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SOUTHERN COMPANY

February 27, 2013

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NL-13-0214

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

Edwin I. Hatch Nuclear 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, *Edwin I. Hatch Nuclear 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 Edwin I. Hatch Nuclear Plant's (HNP) 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 HNP 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 Spring 2016 refueling outage and by December 31, 2016, for Unit 2 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 HNP.

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

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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.

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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: Edwin I. Hatch Nuclear Plant Units 1 and 2 Mitigation Strategies for Beyond-Design-Basis External Events Overall Integrated Implementation Plan

cc: Southern Nuclear Operating Company
Mr. S. E. Kuczynski, Chairman, President & CEO
Mr. D. G. Bost, Executive Vice President & Chief Nuclear Officer
Mr. D. R. Madison, Vice President – Hatch
Mr. B. J. Adams, Vice President – Fleet Operations
Mr. C. R. Pierce, Director – Regulatory Affairs
RType: CHA02.004

U. S. Nuclear Regulatory Commission
Mr. E. J. Leeds, Director of Office of Nuclear Reactor Regulation
Mr. V. M. McCree, Regional Administrator
Mr. R. E. Martin, NRR Senior Project Manager – Hatch
Mr. E. D. Morris, Senior Resident Inspector – Hatch
Ms. Jessica A. Kratchman, NRR/JLD/PMB, NRC
Mr. Eric E. Bowman, NRR/DPRIPGCB, NRC

State of Georgia
Mr. J. H. Turner, Environmental Director Protection Division

Edwin I. Hatch Nuclear 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

Edwin I. Hatch Nuclear Plant Units 1 and 2 Mitigation Strategies for Beyond-Design-Basis External Events Overall Integrated Implementation Plan

Southern Nuclear Operating Company

Edwin I. Hatch Nuclear Plant

Units 1 & 2

Mitigating Strategies (FLEX)

Overall Integrated Implementation Plan

Revision 0, February 27, 2013

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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 (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 E. I. Hatch Nuclear Plant (HNP or Hatch) 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 Hatch Nuclear Plant (HNP or Hatch) are seismic, ice, high winds and high temperature as detailed below:

Seismic Hazard Assessment:

Per the Hatch Unit 1 (HNP-1) and Hatch Unit 2 (HNP-2) Final Safety Analysis Reports (FSAR) (References 1 and 2) Section 2.5, the seismic criteria for HNP include two design basis earthquake spectra: Operating Basis Earthquake (OBE) and the Design Basis Earthquake (DBE) (Safe Shutdown Earthquake). The OBE and the DBE are 0.08g and 0.15g, respectively; these values constitute the design basis of HNP. Per NEI 12-06 Section 5.2 (Reference 3), all sites will consider the seismic hazard.

> The HNP FSAR was reviewed to perform a limited evaluation of the liquefaction potential outside the power block area for a design basis earthquake (DBE) event.
>
> There are no liquefaction susceptible soils within the area of the principle structures for a DBE event with a maximum horizontal acceleration equal to 0.15 g, according to HNP-1 FSAR Section 2.7.7 - Liquefaction Potential and HNP-2 FSAR Section 2.5.4.8 - Liquefaction Potential. Therefore, the likelihood of liquefaction at the site for a DBE event with a maximum horizontal acceleration equal to 0.15 g appears to be low based on the information presented in the HNP-1 and HNP-2 FSARs.

Thus the HNP site screens in for an assessment for seismic hazard except for liquefaction.

External Flood Hazard Assessment:

Not applicable, HNP is built above the design basis flood level. Per HNP-2 FSAR Chapter 2 (Section 2.4) (Unit 1 FSAR refers to information in Unit 2 FSAR) the Probable Maximum Flood (PMF) elevation is 105 ft with wave crests to 108.3 ft. The grade level at HNP is 129.5', and the floor elevation in the Intake Structure is 111 ft (Reference 2). Therefore, HNP is built above the design basis flood level and is considered a "dry" site by the NEI 12-06 (Reference 3, Section 6.2.1) guidance and "dry" sites are not required to evaluate flood-induced challenges.

Thus the HNP 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 35^{th} parallel. The HNP plant site is located at 31°56'2" N latitude and 82°20'39" W longitude (Reference 2 Section 2.1.1.1), which is below the 35^{th} parallel (Reference 2 Section 2.1.1.1). Thus, the capability to address hindrances caused by extreme snowfall with snow removal equipment need not be provided. According to HNP-2 FSAR Section 2.4.7, there is no record of the Altamaha River freezing over. The minimum recorded river temperature is at Doctortown, Georgia (approximately 35 miles SE of HNP) and is 37.4°F, and is safely above the freezing temperature. Therefore, there is no risk of ice blockage, frazil ice, or loss of

UHS due to ice.

The Hatch site is located within the region characterized by Electric Power Research Institute (EPRI) as ice severity level 5 (Reference 3, Figure 8-2). The plant's design basis is 0.25 inches of ice every 9 years (Reference 2 Section 2.3.1.3). As such, the Hatch site is subject to severe icing conditions.

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

High Wind Hazard Assessment:

Plant Hatch is located at 31°56'2" N latitude and 82°20'39" W longitude (Reference 2 Section 2.1.1.1). Per NEI 12-06 guidance, hurricanes and tornado hazards are applicable to Hatch. NEI 12-06 Figures 7-1 and 7-2 were used for this assessment.

Thus, the Hatch site screens in for an assessment for High Wind Hazard.

Extreme High Temperature Hazard Assessment:

Per NEI 12-06 Section 9.2, all sites will address high temperatures. In the middle coastal plain of Georgia summers are warm and humid, with rare periods of extremely hot weather over 100°F (Reference 2 Section 2.3.2.2).

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

Summary of Extreme External Hazards Assessments:

The hazards applicable to HNP are seismic, ice, high wind, and high temperature.

References:

1. Hatch Nuclear Plant Unit 1 Final Safety Analysis Report, Revision 31, 11/12
2. Hatch Nuclear Plant Unit 2 Final Safety Analysis Report, Revision 31, 11/12
3. 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 HNP are described below:

- 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.

- 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, RCIC 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 screened in hazards in accordance with NEI 12-06. Portable FLEX components will be procured commercially.
- Margin will be added to the design of the 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).

Notes:
Many items in the HNP Unit 1 FSAR reference the HNP Unit 2 FSAR for supporting information versus repeating information in both documents. Thus in this report many Unit 1 items will reference the Unit 2 FSAR as a controlling reference.

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

Section 3: 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.

- 10-35 minutes, Operators override the auto-swap of RCIC suction valves in accordance with EOPs to maintain suction from the CST (table item 3) - Time critical at the point when torus water level reaches the high level setpoint (approximately 35 - 45 minutes) which would initiate the automatic swap of the RCIC suction from the CST to the torus. It is desirable to maintain suction from the CST because it is a source of higher quality water and is also a step directed by EOPs (Reference 1).

- 48 minutes, Entry into Extended Loss of AC Power (ELAP) (table item 4) - Time critical at a time greater than 1 hour. Time period of one (1) hr 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. One hour 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 one hour estimate. A formal validation of the timeline will be performed once the procedure guidance is developed and related staffing study is completed.
- 1 hour, DC Load shed complete (table item 5) - Time critical at a time greater than 1 hour and 15 minutes. Time period of 12 minutes past ELAP entry is selected to ensure that DC buses are available from battery sources. Phase 2 battery recharging is assumed in item 10 to begin at 12 hours. Therefore, there is sufficient conservatism in the life of the DC power source. The DC buses are located in adjacent Switchgear Rooms on the ground elevation of the control building and are readily accessible to the operator. Load stripping consists of tripping 14 breakers on unit 1 and 16 breakers on unit 2 at local panels. As an operator aid, the breakers will be appropriately identified (labeled) to show which are required to be opened to facilitate an extended load shed (Reference 4). From the time that ELAP conditions are declared, it is reasonable to expect that operators can complete the DC bus load shed in approximately 12 minutes. A formal validation of the timeline will be performed once the procedure guidance is developed and related staffing study is completed.
- 1 hour, Reactor pressure control to keep from entering Unsafe Region of Heat Capacity Temperature Limit (HCTL) Curve (table item 6) - Using manual control of SRVs, depressurize the RPV IAW EOPs (to approximately 200 – 400 psig) to keep in the Safe Region of the HCTL curve (Reference 2). Time critical at the point of entering the Unsafe Region of the HCTL Curve (Approximately 3 hours per MAAP analysis (Reference 11)). SRV control is maintained from the control room with sufficient DC power and pneumatic pressure to operate the SRVs throughout Phase 1 (Reference 4).
- 6.5-7.5 hours - When CST inventory is near depletion, swap RCIC suction from CST to torus to preserve RCIC availability (table item 7) - CST inventory is estimated to last approximately 6.5-7.5 hours (References 5 and 11). To maintain RCIC operating the suction must be swapped to a suction source that contains available inventory, i.e., the torus.
- 7.5 Hours, Initiate use of Hardened Containment Vent System (HCVS) per EOPs to maintain containment parameters below design limits and within the limits that allow continued use of RCIC (table item 8) - The reliable operation of HCVS will be met because HCVS is seismic and will be powered by DC buses with motive force supplied to HCVS valves from installed accumulators and portable nitrogen storage bottles per EA-12-050. Critical HCVS controls and instruments associated with containment will be DC powered and operated from the MCR or a Remote Operating Station on each unit (Reference 10). The DC power for HCVS will be available as long as the HCVS is required. Station batteries will provide power for greater than 12 hours with Phase 2 FLEX DG supplying power before battery life is exhausted.
- 10 Hours, Transition from Phase 1 to Phase 2 for Core cooling function by placing FLEX pumps in service to make up to the CST (table item 9) - Time critical after 20 hours. FLEX pumps will

be staged beginning at approximately 6 – 8 hours time frame (Reference 4). Two (2) hours later, the FLEX pumps will be in service. The combined CST and suppression pool credited volume is estimated to be sufficient out to 20-24 hours (Reference 4). Thus the FLEX pumps will be available to be placed in service at any point after 10 hours as required to make-up to the CST which provides margin to the time constraint of 20-24 hours for CST make up. FLEX pumps will be maintained in on-site FLEX storage buildings (Reference 4). FLEX pumps will be transferred and staged via haul routes and staging areas evaluated for impact from external hazards (Reference 4). Modifications will be implemented to facilitate the connections and operational actions required to provide makeup to the CST (or reactor vessel via RHR or CRD) as necessary (Reference 4). Programs and training will be implemented to support operation of FLEX pumps.

- 10 Hours, Power up both divisions of station Class 1E battery chargers using a FLEX 600 VAC DG to supply power to both divisions of Class 1E emergency 600 VAC buses C and D (table item 10) - Time critical after 12 hours. Current battery durations are calculated to last greater than 12 hours (Reference 4). FLEX DG will be staged beginning at approximately 8-10 hours time frame (Reference 4). Two (2) hours later the FLEX DG will be in service. Thus the FLEX DGs will be available to be placed in service at any point after 12 hours as required to supply power to both divisions of Class 1E emergency 600 VAC buses C and D which provides margin to the time constraint for back-up power. FLEX DG will be maintained in on-site FLEX storage buildings (Reference 4). FLEX DG will be transferred and staged via haul routes and staging areas evaluated for impact from external hazards (Reference 4). Modifications to Buses C and D and to the control building will be implemented to facilitate the connections and operational actions required to supply buses C and D from the FLEX DGs (Reference 4). Programs and training will be implemented to support operation of FLEX DGs.
- 20-24 hours, Swap RCIC suction from the torus to the CST when torus level impacts RCIC required NPSH (between 146” and 102”) or before torus level reaches 102” (table item 12) - Time critical when the reduction in torus level begins to impact RCIC required NPSH or when 102” is reached (102” is the limiting level to maintain coverage over the RCIC exhaust).

<u>Technical Basis Support information</u>

1. On behalf of the Boiling Water Reactor Owners Group (BWROG), GE-Hitachi (GEH) developed a document (NEDC-33771P, Revision 1 (Reference 3)) to supplement the guidance in NEI 12-06 by providing additional BWR-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. In the document, GEH utilized the NRC accepted SUPERHEX (SHEX) computer code methodology for BWR’s long term containment analysis for the ELAP analysis. As part of this document, a generic BWR 4/Mark I containment NSSS evaluation was performed. The BWR 4/Mark I containment analysis is applicable to the HNP (a BWR 4 Mark I plant) coping strategy because it supplements the guidance in NEI 12-06 by providing BWR-specific information regarding plant response for core cooling, containment integrity, and spent fuel pool cooling. The guidance provided in the guidance was utilized as appropriate to develop coping strategies and for prediction of the plant’s response. The NSSS vendor has performed site specific evaluations associated with RPV and containment response and impacts (References 5, 6, 7, 8, and 9).
2. HNP containment integrity for Phases 1 through 3 was evaluated by use of computer code MAAP 4.05 (Reference 11).

3. A best estimated bounding decay heat curve was developed by GEH using ANSI 5.1 (DRF 0000-0152-0890 (Reference 5)) for use in NSSS modeling.
4. Environmental conditions within the station areas will be evaluated utilizing methods and tools in NUMARC 87-00 (Reference 13) or Gothic 8.0 (EPRI software).
5. Per the guidance in 10 CFR 50.63 and Regulatory Guide 1.155, HNP is an alternate AC, four (4) hour coping plant for Station Blackout (SBO) considerations. Applicable portions of supporting analysis have been used in ELAP evaluations (Reference 12, HNP-2 FSAR Section 8.4.2) as starting points for the 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) Reactor coolant system (RCS) inventory losses are limited to normal system leakage and recirculation pump seal leakages (18 gal/min per pump maximum).
   b) Credit is taken for operator actions where appropriate.
   c) Equipment needed for the SBO coping duration is available at the site once Phase 2 is implemented.
   d) There is reasonable assurance that the equipment will remain operable during and subsequent to an SBO event.

References:

1. 31EO-EOP-010-1(2), RC RPV Control (Non-ATWS), Version 10.0
2. 31EO-EOP-012-1(2), PC Primary Containment Control
3. NEDC-33771P, Project Task Report BWROG GEH Evaluation of FLEX Implementation Guidelines, Revision 1
4. SNCH084-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. GEH Letter Number 316004-004, J.W. Mays to Ron J. Bush, Transmittal of (proprietary) Response to ENERCON Letter WHC12-02 dated 8/10/12 concerning RPV make-up rates for RCIC and Portable Pumps based on RPV pressure, dated 10/03/2012
6. GEH Letter Number 316004-012, J.W. Mays to Ron J. Bush, Transmittal of (proprietary) Response to ENERCON Letter WHC12-003 dated 8/14/12 concerning core and containment cooling and SNC Purchase Order SNG10046615, Item 1.1 concerning use of containment and torus sprays during a FLEX beyond design basis event, dated December 19, 2012
7. GEH Letter Number 316004-004, J.W. Mays to Ron J. Bush, Transmittal of (proprietary) Response to ENERCON Letter WHC12-004 dated 9/04/12 concerning use of river water for reactor vessel injection during ELAP conditions
8. GEH Letter Number 316004-006, J.W. Mays to Ron J. Bush, Transmittal of (proprietary) Response to ENERCON Letter WHC12-006 dated 9/21/12 concerning level limits associated with torus level, dated October 12, 2012
9. GEH Letter Number 316004-010, J.W. Mays to Ron J. Bush, Transmittal of (proprietary) Response to ENERCON Letter WHC12-011 dated 11/27/12 concerning impact to fuel and fuel cooling from use of river water injection, dated December 12, 2012
10. SNC Submittal for NRC Order EA-12-050, Hardened Containment Vent System, Letter NL-13-

0145
11. SMNH-12-032, Containment Analysis of FLEX Strategies (MAAP Calculation), Revision 0
12. Hatch Nuclear Plant Unit 2 Final Safety Analysis Report, Revision 31, 11/12
13. NUMARC 87-00, Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors, Revision 1
14. 0000-0147-5233-R0, BWROG Project Task Report, RCIC Pinch Points, Operation in Prolonged Station Blackout, Feasibility Study, Revision 0

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 HNP deployment strategy will be included within an administrative program.

- HNP procedures and programs are being 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 HNP.
- 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 paths and deployment areas will be accessible during all modes of operation. The administrative program will have elements that ensure pathways will be kept clear or will require actions to clear the pathways.
- The chosen pathways will be evaluated for applicable hazards including the liquefaction for the non-power block 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**
  o **Phase 1 Modifications**
  o **Phase 2 Modifications**
  o **Phase 3 Modifications**
• **Procedure guidance development complete**
  o **Strategies**
  o **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.*

HNP will implement an administrative program for implementation and maintenance of the HNP 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:* HNP 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:* HNP will develop procedures and programs to address storage structure requirements and deployment/haul path requirements relative to the hazards applicable to HNP.
- *Maintenance and Testing:* HNP 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:* HNP 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 general station staff and EP will be performed no later than 2016, prior to the 1st HNP 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*

HNP will utilize the industry Regional Response Centers (RRC) for Phase 3 equipment. HNP 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

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

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

Maintain Core Cooling: BWR Installed Equipment Phase 1:

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

Power Operation, Startup, and Hot Shutdown

At the initiation of the BDBEE, main steam isolation valves (MSIVs) automatically close, feedwater is lost, and safety relief valves (SRVs) automatically cycle to control pressure, causing reactor water level to decrease. When reactor water level reaches -35 inches, reactor core isolation cooling (RCIC) and high pressure coolant injection (HPCI) (References 15, 16, 17, 18, 19, 19, 20) automatically start with suction from the Condensate Storage Tanks (CST) (Reference 1, Technical Specification (TS) Bases, 3.3.5.1, Function 3A and TS Bases 3.3.5.2, Function 1) and operate to inject makeup water to the reactor vessel. This injection recovers the reactor level to the normal band. The SRVs control reactor pressure (Reference 1, Table 3.3.6.3-1). Due to SRV actuation, the torus level increases to the setpoint that causes RCIC suction valves to automatically swap from the CST to the torus (Reference 1, TS Table 3.3.5.2-1, Function 4, and TS Bases 3.3.5.2, Function 4), followed shortly by HPCI (Reference 1, TS Table 3.3.5.1-1, Function 3e, and TS Bases 3.3.5.1, Function 3e). These automatic valve swaps are overridden in accordance with EOPs to maintain RCIC suction from the CST (Reference 9). RCIC and HPCI valves and controls are powered by station DC power (References 29 and 30, HNP-1 FSAR Sections 4.7.3 and 6.3.1 HNP-2 FSAR Section 5.5.6.3 and 6.3.2.2.1). HPCI is secured and RCIC provides all makeup flow to the reactor vessel. After determination that Emergency Diesel Generators (EDGs) cannot be restarted, the operating crew determines the event is a beyond-design-basis event and anticipates a loss of power for an extended time period at approximately 1 hour into the event (Reference 5). RCIC is maintained feeding the reactor vessel with suction from the CST. The RCIC trip signals and isolation signals that could possibly prevent RCIC operation during the ELAP will be overridden in accordance with procedural direction. Additionally, the automatic depressurization system (ADS) will be either placed in ‘inhibit’ or closely monitored to prevent automatic initiation of ADS. This is necessary to ensure reactor pressure is not reduced to a pressure which would prevent operation of RCIC.

As stated above, the primary method of reactor pressure control is by operation of the SRVs. Operator control of reactor pressure using SRVs requires DC control power and pneumatic pressure (supplied by station batteries and the drywell pneumatics system (References 29 and 30, HNP-1 FSAR Section 4.4.5 and HNP-2 FSAR Sections 5.2.2.2.3 and 7.3.1.2.2)). For Phase 1, the power for the SRVs is supplied by the station batteries. At event initiation the normal pneumatic supply is lost due to loss of power, but each SRV is provided an accumulator (volume of 5.48 ft^3 per accumulator) which contains enough pneumatic pressure to operate each valve through 5 open/close cycles (each cycle requires 25 in^3 per actuation) (References 29 and 30 HNP-1 FSAR Section 4.4.5 and HNP-2 FSAR Section 5.2.2.2.3). In addition, the 9,000-gallon liquid nitrogen storage tank automatically supplies backup pneumatic

[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

pressure for SRV operation and the unit specific nitrogen storage tanks can be cross tied, thus providing a large volume of pneumatic supply to either unit (Reference 34 and 35). Mechanical SRV operation will also control reactor pressure.

The torus continues to heat up due to RCIC exhaust and SRV cycling. Based on experience derived from Fukushima, the RCIC system can run at a much higher lube oil temperature and suction source temperature (Reference 6) than that originally assumed for the operation of RCIC. Additionally, the BWROG has performed a RCIC study (Reference 31) which will allow operation of RCIC at a lube oil temperature of >230°F; SNC will take the necessary actions to allow operation at elevated temperatures.

When the inventory in the CST nears depletion the operators will transfer RCIC suction from the CST to the suppression pool (SP). Regarding net positive suction head (NPSH) for RCIC, at the time of the suction transfer from CST to torus, the makeup flow required is approximately 190 gpm at a torus water temperature of approximately 222°F (Reference 7). The Unit 1 RCIC pump data sheet, S16844 (Reference 32) shows a required NPSHR of 11.8 ft at 339 GPM for the normal operating speed of the pump, 3579 RPM. The NPSHR decreases at flow rates lower than 339 GPM and at pump speeds slower than 3579 RPM. Therefore, an NPSHR of 11.8 can be conservatively assumed to be bounding for a flow rate of 190-200 GPM. Using this value as a minimum allowed NPSH for the pump, MAAP analysis (Reference 24) shows that the NPSHA remains above the NPSHR limit during the time RCIC is aligned to the torus. The HNP-1 and HNP-2 RCIC pumps have the same purchase specification and virtually identical pump test curves. Thus, with the conservative selection of 11.8 ft, NPSH requirements is bounding for NHP-2 (Reference 33).

During the time that torus temperature is increasing, operators reduce reactor pressure to a pressure range (200 to 400 psig) which provides margin to the Unsafe Region of the heat capacity temperature limit (HCTL) curve (References 9 and 11). When the torus temperature reaches the Unsafe Region of the HCTL, RPV emergency depressurization is required (References 9 and 11). In accordance with EPGs and per BWR Owner's Group (BWROG) guidance, EOPs will be revised to allow termination of RPV emergency depressurization at a pressure that will allow continued RCIC operation, because steam driven RCIC is the sole means of core cooling (Reference 4).

The maximum suppression pool water level allowed in the torus while the vessel is pressurized is governed by curves in the Emergency Operating Procedures (EOPs). Reference 12, EOP procedure 31EO-OPS-001-0, EOP General Information, contains the curves for Heat Capacity Temperature Limit (HCTL), SRV Tailpipe Level Limit (SRVTPLL), and Pressure Suppression Pressure Limit (PSP) each of which provide limits or requirements which govern or prescribe actions such as RPV emergency depressurization based on or related to level in the torus. EOPs will be revised to direct operators to terminate RPV emergency depressurization to prevent the loss of RCIC, if it is the only available injection source for ensuring adequate core cooling.

The primary strategy for core cooling is to supply high quality water via RCIC with suction from the CST. The design of the Condensate Storage Tanks ensures that 100,000 gallons of water is available to RCIC and HPCI suctions for injection into the reactor vessel. The design includes standpipes internal to the tank that prevents usage of at least 100,000 gallons in the tank by systems other than RCIC and HPCI (Reference 1). Based on Reference 7, Reference 24, and the scenario as described above, the 100,000 gallons of water in the CST will be depleted between approximately 6.5 and 7.5 hours.

The enclosure walls surrounding the tanks provide protection from tornado missiles. The walls are 20'

Section 10: Maintain Core Cooling

tall for both HNP-1 and HNP-2 (References 21 and 22), and protect approximately half of the tank or 250,000 gallons of CST water; however, only 100,000 gallons of this volume is credited as being available for RCIC usage due to the internal standpipe configuration. The required amount of makeup to the reactor over 72 hours is approximately 600,000 gallons (References 7, 24 and 33). 100,000 gal is supplied from CST during the initial 6.5-7.5 hours. The remainder is provided by taking suction from the torus and/or, in Phase 2, from the CST after FLEX pumps have replenished the CST (Reference 33).

Cold Shutdown and Refueling

The overall strategy for core cooling for Cold Shutdown and Refueling are, in general, similar to those for Power Operation, Startup, and Hot Shutdown.

If an ELAP occurs during Cold Shutdown, water in the vessel will heat up. When temperature reaches 212°F, (Hot Shutdown) the vessel will begin to pressurize. The turbine driven systems (RCIC and HPCI) are generally available for emergency use at the beginning and end of an outage, thus during the pressure rise RCIC can be returned to service with suction from the CST to provide injection flow. When pressure rises to the SRV setpoints, pressure will be controlled by SRVs. The primary and alternate strategies for Cold Shutdown are the same as those for Power Operation, Startup, and Hot Shutdown as discussed for core cooling. Drywell airlock may be open, but the amount of steaming will have limited impact on the Reactor Building since Phase 2 manpower will be available to shut the airlock before Phase 2 actions are required in the reactor building airlock area.

During Refueling, many variables exist which impact the ability to cool the core. In the event of an ELAP during Refueling, there are no installed plant systems available to cool the core, thus the deployment of Phase 2 equipment will occur immediately. To accommodate the activities of vessel disassembly and refueling, water levels in the reactor vessel and the reactor cavity are often changed. The most limiting condition is the case in which the reactor head is removed and water level in the vessel is at or below the reactor vessel flange. If an ELAP/LUHS occurs during this condition, (depending on the time after shutdown) boiling in the core may occur quite rapidly. As indicated in procedure 34AB-E11-001-1(2) (Reference 13), if the event occurs at 1 day after shutdown, boiling will occur in less than 1 hour with fuel uncovering in less than 6 hours.

Pre-staging of FLEX equipment can be credited for some predictable hazards, but cannot be credited for all hazards per the guideline of NEI 12-06. Deploying and implementation of portable FLEX pumps to supply injection flow must commence immediately from the time of the event. This should be plausible because more personnel are on site during outages to provide the necessary resources. Guidance will be provided to ensure that sufficient area is available for deployment and that haul paths remain accessible without interference from outage equipment during refueling outages.

References:

1. Edwin I. Hatch Nuclear Plant Technical Specifications & Bases, Revised 11-14-2012
2. Letter from Dr. Robert P. Kennedy to Mr. Donald P. Moore (Southern Company Services), "Hatch Condensate Water Tank," dated August 13, 1993 and attached calculation Hatch CWT dated 9/24/89, and Hatch Condensate Water Tank dated 8/10/93.
3. Email from Ken Whitmore to Bill Chenault, "CST Files No. 4 of 4," dated 9/11/2012
4. BWROG EPG Issue Number 1103, 3/1/12
5. Table Top Timeline performed by Hatch Operations Personnel for IER 11-4/FLEX Response

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6. 0000-0143-0382-R0 (proprietary), GEH Feasibility Study of RCIC System Operation in Prolonged Station Blackout
7. GEH Letter Number 316004-004, J.W. Mays to Ron J. Bush, Transmittal of (proprietary) Response to ENERCON Letter WHC12-02 dated 8/10/12 concerning RPV make-up rates for RCIC and Portable Pumps based on RPV pressure, dated 10/03/2012
8. SNCH084-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
9. NEDC-33771P, Project Task Report BWROG GEH Evaluation of FLEX Implementation Guidelines, Revision 1
10. 31EO-EOP-010-1(2), RC RPV Control (Non-ATWS), Version 10.0
11. 34SO-E51-001-1(2), Reactor Core Isolation Cooling (RCIC) System, Version 8.0
12. 31EO-OPS-001-0, EOP General Information, Version
13. 34AB-E11-001-1(2), Loss of Shutdown Cooling, Version 3.13 (Version 6.11)
14. 31EO-EOP-100-1(2), Miscellaneous Emergency Overrides, Version 4.0
15. 34SO-P70-001-1(2), Drywell Pneumatic System, Version 11.6
16. H16334, Sheet 1, RCIC System P&ID, Version 49.0
17. H16335, Sheet 2, RCIC System P&ID, Version 34.0
18. H26023, Sheet 1, RCIC System P&ID, Version 41.0
19. H26024, Sheet 2, RCIC System P&ID, Version 33.0
20. H16332, Sheet 1, HPCI System P&ID, Version 65.0
21. H26020, Sheet 1, HPCI System P&ID, Version 51.0
22. H12313, Outdoor Conc. Cond. Storage Tank Retaining Wall, Revision 2
23. H22401, Condensate Storage Tank Outdoor Concrete Slab and Wall Neat Line, Revision 7
24. SNCH084-CALC-001, Makeup Water and Its Impact on Suppression Pool Levels, Revision 0.0.
25. SMNH-12-032, Containment Analysis of FLEX Strategies (MAAP Calculation), Revision 0
26. BH1-M-V005-0047, NPSH Limits – HPCI and RCIC Pumps, Revision 7
27. BH1-M-V001-0038, Torus Water Level, Revision 1.0
28. 34SO-E41-001-1(2), High Pressure Coolant Injection (HPCI) System, Version 25.1
29. 34SO-E51-001-1(2), Reactor Core Isolation Cooling (RCIC) System, Version 26.2 (24.0)
29. Hatch Nuclear Plant Unit 1 Final Safety Analysis Report, Revision 31, 11/12
30. Hatch Nuclear Plant Unit 2 Final Safety Analysis Report, Revision 31, 11/12
31. 0000-0147-5233-R0, BWROG Project Task Report, RCIC Pinch Points, Operation in Prolonged Station Blackout, Feasibility Study, Revision 0
32. S16844, RCIC Pump Performance Test Data (PF-2745-60-1)
33. S25506, RCIC Pump Performance Curve (PF-3059-151-1)
34. H16000, Nitrogen Inerting System P&ID, Version 51
35. H26083, Nitrogen Inerting System P&ID, Version 44

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Details:

Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation*

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.*

- Change power supply of containment instrumentation (torus temperature, pressure and level, drywell temperature and pressure) from the AC instrument buses to station batteries to provide continuous power to critical instruments so that critical containment parameters can be monitored throughout the event.
- Change emergency control room lighting from incandescent/ florescent to LED bulbs to improve the station battery duration and reduce heat load in the MCR.
- Change Appendix R lighting from incandescent/ florescent to LED to lengthen the duration of lighting required in critical areas of the plant (primarily HCVS operation areas, NRC Order EA-12-050)
- 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.
- SNC will take the necessary actions to allow RCIC operation at elevated temperatures (>230°F). These actions could be procedures, maintenance practices or modifications.

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

Reactor Vessel Essential Instrumentation	**Safety Function**
RPV Level – WR (B21-LI-R604A, B) (Ref. 1)	Reactor vessel inventory and core heat removal
RPV Pressure (C32-PI-R605B, C) (Ref. 1)	Reactor vessel pressure boundary and pressure control
Containment Essential Instrumentation	**Safety Function**
Drywell & Torus Pressure (T48-PR-R608, R609) (Ref. 2)	Containment integrity
Drywell & Torus Temperature (T47-TR-R611, R612) (Ref. 3)	Containment integrity
Torus Water Level (T48-L/PR-R607A, B) (Ref. 2)	Containment integrity
Spent Fuel Pool Essential Instrumentation	**Safety Function**
SFP Level (Component # TBD)	SFP inventory

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HNP will have the following instruments remain available following load stripping due to their power sources:

- RPV Level – NR (C32-LI-R606B, C)
- RPV Level – WR (B21-L/PR-R623A, B)
- RPV Pressure (C32-PI-R605A)
- RPV Pressure - Local Indication P004 & P005 panels (B21-PI-R004A, B)
- Drywell Wide Range Radiation Monitor (T48-P/RR-R601A, B)

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

Notes: Per SNCH084-CALC-002, *Station Service Battery Discharge Capacity During Extended Loss of All AC Power*, Revision 0.0, the duration of each station battery was calculated to last greater than 12 hours.

References:

1. H16063, Nuclear Boiler System P&ID, Version 37.0
2. H16024, Primary Containment Purge & Inerting System, P.&I.D., Version 51
3. H16007, Drywell Cooling System, Version 22.0

Section 10: Maintain Core Cooling

Maintain Core Cooling: BWR Portable Equipment Phase 2

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

Primary Strategy

During Phase 2, as in Phase 1, reactor core cooling will be maintained using RCIC in automatic mode (i.e. with operators controlling the RCIC flow controller) with suction from the CST. When CST grade water becomes depleted, RCIC suction will be swapped to the torus. RCIC will continue to inject water from the torus until the torus level reaches the torus low level limit and must be re-aligned to the CST. The torus water level will drop due to evaporation through the Hardened Containment Vent System (HCVS) which was operated to maintain containment parameters below design limits and RCIC operating parameters within acceptable limits (see the Maintain Containment response for additional discussion of the HCVS). During the time that RCIC suction is aligned to the torus the CST will be replenished by using portable FLEX pumps taking suction from the Ultimate Heat Sink (Altamaha River). The FLEX pumps will provide water to the CST via the existing RHRSW piping (between the intake structure and the reactor building), permanently installed FLEX piping in the reactor building, and a FLEX hose jumper from the reactor building to the CST. The portable FLEX pumps deployed near the Intake Structure at the river will be connected to the Division I seismically qualified RHRSW piping via FLEX hose and flanged connections at the Intake Structure. To provide makeup flow from RHRSW to the CST a FLEX hose jumper will be utilized between FLEX Connection #1 at a new Reactor Building penetration and the CST FLEX fill connection (Figure 1, Reference 16).

During Phase 2, reactor pressure will be controlled by manual operation of SRVs as described in Phase 1. As backup to the nitrogen tank and the SRV accumulators, pre-staged emergency N2 bottles can be valved in per 34SO-P70-001-1 (2), Drywell Pneumatic System (Reference 13).

Use of raw water (Altamaha River) as a direct injection source was evaluated by GEH (Reference 14) for impact to fuel and heat transfer. GEH concluded that there would not be a serious threat to the fuel from use of river water, but stated that potential clogging of the inlet or outlet of the fuel bundles should be minimized by including some level of straining to minimize ingress of large quantities of debris with the river water. This recommendation will be addressed by connecting to the RHRSW system upstream of the currently installed system strainers (D002A/B and D003A/B) (Reference 8) such that any river water injected is directed through the system strainers. The strainers are in parallel such that one remains in service while the other is in maintenance. In addition, the suction hose of the FLEX pumps will be fitted with a strainer to prevent large debris from entering the suction of the pump. Also, the water level will be maintained above the top of fuel throughout the ELAP so cooling of the fuel does not solely rely on flow from the bottom of the fuel assembly. As part of the RHRSW

Section 10: Maintain Core Cooling

design as described in the HNP-2 FSAR a cross-connect line is provided between the RHR system and RHRSW system so that service water may be pumped directly into the reactor vessel or into the containment via the spray headers (Reference 17, section 9.2.7.4).

The 125V DC batteries are available for greater than 12 hours without recharging (Reference 15). Connection to 600V Bus C and D provides the ability to power Battery Chargers A/B and D/E which charge the Batteries A and B and supply DC loads. The FLEX 600 VAC, 600 kW DG will be connected at approximately 10-12 hours and will be sized to power two 125/250 VDC Battery Chargers, RCIC Controls, RHR Room Cooler and RHR Motor Operated Valves (MOVs) per division, and other selected loads. Permanently installed cables will be installed from a point near the switchgear to the exterior of the Control Building. The deployment area of the FLEX 600 VAC DG powering the 600 V bus will be located near the Service Building. Cables from the generators are run to a connection point on the exterior of the Control Building (Reference 16).

Alternate Strategies

Providing defense in depth for RCIC, the FLEX pumps deployed at the river can provide RPV injection via the normal RHR injection flow path (see Figure 1). The same connections from the river to the reactor building as used in the primary strategy will be able to supply water to the RHR SW header in the reactor building. The RHR system cross tie valves, E11-F073A(B) and F075A(B), will be opened so that makeup water can be injected via the normal RHR injection flow path (References 2, 3, 4, and 5). As a third method, a connection to the CRD system piping will be capable of providing RPV makeup flow from the FLEX pumps via a hose connection to the control rod drive (CRD) system at Seismic Category II piping downstream of C11-F018 on the CRD pump test bypass piping. See Figure 1, Flow Diagram for FLEX Strategies, which illustrates the makeup and injection strategies discussed above (Reference 6, 7, 9, 10, 11, and 12). If the RPV is still pressurized then SRVs will be opened to depressurize to a pressure at which the FLEX pumps can maintain RPV level (less than approximately 150 psig per Reference 16).

Phase 2 strategies for makeup water during Modes 4-5 will be identical to core cooling strategies during Operation, Startup, and Hot Shutdown modes. FLEX pumps will take suction from the UHS/river and discharge into the RHRSW piping (to cross-connect into the RHR injection flow path), or discharge into the CRD connection as shown in Figure 1**,** Flow Diagram for FLEX Strategies.

As an alternate strategy to power the battery chargers from their 600 VAC electrical buses, a welding receptacle type of connection point will be installed on each of the battery chargers. This will allow connecting power cables from the FLEX 600 VAC DG directly to the battery charger via the welding receptacle (Reference 16).

If onsite diesel fuel reserves are needed to operate temporary equipment, there are two primary locations to obtain diesel fuel. The first option would be the diesel day tanks. The second option would be to pump fuel directly from the seismically qualified underground fuel oil storage tanks. The fuel would be accessed through nozzles on the tank. A minimum of 175,000 gallons of diesel fuel is stored in the five fuel oil storage tanks and 2,500 gallons in the five day tanks. Adequate fuel supplies are available and accessible to operate emergency response equipment.

<u>References</u>:

1. 31EO-EOP-010-1(2), RC RPV Control (Non-ATWS), Version 10.0

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2. H16329, Sheet 1, RHR System P&ID, Version 78.0 3. H16330, Sheet 2, RHR System P&ID, Version 66.0 4. H26014, Sheet 1, RHR System P&ID, Version 63.0 5. H26015, Sheet 2, RHR System P&ID, Version 56.0 6. H26006, Sheet 1, Control Rod Drive System P&ID, Version 30.0 7. H26007, Sheet 2, Control Rod Drive System P&ID, Version 45.0 8. H21039, RHR Service Water System P. & I. D., Version 45.0 9. A2100, Piping Class Summary a. 2C11A, Revision 1.0 b. 2G41A Revision 0 c. 2N21A Revision 0 10. A1100, Piping Class Summary a. 1C11A, Revision 1.0 b. G41A Revision 0 c. N21A Revision 0 11. NEDC-33771P, Project Task Report BWROG GEH Evaluation of FLEX Implementation Guidelines, Revision 1 12. H16065, Sheet 2, Control Rod Drive System P&ID, Version 49.0 13. 34SO-P70-001-1(2), Drywell Pneumatic System, Version 11.6 14. GEH Response to ENERCON Information Request WHC 12-004 (proprietary), Regarding Use of River Water for Reactor Vessel Injection During ELAP Conditions 15. SNCH084-CALC-002, Station Service Battery Discharge Capacity During Extended Loss of All AC Power, Revision 0.0 16. SNCH084-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 17. Hatch Nuclear Plant Unit 2 Final Safety Analysis Report, Revision 31, 11/12	
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.*

Section 10: Maintain Core Cooling	
• Install connection points on the RHRSW piping at the intake structure for the FLEX pump discharge hose connection. (Primary and alternate strategies) (This modification also provides sufficient capacity to connect the larger RRC pump to the RHRSW piping to provide flow to the RHR HXs for SDC or torus cooling). • Install connection points on the RHRSW piping in RB to provide makeup flow to CST, SFP, vessel injection flow via RHR or CRD, and cooling water flow to RHR, MCR, and RCIC room coolers (Primary and alternate strategies). • Install new RB penetration and modify existing RB penetration to facilitate connection points for hose to provide makeup flow to CST (Primary strategy). • Install new connections at CST for makeup from the FLEX pumps via the RHRSW piping (Primary strategy). • Install hose connection point at CRD piping for alternate method of direct injection (Alternate strategy). • Add connection points and cabling at control building wall to connect FLEX 600 VAC diesel generators to the 600 VAC Bus C and Bus D to provide power to battery chargers and critical AC components (Primary strategy). • Add connection points and transfer switches locally at battery chargers to provide for direct connection from 600 VAC DGs (Alternate strategy).	
Key Reactor Parameters	*List instrumentation credited or recovered for this coping evaluation.*
Same as instruments listed in Core 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*
Permanent piping systems used to provide water from the intake structure to the plant is the RHRSW piping which is seismically qualified. Installation of new pipes and equipment used to provide core cooling to the RPV 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. HNP procedures and programs are being developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to HNP.	
Flooding Note: if stored below current flood level, then ensure	*List how equipment will be protected or scheduled to protect*

Section 10: Maintain Core Cooling	
procedures exist to move equipment prior to exceeding flood level	
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 to the RPV will be contained within buildings that are protected 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 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. HNP procedures and programs are being developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to HNP.	
Snow, Ice, and Extreme Cold	*List how equipment will be protected or scheduled to protect*
The piping used to provide core cooling to the RPV will be contained within buildings that are protected 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 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. HNP procedures and programs are being developed to address storage structures requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to HNP.	
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 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. HNP procedures and programs are being developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to HNP.	

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*

Section 10: Maintain Core Cooling		
Storage location and structure have not yet been decided. 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. For this function a deployment path to the Intake Structure and FLEX pump staging areas next to the Altamaha River will be developed.	Construct staging area at the UHS (river) for FLEX pump operation, including ramps that will allow access to the river for pump suction over the possible range of water levels. (Primary and alternate strategies)	• 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 at the exterior of the RB 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. • Connection points for the FLEX pump discharge will be outside the Intake Structure and designed to withstand the applicable hazards. • Electrical connection points for the FLEX 600 VAC DGs will be established at the control building west wall and designed to withstand the applicable hazards.

Notes:

References:

1. NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide", Rev. 0, August 2012

Section 10: Maintain Core Cooling
Maintain Core Cooling: BWR Portable Equipment Phase 3
Provide a general description of the coping strategies using Phase 3 equipment including modifications that are proposed to maintain core cooling. Identify methods (RCIC/HPCI/IC) and strategy(ies) utilized to achieve this coping time. *Primary Strategy* For Phase 3, the reactor core cooling strategy is to place one loop of RHR into the Shutdown Cooling mode. This will be accomplished by powering up a Division I or II RHR pump from the Class 1E emergency E or G 4160 V bus utilizing a 4160 VAC RRC FLEX portable diesel generator (i.e., from the RRC) and supplying the RHR Heat Exchanger with river water with a large portable RRC FLEX pump (i.e., from the RRC) at the intake structure via the RHRSW piping (Reference 1). The 4160 V RRC FLEX diesel generator will be capable of carrying approximately 3250 kW load which is sufficient to carry all of the loads on 4160 V bus E or G necessary to support the Phase 3 FLEX strategies which includes an RHR pump and its support equipment (i.e., MOVs, jockey pump, room coolers, etc.). The RRC FLEX pump will be sized to provide sufficient flow to the RHR heat exchanger to support SDC or Torus Cooling modes of RHR. This strategy for SDC can be accomplished utilizing a single large RRC FLEX pump or multiple RRC FLEX pumps, depending on pump sizes available from the RRC. In order to prevent pipe damage due to water hammer, the jockey pumps will be repowered to allow proper venting prior to RHR shutdown cooling operation. The primary strategy is provided by RHR A(B) and the secondary strategy is provided by RHR B(A) (Reference 1). *Alternative Strategy* Alternate means of core cooling can be provided by connecting to and using the opposite division of RHR and RHRSW as that used for the primary function. An alternate means of providing power to the RHR pumps for SDC operation would be to run cable from the 4160 VAC RRC DG directly to the component by connecting either at the switchgear end of the component's power cable or locally at the pump end of the power cable. <u>References</u>: 1. SNCH084-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.*

Section 10: Maintain Core Cooling

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 to support Phase 3.*

- Add connection point to RHRSW at Intake Structure with sufficient capacity to support the larger RRC pumps used for SDC and torus cooling. (Primary Strategy)

(These are the same modifications noted in the Core Cooling Phase 2 section)

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

Same as Phase 1 not including instrumentation to support portable equipment.

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) which is to be located in Memphis, TN. Equipment transported to the site will be either immediately staged at the point of use location (pumps and generators) or temporarily stored at a lay down area until moved to the point of use area. Pre-identified deployment paths will be used to move equipment as necessary.	No modifications identified for Phase 3 deployment issues.	• The FLEX/RRC pump makeup connections at the Intake Structure and connection points at RB penetrations will be designed to withstand the applicable hazards or have diverse connections. • All other equipment will be portable.

Notes:

None

Section 11: Maintain Containment

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

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

Maintain Containment: BWR Installed Equipment Phase 1

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

During Phase 1, containment integrity is maintained by normal design features of the containment, such as the containment isolation valves and HCVS. In accordance with NEI 12-06 (Reference 5), the containment is assumed to be isolated following the event. As the torus heats up and the water begins to boil, the containment will begin to heat up and pressurize. Additionally, the torus water level rises due to the transfer of inventory from the CST to the torus (via RCIC and SRVs). According to MAAP analysis (Reference 3), at approximately 7.5 hours, the torus level will increase to the SRVTPLL (Safety Relief Valve Tail Pipe Level Limit) while concurrently, the containment pressure is approaching the Pressure Suppression Pressure (PSP) limit. Because it is necessary to ensure the capability of SRVs to perform the pressure relief function, and it is necessary to maintain containment integrity, the containment will be vented to reduce torus inventory and containment pressure at approximately 7.5 hours. The HCVS will be used as implemented per EA-12-050, Reliable Hardened Containment Vents (Reference 4) with control from the main control room (MCR) or remote operating station.

The torus temperature will also be a limiting factor for implementation of the ELAP strategy (Reference 3). As discussed in Phase 1 Core Cooling section, RCIC suction temperature will be allowed to go as high as 230°F. At the time that RCIC suction is swapped from the CST to the torus, torus temperature will be approximately 220°F and rapidly increasing (Reference 3). By opening the HCVS at approximately the 7.5 hour point, the temperature peaks at approximately 225°F at approximately 8.6 hours (Reference 3).

The containment design pressure is 56 psig (Reference 1, HNP-1 FSAR Section 5.2.2.2 and HNP-2 FSAR Section 6.2.3.1.1). Containment pressure limits are not expected to be reached during the event as indicated by MAAP analysis (Reference 3), because the HCVS will be opened prior to exceeding any containment pressure limits.

Thus, containment integrity will not be challenged and remains functional throughout the event. As indicated by MAAP analysis (Reference 3), the containment will require venting with the Reliable Hardened Vent (RHV) system at approximately 7.5 hours after event initiation. Monitoring of containment (drywell) pressure and temperature will be available via normal plant instrumentation.

Phase 1 (i.e., the use of permanently installed plant equipment/features) of containment integrity will be maintained throughout the duration of the event; no non-permanently installed equipment will be required to maintain containment integrity. Therefore, there is no defined end time for the Phase 1 coping period for maintaining containment integrity. An alternative strategy for containment during Phase 1 is not provided, because containment integrity is maintained by the plant's design features.

References:

[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 Containment

1. Hatch Nuclear Plant Units 1 and 2 Final Safety Analysis Report, Revision 31, 11/12
2. 31EO-EOP-012-1(2), PC Primary Containment Control
3. SMNH-12-032, Containment Analysis of FLEX Strategies (MAAP Calculation), Revision 0
4. JLD-ISG-2012-02, Interim Staff Guidance, "Compliance with Order EA-12-050, Reliable Hardened Containment Vents", Revision 0
5. 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.*

HNP EOP, 31EO-EOP-012-1(2), Primary Containment Control exists to direct operators in protection and control of containment integrity.

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.*

Hardened Containment Vent System (HCVS) (i.e., Reliable Hardened Vent) is currently installed but will be enhanced in accordance with NRC Order EA-12-050, Issuance of Order to Modify Licenses with Regard to Reliable Hardened Containment Vents.

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

Containment Essential Instrumentation	Safety Function
Drywell & Torus Pressure (T48-PR-R608, R609) (Ref. 1)	Containment integrity
Drywell & Torus Temperature (T47-TR-R611, R612) (Ref.2)	Containment integrity
Torus Water Level (T48-L/PR-R607A, B) (Ref.1)	Containment integrity
Containment Hardened Vent Radiation Monitor (Component No. TBD)	RHVS effluent radioactivity
RHV system valve position indication (Component No. TBD)	HCVS operability
RHV system pressure indication (Component No. TBD)	HCVS operability
RHV system power status	HCVS operability
Nitrogen system supply status (Component No. TBD)	HCVS operability
RHV effluent temperature (Component No. TBD)	HCVS operability

Notes:

References:

1. H16024, Primary Containment Purge & Inerting System, P.&I.D., Version 51
2. H16007, Drywell Cooling System, Version 22.0

Section 11: Maintain Containment

Maintain Containment: BWR Portable Equipment Phase 2

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

Containment integrity is maintained by permanently installed equipment. Portable FLEX diesel generators will be employed, as discussed in Phase 2 Core Cooling section, to charge the station batteries and maintain DC bus voltage. See Phase 1 description for discussion of containment integrity applicable throughout the event.

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.*

See procedures listed in Phase 1 section.

Identify modifications	*List modifications necessary for Phase 2.*

See modifications listed in Phase 1 section

- Add connection points and cabling at control building wall to connect FLEX 600 VAC diesel generators to the 600 VAC Bus C and Bus D to provide power to battery chargers and critical AC components (Primary strategy).
- Add connection points and transfer switches locally at battery chargers to provide for direct connection from 600 VAC DGs (Alternate strategy).

(These are the same modifications noted in the Core Cooling Phase 2 section)

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

See instrumentation listed in Phase 1 section

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*

The HCVS is currently installed but will be enhanced in accordance with NRC Order EA-12-050, Issuance of Order to Modify Licenses with Regard to Reliable Hardened Containment Vents and guidance in JLD-ISG-2012-02. The HCVS will meet the design requirements as specified for reasonable protection per NEI 12-06. Refer to Phase 2 of Maintain Core Cooling to address storage and protection features of support equipment.

Section 11: Maintain Containment	
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 HCVS is currently installed but will be enhanced in accordance with NRC Order EA-12-050, Issuance of Order to Modify Licenses with Regard to Reliable Hardened Containment Vents and guidance in JLD-ISG-2012-02. The HCVS will meet the design requirements as specified for reasonable protection per NEI 12-06. Refer to Phase 2 of Maintain Core Cooling to address storage and protection features of support equipment.	
Snow, Ice, and Extreme Cold	*List how equipment will be protected or scheduled to protect*
The HCVS is currently installed but will be enhanced in accordance with NRC Order EA-12-050, Issuance of Order to Modify Licenses with Regard to Reliable Hardened Containment Vents and guidance in JLD-ISG-2012-02. The HCVS will meet the design requirements as specified for reasonable protection per NEI 12-06. Refer to Phase 2 of Maintain Core Cooling to address storage and protection features of support equipment.	
High Temperatures	*List how equipment will be protected or scheduled to protect*
The HCVS is currently installed but will be enhanced in accordance with NRC Order EA-12-050, Issuance of Order to Modify Licenses with Regard to Reliable Hardened Containment Vents and guidance in JLD-ISG-2012-02. The HCVS will meet the design requirements as specified for reasonable protection per NEI 12-06. Refer to Phase 2 of Maintain Core Cooling to address storage and protection features of support equipment.	

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*
HCVS is designed as permanently installed equipment. No deployment strategy is required.	The Hardened Containment Vent System (HCVS) is currently installed but will be enhanced in accordance with NRC Order EA-12-050, Issuance of Order to Modify Licenses with Regard to Reliable Hardened Containment Vents and guidance in JLD-ISG-2012-02.	HCVS is designed as permanently installed equipment. No connection points are required.

Section 11: Maintain Containment

Maintain Containment: BWR Portable Equipment Phase 3

Provide a general description of the coping strategies using Phase 3 equipment including modifications that are proposed to maintain containment integrity. Identify methods (containment vent or alternative / Hydrogen Igniters) and strategy(ies) utilized to achieve this coping time.

See Phase 2 discussion.

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.*

See Phase 2 discussion.

Identify modifications	*List modifications necessary for Phase 3.*

See Phase 2 discussion.

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

See Phase 2 discussion.

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*
See Phase 2 discussion.	See Phase 2 discussion.	See Phase 2 discussion.

Notes:

None

Section 12: Maintain Spent Fuel Pool Cooling

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

- **Makeup with Portable Injection Source**

Maintain Spent Fuel Cooling: BWR Installed Equipment Phase 1

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

There are no Phase 1 actions required at this time that need to be addressed. Fuel in the SFP is cooled by maintaining 21' of water over top of fuel. (Reference 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.*

Phase 1 strategy is to use plant design to maintain cooling to fuel in the SFP. Water level is maintained at least 21 feet above the top of irradiated fuel assemblies seated in the SFP (Reference 1).

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

- Modification to install SFP level instrumentation per Order EA-12-051

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

Per NRC Order EA-12-051

Notes:

References

1. 34SO-G41-003-1(2), Fuel Pool Cooling and Cleanup System, Version 20.27 (23.31)

[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 Spent Fuel Pool Cooling

Maintain Spent Fuel Cooling: BWR Portable Equipment Phase 2

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

The normal SFP water level at the event initiation is 21 feet (Reference 10) over the top of the stored spent fuel. Using the design basis maximum heat load, the SFP water inventory will heat up from 110°F to 212°F during the first 12 hours for Unit 1 and Unit 2 (Reference 7). Thus, the transition from Phase 1 to Phase 2 for SFP cooling function will occur at approximately at 12 hours.

The required makeup rate to maintain the fuel pool filled during this time will be 24 gpm (Reference 7). However maintaining the SFP full at all times during the ELAP event is not required, the requirement is to maintain adequate level to protect the stored spent fuel and limit exposure to personnel onsite and offsite. Note that the time to boil is determined from the design basis decay heat load in the spent fuel pool. The design basis spent fuel pool heat load is the heat load 30 days following a refueling outage (Reference 1, HNP-2 FSAR Section 9.1.2.3.1). More realistic time dependent heat loads post-shutdown are available in procedures 34AB-G41-001-1 and 34AB-G41-001-2 (References 4 & 5). Makeup to the SFP will be provided by one of three baseline capabilities.

Full Core Offload

Calculation SMNH 98-019 (Reference 7) concludes that the time to boil in the SFP for a core offload is 4.2 hours, and the water loss is 72 gpm. However maintaining the SFP full at all times during the ELAP event is not required. The requirement is to maintain adequate level to protect the stored spent fuel and limit exposure to personnel onsite and offsite. Thus, Phase 2 actions after 8 hours will be acceptable because only 3.52 feet of level (16,416 gallons) will have evaporated by 8 hours into the ELAP (Reference 9). See Cold Shutdown and Refueling discussion in Core Cooling section for discussion on actions required if an ELAP occurs during a refueling outage.

Four baseline capabilities related to SFP level are specified in the NEI 12-06 guidance, 3 for makeup and 1 for venting the SFP area. The venting of the SFP area capability is discussed in the Safety Functions Support section.

Primary Strategy Method 1

The first method will be with the FLEX pump connected and providing flow to the RHRSW system piping at the Intake Structure to supply water to the new FLEX piping in the reactor building. A branch line will be provided that terminates on the refueling floor with a hose connection. A hose long enough to reach the SFP will be pre-staged nearby to allow filling of the SFP utilizing river water (primary source) via FLEX pump. The flow requirement for this method will be 24 gpm which can be easily supplied by the FLEX pump.

Primary Strategy Method 2

The second method will be with the FLEX pump connected and providing flow to the RHRSW system piping at the Intake Structure and cross-connecting the RHRSW system to the seismically qualified Reactor Building Service Water (RBSW) system piping in the reactor building. The RBSW piping provides an emergency fill connection to the Fuel Pool Cooling System SFP makeup piping (References 11 and 12). To initiate this method of SFP makeup, operators would open RBSW system manual valves P41-F070A, F103, and Fuel Pool Cooling System manual valve, G41-F217 and new RHRSW-RBSW manual valves X022A and X023A as shown on Figure 1. This flow path discharges

Section 12: Maintain Spent Fuel Pool Cooling

into the SFP via seismically qualified fuel pool cooling piping and the SFP makeup diffuser. All valves are accessible without having to access the refuel floor area. As noted above, this method of makeup will be required to supply 24 gpm.

Primary Strategy Method 3

The third method to provide water to the SFP utilizes the FLEX pump connected to the RHRSW piping at the intake structure to supply water to the new FLEX piping in the reactor building. A branch line will be provided that terminates on the refueling floor with a hose connection. A hose long enough to reach the SFP will be pre-staged nearby to allow connection to a monitor spray nozzle on the refuel floor. The monitor spray nozzle will be used as necessary to provide spray flow over the SFP. According to the NEI 12-06 guide, a 250 gpm flow rate is required for a SFP spray. The required head at this flow rate is about 270 ft (120 psi) (Reference 8). The flow and pressure provided by the FLEX pump will be sufficient to meet the NEI requirement (Reference 9).

References:

1. Hatch Nuclear Plant Units 1 and 2 Final Safety Analysis Report, Revision 31, 11/12
2. Edwin I. Hatch Nuclear Plant Technical Specifications & Bases, Revised 11-14-2012
3. 31EO-TSG-001-0, Technical Support Guidelines, Version 8.0
4. 34AB-G41-001-1, Loss of Fuel Pool Cooling, Version 3.4
5. 34AB-G41-001-2, Loss of Fuel Pool Cooling, Version 4.3
6. H16329, Sheet 1, RHR System P&ID, Version 78.0
7. SMNH 98-019, Fuel Pool Time To Boil, Revision 2.0
8. SNCH084-CALC-003, FLEX Pump Requirements, Revision 0
9. SNCH084-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
10. 34SO-G41-003-1(2), Fuel Pool Cooling and Cleanup System, Version 20.27 (23.31)
11. H16002, Fuel Pool Cooling System P&ID, Version 39.0
12. H16011, Reactor Building Service Water System P&ID, Version 69.0

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.*

- Add connection points and cabling at control building wall to connect FLEX 600 VAC diesel

Section 12: Maintain Spent Fuel Pool Cooling	
generators to the 600 VAC Bus C and Bus D to provide power to battery chargers and critical AC components (This is the same modifications noted in the Core Cooling Phase 2 section) (Primary strategy). • Add connection points and transfer switches locally at battery chargers to provide for direct connection from 600 VAC DGs (This is the same modifications noted in the Core Cooling Phase 2 section) (Alternate strategy). • Modification to install SFP level instrumentation per Order EA-12-051 • Modification to install hard pipe from the RHRSW connection on the 130' elevation of the RB to the refuel floor with connections for the hoses that will provide makeup flow and spray flow.	
Key SFP Parameters	*List instrumentation credited or recovered for this coping evaluation.*
Per NRC Order EA-12-051 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 intake structure to the plant is the RHRSW piping which is seismically qualified. New pipes and equipment used to provide flow to the SFP will be installed seismically and protected in structures that are seismically qualified. Refer to Phase 2 of Maintain Core Cooling to address storage and protection features of support equipment.	
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 makeup flow to the SFP is contained within buildings that are protected from storms and high winds. Refer to Phase 2 of Maintain Core Cooling to address storage and protection features of support equipment.	
Snow, Ice, and Extreme Cold	*List how equipment will be protected or scheduled to protect*
The piping used to provide makeup flow to the SFP is contained within buildings that are protected from snow, ice, and extreme cold. Refer to Phase 2 of Maintain Core Cooling to address storage and protection features of support equipment.	
High Temperatures	*List how equipment will be protected or scheduled to protect*

Section 12: Maintain Spent Fuel Pool Cooling

The piping used to provide makeup flow to the SFP is contained within buildings that are protected from high temperatures. Refer to Phase 2 of Maintain Core Cooling to address storage and protection features of support equipment.

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*
• The pumps used to provide the SFP cooling and makeup functions are the same FLEX pumps described in the Core Cooling section. See Phase 2 Core Cooling for discussion of deployment strategy for FLEX pumps. • The monitor spray nozzle and fire hoses needed to spray and or makeup to the SFP will be kept at an accessible and protected area of the refueling floor or reactor building.	• See Phase 2 Core Cooling for discussion of modification necessary to deploy the FLEX pumps. • Piping modifications will be installed to provide flow from the RHRSW piping on the 130' elevation of the RB to the refueling floor.	See Phase 2 Core Cooling for discussion of protection of connection points for FLEX pumps.

Notes:

None

Section 12: Maintain Spent Fuel Pool Cooling

Maintain Spent Fuel Cooling: BWR Portable Equipment Phase 3

Provide a general description of the coping strategies using Phase 3 equipment including modifications that are proposed to maintain spent fuel pool cooling. Identify methods (makeup with portable injection source)and strategy(ies) utilized to achieve this coping time.

Replace Phase 2 equipment with RRC supplied equipment with the same flow path and power setup.

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.*

N/A

Identify modifications	*List modifications necessary for Phase 3.*

See Phase 2 discussion.

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

Spent Fuel Pool Level Per Order EA-12-051

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*
See Phase 2 discussion	See Phase 2 discussion	See Phase 2 discussion

Notes:

None

Section 13: Safety Functions Support

Determine Baseline coping capability with installed coping[4] modifications not including FLEX modifications.

Safety Functions Support: BWR Installed Equipment Phase 1

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

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 2)) in a time of approximately 9 hours. The Phase 1 FLEX strategy is to block open the entrance at the stairwell to the MCR and the lower stairwell doors coupled with the opening of the outside freight elevator doors when the MCR temperature reaches 96°F (the assumed outside temperature at the time of event occurrence). This will establish a flow path for air to flow from the control building (and outside) 130' elevation to the MCR. The preliminary assessment indicates that by employing this strategy the MCR temperature will rise to approximately 108°F at the 9 hour point by which time Phase 2 actions can be implemented (Reference 4). See Phase 2 discussion later.

If the outside temperature is above 96°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 96°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 1, section 2.3.2.2 and table 2.3-2)

RCIC Room Accessibility

The design area temperature limit for equipment qualification is 295°F as listed in HNP-1 FSAR Tables 7.16-7 and HNP-2 FSAR Table 3.11-1. For long term operation (6 months), the safety-related components of the RCIC room are designed to operate with area temperatures of 148 °F as discussed in the HNP-1 FSAR Section 10.18.5 and HNP-2 FSAR Section 9.4.2.2.3 (Reference 1). The existing GOTHIC calculation SMNH-12-008 (Reference 3) explores different cases of room heat up with a loss of all cooling. The transients evaluated by this calculation continue for 8 hours for purposes of immediate operator action determination. Under the Station Blackout case the temperature remains below 148°F for the entire transient of 8 hours. To determine the temperature impact to the RCIC room over an extended period, the curves in the above calculation were extrapolated to 72 hours. The extrapolation indicated that temperature in the RCIC room will rise to approximately 131°F in approximately 72 hours. Thus RCIC room temperature will be maintained well below design limits during RCIC operations in Phase 1. For the purposes of NEI 12-06 it is not anticipated that continuous habitability would be required in the RCIC room. If personnel entry is required into the RCIC room then personal protective measures such as ice vests will be taken.

Site industrial safety procedures currently address activities with a potential for heat stress to prevent

[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: Safety Functions Support

adverse impacts on personnel.

Communication

The communication plan for HNP 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, HNP committed to actions to address items identified communication actions for the items identified in the assessment (Reference 5).

For Phase 1communication coping, the plant Public Address (PA) system, with battery backup, 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. Hatch Nuclear Plant Units 1 and 2 Final Safety Analysis Report, Revision 31, 11/12
2. NUMARC 87-00, *Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors*, Revision 1
3. SMNH-12-008, Transient Analysis for Hatch Unit 1 & 2 RCIC Pump, Revision 1.0.
4. SNCH084-CALC-004, Hatch Main Control Room Heatup Evaluation during an Extended Loss of all AC Power, Revision 0
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-12-2069)

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.

Extend plant radio system battery run time capability.

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

Section 13: Safety Functions Support	
Modification to enclose the small open area between the MCR entrance stairwell door and the MCR entrance on the turbine deck elevation to allow flow path for airflow from the 130' elevation of the control building to the MCR.	
Key Parameter	*List instrumentation credited or recovered for this coping evaluation Phase.*
Temperature indication for the MCR is available from a battery powered thermometer that is mounted in the center of the MCR. Additionally, several battery operated portable temperature instruments are available if necessary from the Instrument and Control (I&C) shop.	
Notes: None	

Section 13: Safety Functions Support

Safety Functions Support: BWR Portable Equipment Phase 2

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

Main Control Room Habitability

Primary Strategy

The primary strategy for maintaining the environment of the MCR during Phase 2 will be the employment of a portable fan in the stairwell and MCR doors. The fan will be powered by a portable FLEX diesel generator to initiate a forced air flow path up the stairwell in the control building and through the MCR, replacing hot MCR air with cooler air from the lower control building elevations and outside via the 130' elevation freight elevator doors.

Alternative Strategy

An alternate strategy for maintaining the environment of the MCR during Phase 2 will be to power the MCR chillers and air handling units if the 600 VAC switchgear is energized with the FLEX 600 VAC DG. Cooling water will be provided to the control room air conditioning units by cross-connecting RHRSW to the reactor building service water piping that supplies cooling water to the MCR air conditioning units (References 4 and 7). The new FLEX cross-connection will provide the means to supply 120 gpm each to two of the MCR air conditioning units.

RCIC Room Accessibility

Primary Strategy

The primary strategy for maintaining the environment of the RCIC room will use the same strategy as in Phase 1 section. Based on extrapolation of the heat up curves in existing GOTHIC calculation SMNH-12-008 (Reference 9), temperature in the RCIC room will rise to approximately 131°F in approximately 72 hours. Thus RCIC room temperature will be maintained well below equipment design limits during RCIC operations in Phase 1, Phase 2, and Phase 3.

Alternative Strategy

It is not anticipated that habitability of the RCIC room will be required; however, if personnel habitability becomes necessary then a method of cooling or exhausting heat from the RCIC room will be established. The room cooler will be powered after the 600 V FLEX diesel generators have been connected as emergency power. Cooling water from the RHRSW system will be supplied for the room coolers.

RCIC Room Flooding

RCIC room flooding will be evaluated and action taken to mitigate the effects.

Engineered Safety Feature (ESF) Switchgear Rooms

For Phase 2, the rooms containing the 600 VAC ESF switchgear will begin to heat up as the switchgear is energized by the FLEX 600VAC DGs; therefore, they were evaluated for limiting temperatures for equipment survivability. The calculations performed for Station Blackout (Reference 10), indicate that switchgear rooms rise to 135°F at the end of a four hour coping period. Under ELAP conditions, both units' switchgear are deenergized at the onset of the ELAP and remain deenergized until Phase 2 when portions of the switchgear are reenergized by the FLEX 600 VAC DGs. Therefore, in Phase 2

Section 13: Safety Functions Support

following the energization of some of the 600 VAC switchgear by the FLEX 600 VAC DGs the rooms will begin to heat up and a coping period for the duration of Phase 2 must be considered.

Per drawing H-26093 (Reference 3) the design basis temperature limit for the Control Building HVAC system is 110°F. HNP-2 FSAR Section 9.4.7.2.8 (Reference 1) describes the Control Building HVAC System that supplies the 600 VAC switchgear areas. The Unit 1 and 2 switchgear areas are cooled using outside air only. HNP-2 FSAR Section 9.4.7.2.8 states: "A maximum temperature of 110°F is maintained when the outside air is 95°F." The strategy for heat removal from the switchgear rooms will be to exhaust the heat to the outside via portable exhaust fans. Note the 4160 VAC switchgear will not be energized during the Phase 2 coping period.

Battery Room Ventilation

During battery charging operations in Phase 2 and 3, ventilation will be required in the main battery rooms due to hydrogen generation. The battery rooms are not evaluated for heat loads because the resultant temperature rise would be negligible (Reference 11). The calculation of main battery room hydrogen generation determines that hydrogen levels reach 2% in 1.98 days (Reference 8). Because the battery load calculations indicate the batteries will remain with sufficient power for greater than 12 hours (Reference 12), the batteries will likely not be placed on charge until at least 12 hours after event initiation. Hydrogen generation does not occur unless the batteries are on charge. Two percent (2%) hydrogen will not occur before approximately 2 ½ days (i.e., 1.98 days plus 12 hours). Therefore, Phase 2 strategies can safely be used to establish a means to ventilate the rooms.
There are two strategies for venting the battery rooms. The primary strategy will be to repower the existing emergency exhaust fans which are connected to the Emergency Power bus. This will occur after the FLEX DG has been connected to power the 600 V bus. The alternate strategy will be to prop open doors and set up portable fans.

Spent Fuel Pool Area

Per the NEI 12-06 guidance, a baseline capability for Spent Fuel Cooling is to provide a vent pathway for steam and condensate from the SFP. The roof of the reactor refueling floor is equipped with vents (Reference 5 and 6) designed to open/operate automatically on a pressure differential of 55 lb/ft^2 between the secondary containment and the outside atmosphere (Reference 1, HNP-1 FSAR Section 3.3.2.3 and HNP-2 FSAR Section 3.3.2.3). However, under Station Blackout conditions, the roof vents have no power to operate and must be operated manually. Manual operation of the roof vents will be required at the time that the SFP commences boiling, at approximately 12 hours into the event. The SBO/FLEX strategy to cope with the pressurization of the refueling floor and prevent buildup of steam and condensation will be to operate the vents using the manual "pull chains" from the roof of the reactor building and/or to open the air lock doors. Both of these strategies are provided in the Technical Support Guidelines (Reference 2, Attachment 20). In order to establish flow of air through the SFP area it will be necessary to open stairwell doors at the refuel floor elevation and the 130' elevation. Additionally, a door to the outside (through secondary containment) must be opened.

Spent Fuel Pool Gate Seals

Removable gates are provided at the transfer canal of the SFP to facilitate movement of fuel during refueling operations. The gates have pneumatic seals that prevent water from leaking out of the SFP when water on the reactor cavity side of the gate is lower than that of the SFP. The seals are supplied by the service air system with a backup supply from an accumulator that provides sufficient air to keep the gate seal pressurized for 24 hours as noted in HNP-1 FSAR Section 10.11.3 (Reference 1). During

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Phase 2 the SFP gate seals are pressurized as necessary by valving in backup air from the FLEX air compressor located on the east side of the RB. The air compressor will be connected at the reactor building penetration and supplies the gate seals via hard pipe run from the 130' elevation to the refueling floor and to the service air system that supplies the gate seals. In addition, the gate seals can be pressurized using backup nitrogen bottles in accordance with procedure 34SO-P51-002, Instrument and Service Air System.

Communication

The communication plan for HNP 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, HNP committed to actions to address items identified communication actions for the items identified in the assessment (Reference 13).

The specific items for Phase 2 from the referenced 9.3 assessment are 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.

References:

1. Hatch Nuclear Plant Units 1 and 2 Final Safety Analysis Report, Revision 31, 11/12
2. 31EO-TSG-001-0, Technical Support Guidelines, Version 8.0
3. H26093, Control Building Ventilation P&ID and Process Flow Diagram, Version 15.
4. H16011, Reactor Building Service Water System P&ID, Version 69.0
5. H22804, Architectural Turbine Building Floor Plan- El 130'-0" (UON) , Version 5.0
6. H15857, Architectural Roof Plan, Version 9.0.
7. H11609, Sheet 2, Service Water Piping
8. BH2-M-0385, Station Battery Room Hydrogen Concentration – Units 1& 2, Revision 6.0
9. SMNH-12-008, Transient Analysis for Hatch Unit 1 & 2 RCIC Pump, Revision 1.0.
10. BH2-M-0578, HNP-1, 2 Control Building Heatup due to Station Blackout, Revision 0.0
11. X4C1500523, Miscellaneous Plant Area SBO Ambient Temperature Analysis [Vogtle Unit 2], Revision 4
12. SNCH084-CALC-002, Station Service Battery Discharge Capacity During Extended Loss of All AC Power, Revision 0.0.
13. 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-*

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Term Task Force Review of Insights from the Fukushima Daiichi Accident, dated March 12, 2012 (NL-12-2069)	
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.*
• Enclose the small area between the MCR entry door and the 164' elevation door of the stairwell leading to the MCR to create a path for continuous flow of air from the 130' elevation to the MCR • Modify RB penetrations for connection points for air compressors • Modify air supply to the gate seals to provide backup air from a FLEX air compressor. This will involve running hard pipe from the 130' elevation of the RB to the refuel floor gate seal accumulator tank. • Modify RHRSW and RB Service Water system to provide a cross-connect to supply cooling water for MCR chillers, RCIC room coolers, and RHR room coolers • Add connection points and cabling at control building wall to connect FLEX 600 VAC diesel generators to the 600 VAC Bus C and Bus D to provide power to battery chargers and critical AC components (This is the same modifications noted in the Core Cooling Phase 2 section) (Primary strategy). • Add connection points and transfer switches locally at battery chargers to provide for direct connection from 600 VAC DGs (This is the same modifications noted in the Core Cooling Phase 2 section) (Alternate strategy).	
Key Parameter	*List instrumentation credited or recovered for this coping evaluation Phase.*
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*
FLEX air compressors will be stored in storage buildings designed and protected from seismic concerns in accordance with NEI 12-06. 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	

Section 13: Safety Functions Support	
completion due date. The remaining FLEX equipment will be available and protected by the implementation completion date for the second unit.	
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*
FLEX air compressors will be stored in storage buildings designed and protected from storms and high winds in accordance with NEI 12-06. 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.	
Snow, Ice, and Extreme Cold	*List how equipment will be protected or scheduled to protect*
FLEX air compressors will be stored in storage buildings designed and protected from snow, ice, and extreme cold in accordance with NEI 12-06. 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.	
High Temperatures	*List how equipment will be protected or scheduled to protect*
FLEX air compressors will be stored in storage buildings designed and protected from high temperatures in accordance with NEI 12-06. 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.	

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*
• The pumps used to provide the cooling water to the room coolers for RCIC and MCR are the same FLEX pumps described in the Core Cooling section. See Phase 2 Core Cooling for discussion of deployment strategy for FLEX pumps.	• One reactor building penetration will be modified to provide connection points for the FLEX air compressor to provide air to the gate seals on the refueling floor. • No other modifications are necessary, beyond those already identified (buildings,	Connection points for the FLEX air compressors will be protected from missile hazards, which will inherently protect it from local hazards such as vehicle impact.

Section 13: Safety Functions Support		
• The fans and air compressors that will be deployed for room cooling and SFP gate seals will be stored in the FLEX Storage Building and deployed via identified and evaluated haul routes to the power block and their staging areas.	roads, etc.) for deployment of the strategies associated with the Phase 2 support function.	
Notes: None		

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Safety Functions Support: BWR Portable Equipment Phase 3

Provide a general description of the coping strategies using Phase 3 equipment including modifications that are proposed to maintain and/or support safety functions. Identify methods and strategy(ies) utilized to achieve coping times.

Main Control Room Accessibility

The primary and secondary strategies for cooling the MCR are the same in Phase 3 as for Phase 2. However, the power for the MCR chillers and air handling units may be powered from the 4160 VAC emergency bus if it has been energized by RRC FLEX 4160 VAC DG instead of the FLEX 600 VAC DG.

RHR Room Accessibility

As part of Phase 3 strategies, an RHR pump will be placed into service in order to perform torus cooling and shutdown cooling. This results in heat addition to the RHR pump diagonal due to heat generated by the RHR pump motor as well as heat dissipated from the associated piping and RHR heat exchanger. For long term RHR pump operation, the RHR pump room must be cooled to maintain room temperatures within acceptable ranges (limited by maximum allowable RHR pump motor requirements). RHR Room Heat Up Analysis with Loss of Ventilation calculation, BH2-M-0625 (Reference 2), documents a temperature of 196°F after operating one RHR pump, one RHR HX, and RHR piping for 24 hours without ventilation. RHR Room Heat up with Loss of Ventilation calculation, BH2-M-0560 (Reference 3), for post Loss of Coolant Accident (LOCA) heat up, has a temperature of 148°F after operating for 1.5 hrs with one RHR pump and one RHR heat exchanger. Each of these calculations indicates that the RHR room will reach its maximum design criteria of 148°F following a loss of ventilation. During an ELAP, this limit would be significantly exceeded, as shown in the calculation BH2-M-0625 (Reference 2). Mitigating actions will therefore be employed to prevent the RHR room from surpassing its design maximum of 148°F as described in the FSAR (Reference 1, HNP-1 FSAR Section 10.18.5 and HNP-2 FSAR Section 9.4.2.2.3). This can be accomplished once the RRC 4160V FLEX DG will be connected to the 4160 VAC emergency bus at which time the RHR room cooler can be energized and cooling water supplied from the FLEX pump via the FLEX connections provided between the RHRSW piping and PSW cooling water supply piping.

An alternate means of cooling the RHR rooms if the room coolers are not available will be to use portable exhaust fans and hose trunks to exhaust RHR room air to outside the reactor building.

Other Support Requirements

Other areas of support required in Phase 3 are the same as described in the Phase 2 section of Safety Function Support.

References:

1. Hatch Nuclear Plant Units 1 and 2 Final Safety Analysis Report, Revision 31, 11/12
2. BH2-M-0625, RHR Room Heat Up Analysis with Loss of Ventilation for Plant Hatch IPE, Revision 1.0.
3. BH2-M-0560, RHR Room Heatup with Loss of Ventilation, Revision 1.0

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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.*
See Phase 2 discussion.	
Identify modifications	*List modifications necessary for Phase 3.*
See Phase 2 discussion.	
Key Containment Parameters	*List instrumentation credited or recovered for this coping evaluation.*
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*
See Phase 2, Safety Functions Support	See Phase 2, Safety Functions Support	See Phase 2, Safety Functions Support

Notes:

None

Attachment 1: Portable Equipment Lists

BWR 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
Six (6) Self-Priming Pumps, diesel fuel and required hoses	**X**		**X**			500 gpm, 215 psia, for pumping river water	Will follow EPRI template requirements
Two (2) Vehicles					**X**	Vehicles with sufficient rating that can tow the pumps and DGs.	Will follow EPRI template requirements
Two (2) Portable Air Compressors – Diesel	**X**		**X**			Minimum pressure required to operate E11-F014A , and for SFP gate seals.	Will follow EPRI template requirements
Three (3) 600VAC Diesel Generators and cables – #1 per Phase.			**X**	**X**	**X**	20 to 60 kW for air compressors, ventilation fans and miscellaneous hand held equipment recharging	Will follow EPRI template requirements
Three (3) 600VAC Diesel Generators and Cables	**X**	**X**	**X**	**X**		600 kW .	Will follow EPRI template requirements
Flatbed Trailers	**X**	**X**	**X**	**X**	**X**	Means to store and transport hoses, strainers, cables, and miscellaneous equipment.	
Two (2) Trailers with Fuel Tank, transfer pumps and portable fuel containers	**X**	**X**	**X**	**X**		200 gallons	
Two (2)Monitor Spray Nozzles and required hoses			**X**			Sized for 250 gpm, for SFP Spray	Will follow EPRI template requirements
Two (2) Rapidly Deployable Communications Kit					**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
Two (2) Portable ventilation fans					**X**	For MCR ventilation	

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.

BWR Portable Equipment Phase 3							
Use and (potential / flexibility) diverse uses						*Performance Criteria*	*Notes*
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility		
Two (2) Large FLEX Pumps	**X**	**X**	**X**			2135 gpm minimum	Capacity to supply RHRSW for cold shutdown
Two (2) 4160VAC Diesel Generators	**X**	**X**	**X**	**X**		4160 VAC	To power RHR, etc.
Two (2) sets of Suction hoses and strainers, 5" discharge hoses, and fittings	**X**	**X**	**X**			N/A	Discharge hoses shall fit on FLEX Pump and connect to RHRSW manifold at the intake structure.
Two (2)sets of Cables for connecting portable generators	**X**			**X**	**X**	N/A	Supply as required
Six (6) Portable ventilation fans	**X**	**X**	**X**	**X**	**X**	N/A	Supply as required
Two (2) Diesel Generator fuel transfer pump and hoses	**X**	**X**	**X**	**X**		N/A	Supply as required. To ensure transfer capability of site fuel to portable equipment

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 [5]	Remarks / Applicability
	0	**Event Starts**	N	Plant @100% power
1	60 sec	RCIC/HPCI starts	N	Reactor operator initiates or verifies initiation of reactor water level restoration with steam driven high pressure injection (refer to HNP-2 FSAR Section 15.3.8.3 with this elapsed time of 60 sec for this action). Manual operation capability of RCIC is proceduralized.
2	2 min	HPCI secured	N	HPCI will trip automatically when reactor level reaches the high level setpoint
3	10-35 min	Operators override the auto-swap of RCIC suction valves in accordance with EOPs to maintain suction from the CST	Y	Time critical at the point when torus water level reaches the high level setpoint (approximately 35- 45 minutes) which would initiate the automatic swap of the RCIC suction from the CST to the torus. Swap must be overridden to keep suction on CST as required by EOPs.
4	48 min	Attempts to start EDGs have been unsuccessful. Enter ELAP Procedure	Y	Time critical at a time greater than 1 hour. Entry into ELAP provides guidance to operators to perform ELAP actions.
5	1 hr	DC Load shed complete	Y	Time critical at a time greater than 1 hour 15 minutes. DC buses are readily available for operator access and breakers on the 130' elevation will be appropriately identified (labeled) to show which are required to be opened.
6	1 hr	Using manual control of SRVs depressurize the RPV IAW EOPs (to approximately 200 – 400 psig) to keep in the Safe Region of the HCTL curve.	Y	Time critical at the point of entering the Unsafe Region of the HCTL Curve (Approximately 3 hours). EOPs require operators to keep reactor pressure and temperature from causing entry into unsafe region of HCTL curve
7	6.5 – 7.5 hr	When CST inventory is near depletion, swap RCIC suction from CST to torus to preserve RCIC availability	Y	CST inventory is estimated to last approximately 6.5-7.5 hours. To maintain RCIC operating, the suction must be swapped to a suction source that contains available inventory, i.e. the torus.
8	7.5 hr	Initiate use of Hardened Containment Vents per EOPs to maintain containment parameters within limits.	Y	The constraint can be met because HCVS is seismic and powered by DC buses with nitrogen supplied from the accumulators or temporary nitrogen bottles to operate the HCVS valves
9	10 hr	Transition from Phase 1 to Phase 2 for Core cooling function by placing FLEX pumps in service to make up to the CST	Y	FLEX pumps will be staged beginning at approximately 6 – 8 hours time frame. Combined CST and torus volume is estimated to be sufficient out to 20-24 hours.

[5] 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 [5]	Remarks / Applicability
10	10 hr	Power up the station battery chargers using a FLEX 600 VAC DG to supply power to the buses C and D	Y	Time critical after 12 hours. Batteries durations are calculated to last greater than 12 hours.
11	12 hr	Begin makeup to SFP as necessary to maintain adequate level in the SFP. (Boiling under design basis conditions begins at 12 hours and requires 24 gpm makeup). Vent the refuel floor to prevent pressurization during pool boiling by opening the reactor building roof vents	N	Boil-off rate is slow with a large volume of water in the SFP.
12	20-24 hr	Swap RCIC suction from the torus to the CST when torus level impacts RCIC required NPSH (between 146" and 102") or before torus level reaches 102".	Y	Time critical when the reduction in torus level begins to impact RCIC required NPSH or when 102" is reached (102" is the limiting level to maintain coverage over the SRV tailpipe quenchers and the RCIC exhaust).
13	72 hr	Transition from Phase 2 to Phase 3 for Core Cooling function by placing RRC Pumps in service to cool plant down to cold shutdown. Requires staging and operation of 4160 VAC RRC Portable DGs	N	If RRC pumps 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 (NEDC 33771P, GEH Evaluation of FLEX Implementation Guidelines)

Item	Parameter of interest	NEDC value (NEDC 33771P Revision 1, January 2013)	NEDC 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	
Nov 2013	Develop Strategies (Playbook) with RRC	
Feb. 2014	Submit 6 Month Status Report	
Apr 2014	Develop Modifications Unit 2	
June 2014	Initiate Phase 2 Equipment Procurement	
Aug. 2014	Submit 6 Month Status Report	
Aug 2014	Perform Staffing Analysis (Phase 2)	
Sept. 2014	Develop Operational Procedure Changes	
Nov 2014	Create Maintenance Procedures	
Nov 2014	Develop Training Material	
Feb. 2015	Submit 6 Month Status Report	
Mar 2015	Issue FSGs	
Mar 2015	Unit 2 Implementation Outage **	
Mar 2015	Implement Training	
Apr 2015	Develop Modifications Unit 1	
Aug 2015	Submit 6 Month Status Report	
Feb. 2016	Submit 6 Month Status Report	
Apr 2016	Unit 1 Implementation Outage *	
Aug. 2016	Submit 6 Month Status Report	
Dec 2016	Unit 2 Implement Non-Outage Mods **	
Dec 2016	Submit Completion Report	

*Full compliance after second listed refueling outage
** Full compliance by 12/31/2016 since second refueling outage is after 12/31/2016

Attachment 3: Conceptual Sketches

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

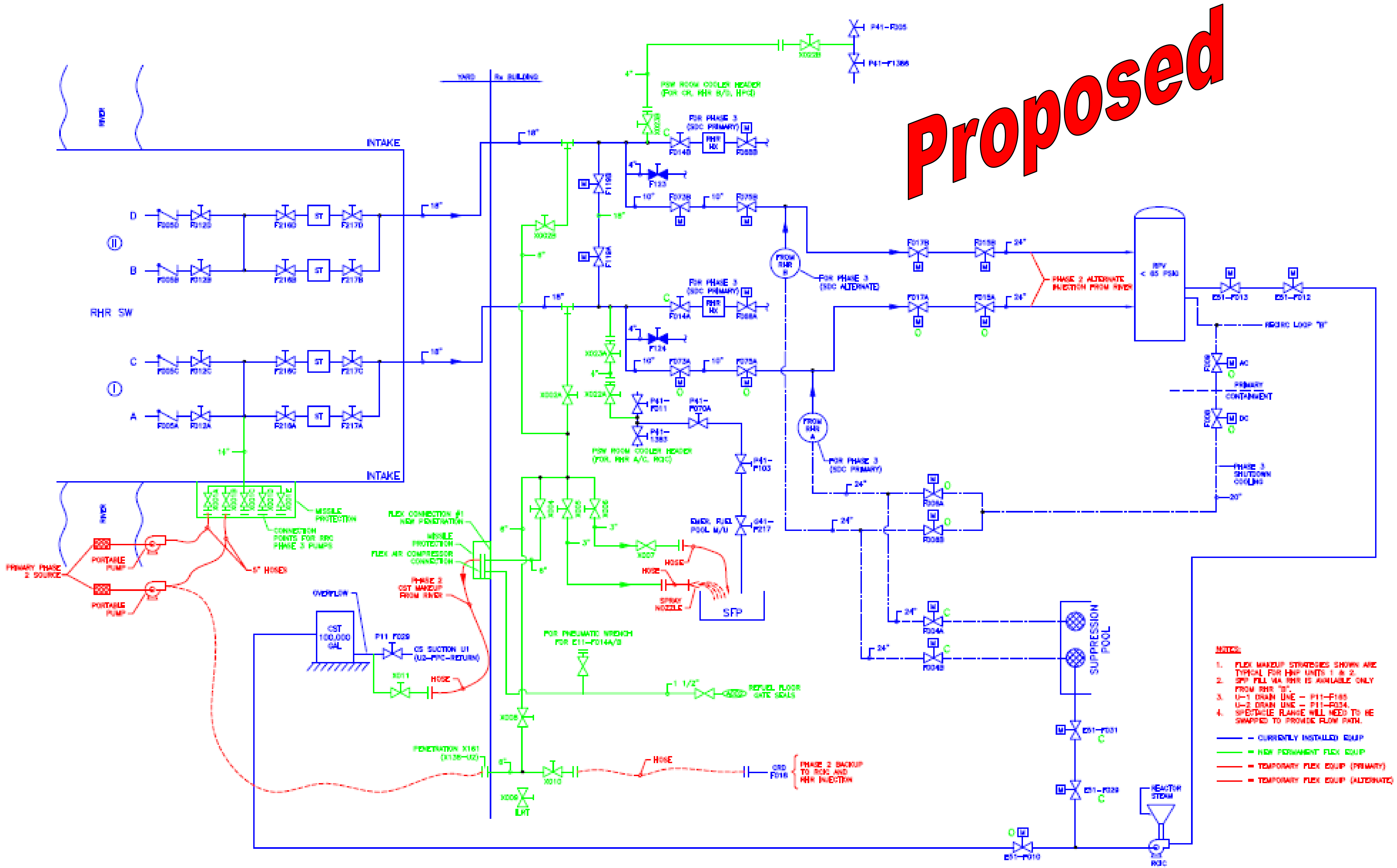

Figure 1 –Flow Diagram for FLEX Strategies

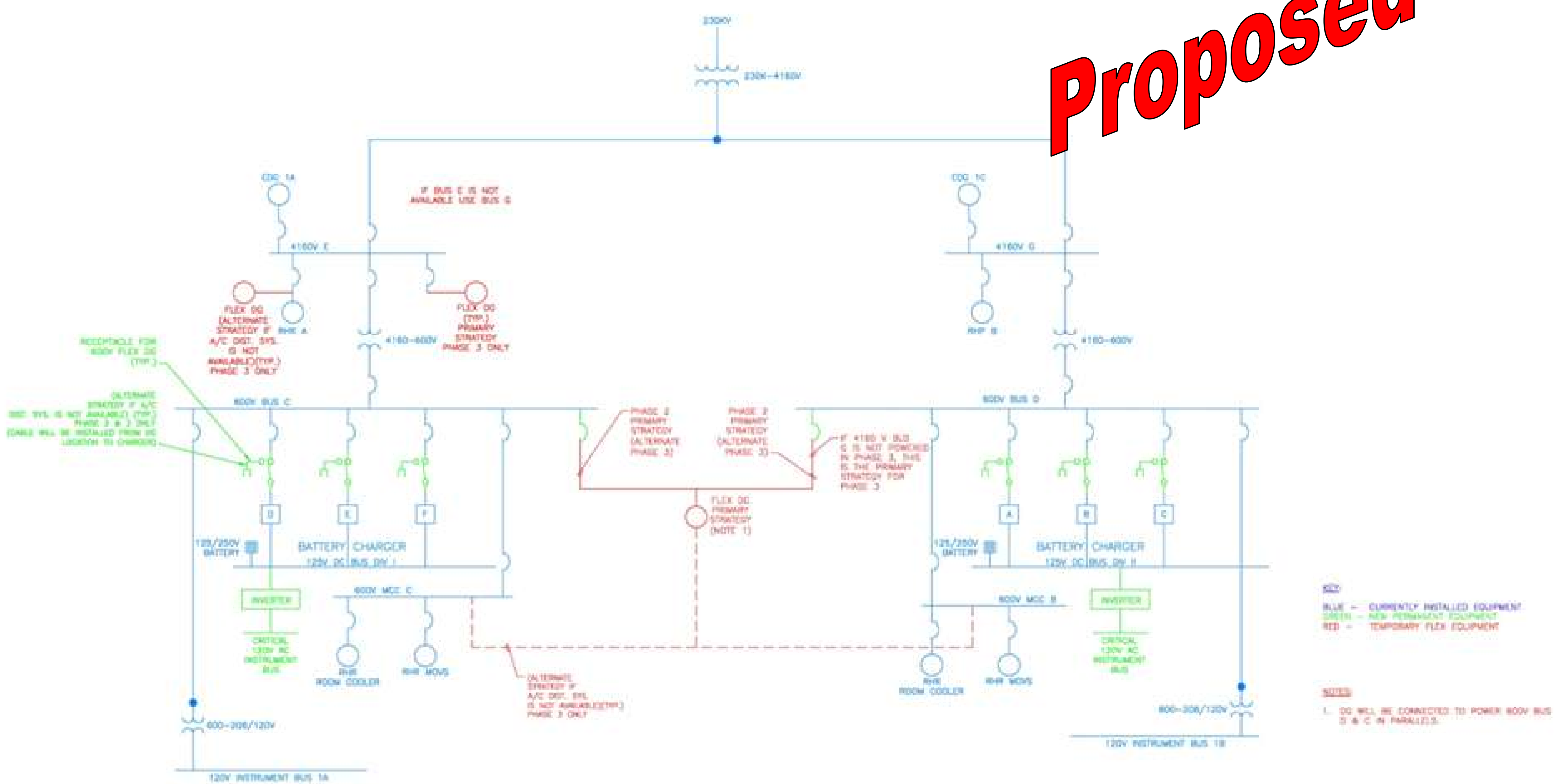

Figure 2 - Electrical Diagram for FLEX Strategies