 or Mode 5-6 RCS FLEX pump, as needed) and one battery charger for each of the four Class 1E 125 VDC Switchgear (providing continuity of power for instrumentation). The Phase 2 FLEX diesel generators are capable of starting without external equipment and have their own fuel transfer pumps. Other equipment provided for this strategy includes portable switchgear and quick connect power cables for connecting to multiple, separate loads concurrently. Diverse connection points (*primary and alternate*) are provided.

References:

1. LTR-FSE-12-26 Revision 1, "Evaluations to Support SNC FLEX Strategies for Vogtle Electric Generating Plant," January 21, 2013
2. WCAP-17601-P, "Reactor Coolant System Response to the Extended Loss of AC Power Event for Westinghouse, Combustion Engineering, and Babcock & Wilcox NSSS Designs"
3. SNCV065-PR-002, Engineering Report, Diverse and Flexible Coping Strategies (FLEX) in Response to NRC Order EA-12-049, Mitigation Strategies for Beyond-Design-Basis External Events, Revision 1
4. LTR-FSE-13-3, "Responses to Requested Clarification and Comments Received from the Southern Nuclear Company with Respect to Westinghouse Correspondence LTR-FSE-12-26," January 31, 2013.

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.*

SNC will utilize 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*

- Modify flush piping of each RHR train to provide suction and discharge location points for placing RCS FLEX Pump in parallel with existing RHR Pumps. Suction will be from the BAST (primary) or the RWST (alternate). The installation of tie-ins for portable pumps to be placed in parallel with RHR pumps will be needed to meet the strategy implementation time constraints.
- Install a 480V distribution panel in the Control Bldg., transfer switches, and route cable to enable connection of On-site FLEX Diesel Generator. Installation will be needed to minimize the time and resource requirements to implement the applicable strategies.
  (NOTE: This same modification is listed in the Core Cooling & Heat Removal Phase 2 section.)
- Install new cabling with disconnects for powering Mode 1-4 or Mode 5-6 RCS FLEX Pumps for supplemental boron addition into the RCS at an easily accessible location in the Aux. Bldg. Level "D" corridor (near the RHR pump rooms). Receptacles will be powered from FLEX diesel generator via 480V FLEX switchgear. The installation of disconnects for powering either RCS FLEX pump (Mode 1-4 or Mode 5-6) will be needed to support the strategy implementation time

Section 11: Maintain RCS Inventory Control

constraints.

References:

1. SNCV065-PR-002, Engineering Report, Diverse and Flexible Coping Strategies (FLEX) in Response to NRC Order EA-12-049, Mitigation Strategies for Beyond-Design-Basis External Events, Revision 1

Key Reactor Parameters	*List instrumentation credited or recovered for this coping evaluation.*

Same as instruments listed in section, RCS Inventory Phase 1.

Phase 2 FLEX equipment will have installed local instrumentation needed to operate the equipment. The use of these instruments will be described in the associated procedures for use of the equipment. These procedures will be based on inputs from the equipment suppliers, operation experience and expected equipment function in an ELAP.

Storage / Protection of Equipment:
Describe storage / protection plan or schedule to determine storage requirements

Seismic	*List how equipment will be protected or scheduled to protect*

Permanent piping systems used to provide water from the storage tanks to the plant is seismically qualified. Installation of new pipes and equipment used to provide RCS Inventory Control will be installed seismically rugged and protected in structures that are seismically rugged or qualified. Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06 Section 11. The schedule to construct the structures is still to be determined. The storage structures construction will be completed for 2 sets of FLEX equipment by the date the first unit will reach the Order EA-12-049 implementation completion due date. The remaining FLEX equipment will be available and protected by the implementation completion date for the second unit.

VEGP procedures and programs are being developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to VEGP.

Flooding Note: if stored below current flood level, then ensure procedures exist to move equipment prior to exceeding flood level	*List how equipment will be protected or scheduled to protect*

Not applicable per NEI 12-06 as outlined within the first section of this Integrated Plan.

Severe Storms with High Winds	*List how equipment will be protected or scheduled to protect*

The piping used to provide RCS Inventory Control will be contained within structures that are protected or designed for protection from storms and high winds. Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06 Section 11. The schedule to construct the structures is still to be determined. The storage structures construction will be completed for 2 sets of FLEX equipment by the date the first unit will reach the Order EA-12-049 implementation completion due date. The remaining FLEX equipment will be available and protected by the implementation completion date for the second unit.

VEGP procedures and programs are being developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to VEGP.

Section 11: Maintain RCS Inventory Control

Snow, Ice, and Extreme Cold	*List how equipment will be protected or scheduled to protect*

The piping used to provide RCS Inventory Control will be contained within structures that are protected or designed for protection from snow, ice, and extreme cold. Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06 Section 11. The schedule to construct the structures is still to be determined. The storage structures construction will be completed for 2 sets of FLEX equipment by the date the first unit will reach the Order EA-12-049 implementation completion due date. The remaining FLEX equipment will be available and protected by the implementation completion date for the second unit.

VEGP procedures and programs are being developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to VEGP.

High Temperatures	*List how equipment will be protected or scheduled to protect*

Storage structures will be ventilated to allow for equipment to function. Active cooling systems are not required as normal room ventilation will be utilized per Reference 1. The schedule to construct structures is still to be determined. The storage structures construction will be completed for 2 sets of FLEX equipment by the date the first unit will reach the Order EA-12-049 implementation completion due date. The remaining FLEX equipment will be available and protected by the implementation completion date for the second unit.

VEGP procedures and programs are being developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to VEGP.

Deployment Conceptual Design
(Attachment 3 contains Conceptual Sketches)

Strategy	**Modifications**	**Strategy**
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify Strategy including how the equipment will be deployed to the point of use.*
Equipment pre-staged will be in Category 1 safety related seismically qualified locations near point of use.	No modifications identified for Phase 2 deployment issues.	• Plant piping and valves for FLEX connections will be missile protected and enclosed within a Seismic Category 1 or seismically 'rugged' structure, which will inherently protect it from local hazards such as vehicle impact. • Electrical connection points for the On-site FLEX 480 VAC DGs will be designed to withstand the applicable hazards.

Notes:

None

Section 11: Maintain RCS Inventory Control

References:

1. SNCV065-PR-002, Engineering Report, Diverse and Flexible Coping Strategies (FLEX) in Response to NRC Order EA-12-049, Mitigation Strategies for Beyond-Design-Basis External Events, Revision 1
2. NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide", Rev. 0, August 2012

Section 11: Maintain RCS Inventory Control

Maintain RCS Inventory Control: PWR 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 (Low Leak RCP Seals and/or borated high pressure RCS makeup) and strategy(ies) utilized to achieve this coping time.

For RCS injection in Phase 3, boron mixing equipment (delivered from off-site) will be employed to restore the RWST inventory. Injection to the RCS will be through the RHR system cold leg injection paths (*primary and alternate*). Refer to the Phase 2 RCS Inventory strategy.

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.*

SNC will utilize 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*

No modifications required for the Phase 3 RCS Inventory strategy.

Key Reactor Parameters	*List instrumentation credited or recovered for this coping evaluation.*

Same as instruments listed in RCS Inventory Control Phase 1.

Phase 3 FLEX equipment will have installed local instrumentation needed to operate the equipment. The use of these instruments will be described in the associated procedures for use of the equipment. These procedures will be based on inputs from the equipment suppliers, operation experience and expected equipment function in an ELAP.

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 will be protected*
Phase 3 equipment will be provided by the Regional Response Center (RRC). Equipment transported to the site will be either immediately staged at the point of use location (pumps and generators) or temporarily stored at the lay down area until moved to the point of use area. After storage structure design and location are	No modifications identified for Phase 3 deployment issues.	The RWST is permanently installed. Diverse connections to the RWST are available for RRC equipment.

Section 11: Maintain RCS Inventory Control		
finalized, the deployment routes-including deployment routes for off-site RRC equipment—will be evaluated for external hazards to demonstrate a clear deployment path.		
Notes: None		

Section 12: Maintain Containment

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

- Containment Spray
- Hydrogen igniters (ice condenser containments only)

Maintain Containment: PWR 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 spray/Hydrogen igniter) and strategy(ies) utilized to achieve this coping time.

Analysis is being performed to demonstrate that containment response following a postulated ELAP event does not challenge design limits until well after availability of RRC equipment and implementation of long term strategies to control pressure and temperature. See Phase 3 discussion.

References:

1. SNCV065-PR-002, Engineering Report, Diverse and Flexible Coping Strategies (FLEX) in Response to NRC Order EA-12-049, Mitigation Strategies for Beyond-Design-Basis External Events, Revision 1
2. NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide", Rev. 0, August 2012

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.*

No procedures, strategies, or guidelines are required for the Phase 1 Containment strategy.

Identify modifications	*List modifications and describe how they support coping time.*

No modifications required for the Phase 1 Containment strategy.

Key Containment Parameters	*List instrumentation credited for this coping evaluation.*

Containment System Essential Instrumentation	**Safety Function**
CTMT – Pressure (PI-936 and PI-937) (Ref. 1)	Containment

Notes:

None

[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.

Section 12: Maintain Containment

References:

1. SNCV065-PR-002, Engineering Report, Diverse and Flexible Coping Strategies (FLEX) in Response to NRC Order EA-12-049, Mitigation Strategies for Beyond-Design-Basis External Events, Revision 1

Section 12: Maintain Containment

Maintain Containment: PWR 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 (containment spray/hydrogen igniters) and strategy(ies) utilized to achieve this coping time.

Portable on-site FLEX Diesel Generators will be employed (as discussed in Core Cooling & Heat Removal Phase 2 section) to charge the station batteries and maintain DC bus voltage for continued availability of required instrumentation.

Analysis is being performed to demonstrate that containment response following a postulated ELAP event does not challenge design limits until well after availability of RRC equipment and implementation of long term strategies to control pressure and temperature. See Phase 3 discussion.

References:

1. SNCV065-PR-002, Engineering Report, Diverse and Flexible Coping Strategies (FLEX) in Response to NRC Order EA-12-049, Mitigation Strategies for Beyond-Design-Basis External Events, Revision 1

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.*

SNC will utilize 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*

Install a 480V distribution panel in the Control Bldg., transfer switches, and route cable to enable connection of On-site FLEX Diesel Generator. Installation is needed to minimize the time and resource requirements to implement the applicable strategies.
(NOTE: This same modification is listed in the Core Cooling & Heat Removal Phase 2 section.)

Key Containment Parameters	*List instrumentation credited or recovered for this coping evaluation.*

Same as instruments listed in Containment Phase 1.

Section 12: Maintain Containment	
Storage / Protection of Equipment: **Describe storage / protection plan or schedule to determine storage requirements**	
Seismic	*List how equipment will be protected or scheduled to protect*
Connections for FLEX DG will be installed seismically rugged and protected or in structures that are seismically rugged or qualified. Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06 Section 11. The schedule to construct the structures is still to be determined. The storage structures construction will be completed for 2 sets of FLEX equipment by the date the first unit will reach the Order EA-12-049 implementation completion due date. The remaining FLEX equipment will be available and protected by the implementation completion date for the second unit. VEGP procedures and programs are being developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to VEGP.	
Flooding Note: if stored below current flood level, then ensure procedures exist to move equipment prior to exceeding flood level	*List how equipment will be protected or scheduled to protect*
Not applicable per NEI 12-06 as outlined within the first section of this Integrated Plan.	
Severe Storms with High Winds	*List how equipment will be protected or scheduled to protect*
Connections for FLEX DG will be contained within structures that are protected or designed for protection from storms and high winds. Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06 Section 11. The schedule to construct the structures is still to be determined. The storage structures construction will be completed for 2 sets of FLEX equipment by the date the first unit will reach the Order EA-12-049 implementation completion due date. The remaining FLEX equipment will be available and protected by the implementation completion date for the second unit. VEGP procedures and programs are being developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to VEGP.	
Snow, Ice, and Extreme Cold	*List how equipment will be protected or scheduled to protect*
Connections for FLEX DG will be contained within structures that are protected or designed for protection from snow, ice, and extreme cold. Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06 Section 11. The schedule to construct the structures is still to be determined. The storage structures construction will be completed for 2 sets of FLEX equipment by the date the first unit will reach the Order EA-12-049 implementation completion due date. The remaining FLEX equipment will be available and protected by the implementation completion date for the second unit. VEGP procedures and programs are being developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to VEGP.	
High Temperatures	*List how equipment will be protected or scheduled to protect*
Storage structures will be ventilated to allow for equipment to function. Active cooling systems are not	

Section 12: Maintain Containment

required as normal room ventilation will be utilized per Reference 1. The schedule to construct structures is still to be determined. The storage structures construction will be completed for 2 sets of FLEX equipment by the date the first unit will reach the Order EA-12-049 implementation completion due date. The remaining FLEX equipment will be available and protected by the implementation completion date for the second unit.

VEGP procedures and programs are being developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to VEGP.

Deployment Conceptual Design
(Attachment 3 contains Conceptual Sketches)

Strategy	**Modifications**	**Strategy**
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify Strategy including how the equipment will be deployed to the point of use.*
Storage location and structure have not yet been decided. After the structure design and location are finalized, the deployment routes will be evaluated for external hazards to demonstrate a clear deployment path.	No modifications identified for Phase 2 deployment issues.	Electrical connection points for the On-site FLEX 480 VAC DGs will be designed to withstand the applicable hazards.

Notes:

None

References:

1. SNCV065-PR-002, Engineering Report, Diverse and Flexible Coping Strategies (FLEX) in Response to NRC Order EA-12-049, Mitigation Strategies for Beyond-Design-Basis External Events, Revision 1

Section 12: Maintain Containment

Maintain Containment: PWR 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 (containment spray/hydrogen igniters) and strategy(ies) utilized to achieve this coping time.

The Phase 3 coping strategy required for maintaining containment integrity will be to repower a containment cooling train and use a portable pump and cooler for the heat sink. The first requirement for repowering a containment cooler train will be to provide power to the 480V, low speed fan motors. The second requirement will be to establish a lineup using FLEX hoses and a portable pump for cooling water supply from the RRC heat removal equipment to the containment coolers.

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.*

SNC will utilize 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*

No modifications required for the Phase 3 Containment strategy.

Key Containment Parameters	*List instrumentation credited or recovered for this coping evaluation.*

Same as instruments listed in Containment Phase 1.

Phase 3 FLEX equipment will have installed local instrumentation needed to operate the equipment. The use of these instruments will be described in the associated procedures for use of the equipment. These procedures will be based on inputs from the equipment suppliers, operation experience and expected equipment function in an ELAP.

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 will be protected*
Phase 3 equipment will be provided by the Regional Response Center (RRC). Equipment transported to the site will be either immediately staged at the point of use location (pumps and generators) or temporarily stored. After storage structure	No modifications identified for Phase 3 deployment issues.	The NSCW system is permanently installed. Diverse connections to the containment coolers are available for RRC equipment.

Section 12: Maintain Containment		
design and location are finalized, the deployment routes—including deployment routes for off-site RRC equipment—will be evaluated for external hazards to demonstrate a clear deployment path.		
Notes: None		

Section 13: Maintain Spent Fuel Pool Cooling

Determine Baseline coping capability with installed coping[4] modifications not including FLEX modifications, utilizing methods described in Table 3-2 of NEI 12-06:

- **Makeup with Portable Injection Source**

Maintain Spent Fuel Pool Cooling: PWR 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 via portable injection source)and strategy(ies) utilized to achieve this coping time

Gravity feed from the RWST will be established as needed during the initial phase of FLEX for SFP Cooling. Gravity feed from each RWST will be established by manually opening valves per Procedures 13719-1 (Reference 2) and 13719-2 (Reference 3). The gravity feed flow rate for SFP makeup will be approximately 75 gpm if the RWST is near its Technical Specifications minimum volume of 686,000 gallons. In operating Modes 1 through 4, makeup will not be required until approximately 10 hours following the event; however, gravity feed will be available immediately following the ELAP event.

In operating Modes 5 and 6, gravity feed may not be available as the majority of the RWST inventory may be discharged into the Refueling Cavity in containment. The bounding case considers that both Units 1 and 2 are offloaded into their respective SFPs. This scenario has a time to boil in the SFPs of approximately 5 hours with a boil-off rate of nearly 125 gpm. If RWST is unavailable, transition to Phase 2 will occur after this time (5 hours), but will not be required for several hours after this time until water volume is evaporated from the pool at a level approximately 15 feet above the used fuel stored in the SFP racks. In this case, gravity feed from the RWST will not be a credited action for the initial phase of FLEX but will be included in the FLEX Support Guidelines (FSG) as a requirement if any RWST is available for gravity feed during operating Modes 5 and 6.

References:

1. SNCV065-PR-002, Engineering Report, Diverse and Flexible Coping Strategies (FLEX) in Response to NRC Order EA-12-049, Mitigation Strategies for Beyond-Design-Basis External Events, Revision 1
2. 13719-1, Spent Fuel Pool Cooling and Purification System, Version 55.1
3. 13719-2, Spent Fuel Pool Cooling and Purification System, Version 49.3

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.*

SNC will utilize 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.

[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.

Section 13: Maintain Spent Fuel Pool Cooling	
Identify modifications	*List modifications and describe how they support coping time.*
Modification to install SFP Level instrumentation per EA-12-051 response (SNC Letter NL-13-0173).	
Key SFP Parameters	*List instrumentation credited or recovered for this coping evaluation.*
SFP Level per EA-12-051 response (SNC Letter NL-13-0173).	
Notes: None	

Section 13: Maintain Spent Fuel Pool Cooling

Maintain Spent Fuel Pool Cooling: PWR 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 via portable injection source) and strategy(ies) utilized to achieve this coping time.

The normal SFP water level at the event initiation will be at least 23 feet over the top of irradiated fuel assemblies seated in the Storage Racks (Reference 2). Upon interruption of power to the installed SFP cooling pumps, the water inventory will heat up. Unit 1 SFP heat loads and temperatures are bounded by Unit 2 values due to the larger storage capacity in the Unit 2 SFP. Requirements for SFP makeup (which are not required until boil-off occurs in the SFPs) are based on the design basis heat loads applicable to specific operating modes as described below.

- Maximum Normal Design Basis Heat Load: For an ELAP event initiated during operating Modes 1 through 4 (and Mode 5 with the Steam Generators available), the SFP makeup flowrate is based on the maximum normal design basis heat load limit for power operation immediately following startup from a refueling outage. The SFP water inventory will heat up from 130°F to 212°F after 10 hours at which time boiling would commence. The time to reach the minimum safe shielding water coverage of 15 feet above the top of irradiated fuel is greater than 50 hours with no makeup. Total required flow to make up for boil off due to maximum normal operating heat load and temperature in both units' SFPs is no greater than 123 gpm (Reference 1). Since the SFP is designed so that it does not require borated water to maintain subcritical conditions, the NSCW basins are the preferred source of makeup in this scenario. The RMWST and the CSTs are available but the less preferred sources as they should be left to supply de-mineralized water to the steam generators for the FLEX Core Cooling & Heat Removal Strategy.
- Emergency Design Basis Heat Load (Full Core Offload): For an ELAP event initiated during operating Mode 6 and Mode 5 with the steam generators unavailable, the SFP makeup flowrate is based on the SFP cooling system design basis heat load for the emergency condition in which all fuel has been transferred from the reactor to the SFP shortly after shutdown. The time to boil is approximately 5 hours; time to reach the minimum safe shielding water coverage of 15 feet above the top of irradiated fuel is approximately 25 hours with no makeup. Total required flow to make up for boiloff due to maximum emergency core offload storage heat load and temperature in both units' SFPs is 250 gpm (Reference 1). Initiating Phase 2 actions at approximately 10 hours will be acceptable because only 3 feet of level will have evaporated by then. As the CSTs and RMWST will not be required for steam generator injection in these modes, the preferred source of makeup is the de-mineralized water inventory located in these tanks.

Four baseline capabilities related to SFP level are specified in the NEI 12-06 guidance, three for makeup and one for venting the SFP area. The venting of the SFP area capability is discussed in the Safety Functions Support section.

Primary Strategy Method 1

Direct makeup to the SFP will be accomplished by hoses staged on the refuel floor. This makeup strategy employs one hose that splits into separate hoses for each SFP. As the SFP area (Level 1 of the FHB and Auxiliary Building) may become inaccessible as the transition phase progresses, hoses will be deployed as soon as possible to minimize the need for personnel access to the SFP area following

Section 13: Maintain Spent Fuel Pool Cooling

the ELAP event.

Primary Strategy Method 2

An adapter will be used for connection to an existing valve located on the SFP makeup line from the RMWST. The isolation valve is 1-1228-U4-039 for Unit 1 and 2-1228-U4-039 for Unit 2 (Reference 1). These valves are located in the Aux. Building (a seismic category 1 structure) near the reactor makeup pumps with accessibility from the yard (i.e., personnel access to the SFP area will not be required). This injection source requires operator action to isolate other valves located in the RMWST and other interfacing systems.

Primary Strategy Method 3

To assure spent fuel cooling in the event that methods described above prove insufficient, spray capability with portable monitor nozzles from the refueling floor will be provided. The monitor nozzles are deployed as soon as possible to minimize the need for personnel access to the SFP area following the ELAP event. The spray strategy consists of dragging a hose to a pre-determined location in the SFP area, splitting flow (*e.g.*, via pipe wye) into three separate hoses for each SFP, which connect to spray monitors located in the three most accessible corners of each SFP.

Total required flow to satisfy the spray capability for both units' SFPs via portable monitor nozzles is 500 gpm as established in NEI 12-06 (Table D-3). This flow rate is bounding for all other SFP cooling baseline capabilities. Based on needs identified during the transition phase, makeup or spray may be chosen by connection of the appropriate hose to the discharge of a single pump capable of providing the total minimum flow for both units (*i.e.*, a 200% capacity pump). The pump, or SFP FLEX Pump, provides a minimum flow rate of 500 gpm with enough discharge pressure to provide the appropriate spray pressure from the monitor nozzles and to overcome head losses associated with discharge hoses and any other discharge connections. The inventory of each NSCW basin (approximately 3,600,000 gallons based on Technical Specifications minimum level) is capable of providing spray for both SFPs (500 gpm total flow) for approximately 120 hours. Since the NSCW basin is over 80 ft deep, a portable submersible pump (described in the Phase 2 Core Cooling & Heat Removal discussion above) will be used to provide the required suction lift so the entire inventory from the NSCW basin may be accessed. Separate sets of hoses and the necessary makeup equipment (tools, spray monitor nozzles, wyes, etc.) for hose spray and makeup will be stored in both the SFP area and in the FLEX storage structures.

References:

1. SNCV065-PR-002, Engineering Report, Diverse and Flexible Coping Strategies (FLEX) in Response to NRC Order EA-12-049, Mitigation Strategies for Beyond-Design-Basis External Events, Revision 1
2. Vogtle Units 1 and 2 Technical Specifications, Amendment No. 168 (Unit 1) and Amendment No 150 (Unit 2)

Details:

Section 13: Maintain Spent Fuel Pool Cooling	
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.*
SNC will utilize 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*
Same as Phase 1 discussion.	
Key SFP Parameters	*List instrumentation credited or recovered for this coping evaluation.*
Same as instruments listed in SFP Cooling Phase 1. Phase 2 FLEX equipment will have installed local instrumentation needed to operate the equipment. The use of these instruments will be described in the associated procedures for use of the equipment. These procedures will be based on inputs from the equipment suppliers, operation experience and expected equipment function in an ELAP.	
Storage / Protection of Equipment: **Describe storage / protection plan or schedule to determine storage requirements**	
Seismic	*List how equipment will be protected or scheduled to protect*
Connections for FLEX equipment will be installed seismically rugged and protected or in structures that are seismically rugged or qualified. Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06 Section 11. The schedule to construct the structures is still to be determined. The storage structures construction will be completed for 2 sets of FLEX equipment by the date the first unit will reach the Order EA-12-049 implementation completion due date. The remaining FLEX equipment will be available and protected by the implementation completion date for the second unit. VEGP procedures and programs are being developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to VEGP.	
Flooding Note: if stored below current flood level, then ensure procedures exist to move equipment prior to exceeding flood level.	*List how equipment will be protected or scheduled to protect*
Not applicable per NEI 12-06 as outlined within the first section of this Integrated Plan.	
Severe Storms with High Winds	*List how equipment will be protected or scheduled to protect*
Connections for FLEX equipment will be contained within structures that are protected or designed for protection from storms and high winds. Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06 Section 11. The schedule to construct the structures is still to be determined. The storage structures construction will be completed for 2 sets of FLEX equipment by the date the first unit will reach the Order EA-12-049 implementation completion due date. The remaining FLEX equipment will be available and protected by the	

Section 13: Maintain Spent Fuel Pool Cooling	
implementation completion date for the second unit. VEGP procedures and programs are being developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to VEGP.	
Snow, Ice, and Extreme Cold	*List how equipment will be protected or scheduled to protect*
Connections for FLEX equipment will be contained within structures that are protected or designed for protection for protection from snow, ice, and extreme cold. Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06 Section 11. The schedule to construct the structures is still to be determined. The storage structures construction will be completed for 2 sets of FLEX equipment by the date the first unit will reach the Order EA-12-049 implementation completion due date. The remaining FLEX equipment will be available and protected by the implementation completion date for the second unit. VEGP procedures and programs are being developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to VEGP.	
High Temperatures	*List how equipment will be protected or scheduled to protect*
Connections for FLEX equipment will be contained within structures that are protected or designed for protection for protection from high temperatures. Storage structures will be ventilated to allow for equipment to function. Active cooling systems are not required as normal room ventilation will be utilized per Reference 1. The schedule to construct structures is still to be determined. The storage structures construction will be completed for 2 sets of FLEX equipment by the date the first unit will reach the Order EA-12-049 implementation completion due date. The remaining FLEX equipment will be available and protected by the implementation completion date for the second unit. VEGP procedures and programs are being developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to VEGP.	

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 will be protected*
Storage location and structure have not yet been decided. After the structure design and location are finalized, the deployment routes will be evaluated for external hazards to demonstrate a clear deployment path.	No modifications identified for Phase 2 deployment issues.	Valves and flanges for FLEX connections will be missile protected and enclosed within a Seismic Category 1 or seismically 'rugged' structure, which will inherently protect it from local hazards such as vehicle impact.

Notes:

None

Section 13: Maintain Spent Fuel Pool Cooling

Maintain Spent Fuel Pool Cooling: PWR 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 via portable injection source)and strategy(ies) utilized to achieve this coping time.

The long term coping strategy for core cooling for the SFP will include establishing a heat sink with equipment from the RRC aligned to the CCW system which normally cools the SFP heat exchangers. To establish flow in the SFPCS, power will be supplied from an off-site diesel generator to the SFPCS pumps. Power to the SFP cooling pumps will be provided by repowering the 4160V distribution system if available or by powering the pump motors directly from RRC DG. If needed to maintain operating conditions in the SFP pump and heat exchanger rooms, cooling water flow will be established through the heat exchanger and pump room cooler. The 5 hp fan in the room cooler will also be repowered.

References:

1. SNCV065-PR-002, Engineering Report, Diverse and Flexible Coping Strategies (FLEX) in Response to NRC Order EA-12-049, Mitigation Strategies for Beyond-Design-Basis External Events, Revision 1

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.*

SNC will utilize 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*

Same as Phase 1.

Key SFP Parameter	*List instrumentation credited or recovered for this coping evaluation.*

Same as instruments listed in SFP Cooling Phase 1.

Phase 3 FLEX equipment will have installed local instrumentation needed to operate the equipment. The use of these instruments will be described in the associated procedures for use of the equipment. These procedures will be based on inputs from the equipment suppliers, operation experience and expected equipment function in an ELAP.

Deployment Conceptual Design
(Attachment 3 contains Conceptual Sketches)

Strategy	**Modifications**	**Protection of connections**
Identify Strategy including how the equipment will be	*Identify modifications*	*Identify how the connection will be protected*

Section 13: Maintain Spent Fuel Pool Cooling		
deployed to the point of use.		
Phase 3 equipment will be provided by the Regional Response Center (RRC). Equipment transported to the site will be either immediately staged at the point of use location (pumps and generators) or temporarily stored. After storage structure design and location are finalized, the deployment routes—including deployment routes for off-site RRC equipment—will be evaluated for external hazards to demonstrate a clear deployment path.	No modifications identified for Phase 3 deployment issues.	Plant piping and valves for FLEX connections will be missile protected or enclosed within a Seismic Category 1 or seismically 'rugged' structure, which will inherently protect it from local hazards such as vehicle impact.
Notes: None		

Section 14: Safety Functions Support

Determine Baseline coping capability with installed coping[5] modifications not including FLEX modifications.

Safety Functions Support: PWR 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.

Main Control Room Accessibility

Under ELAP conditions with no mitigating actions taken, initial analysis projects the control room to surpass 110°F (the assumed maximum temperature for efficient human performance as described in NUMARC 87-00 (Reference 1) in a time of approximately 9 hours. The Phase 1 FLEX strategy will be to block open the MCR access doors when the MCR temperature reaches 98°F (the assumed outside temperature at the time of event occurrence). This strategy will open the MCR to the structure exterior at plant grade level and provide enough ventilation to equalize the MCR temperature to approximately that of the outside air. During cold weather, the ventilation flow can be limited to keep the MCR at a habitable temperature. If the outside temperature is above 98°F, then the doors will not be opened until the MCR temperature is in excess of the outside temperature. Note that on the infrequent days when the peak daily outside temperature is above 98°F, this temperature is normally only exceeded for a limited time during the early afternoon hours. In addition, there is on average a 20°F difference between the daily high and low temperatures. (Reference 4, Section 2.3.2.1.2 and Table 2.3.2-1)

The strategy also calls for operator action to align MCR lighting in the "Horseshoe" area to the associated unit's D Battery. Analysis (Reference 3) indicates that execution of specified load shed actions outlined in plant procedures provides a reliable source of illumination for more than 13 hours.

The Phase 1 strategy can be extended indefinitely or until long term Phase 3 strategies can be implemented.

As an alternate strategy, VEGP will rely on portable battery powered lighting to perform MCR functions.

TDAFW Pump Room Accessibility

The core cooling strategies rely on operation of the TDAFW pump during all phases of the event. During operation, there will be a considerable heat load within the room from the steam turbine and associated piping. Operation of TDAFW without forced ventilation was evaluated for the SBO condition by calculation X4C2159V50 (see Reference 2). This conservative calculation (ignored heat sinks and heat transfer out of the room) determined that with no ventilation, the room would heat up to 121°F during the 4 hour SBO coping period.

Thus, to mitigate this temperature increase, the FLEX strategy relies on opening and securing the door and vent louvers to TDAFW pump room (note that the vent louvers fail open). A walkdown of this room concluded that the ventilation path using this strategy would provide substantial air flow via heat-

[5] 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.

Section 14: Safety Functions Support

induced natural circulation sufficient to maintain accessibility of the room for manual operation if required and to maintain equipment temperatures within operating limits.

Site industrial safety procedures currently address activities with a potential for heat stress to prevent adverse impacts on personnel.

Battery and Switchgear Rooms

During the ELAP event, the 125V dc and inverter-fed 120V ac electrical distributions are energized and maintain power to instrumentation and controls for core cooling, containment, and SFP cooling functions. Until power can be provided to the normal room ventilation system, doors will be manually propped open to allow airflow (providing cooling) through the main battery rooms and associated switchgear rooms.

Communications

The communication plan for VEGP in response to an ELAP will rely on elements of the NTTF recommendation 9.3 emergency preparedness communication assessment performed in response to the March 12, 2012 NRC letter entitled, "Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident." The request for information asked that licensees assess their current communications systems and equipment during a large scale natural event and loss of all alternating current power. On October 31, 2012, VEGP committed to actions to address communication items identified in the assessment (Reference 4).

For Phase 1 communication coping, the plant Public Address (PA) system, with extended battery runtime, will assist with initial notifications and directions to on-site personnel, the on-shift Emergency Response Organization (ERO) personnel, and in-plant response personnel. Battery operated satellite phones will assist with initial notifications and directions to off-site Emergency Response Organization (ERO) personnel and other personnel. The battery operated satellite phones will be maintained in a charged condition and will not be dependent on the availability of power, or onsite or off-site infrastructure.

References:

1. NUMARC 87-00, Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors, Revision 1
2. X4C2159V50, Maximum Turbine Driven Aux Feedwater Pump Room Ambient Temperature During Station Blackout, Version 2.0
3. SNCV065-PR-002, Engineering Report, Diverse and Flexible Coping Strategies (FLEX) in Response to NRC Order EA-12-049, Mitigation Strategies for Beyond-Design-Basis External Events, Revision 1
4. Vogtle Electric Generating Plant Final Safety Analysis Report (FSAR), Revision 18.
5. SNC Letter to NRC on Emergency Preparedness Communication Assessment dated October 31, 2012 as requested by NRC Letter, Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Daiichi Accident, dated March 12, 2012 (NL-12-2070)

Section 14: 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.*

SNC will utilize 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.*

Provide a connection in the Control Bldg. from the Class 1E "D" 120 VAC panel (1/2DY1B) spare breakers to the Train "B" MCR Lighting Panel via transfer switch 1/2-TRS-9616B to extend MCR lighting availability until FLEX Diesel will be available to power lighting.

References:

1. SNCV065-PR-002, Engineering Report, Diverse and Flexible Coping Strategies (FLEX) in Response to NRC Order EA-12-049, Mitigation Strategies for Beyond-Design-Basis External Events, Revision 1

Key Parameter	*List instrumentation credited for this coping evaluation phase.*

1E Battery Bus Essential Instrumentation	**Safety Function**
Voltage Indication (Train A – D)	Safety Functions Support
Current Indication (Train A – D)	Safety Functions Support

Temperature indication for the MCR is available in the MCR. Additionally, several battery operated portable temperature instruments are available if necessary from the Instrument and Control (I&C) shop.

Notes:

None

Section 14: Safety Functions Support

Safety Functions Support: PWR 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.

On-site FLEX Diesel Generator

The Phase 2 coping strategy following an ELAP event will be to stage and connect a 600 kW, 480 VAC diesel generator to power select loads. The loads which will be powered by the Phase 2 FLEX Diesel Generator include one battery charger for each of the four Class 1E 125 VDC Switchgear (providing continuity of power for lighting in the "horseshoe" area of the Main Control Room), the RCS FLEX pump (Mode 1-4 or Mode 5-6), and the plant public address system. The Phase 2 FLEX diesel generators are capable of starting without external equipment and have their own fuel transfer pumps. Other equipment provided for this strategy includes portable switchgear and quick connect power cables for connecting to multiple, separate loads concurrently. Diverse connection points are provided locally at the individual loads.

Main Control Room Accessibility

Continue Phase 1 strategies to maintain control room accessibility. Employ portable ventilation fans powered by electric generators or gas powered portable fans as necessary.

Battery and Switchgear Rooms

The Phase 2 support strategy includes connecting a portable diesel generator to supply the electrical distribution for the Class 1E battery chargers. During subsequent battery charging operations, hydrogen will be released into the battery rooms. If necessary to provide room cooling or to prevent hydrogen buildup, forced ventilation can be established using portable fans (electric powered from the Phase 2 FLEX DG powering the battery chargers).

Aux. Bldg. "D" Level Corridor

The Phase 2 support strategy includes connecting a portable diesel generator to supply the electrical distribution for RCS Inventory strategies that rely on portable FLEX pumps (nominally 100 hp) located in the Aux. Bldg. "D" Level corridor. Temperature in these areas will remain low enough so as to not impact habitability or equipment operation given the heat load and building size.

Refueling Portable Diesel Generators

Diesel fuel is available from many sources (*e.g.*, diesel fuel oil storage tanks, the vehicle garage diesel fuel storage tank, and nearby off-site diesel fuel storage) and can be retrieved and transported using a portable fuel pump and transfer carts. The 4 underground fuel oil storage tanks (2 per Vogtle unit) are seismically qualified and capable of storing a Tech. Spec. minimum of 68,000 gallons each with a nominal capacity of 80,000 gallons each. This stored quantity of fuel will meet the fuel demand for all of the FLEX equipment well into Phase 3.

SFP Area Venting

Per the NEI 12-06 guidance, a baseline capability for Spent Fuel Cooling is to provide a vent pathway for steam from the SFP area. This pathway will be established by manually opening the personnel door on the south wall of the Auxiliary Building. The Auxiliary Building personnel door is locked and

Section 14: Safety Functions Support

closed during normal operations. This door must be opened from inside the building with support from Security personnel. In addition to the personnel door, the large missile shield doors could also be manually opened from inside the building (using a ladder to access pins at the top of the doors) to provide a large opening for ventilation. Ventilation from the Auxiliary Building personnel and large missile shield doors will be sufficient for the initial coping efforts due to the relatively large opening provided by these doors.

Communication

The communication plan for VEGP in response to an ELAP will rely on elements of the NTTF recommendation 9.3 emergency preparedness communication assessment performed in response to the March 12, 2012 NRC letter entitled, "*Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident*." The request for information asked that licensees assess their current communications systems and equipment during a large scale natural event and loss of all alternating current power. On October 31, 2012, VEGP committed to actions to address items identified in the communications assessment (Reference 1).

The specific items for Phase 2 from the referenced 9.3 assessment are 1) the plant public address (PA) system will be repowered using FLEX DGs, and a rapidly deployable communications kit will be utilized to support both satellite and radio communications, if needed, for the ERO, including field monitoring teams. The mobile communications systems will be self-powered via a generator located on board and maintained in a charged condition and independent of onsite or off-site infrastructure. The generator can be refueled using multiple fuel sources which would be available on-site. The mobile communications system does not rely on the availability of either on-site or off-site infrastructure other than satellites, which are assumed to be unaffected by the postulated LSEE

Other Support Requirements

Other areas of support required in Phase 2 are the same as described in the Phase 1 section of Safety Functions Support.

References:

1. SNC Letter to NRC on Emergency Preparedness Communication Assessment dated October 31, 2012 as requested by NRC Letter, Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Daiichi Accident, dated March 12, 2012 (NL-12-2070)
2. NUMARC 87-00, Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors, Revision 1
3. X4C2159V50, Maximum Turbine Driven Aux Feedwater Pump Room Ambient Temperature During Station Blackout, Version 2.0
4. SNCV065-PR-002, Engineering Report, Diverse and Flexible Coping Strategies (FLEX) in Response to NRC Order EA-12-049, Mitigation Strategies for Beyond-Design-Basis External Events, Revision 1

Details:

Section 14: Safety Functions Support	
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.*
SNC will utilize 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*
Install a 480V distribution panel in the Control Bldg., transfer switches, and route cable to enable connection of On-site FLEX Diesel Generator. Installation is needed to minimize the time and resource requirements to implement the applicable strategies. (NOTE: This same modification is listed in the Core Cooling & Heat Removal Phase 2 section.) References: 1. SNCV065-PR-002, Engineering Report, Diverse and Flexible Coping Strategies (FLEX) in Response to NRC Order EA-12-049, Mitigation Strategies for Beyond-Design-Basis External Events, Revision 1	
Key Parameter	*List instrumentation credited for this coping evaluation phase.*
Same as instruments listed in section Safety Functions Support Phase 1. Phase 2 FLEX equipment will have installed local instrumentation needed to operate the equipment. The use of these instruments will be described in the associated procedures for use of the equipment. These procedures will be based on inputs from the equipment suppliers, operation experience and expected equipment function in an ELAP.	
Storage / Protection of Equipment: **Describe storage / protection plan or schedule to determine storage requirements**	
Seismic	*List how equipment will be protected or scheduled to protect*
Connections for FLEX equipment will be installed seismically rugged and protected or in structures that are seismically rugged or qualified. Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06 Section 11. The schedule to construct the structures is still to be determined. The storage structures construction will be completed for 2 sets of FLEX equipment by the date the first unit will reach the Order EA-12-049 implementation completion due date. The remaining FLEX equipment will be available and protected by the implementation completion date for the second unit. VEGP procedures and programs are being developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to VEGP.	
Flooding Note: if stored below current flood level, then ensure procedures exist to move equipment prior to exceeding flood level.	*List how equipment will be protected or scheduled to protect*
Not applicable per NEI 12-06 as outlined within the first section of this Integrated Plan.	

Section 14: Safety Functions Support	
Severe Storms with High Winds	*List how equipment will be protected or scheduled to protect*
Connections for FLEX equipment will be contained within buildings that are protected or designed for protection from storms and high winds. Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06 Section 11. The schedule to construct the structures is still to be determined. The storage structures construction will be completed for 2 sets of FLEX equipment by the date the first unit will reach the Order EA-12-049 implementation completion due date. The remaining FLEX equipment will be available and protected by the implementation completion date for the second unit. VEGP procedures and programs are being developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to VEGP.	
Snow, Ice, and Extreme Cold	*List how equipment will be protected or scheduled to protect*
Connections for FLEX equipment will be contained within buildings that are protected or designed for protection for protection from snow, ice, and extreme cold. Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06 Section 11. The schedule to construct the structures is still to be determined. The storage structures construction will be completed for 2 sets of FLEX equipment by the date the first unit will reach the Order EA-12-049 implementation completion due date. The remaining FLEX equipment will be available and protected by the implementation completion date for the second unit. VEGP procedures and programs are being developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to VEGP.	
High Temperatures	*List how equipment will be protected or scheduled to protect*
Connections for FLEX equipment will be contained within buildings that are protected or designed for protection for protection from high temperatures. Storage structures will be ventilated to allow for equipment to function. Active cooling systems are not required as normal room ventilation will be utilized per Reference 1. The schedule to construct structures is still to be determined. The storage structures construction will be completed for 2 sets of FLEX equipment by the date the first unit will reach the Order EA-12-049 implementation completion due date. The remaining FLEX equipment will be available and protected by the implementation completion date for the second unit. VEGP procedures and programs are being developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to VEGP.	

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 will be protected*
Storage location and structure have not yet been decided. After the structure design and	No modifications identified for Phase 2 deployment issues.	Electrical connection points from the On-site FLEX diesel generator will be designed and installed to

Section 14: Safety Functions Support		
location are finalized, the deployment routes will be evaluated for external hazards to demonstrate a clear deployment path.		withstand the applicable hazards.
Notes: None		

Section 14: Safety Functions Support

Safety Functions Support: PWR 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.

Off-site FLEX Diesel Generator

Phase 3 strategies use large 4160 VAC Off-site FLEX Diesel Generators from the RRC to restore power to the essential electrical distribution system and/or select loads as needed to support indefinate coping. Loads that will be powered by the Off-site FLEX Diesel Generator include RHR pumps and various additional components supplied by the RRC (e.g., makeup water treatment system, replacement service water pumps). Additional plant equipment will be loaded onto the Off-site FLEX Diesel Generators as needed to support plant restoration.

Other Support Requirements

Other areas of support required in Phase 3 are the same as described in the Phase 2 section of 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.*
Same as Phase 2.	
Identify modifications	*List modifications necessary for Phase 3*
Same as Phase 2.	
Key Containment Parameters	*List instrumentation credited or recovered for this coping evaluation.*

Same as instruments listed in section Safety Functions Support Phase 1.

Phase 3 FLEX equipment will have installed local instrumentation needed to operate the equipment. The use of these instruments will be described in the associated procedures for use of the equipment. These procedures will be based on inputs from the equipment suppliers, operation experience and expected equipment function in an ELAP.

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 will be protected*
Phase 3 equipment will be provided by the Regional Response Center (RRC). Equipment transported to the site will be either immediately	No modifications required for deploying the Phase 3 strategy.	Connection points for 4160V AC diesel generators are enclosed within a Seismic Category 1 structure, which will inherently protect it from local hazards such

Section 14: Safety Functions Support		
staged at the point of use location (pumps and generators) or temporarily stored. After the structure design and location are finalized, the deployment routes, including deployment routes for offsite RRC equipment will be evaluated for external hazards to demonstrate a clear deployment path.		as vehicle impact.
Notes: None		

Attachment 1: FLEX Portable Equipment

PWR Portable Equipment Phase 2							
Use and (potential / flexibility) diverse uses						*Performance Criteria*	*Maintenance*
List portable equipment (1)	Core	Containment	SFP	Instrumentation	Accessibility		Maintenance / PM requirements
Three (3) Self-powered CST FLEX Pumps	**X**					Provide makeup to CSTs for all strategies.	Will follow EPRI template requirements
Three (3) Self-powered SG FLEX Pumps	**X**					Provide injection into SGs to remove decay heat from Reactor; pump must be rated for removal of the decay heat at one hour after reactor shutdown with TDH high enough to overcome line losses and SG pressure (350 gpm @ 325 psi minimum/400 psi maximum).	Will follow EPRI template requirements
Two (2) Self-powered SFP FLEX Pumps (200% capacity)			**X**			Provide minimum flow for spray of both SFPs (500 gpm @ 115 psi minimum/200 psi maximum).	Will follow EPRI template requirements
Two (2) Electric motor-driven NSCW Sump (submersible) Pumps (200% capacity)	**X**		**X**			Provides access to entire water inventory of NSCW basin (80+ feet suction lift required); pump must be sized to provide minimum flow for supply of SFP FLEX Pump (500 gpm @ 50 psi minimum/100 psi maximum).	Will follow EPRI template requirements
Three (3) Electric motor-driven Mode 1-4 RCS FLEX pumps	**X**					Provides borated water injection (from the BAST or RWST) to RCS during modes with SGs available for decay heat removal; 40 gpm at 400 psi minimum to 540 psi maximum for RPV injection via RHR piping.	Will follow EPRI template requirements. Pre-staged at Aux Bldg Level D
Two (2) Electric motor-driven Mode 5-6 RCS FLEX pumps	**X**					Provides borated water injection (from the RWST) to RCS during modes with SGs not available for decay heat removal; 120 gpm for injection to vented RCS (*e.g.*, RPV head removed) via RHR piping.	Will follow EPRI template requirements. Pre-staged at Aux Bldg Level D
Two (2) Electric motor-driven Diesel Fuel FLEX pumps	**X**		**X**	**X**		Supplies makeup diesel fuel to portable transfer carts (minimum suction lift required to access bottom of Diesel Fuel Storage Tanks from grade level).	Will follow EPRI template requirements. Support equipment
Two (2) Vehicles					**X**	Vehicles with sufficient rating to tow the pumps and DGs.	Will follow EPRI template requirements

PWR Portable Equipment Phase 2							
Use and (potential / flexibility) diverse uses						*Performance Criteria*	*Maintenance*
List portable equipment (1)	Core	Containment	SFP	Instrumentation	Accessibility		Maintenance / PM requirements
Three (3) 480 VAC Diesel Generators	**X**		**X**	**X**		Provides power to various small loads (*e.g.*, Diesel Fuel FLEX Pump, NSCW Sump Pump) as needed (480V, 20-60KW; two outputs)	Will follow EPRI template requirements
Three (3) 480 VAC Diesel Generators	**X**			**X**		Provides power to 480V FLEX Switchgear (480V, 600KW; two 400-amp outputs)	Will follow EPRI template requirements
Flatbed Trailers	**X**		**X**		**X**	Means to store and transport hoses, strainers, cables, and miscellaneous equipment.	
Three (3) Trailers with Fuel Tank and Portable Fuel Containers	**X**		**X**	**X**		Means to transport diesel fuel (~200 gallons) to deployed FLEX equipment.	
Two (2) sets of three (3) Monitor Spray Nozzles for SFP Spray and required hoses			**X**			Provides adequate distribution for reduction of radionuclide release from SFP (500 gpm for total coverage)	Will follow EPRI template requirements. Pre-staged at SFP
Hoses, cables, fittings, and connectors	**X**	**X**	**X**				Will follow EPRI template requirements
Two (2) Rapidly Deployable Communications Kit	**X**	**X**	**X**	**X**	**X**	Does not rely on the availability of either on-site or off-site infrastructure other than satellites	Will use manufacturers recommended practices as basis

Notes: This table provides N +1 (Three) sets of FLEX equipment as required to be protected to comply with NEI 12-06. The actual quantity of equipment that will be purchased and stored in site structures will be determined based using the guidance in NEI 12-06 once the decision on storage structures is determined.

PWR Portable Equipment Phase 3							
Use and (potential / flexibility) diverse uses						*Performance Criteria*	*Notes*
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility		
Two (2) 4160VAC Diesel Generators	**X**	**X**	**X**	**X**		4160V, 3000KW, single output; must be able to start 1000HP motor	Capacity to re-power essential electrical distribution, RHR/SFP pumps, etc.
Two (2) Makeup water treatment systems (skids)	**X**		**X**			N/A	Provide high quality makeup water source
Two (2) Boron mixing systems (skids)	**X**					N/A	Provide makeup on depletion of RWST
Two (2) Portable heat exchangers (skids)	**X**	**X**	**X**			80MM Btu/hr, 7000 gpm	Long term cooling for RHR HX, SFP HX, Containment coolers, RHR seal cooler, RHR motor cooler
Two (2) Replacement Service Water Pumps	**X**	**X**	**X**			7000 gpm @160 feet TDH with standard hose connections	Provides cooling water flow from portable HX through CCW system to Phase 3 loads
Two (2) Portable chilled water systems (skids)	**X**		**X**			1000Btu/hr, 750 gpm	Long term cooling for SFP pump room cooler, RHR room cooler
Two (2) Chilled Water Pumps	**X**		**X**			600 gpm @ 125 feet TDH with standard hose connections	Provides chilled water flow from portable skid through Phase 3 loads
Diesel Fuel	**X**	**X**	**X**	**X**		N/A	Supply as required
Cables for connecting portable generators	**X**	**X**	**X**	**X**		N/A	Supply as required
Portable ventilation fans				**X**	**X**	N/A	Supply as required
Radiation Protection Equipment					**X**		Survey instruments, dosimetry, off-site monitoring and sampling

Phase 3 Response Equipment/Commodities	
Item	**Notes**
Radiation Protection Equipment Survey instruments Dosimetry Off-site monitoring/sampling	
Commodities Food Potable water	
Fuel Requirements Diesel Fuel	
Heavy Equipment Transportation equipment Debris clearing equipment	
Portable Lighting	
Portable Toilets	

Attachment 1A: Sequence of Events Timeline

Action Item	Elapsed Time	Action	ELAP New Time Constraint Y/N [6]	Remarks / Applicability
	0	Event Starts	N	Plant @100% power
1.	60 sec	TDAFW pump start	N	RO verifies initiation of TDAFW and that SG levels are increasing (refer to VEGP FSAR Section 10.4.9.2, Appendix 10A).
2.	10 min	Attempt to establish DG emergency power from MCR and local diesel start	N	RO attempts to start EDG from MCR and dispatches SO to start locally.
3.	15 min	Evaluate off site power with off-site PSCC and attempt Plant Wilson Black Start.	N	Shift Manager determines availability of off-site power
4.	30 min	Attempts to start EDGs have been unsuccessful. Enter ELAP Procedure.	Y	Time critical at a time greater than 40 minutes. Entry into ELAP provides guidance to operators to perform ELAP actions.
5.	50 min.	DC extended load shed complete	Y	Time critical at a time greater than 1 hour. DC buses are readily available for operator access and breakers/control switches at the DC switchgear will be appropriately identified (labeled) to show which are required to be opened.
6.	1 hr.	Transfer MCR lighting to the associated unit's D Battery.	N	Installed ballasts on emergency MCR light fixtures provide reduced illumination for 90 minutes. To align MCR lighting in the "Horseshoe" area to the associated Unit's D battery, operators manipulate 12 breakers on a single 120V Instrument ac panel and position one control switch at readily accessible locations in the Control Building.
7.	8 hrs.	Initiate depressurization of the SGs via local operation of ARVs	Y	RCS cooldown occurs at the same time as the secondary side depressurizes. This enables boration via accumulators and RCS FLEX pump prior to net xenon decay (i.e., within 24 hours). Depressurizing also permits makeup to SGs with SG FLEX pump if the TDAFW pump fails.
8.	10 hrs.	Stage and connect on-site FLEX DG to battery chargers and RCS FLEX pump	Y	Time critical after 12 hours.

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

Action Item	Elapsed Time	Action	ELAP New Time Constraint Y/N [6]	Remarks / Applicability
9.	12 hrs.	Stage and connect portable SG FLEX pump in the event a TDAFW pump fails.	N	SG FLEX pump will be staged beginning at approximately 8-10 hour time frame.
10.	12 hrs.	Initiate supplemental boration (with letdown as necessary) using portable RCS FLEX pump.	Y	Time critical after 20 hours. Operator starts the transfer of water from the BASTs to the RCS to ensure adequate boration and maintain sub-criticality.
11.	20 hrs.	Begin makeup to SFP as necessary to maintain adequate level in the SFP. (Under design basis conditions, boiling begins at ~5 hours; without makeup, SFP level falls to 15 feet above the active fuel in ~25 hours.) Vent the spent fuel pool area by opening doors to minimize condensation during pool boiling	N	SFP area venting and hose deployment will begin at approximately 5-6 hour time frame. Boil-off rate is slow with a large volume of water in the SFP. Times shown assume worst case emergency offload heat load in both units' SFPs.
12.	36 hrs.	Align second CST for SG injection	Y	Time critical to transfer source of water to the second CST before the first CST inventory will be exhausted (initial selection of CST 1 assumed).
13.	72 hrs.	Transition from Phase 2 to Phase 3 for Core Cooling function by placing RRC pumps and heat exchanger in service to cool plant down to cold shutdown. Requires staging and operation of 4160 VAC RRC Portable DGs	N	If RRC pumps and heat exchanger are not available or some other reason prevents going to cold shutdown then the plant can be maintained in a stable condition with FLEX pumps in service for injection or makeup to CST.

Attachment 1B: NSSS Significant Reference Analysis Deviation Table

Item	Parameter of interest	WCAP value (WCAP-17601-P August 2012 Revision 0)	WCAP page	Plant applied value	Gap and discussion
	None				

Attachment 2: Milestone Schedule

The following milestone schedule is provided. The dates are planning dates subject to change as design and implementation details are developed. Any changes to the following target dates will be reflected in the subsequent 6 month status reports.

Original Target Date	Activity	Status *{Include date changes in this column}*
Oct. 2012	Submit 60 Day Status Report	Complete
Feb. 2013	Submit Overall Integrated Implementation Plan	Complete
Aug. 2013	Submit 6 Month Status Report	
Sep. 2013	Initiate Phase 2 Equipment Procurement	
Nov 2013	Develop Strategies (Playbook) with RRC	
Dec. 2013	Develop Operational Procedure Changes	
Jan 2014	Develop Modifications	
Feb. 2014	Submit 6 Month Status Report	
Mar. 2014	Develop Training Material	
Aug. 2014	Submit 6 Month Status Report	
Sep 2014	Issue FSGs	
Oct. 2014	Implement Training	
Oct. 2014	Unit 2 Implementation Outage *	
Feb. 2015	Submit 6 Month Status Report	
Aug. 2015	Submit 6 Month Status Report	
Oct. 2015	Unit 1 Implementation Outage *	
Fall 2015	Submit Completion Report	

*(Full compliance after second listed refueling outage)

Attachment 3: Conceptual Sketches

(Conceptual sketches, as necessary to indicate equipment which will be installed or equipment hookups necessary for the strategies.)

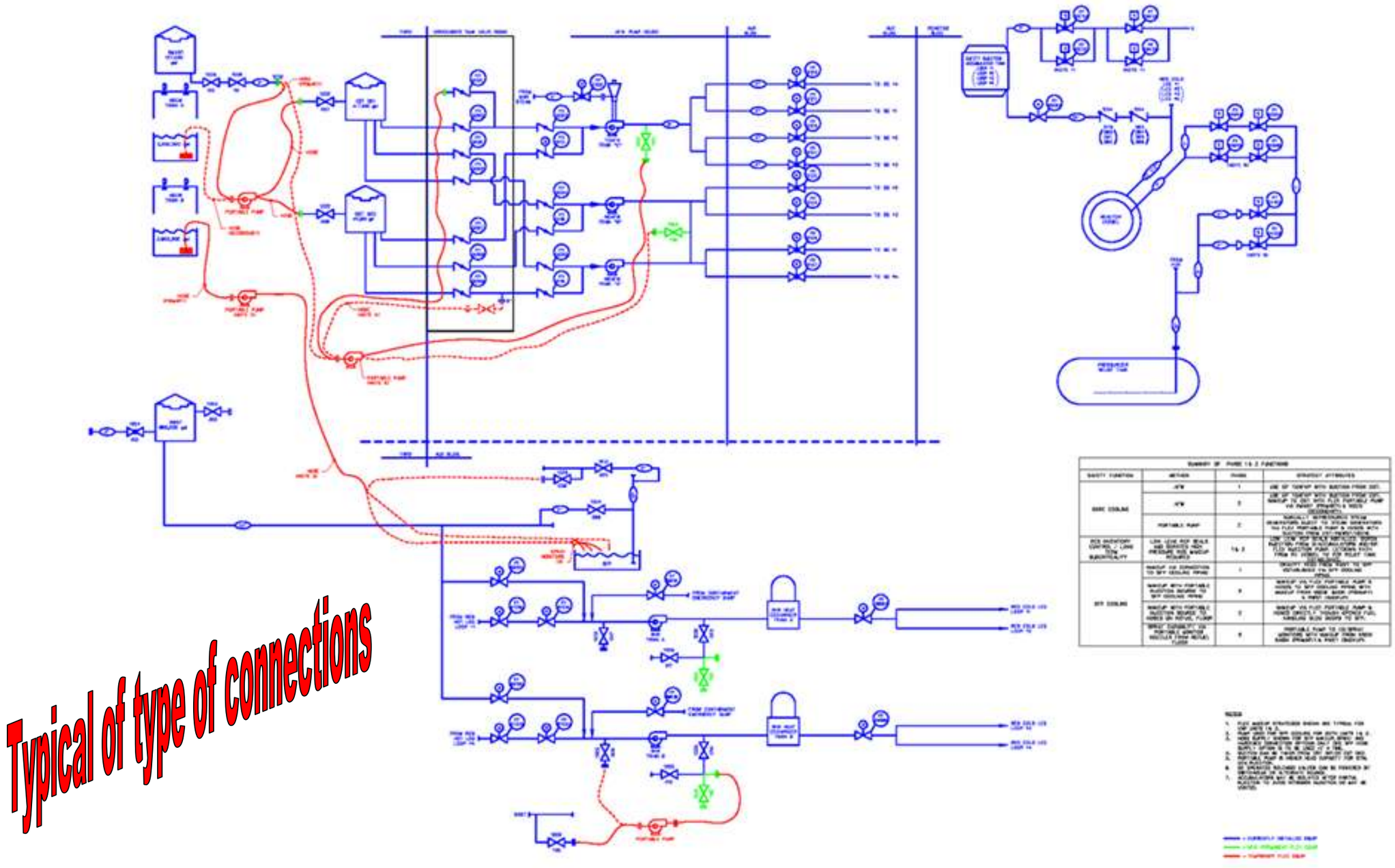

Figure 1 – Flow Diagram for FLEX Strategies

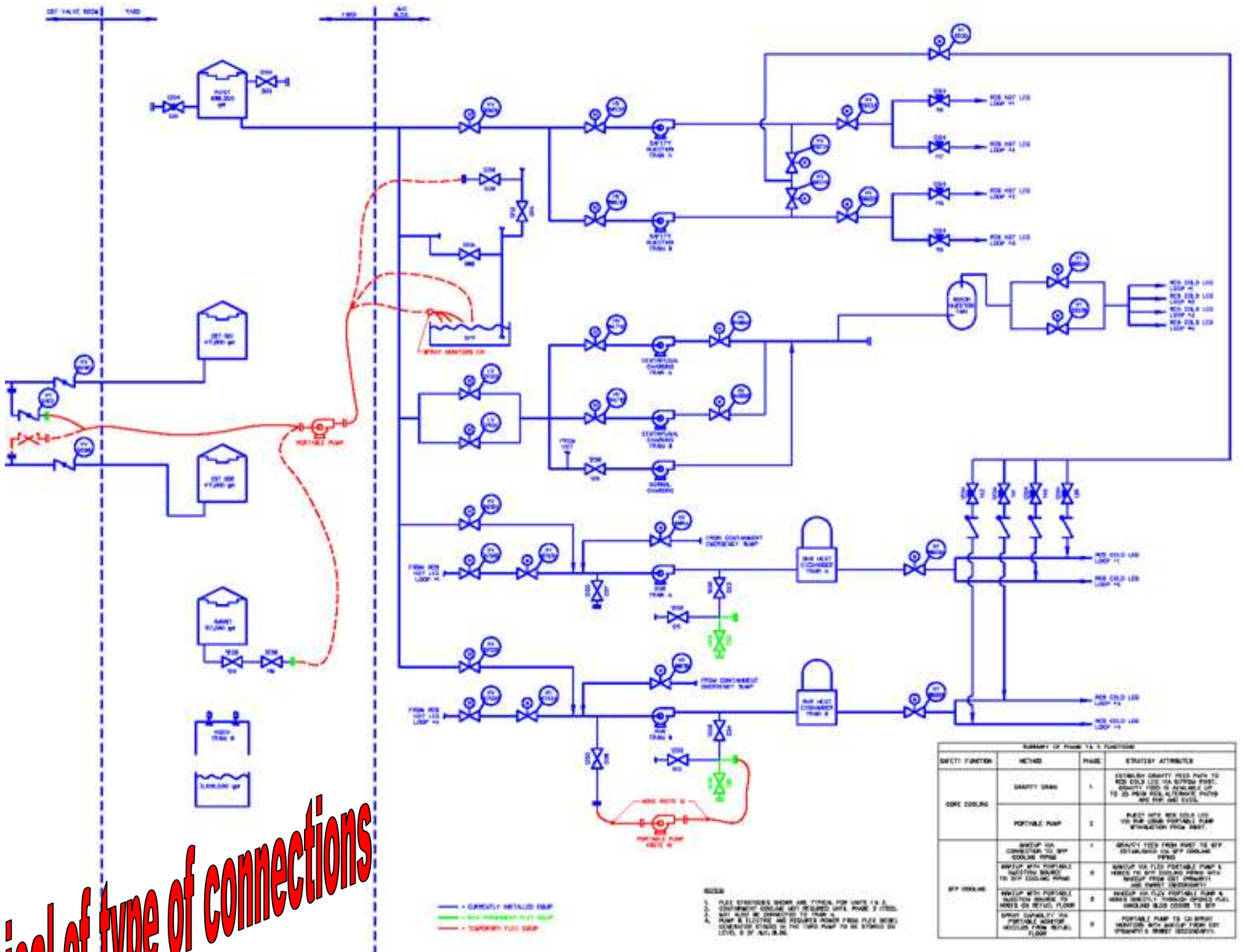

Figure 2 – Flow Diagram for FLEX Strategies

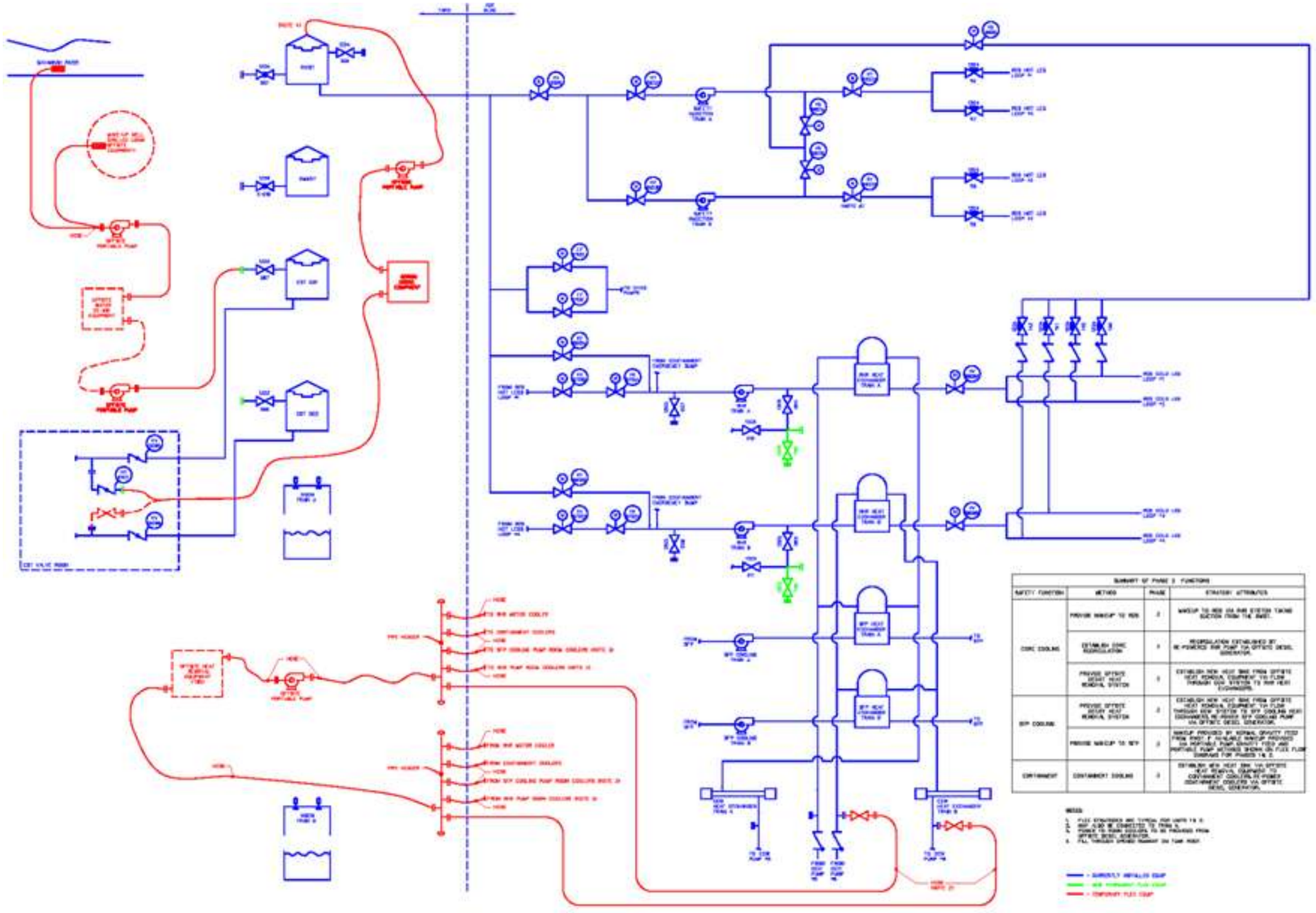

Figure 3 – Flow Diagram for FLEX Strategies

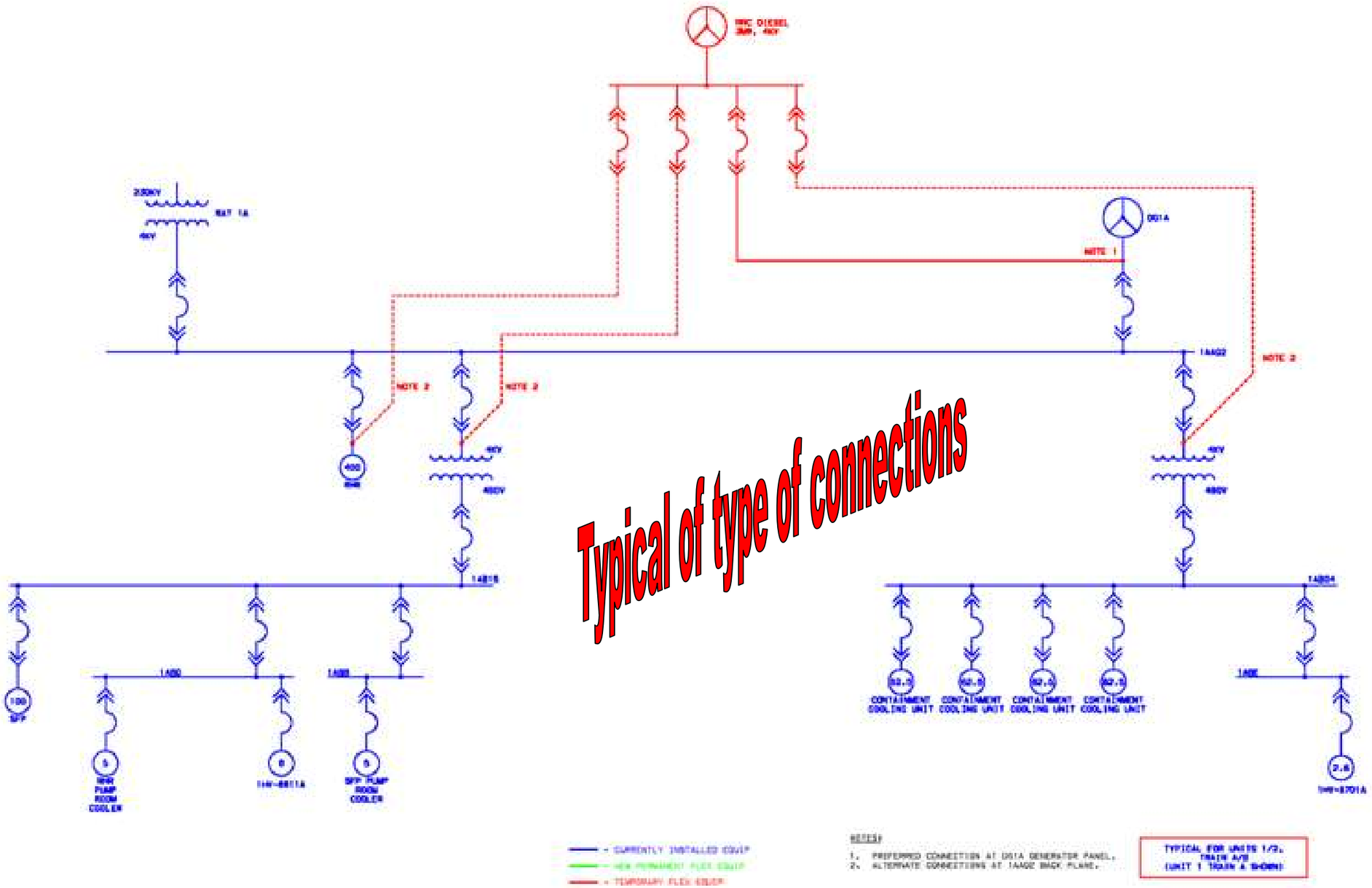

Figure 4 - Electrical Diagram for FLEX Strategies

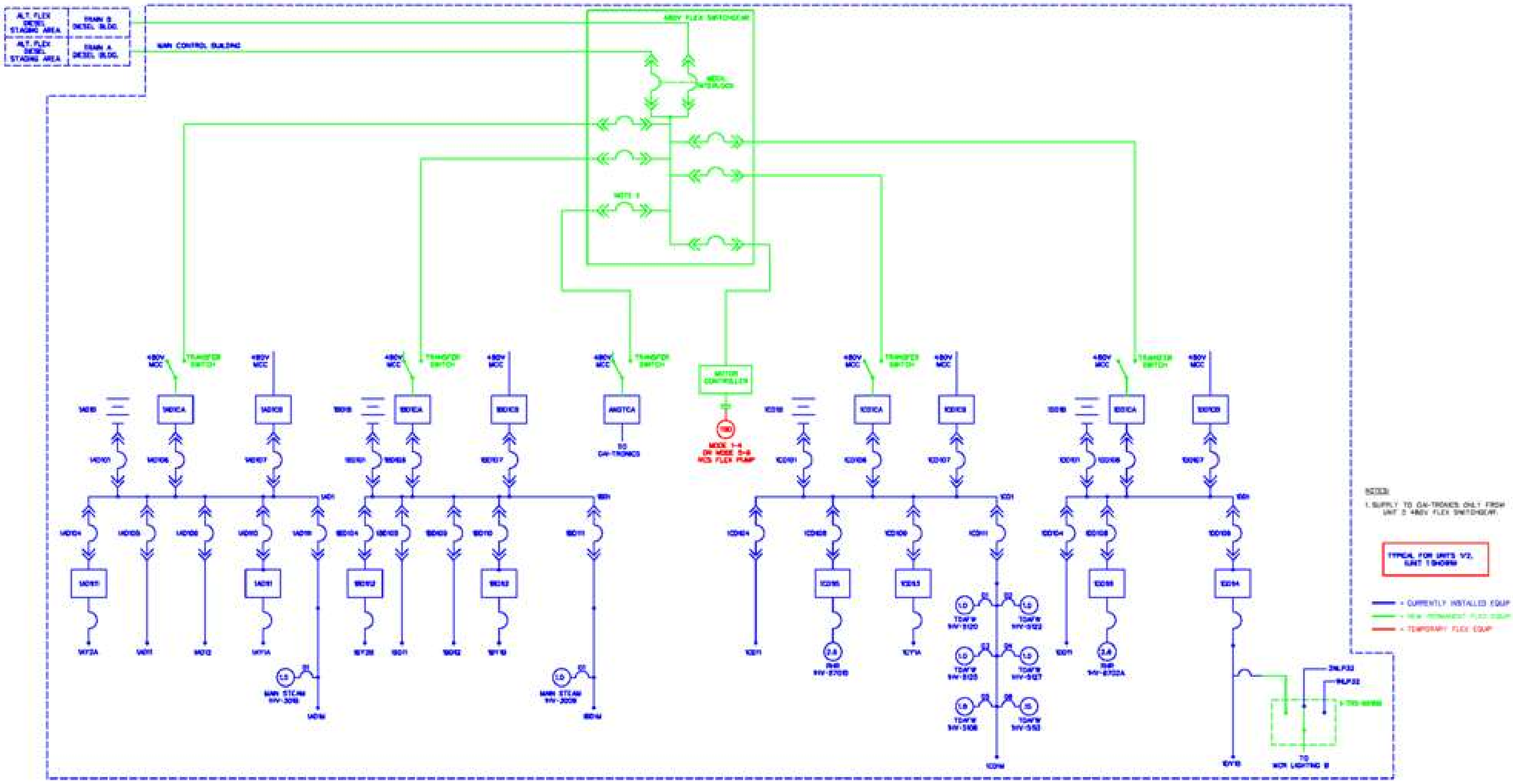

Figure 5 - Electrical Diagram for FLEX Strategies