**Nebraska Public Power District**

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NLS2014019
February 26, 2014

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

Subject: Nebraska Public Power District's Second Six-Month Status Report in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)
Cooper Nuclear Station, Docket No. 50-298, DPR-46

References:

1. NRC Order Number EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," dated March 12, 2012

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. NPPD Letter, "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 29, 2012

5. NPPD Letter "Overall Integrated Plan in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)," dated February 28, 2013

Dear Sir or Madam:

On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued an Order (Reference 1) to Nebraska Public Power District (NPPD). Reference 1 was immediately effective and directs NPPD 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.

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NRR

Reference 1 required submission of an initial status report 60 days following issuance of the final interim staff guidance (Reference 2) and an overall integrated plan pursuant to Section IV, Condition C. Reference 2 endorses industry guidance document Nuclear Energy Institute 12-06, Revision 0 (Reference 3) with clarifications and exceptions identified in Reference 2. Reference 4 provided NPPD's initial status report for Cooper Nuclear Station (CNS) regarding mitigation strategies. Reference 5 provided CNS' Overall Integrated Plan for diverse and flexible coping strategies (FLEX).

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

Attachment 2 provides Revision 1 of CNS' Overall Integrated Plan for FLEX.

This letter contains no new regulatory commitments.

Should you have any questions regarding this report, please contact David Van Der Kamp, Licensing Manager, at (402) 825-2904.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on: 2/26/14

Sincerely,

Oscar A. Limpias
Vice President - Nuclear and
Chief Nuclear Officer

/bk

Attachments:
1. Nebraska Public Power District's Second Six-Month Status Report for the Implementation of Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events
2. Cooper Nuclear Station - Overall Integrated Plan for Diverse and Flexible Coping Strategies (FLEX), Revision 1

cc: Regional Administrator, w/attachments
USNRC - Region IV

Director, w/attachments
USNRC - Office of Nuclear Reactor Regulation

Senior Resident Inspector, w/attachments
USNRC - CNS

Cooper Project Manager, w/attachments
USNRC - NRR Project Directorate IV-1

NPG Distribution, w/Attachment 1 only

CNS Records, w/attachments

**Attachment 1**

**Nebraska Public Power District's Second Six-Month Status Report for the Implementation of Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events**

## Introduction

Nebraska Public Power District (NPPD) developed an overall integrated plan for Cooper Nuclear Station (CNS) (Reference 1), documenting the diverse and flexible coping strategies (FLEX), in response to Reference 2. This attachment provides an update of milestone accomplishments since submittal of the first status report to the overall integrated plan (Reference 3), including any changes to the compliance method, schedule, or need for relief/relaxation and the basis, if any.

## Milestone Accomplishments

The following milestone(s) have been completed since the submittal of the first status report for the overall integrated plan, and are current as of February 15, 2014:

None.

## Milestone Schedule Status

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

The revised milestone target completion dates do not impact the Order implementation date.

| Milestone | Target Completion Date | Status | Revised Target Completion Date |
|---|---|---|---|
| 60-day Status Update | October 2012 | Complete | |
| Submit Overall Integrated Plan | February 2013 | Complete | |
| 6-month Status Update | August 2013 | Complete | |
| Refine Strategies (post-NRC review) | September 2013 | Not Started | June 2014 |
| Develop Strategies / Contract with Regional Response Center | January 2014 | Not Started | August 2014 |
| 6-month Status Update | February 2014 | Complete | |
| Regional Response Center Operations | TBD | Not Started | |

| Milestone | Target Completion Date | Status | Revised Target Completion Date |
|---|---|---|---|
| Develop Storage Plan | May 2014 | Not Started | |
| Purchase FLEX Equipment | June 2014 | Not Started | |
| Issue Maintenance Procedures (for FLEX equipment) | August 2014 | Not Started | |
| 6-month Status Update | August 2014 | Not Started | |
| Develop Training Plan | October 2014 | Not Started | |
| Implementation Outage 1 | Fall 2014 | Not Started | |
| Develop Online Mods and Implementing Procedures | December 2014 | Started | |
| 6-month Status Update | February 2015 | Not Started | |
| Walk-throughs or Demonstrations | April 2015 | Not Started | |
| Implement Training | May 2015 | Not Started | |
| 6-month Status Update | August 2015 | Not Started | |
| Develop Outage Mods and Implementing Procedures | October 2015 | Not Started | |
| Implement Online Mods and Procedures | December 2015 | Not Started | |
| 6-month Status Update | February 2016 | Not Started | |
| Perform Staffing Assessment | May 2016 | Not Started | |
| 6-month Status Update | August 2016 | Not Started | |
| Implementation Outage 2 | Fall 2016 | Not Started | |
| Implement Outage Mods and Procedures | Fall 2016 | Not Started | |
| Implement Training Updates | Fall 2016 | Not Started | |
| Submit Completion Report | Fall 2016 | Not Started | |

**Changes to Compliance Method**

There are no changes to the compliance method as documented in the overall integrated plan at this time.

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

NPPD expects to comply with the Order implementation date and no relief/relaxation is required at this time.

**Open and Confirmatory Items in the Interim Staff Evaluation**

In Reference 4, the Nuclear Regulatory Commission (NRC) issued the Interim Staff Evaluation (ISE) for CNS relating to the overall integrated plan. The following table provides a summary of the confirmatory items documented in the ISE and the status of each item. There were no open items identified in the ISE.

| ISE Confirmatory Items | | |
|---|---|---|
| **Item Number** | **Description** | **Status** |
| 3.1.1.2.A | Confirm that the required debris removal equipment remains functional and deployable to clear obstructions from pathways between the FLEX storage locations and deployment locations, after the FLEX storage building locations are finalized. | Open |
| 3.1.1.4.A | Confirm the location(s) of the staging area(s) for equipment from the RRC, and the licensee's plans for transportation from the RRC, staging, and on-site deployment is in accordance with the guidance in NEI 12-06, Sections 5.3.4, 6.3.4, 7.3.4, and 8.3.4, or provide an acceptable alternative to that guidance. | Open |
| 3.1.3.1.A | Confirm that when the FLEX equipment storage building locations are finalized, separation distance and axis of separation is reviewed to confirm that the building locations are consistent with the recommendations in NEI 12-06, Section 7.3.1. | Open |
| 3.1.4.2.A | Confirm that obtaining makeup water from the Missouri River during an ELAP event adequately addresses NEI 12-06, Section 8.3.2, consideration 3. | Open |
| 3.2.1.1.A | Benchmarks must be identified and discussed which demonstrate that Modular Accident Analysis Program (MAAP) is an appropriate code for the simulation of an ELAP event at CNS, consistent with the NRC endorsement (ADAMS Accession No. ML13275A318) of the industry position paper on MAAP. | Open |

| ISE Confirmatory Items | | |
|---|---|---|
| **Item Number** | **Description** | **Status** |
| 3.2.1.1.B | The licensee should demonstrate that the collapsed reactor pressure vessel level remains above Top of Active Fuel and the reactor coolant system cool down rate is within technical specifications limits. | Open |
| 3.2.1.1.C | The licensee should demonstrate that MAAP is used in accordance with Sections 4.1, 4.2, 4.3, 4.4, and 4.5 of the June 2013 position paper (ADAMS Accession No. ML13190A201). | Open |
| 3.2.1.1.D | The licensee must identify, in using MAAP, the subset of key modeling parameters cited from Tables 4-1 through 4-6 of the "MAAP Application Guidance, Desktop Reference for Using MAAP Software, Revision 2" (Electric Power Research Institute Report 1020236, available at www.epri.com). This should include response at a plant-specific level regarding specific modeling options and parameter choices for key models that would be expected to substantially affect the ELAP analysis performed for CNS. | Open |
| 3.2.1.2.A | Confirm that the analysis for a long-duration ELAP event shows that the reactor recirculation pump seal leakage value does not exceed the value used in analysis of a 4-hour station blackout event. | Open |
| 3.2.1.3.A | Confirm that the method for transferring water from the hotwells to the ECSTs, including flow path, valves, pumps, and related equipment, when developed, is reliable. | Open |
| 3.2.1.3.B | Confirm that the RCIC room heatup evaluation and RCIC room flooding time evaluation are completed with acceptable results. | Open |
| 3.2.1.3.C | Confirm that the licensee's staffing assessment is completed and it shows that proposed actions from the FLEX strategies can be completed within the specified time constraints. | Open |
| 3.2.1.4.A | Confirm that the Phase 2 FLEX equipment performance criterion, when developed, supports the licensee's mitigation strategies. | Open |

| | | |
|---|---|---|
| 3.2.2.1.A | Confirm that modifications to the reactor building roof hatch provide the ability to maintain adequate SFP area ventilation. | Open |
| 3.2.3.A | Confirm that CNS's containment venting strategy is finalized and that the strategy supports both containment pressure protection and proposed RCIC and Phase 2 FLEX pump operation. | Open |
| 3.2.3.B | With regard to maintaining containment, the implementation of BWROG Emergency Procedure Guideline/Severe Accident Guideline, Revision 3, including any associated plant-specific evaluations, must be completed in accordance with the provisions of NRC letter dated January 9, 2014 (ADAMS Accession No. ML13358A206). | Open |
| 3.2.4.2.A | Confirm that fan sizing evaluations support adequate ventilation in the main control room, in the RCIC room, and in other applicable plant areas. | Open |
| 3.2.4.6.A | Confirm that analyses addressing heat up in areas that might have personnel habitability considerations conform to the guidance in NEI 12-06, Section 3.2.2, Guideline 11, or provide an acceptable alternative to that guidance. | Open |
| 3.2.4.7.A | Confirm that the design provisions, as well as operational and protection requirements for the new on-site well/water treatment equipment used for Phase 2 water sources adequately support CNS's proposed ELAP strategies. | Open |
| 3.2.4.8.A | Confirm that adequate electrical interaction and isolation considerations are adequately addressed. | Open |
| 3.2.4.8.B | Confirm that the sizing of the portable FLEX diesel generators adequately supports CNS's ELAP mitigation strategy. | Open |
| 3.2.4.8.C | Provide single-line diagrams showing the proposed connections of Phase 2 and Phase 3 electrical equipment and showing protection information (e.g., breaker, relay, or fuse) and rating for the equipment used when available. | Open |
| 3.2.4.10.A | Confirm that the minimum dc voltage and dc load profile for the ELAP have been determined, the minimum dc bus voltage and the associated load profile supports CNS's proposed ELAP mitigation strategy. | Open |

As discussed with the NRC during the audit process, the overall integrated plan was revised to correct minor discrepancies identified between the Sequence of Events Timeline (Attachment 1A) and the Sequence of Events Time Constraints discussion (Pages 5 and 6). Additionally, the Milestone Schedule (Attachment 2) was updated.

Attachment 2 to this letter provides Revision 1 of CNS' Overall Integrated Plan for FLEX.

**References**

The following references support the status update to the overall integrated plan described in this attachment:

1. NPPD Letter, "Overall Integrated Plan in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)," dated February 28, 2013

2. NRC Order Number EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," dated March 12, 2012

3. NPPD Letter, "Cooper Nuclear Station's First Six-Month Status Report in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)," dated August 27, 2013

4. NRC Letter, "Cooper Nuclear Station – Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Order EA-12-049 (Mitigation Strategies) (TAC No. MF0972)," dated February 11, 2014

# Attachment 2

# Cooper Nuclear Station -

# Overall Integrated Plan for Diverse and Flexible Coping Strategies (FLEX)

# Revision 1

# General Integrated Plan Elements (BWR)

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

Seismic Hazard Assessment:

Per the Updated Safety Analysis Report (USAR) (Reference 1) Section II-5, the seismic criteria for Cooper Nuclear Station (CNS) include two design basis earthquake spectra: Operating Basis Earthquake at 0.1g and Safe Shutdown Earthquake (SSE) at 0.2g. Per Reference 2, all sites will consider the seismic hazard.

External Flooding Hazard Assessment:

Per the USAR (Reference 1) Section II-4, the design basis flood is a value of 903.0 Mean Sea Level (MSL) for the Probable Maximum Flood (PMF). The general ground elevation surrounding CNS Class I Structures is elevated 13 feet above the natural floodplain to 903 feet MSL. The finished floor elevation of all Class I Structures is placed at elevation 903.5 feet MSL, or 1/2 feet above the PMF event. These structures were designed for a hydraulic load equivalent to a groundwater elevation of 903 feet. The station site grade level of 903 feet MSL has been raised 13 feet above the natural grade level of 890 feet MSL, in order to bring final grade one foot above the existing 902 feet MSL levee constructed by the Corps of Engineers. This levee was raised above its original design level and presently has a three foot minimum free board over the 1952 flood of record (899 feet MSL). Flooding of the station is considered to be extremely unlikely due to the combination of upstream Missouri River flood control and the high final site grade. With respect to the 1,000 year, 10,000 year, and 1,000,000 year (PMF) floods, these water levels will provide 3-½ feet, 1-½ feet, and 6 inches of freeboard respectively below the 903'6" grade floor elevation of the principle structures.

Per Reference 2, the site is considered a "dry" site, i.e., the plant is built above the design basis flood level and the external flooding hazard need not be considered.

High Wind Hazard Assessment:

Per the USAR (Reference 1) Section II-3, the design wind pressure for the station and structures is 30 lbs per square foot which is the equivalent of sustained winds up to 100 mph. Station structures have been designed to withstand this wind velocity in accordance with ASCE Paper 3269. Additionally, per USAR (Reference 1) Section XII-2, Class I structures are designed to the following:

- Tornado design criteria
  1. A tangential velocity of 300 mph.
  2. A transverse velocity of 60 mph.
  3. A pressure drop of 3 psi occurring over a 3 second time interval.
- Tornado generated missile criteria
  - A 35 foot long utility pole with a 14 inch butt with an impact velocity of 200 mph.

- A one-ton missile such as compact-type automobile with an impact velocity of 100 mph and a contact area of 25 square feet.
- A 2 inch extra heavy pipe, 12 feet long.
- Any other missile resulting from failure of a structure or component or one which has potential of being lifted from storage or working areas at the site.

The CNS site is located in an area characterized by the Nuclear Regulatory Commission (NRC) as having tornado design wind speeds greater than 130 mph (Reference 2, figure 7-2) and as such, the tornado hazard will be considered.

Extreme Cold Hazard Assessment:

Per the USAR (Reference 1) Section II-3, the design low outside temperature is -5°F dry bulb which will only be exceeded 1% of the time during the winter. The CNS site is located within the region characterized by the National Oceanic and Atmospheric Administration as having a 3-day snowfall of up to 18" (Reference 2, figure 8-1) and would need to consider snow removal in the deployment of the FLEX strategy. The CNS site is also located within the region characterized by Electric Power Research Institute (EPRI) as ice severity level 4 (Reference 2, figure 8-2). As such, the CNS site is subject to severe damage to power lines and/or existence of large amounts of ice. Per Reference 2, cold temperatures, snow, and ice will be considered.

Extreme High Temperature Hazard Assessment:

Per the USAR (Reference 1) Section II-3, the CNS design high outside temperature is 97°F dry bulb (79°F wet bulb). Based on historical records, this temperature is only expected to be exceeded 1% of the time during the summer. Per Reference 2, all sites will address high temperatures.

Conclusion:

The hazards applicable to CNS to consider on the deployment of the strategies to meet the baseline coping capability are seismic, high winds, extreme cold, snow, ice, and high temperature.

References:

1. Cooper Nuclear Station Updated Safety Analysis Report (USAR)
2. NEI 12-06, Diverse and Flexible Coping Strategies (FLEX) Implementation Guide, Revision 0, August 2012

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| Key Site assumptions to implement NEI 12-06 strategies.<br><br>Ref: NEI 12-06 section 3.2.1 | *Provide key assumptions associated with implementation of FLEX Strategies:*<br>• *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* |

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| | *addressed on a schedule commensurate with other licensing bases changes.*<br>• *Exceptions for the site security plan or other (license/site specific) requirements of 10CFR may be required.*<br>• *Deployment resources are assumed to begin arriving at hour 6 and fully staffed by 24 hours.*<br>• *Certain Technical Specifications cannot be complied with during FLEX implementation.* |

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 complete 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.
- Following conditions exist for the baseline case:
  - Seismically designed DC banks are available.
  - Seismically designed AC and DC distribution available.
  - Plant initial response is the same as Station Blackout (SBO).
  - Best estimate analysis and decay heat is used to establish operator time and action.
  - No single failure of Structure, System or Component assumed.
  - The water in the Emergency Condensate Storage Tanks (ECST) is available for use. The ECSTs are located in a seismically robust structure.
  - The water in the main condenser hotwells is available for use. CNS is an Alternate Source Term plant, and as such, the hotwells have been shown to survive a design basis earthquake (Reference 1).
- The design hardened connection is protected against external event or redundant locations.
- Implementation strategies and roads are assessed for hazards impact.
- All Phase II components are stored at site and available after the event they were designed to be protected against.
- Additional staff resources are expected to arrive beginning at 6 hours and the site will be fully staffed 24 hours after the event.

Open items where CNS does not have clear guidance to complete an action related to this submittal:

- Primary and secondary storage locations have not been selected yet; once locations are finalized implementation routes will be defined.
- The location and sizing of the new raw water well has not been determined.
- The method of transferring water from the hotwell to the ECSTs has not been determined.
- The staging area for the Regional Response Center (RRC) equipment has not been determined.
- Exceptions for the site security plan or other (license/site specific) requirements of 10 CFR may be required. Coordination of site FLEX integrated Plan with security personnel is required.

10 CFR 50.54(x) and/or 10 CFR 73.55(p):

This plan defines strategies capable of mitigating a simultaneous loss of all 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 Spent Fuel Pool (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 procedures and guidelines in accordance with established 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).

References:

1. Engineering Evaluation 01-147, Summary of Main Steam Isolation Valve (MSIV) Leakage Pathway to the Condenser Seismic Qualification
2. Task Interface Agreement 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)

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|---|---|
| Extent to which the guidance, JLD-ISG-2012-01 and NEI 12-06, are being followed. Identify any deviations to JLD-ISG-2012-01 and NEI 12-06.<br><br>Ref: JLD-ISG-2012-01<br>NEI 12-06 13.1 | *Include a description of any alternatives to the guidance, and provide a milestone schedule of planned action.* |

Full conformance with JLD-ISG-2012-01 and NEI 12-06 is expected.

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| Provide a sequence of events and identify any time constraint required for success including the technical basis for the time constraint.<br><br>Ref: NEI 12-06 section 3.2.1.7 | *Strategies that have a time constraint to be successful should be identified with a technical basis and a justification provided that the time can reasonably be met (for example, a walk through of deployment).*<br><br>*Describe in detail in this section the technical basis for the* |

| | |
|---|---|
| JLD-ISG-2012-01 section 2.1 | *time constraint identified on the sequence of events timeline Attachment 1A.*<br>*See attached sequence of events timeline (Attachment 1A).*<br>*Technical Basis Support information, see attached NSSS Significant Reference Analysis Deviation Table (Attachment 1B).* |

Discussion of time constraints identified in Attachment 1A table:

- t-2: 11 - 13 minutes, Operators will secure High Pressure Coolant Injection (HPCI) after one cycle or 10 minutes of operation to limit HPCI room heatup (Reference 1).
- t-3:, 30 minutes, Operators will open the DC Switchgear (SWGR) room doors and Control Room panel doors for panel without open backs to allow cooling (Reference 2)
- t-4: 1 hour, Operations will designate the event as an Extended Loss of AC Power (ELAP). The one hour is based on a reasonable amount of time to diagnose the event. Notification of the RRC is expected to take place here; however, the exact timing will be determined during the development of the site's playbook.
- t-5: 1 hour, Secure Main Turbine Emergency Lube Oil Pump (MTELOP). Action is required to support 250 VDC Division II Battery duration. The actions to secure the MTELOP consist of verifying that the Main Turbine has stopped rotating locally and then placing the control switch for the MTELOP in pull-to-lock in the Control Room. Per References 11 through 14, the batteries have the following average loads:
    - 125 VDC Division I 131 Amperes
    - 125 VDC Division II 120 Amperes
    - 250 VDC Division I 166 Amperes
    - 250 VDC Division II 144 Amperes

  Per Reference 3, the battery must have at least 90% of capacity at all times. Per Reference 15, given the average loads, and assuming an end-of-discharge value of 1.85 volts-per-cell, the batteries are estimated as being capable of supplying all required loads for at least the following time periods:
    - 125 VDC Division I 12 hours
    - 125 VDC Division II 13 hours
    - 250 VDC Division I 9 hours
    - 250 VDC Division II 10 hours
- t-6: 6 hours, Begin aligning Severe Accident Management Guideline (SAMG) Diesel Generator (DG) to battery chargers. Per Reference 2, 3 hours is required to place the SAMG DG in service. Personnel will begin arriving on-site at 6 hours. The shortest battery life is 250 VDC Division I at 9 hours.
- t-7: 6 hours, Begin alignment to transfer hotwell water to the ECSTs. When ECST inventory is near depletion, they will need to be re-filled to continue to allow RCIC to inject with cool water. The ECSTs have capacity for ~ 6 to 8 hours. When personnel begin arriving on site, it will be necessary to align and commence filling the ECSTs. The procedure/method for transferring water from the hotwell has not yet been developed. CNS will develop a method and associated procedure to accomplish this.
- t-8: 6 to 8 hours, Transfer Reactor Core Isolation Cooling (RCIC) suction to the torus. When ESCT level no longer supports continued RCIC operation, Operators will transfer the suction to the torus.
- t-9: 7 hours, as Torus temperature rises to near the Heat Capacity Temperature Limit

(HCTL), Operators will lower Reactor Pressure Vessel (RPV) pressure as low as possible while still maintaining RCIC in service per the Emergency Operating Procedures (EOP).

- t-10: 8 hours, Commence makeup to ECSTs from hotwell. At 8 hours into the event the makeup/leakage flow rate to the RPV will be 120 gpm (Reference 4), therefore makeup to the ECST will need to be at least 120 gpm.
- t-11: 8 hours, Begin torus venting to maintain containment parameters within limits. Per NEDC 33771P (Reference 5), containment venting is assumed to start at 4 or 8 hours. In conjunction with NRC Order EA-12-050 (Reference 6), CNS is upgrading the existing 10" Hard Pipe Vent (HPV) to a 12" Reliable Hardened Containment Vent (RHCV). With a 12" RHCV, drywell and wetwell parameters are maintained within limits.
- t-12: 9 hours, Place the SAMG DG in service. At 9 hours batteries will start to reach the end of their capabilities. Placing the SAMG DG in service will preserve the Division I Batteries.
- t-13: 9 hours, Realign RCIC back to the ECSTs. The available volume to transfer to the ECSTs from the hotwell is 80,625 gallons (Reference 4).
- t-14: 13 hours, Align RCIC suction to the torus to allow continued RCIC operation. The minimum useable water available to RCIC from the ECSTs and hotwell is 178,369 gallons (Reference 4). Using the methodology in NUMARC 87-00 (Reference 8) the total required condensate for an 8 hour SBO is 117,676 gallons and for a 16 hour SBO it is 215,326 gallons. A straight interpolation to 12 hours shows 166,501 gallons required (((215,326 - 117,676)/2) + 117, 676 = 166, 501) and interpolating that to 14 hours shows that 190,914 gallons are required (((215,326 - 166,501)/2) + 166,501 = 190,914). Between 12 and 14 hours RCIC suction will need to be transferred back to the torus. This timing is not critical as the torus has sufficient capacity for 24 hours without injection from the ECSTs (Reference 4). Operators will monitor ECST level and transfer when required per Procedure 5.3ALT-STRATEGY (Reference 10). CNS Calculation NEDC 89-1886 (Reference 9) verified the condensate inventory for the original 4 hour SBO coping analysis and demonstrated that the NUMARC methodology is a bounding method for all reactors and is conservative. Included in Reference 9 is a RPV leakage rate of 66 gpm which consists of the Technical Specifications maximum total leakage of 30 gpm and 18 gpm for each Reactor Recirculation Pump.
- t-15: 18 hours, Begin aligning raw water sources for makeup. Initially torus water level will rise due to injection from the ECSTs. When containment venting is required, torus water level will steady out and remain constant until RCIC suction is transferred to the torus, at which time torus level will begin to lower. Per Reference 5, approximately 3 feet of level in the suppression pool is vaporized during a 24 hour period through containment venting. The primary raw water source will be a well installed at the site. This new well will be sized for the makeup requirements 24 hours after shutdown and be hardened against the appropriate external hazards. The backup raw water source will be the Missouri River. The use of portable strainer/filters/demineralizers will be procured and used to assure the river water is acceptable for use in the reactor as an emergency makeup source.
- t-16: 24 hours, Begin makeup to the ECSTs to maintain RCIC availability while Phase 3 resources are being placed into service.

<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 5)) to supplement the guidance in NEI 12-06 by providing additional BWR-specific information regarding the individual plant response to the 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 nuclear steam supply system (NSSS) evaluation was performed. The BWR 4/Mark I containment analysis is applicable to CNS (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 SFP cooling. The guidance provided in Reference 5 was utilized as appropriate to develop coping strategies and for prediction of the plant's response.

2. CNS containment integrity for Phases 1 through 3 was evaluated by use of computer code MAAP 4.05 (Reference 7).

<u>References:</u>

1. NLS9100631, Response to Recommendations on Station Blackout, 10CFR50.63
2. Procedure 5.3SBO, Station Blackout
3. Technical Specification Surveillance Requirement 3.8.4.8
4. CNS-PSA-007, Cooper PRA Deterministic Calculations Notebook, Revision 1
5. NEDC 33771P, GEH Evaluation of FLEX Implementation Guidelines, Revision 1
6. NRC EA-12-050, Order to Modify Licenses with Regard to Reliable Hardened Containment Vents
7. NEDC 13-004, CNS Evaluation of Diverse and Flexible Coping Strategies for Extended Loss of AC Power
8. NUMARC 87-00, Revision 1, Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors
9. Calculation NEDC 89-1886, CNS Station Blackout (SBO) Condensate Inventory
10. Procedure 5.3ALT-STRATEGY, Alternate Core Cooling Mitigating Strategies
11. NEDC 87-131A, 250VDC Division 1 Load and Voltage Study, Revision 13
12. NEDC 87-131B, 250VDC Division 2 Load and Voltage Study, Revision 12
13. NEDC 87-131C, 125VDC Division 1 Load and Voltage Study, Revision 14
14. NEDC 87-131D, 125VDC Division 2 Load and Voltage Study, Revision 13
15. CNS Vendor Manual 1188, 125 & 250 Volt Batteries and Chargers

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

Once storage locations have been determined, deployment routes will be designated to transport the FLEX equipment to the staging areas. An administrative program will be developed to keep the routes and staging areas clear during all modes of operation.

| | |
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| Provide a milestone schedule. This schedule should include:<br>• Modifications timeline<br>o Phase 1 Modifications<br>o Phase 2 Modifications<br>o Phase 3 Modifications<br>• Procedure guidance development complete<br>o Strategies<br>o Maintenance<br>• Storage plan (reasonable protection)<br>• Staffing analysis completion<br>• FLEX equipment acquisition timeline<br>• Training completion for the strategies<br>• Regional Response Centers operational<br><br>Ref: NEI 12-06 section 13.1 | *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 Attachment 2. | |
| | |
| Identify how the programmatic controls will be met.<br><br>Ref: NEI 12-06 section 11<br>JLD-ISG-2012-01 section 6.0 | *Provide a description of the programmatic controls equipment protection, storage and deployment and equipment quality. See section 11 in NEI 12-06. Storage of equipment, 11.3, will be documented in later sections of this template and need not be included in this section.*<br>*See section 6.0 of JLD-ISG-2012-01.* |
| CNS will implement an administrative program. A program owner will be assigned with responsibility for configuration control, maintenance, and testing. The equipment for ELAP will be dedicated and will have unique identification number. CNS FLEX equipment will be categorized as Quality Augmented (QA). The QA will be based on selected Appendix B similar to Appendix K and SBO guidance. Standard industry preventive maintenance (PM) will be established for all components and testing procedures will be developed and frequencies established based on type of equipment and considerations made within EPRI guidelines. CNS will assess the addition of program description into USAR and Technical Requirements Manual. | |
| | |
| Describe training plan. | *List training plans for affected organizations or describe the plan for training development.* |

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| New training of general station staff and Emergency Preparedness will be performed in 2016, prior to the design implementation. Simulator and license operator training will not be impacted. The Systematic Approach to Training will be utilized to implement this training. | |
| | |
| Describe Regional Response Center plan. | *Discussion in this section may include the following information and will be further developed as the Regional Response Center development is completed.*<br>▪ *Site-specific RRC plan*<br>▪ *Identification of the primary and secondary RRC sites*<br>▪ *Identification of any alternate equipment sites (i.e. another nearby site with compatible equipment that can be deployed)*<br>▪ *Describe how delivery to the site is acceptable*<br>▪ *Describe how all requirements in NEI 12-06 are identified* |
| The industry is establishing two RRCs to support utilities during beyond design basis events. The RRCs will hold five sets of equipment, four of which will be able to be fully deployed when requested, the fifth set will have equipment in a maintenance cycle. Equipment will be moved from an RRC to a local Assemble Area, established by the Strategic Alliance for FLEX Emergency Response (SAFER) team and the utility. Communications will be established between the nuclear site and the SAFER team and required equipment moved to the site as needed. First arriving equipment, as established during development of the nuclear site's playbook, will be delivered to the site within 24 hours from the initial request.<br><br>Nebraska Public Power District (NPPD) has entered into a contract with Pooled Equipment Management Company to obtain, maintain and deliver the equipment specified by NPPD to the designated staging area within 24 hours. | |
| Notes: None. | |

## Maintain Core Cooling

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

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

BWR Installed Equipment Phase 1:

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

Power Operation, Startup, and Hot Shutdown:

The primary strategy for core cooling is to supply high quality water via RCIC with suction from the ECSTs. Two 50,000-gallon ECSTs are installed for the exclusive use of the RCIC and HPCI systems (Reference 4, Section VI-5.2.7). An additional 80,625 gallons is available in the Main Condenser Hotwells (Reference 6). The hotwells have been evaluated to be available after a seismic event (Reference 7). The combined capacity of the ECSTs, hotwells, and suppression pool is sufficient to support RPV makeup for at least 24 hours without external makeup sources.

At the initiation of the Beyond-Design-Basis External Event (BDBEE), 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 -42 inches, HPCI and RCIC automatically start with suction from the ECST (Reference 1, Technical Specification (TS), Table 3.3.5.1-1, Function 3A and TS Table 3.3.5.2-1, Function 1) and operate to inject makeup water to the reactor vessel. This injection recovers the reactor level to the high level setpoint of 54" (Reference 1, Tables 3.3.5.1-1 (Function 3c) and 3.3.5.2-1 (Function 2)). The SRVs will be used to control reactor pressure between approximately 800-1000 psig per EOP-1A RPV Control (Reference 2).

In a typical SBO event (and in the ELAP event), RCIC is able to provide make-up and maintain RPV level. HPCI is secured after one cycle or 10 minutes of operation (Reference 3).

After determination that Emergency Diesel Generators cannot be restarted, the operating crew determines the event is a beyond-design-basis event and anticipate a loss of power for an extended time period at approximately 1 hour into the event. RCIC is maintained feeding the reactor vessel with suction from the ECST. The RCIC trip signals and isolation signals that could possibly prevent RCIC operation when needed during the ELAP will be overridden in accordance with EOPs (Reference 2). 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.

[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.

As stated above, the primary method of reactor pressure control is by operation of the SRVs. Operator control of reactor pressure using SRVs require DC control power and pneumatic pressure (supplied by station batteries and the drywell pneumatics system (Reference 4, Section IV-4.6) to open. 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; however, each SRV is provided an accumulator which contains enough pneumatic pressure to operate each valve for multiple open/close cycles. The accumulators for the 2 SRVs associated with Low-Low SET (LLS) are sized to allow 14 cycles of each valve (Reference 4, Section IV-4.6). A plant specific drywell analysis was used to model the effects of a SBO event of 4 hours (Reference 5). The calculation models the operator taking manual action to disable LLS and initiate a manual cooldown of the RPV per EOPs (Reference 2). Twenty-seven individual SRV actuations in LLS mode and manual mode combined are required to maintain pressure control during the 4 hour SBO event. For the ELAP, after 4 hours, the 6 SRVs associated with ADS will be used to control pressure. The accumulators for the ADS valves are sized for 5 cycles and are credited for operation for approximately 40 hours after a SSE (Reference 4, Section IV-4.6). The combined capacity of the accumulators is sufficient to allow operation of the SRVs until Phase 2 when pneumatics will be restored with FLEX equipment.

The torus continues to heat up due to RCIC exhaust and SRV cycling. 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 (Reference 2). When the torus temperature reaches the Unsafe Region of the HCTL, RPV emergency depressurization is required (Reference 2). In accordance with Emergency Procedure Guidelines and per BWROG guidance, EOPs have been 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.

Based on experience derived from Fukushima, the RCIC system can run at a much higher lube oil temperature and suction source temperature than that originally assumed for the operation of RCIC. Additionally, the BWROG is developing a RCIC study (Reference 8) which will allow operation of RCIC at a lube oil temperature of >230°F; CNS will take the necessary actions to allow operation at elevated temperatures. Regarding Net Positive Suction Head (NPSH) for RCIC, CNS will perform a site-specific calculation to determine the available NPSH at elevated temperatures. Alternatively, if the analysis determines that adequate NPSH is not available, CNS will revise its strategy and use the water in the suppression pool first, preserving the ECST water into Phase 2 when makeup sources are available with FLEX equipment.

<u>Cold Shutdown and Refueling:</u>

The overall strategy for core cooling for Cold Shutdown and Refueling (Modes 4 and 5, respectively) are generally similar to those for Power Operation, Startup, and Hot Shutdown.

If an ELAP occurs during Cold Shutdown, water in the vessel will heatup. When temperature reaches 212°F, (Hot Shutdown) the vessel will begin to pressurize. During the pressure rise RCIC can be returned to service with suction from the ECST 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 above for core cooling. While the drywell airlock may be open, the amount of steaming will have limited impact on the Reactor Building until Phase 2 manpower is available to shut the airlock and well 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 to cool the core available. 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 then, depending on the time after shutdown, boiling in the core may occur quite rapidly.

Deploying and implementation of portable FLEX pumps to supply injection flow must commence immediately from the time of the event. This rapid response is 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. Cooper Nuclear Station Technical Specifications & Bases
2. Procedure 5.8 Emergency Operating Procedures (EOPs)
3. NLS9100631, Response to Recommendation on Station Blackout, 10CFR50.63
4. Cooper Nuclear Station Updated Safety Analysis Report
5. NEDC 91-261, Station Blackout with RCIC and RR Seal Leak, Revision 3
6. CNS-PSA-007, Cooper PRA Deterministic Calculations Notebook, Revision 1
7. Engineering Evaluation 01-147, Summary of Main Steam Isolation Valve (MSIV) Leakage Pathway to the Condenser Seismic Qualification, Revision 2
8. 0000-0155-1545-Draft A, RCIC Pump and Turbine Durability Evaluation - Pinch Point Study

Details:

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

Procedure 5.3SBO and the EOPs currently provide guidance to implement Phase 1.

| | |
|---|---|
| Identify modifications | *List modifications.* |

NPPD will evaluate the following potential modifications to address this phase:

- Upgrade ESCT level indicator piping to Seismic Class 1.
- Upgrade power supply and indicator for torus level.

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

| Parameter | Instrument | Indicator Location |
|---|---|---|
| RPV Level Narrow Range | RFC-LI-94A, B and C (0 to 60") | Control Room |
| RPV Level Narrow Range | NBI-LIS 83A and B (0 to 60")<br>NBI-LIS-101A, B, C and D (0 to 60") | Local rack<br>Local rack |
| RPV Level Wide Range | NBI-LI-185B (-155" to + 60") | Local ASDR |
| RPV Level Wide Range | NBI-LIS-57A and B (-150" to +60")<br>NBI-LIS-58A and B (-150" to +60")<br>NBI-LIS-72A, B, C and D (-150" to +60") | Local rack<br>Local rack<br>Local rack |
| RPV Level Fuel Zone | NBI-LI-191B (-320" to +60") | Local ASDR |
| RPV Level Fuel Zone | NBI-LITS-73A and B -260" to +40") | Local rack |
| RPV Pressure | RFC-PI-90A, B and C (0 to 1200 psig) | Control Room |
| RPV Pressure | NBI-PIS-60A and B (0 to 1500 psig)<br>NBI-PIS-52B and D (0 to 500 psig)<br>NBI-PI-61 (0 to 1500 psig) | Local rack<br>Local rack<br>Local rack |
| Drywell Pressure | PC-PI-513 (0 to 2 psig), PC-PI-2104AG (0 to 100 psig) | Local rack |
| Torus Pressure | PC-PI-20 (0 to 2 psig), PC-PI-2104BG (0 to 100 psig) | Local rack |
| Drywell Temperature | PC-TI-505A, B, C, D and E (50 to 600F) | Control Room |
| Drywell Temperature | PC-TE-505A,B, C, D and E, with use of M&TE (50 to 600F) | Control Room |
| Torus Temperature | PC-TE-1A thru H and PC-TE-2A thru H with use of M&TE (0 to 250F) | Local, Cable Spreading Room |
| Torus Temperature | PC-TI-2A, C, E and G (0 to 250F) | Local ASDR |
| Torus Level | PC-LI-110 (-4" to +6" H2O) | Local ASDR |
| ECST Level | CM-LI-1681B (0 to 16' H2O) | Local ASDR |
| ECST Level | HPCI-PI-117A, convert pressure to level | Local rack |
| Spent Fuel Pool Level | TBD, NRC Order EA-12-051 | |
| Spent Fuel Pool Level | Visual | Local at SFP |
| Spent Fuel Pool Temperature | M&TE | Local at SFP |

ASDR - Aux Shutdown Room
TAF = -158"

Notes: None.

**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 is maintained using RCIC in automatic mode (i.e., with operators controlling the RCIC flow controller) with suction from the ECST. When ECST grade water becomes depleted, the ECST will be refilled from a yet to be installed on-site well. The well will be hardened, sized for the required makeup capacity and powered by a portable FLEX generator. The water will be pumped to the ECST connection point through hose. Alternatively, makeup for the ECST will be provided from the Missouri River through a series of portable strainers/filters/demineralizers to ensure sufficient water quality. The torus water level will be influenced both by the addition of water from the SRV discharge as well as evaporation through the RHCV which is placed in service at about 8 hours into the event to maintain containment parameters below design limits (see Maintain Containment response for additional discussion of the RHCV).

During Phase 2, reactor pressure is controlled by operation of SRVs as described in Phase 1 with the use of a portable FLEX pneumatic source.

The 125 VDC Division I batteries are available for approximately 9 hours without recharging. Connecting the SAMG DG to Motor Control Center (MCC) LX or TX provides the ability to power Battery Chargers 125 VDC 'C' and 250 VDC 'C' which charge the 125 VDC Division I battery, the 250 VDC Division 1 battery and supply DC loads. The SAMG 480 VAC, 175 kW DG will be connected at approximately 9 hours and is sized to power two 125/250 VDC Battery Chargers and the DC Busses. Permanently installed cables will be installed from a point near the MCC to the exterior of the Control Building. The deployment area of the SAMG 480 VAC DG powering the 480 V MCC will be located near the Turbine Building (Reference 3). Cables from the generators are run to a connection point on the exterior of the Control Building.

Alternate Strategy:

Providing defense in depth for RCIC, a FLEX pump deployed at the river can provide RPV injection via the normal Residual Heat Removal Service Water (RHRSW) crosstie to the Residual Heat Removal (RHR) injection flow path. Piping will be installed to a connection point to the exterior of the Control Building. RPV pressure will be reduced to below the shutoff head of the FLEX pump after which the RHRSW to RHR flow path is established by opening valves SW-V-118 or 119, and SW-V-120 (Reference 4) to allow flow into the 24" line to the Low Pressure Coolant Injection valves, RHR-MO-27A and RHR-MO-25A (RHR-MO-27B and RHR-MO-25B for loop B). This provides the flow path into the RPV (References 1 and 2). The FLEX pump will supply water to the connection point via hose and strainer/filter/demineralizer to assure water quality.

As an alternate strategy to power the battery chargers from their MCCs, connection points are planned to be installed on each of the 480V Busses. This will allow connecting power cables from a larger FLEX 480 VAC DG directly to the bus.

For Cold Shutdown and Refueling strategies see the discussion in the Phase 1 section above.

References:

1. B&R Drawing 2036, Reactor Building Service Water System
2. B&R Drawing 2040, RHR System
3. Procedure 2.2.100, SAMG Diesel Generator System
4. B&R Drawing 2006, Control Building SW System

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

CNS 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.* |

NPPD will evaluate the following potential modifications to address this phase:

- An external connection point on the exterior of the Control Building for connection of FLEX equipment.
- RHRSW tie-in to external connection point.
- New well for supplying makeup water.
- Hotwell to ECST transfer.
- Torus Wide Range Level Indication power supply.
- 'C' Chargers tie-in to external connection point.
- RCIC mods to support running at high torus temp.
- SRV pneumatic tie-in to external connection point.
- 480 FLEX Generator to 480 F and G Bus tie-ins.

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

| Parameter | Instrument | Indicator Location |
|---|---|---|
| RPV Level Narrow Range | RFC-LI-94A, B and C (0 to 60") | Control Room |
| RPV Level Narrow Range | NBI-LIS 83A and B (0 to 60")<br>NBI-LIS-101A, B, C and D (0 to 60") | Local rack<br>Local rack |
| RPV Level Wide Range | NBI-LIS-57A and B (-150" to +60")<br>NBI-LIS-58A and B (-150" to +60")<br>NBI-LIS-72A, B, C and D (-150" to +60") | Local rack<br>Local rack<br>Local rack |
| RPV Level Fuel Zone | NBI-LITS-73A and B -260" to +40") | Local rack |
| RPV Pressure | RFC-PI-90A, B and C (0 to 1200 psig) | Control Room |
| RPV Pressure | NBI-PIS-60A and B (0 to 1500 psig)<br>NBI-PIS-52B and D (0 to 500 psig)<br>NBI-PI-61 (0 to 1500 psig) | Local rack<br>Local rack<br>Local rack |
| Drywell Pressure | PC-PI-513 (0 to 2 psig), PC-PI-2104AG (0 to 100 psig) | Local rack |
| Torus Pressure | PC-PI-20 (0 to 2 psig), PC-PI-2104BG (0 to 100 psig) | Local rack |
| Drywell Temperature | PC-TE-505A,B, C, D and E, with use of M&TE (50 to 600F) | Control Room |
| Torus Temperature | PC-TE-1A thru H and PC-TE-2A thru H with use of M&TE (0 to 250F) | Local, Cable Spreading Room |
| ECST Level | HPCI-PI-117A, convert pressure to level | Local rack |
| Spent Fuel Pool Level | TBD, NRC Order EA-12-051 | |
| Spent Fuel Pool Level | Visual | Local at SFP |
| Spent Fuel Pool Temperature | M&TE | Local at SFP |
| Containment/Torus Wide Range Level | PC-LRPR-1A/1B (0 to 100ft) and (0 to 30ft) | Control Room |

TAF = -158"

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

| Seismic | *List how equipment is protected or schedule to protect.* |
|---|---|

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.

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

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| Flooding<br>Note: if stored below current flood level, then ensure procedures exist to move equipment prior to exceeding flood level | *List how equipment is protected or schedule to protect.* |
| Not applicable per NEI 12-06 as outlined within the first section of this Integrated Plan. | |
| Severe Storms with High Winds | *List how equipment is protected or schedule to protect.* |
| 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.<br><br>CNS procedures and programs are being developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to CNS. | |
| Snow, Ice, and Extreme Cold | *List how equipment is protected or schedule to protect.* |
| 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.<br><br>CNS procedures and programs are being developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to CNS. | |
| High Temperatures | *List how equipment is protected or schedule to protect.* |
| 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.<br><br>CNS procedures and programs are being developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to CNS. | |

| Deployment Conceptual Modification<br>(Attachment 3 contains Conceptual Sketches) | | |
|---|---|---|
| Strategy | Modifications | Protection of connections |
| *Identify Strategy including how the equipment will be deployed to the point of use.* | *Identify modifications.* | *Identify how the connection is protected.* |

| | | |
|---|---|---|
| Tentative storage locations have been proposed. Once these are finalized, clear deployment paths will be identified and controlled by administrative procedures to allow connection of the FLEX equipment to the external connection point. | See above potential modifications regarding connection points. | • An external connection point structure for FLEX equipment is planned to be constructed on the exterior of the Control Building. This will house all of the external connections to plant systems with the exception of the larger FLEX 480 VAC generator. This structure will be designed to withstand the applicable hazards.<br>• The connection points for the FLEX 480 VAC generator will be inside the existing Class I Critical SWGR Rooms. Pre-staged cables will be used to connect the generator to the connections.<br>• New FLEX piping will be installed to meet necessary seismic requirements. |
| Notes: None. | | |

| **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.*<br><br>For Phase 3, the reactor core cooling strategy is to place one loop of RHR into the Shutdown Cooling (SDC) mode. This will be accomplished by powering up a Division I or II RHR pump from the Class 1E emergency F or G 4160 VAC 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) from the Missouri River via the RHRSW piping external connection point.<br><br>The 4160 VAC RRC FLEX diesel generator will be capable of carrying approximately 3250 kW load which is sufficient to carry all of the loads on 4160 VAC bus F or G necessary to support the Phase 3 FLEX strategies which includes an RHR pump and its support equipment (i.e., Motor Operator Valves, jockey pump, room coolers, etc.). In order to prevent pipe damage due to water hammer, the Reactor Building Aux Condensate Pump 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).<br><br><u>Alternative Strategy:</u><br><br>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.<br><br>An alternate means of providing power to the RHR pumps for SDC operation is 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. | |
| Details: | |
| Provide a brief description of Procedures / Strategies / Guidelines. | *Confirm that procedure/guidance exists or will be developed to support implementation.* |
| CNS 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.* |

NPPD will evaluate the following potential modifications to address this phase:

- Modification for connection of 4160 VAC RRC DG to the F or G 4160 VAC bus is made by modifying a spare breaker in the warehouse to be able to accept the cable connections from the RRC DG such that in Phase 3 that breaker can be inserted into a spare slot or non-required breaker to connect the DG to the bus. (Primary Strategy)
- Modification to allow re-powering the Reactor Building Aux Condensate Pump.

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

| Parameter | Instrument | Indicator Location |
|---|---|---|
| RPV Level Narrow Range | RFC-LI-94A, B and C (0 to 60") | Control Room |
| RPV Level Narrow Range | NBI-LIS 83A and B (0 to 60")<br>NBI-LIS-101A, B, C and D (0 to 60") | Local rack<br>Local rack |
| RPV Level Wide Range | NBI-LI-185B (-155" to + 60") | Local ASDR |
| RPV Level Wide Range | NBI-LIS-57A and B (-150" to +60")<br>NBI-LIS-58A and B (-150" to +60")<br>NBI-LIS-72A, B, C and D (-150" to +60") | Local rack<br>Local rack<br>Local rack |
| RPV Level Fuel Zone | NBI-LI-191B (-320" to +60") | Local ASDR |
| RPV Level Fuel Zone | NBI-LITS-73A and B -260" to +40") | Local rack |
| RPV Pressure | RFC-PI-90A, B and C (0 to 1200 psig) | Control Room |
| RPV Pressure | NBI-PIS-60A and B (0 to 1500 psig)<br>NBI-PIS-52B and D (0 to 500 psig)<br>NBI-PI-61 (0 to 1500 psig) | Local rack<br>Local rack<br>Local rack |
| Drywell Pressure | PC-PI-513 (0 to 2 psig), PC-PI-2104AG (0 to 100 psig) | Local rack |
| Torus Pressure | PC-PI-20 (0 to 2 psig), PC-PI-2104BG (0 to 100 psig) | Local rack |
| Drywell Temperature | PC-TI-505A, B, C, D and E (50 to 600F) | Control Room |
| Drywell Temperature | PC-TE-505A,B, C, D and E, with use of M&TE (50 to 600F) | Control Room |
| Torus Temperature | PC-TE-1A thru H and PC-TE-2A thru H with use of M&TE (0 to 250F) | Local, Cable Spreading Room |
| Torus Temperature | PC-TI-2A, C, E and G (0 to 250F) | Local ASDR |
| Torus Level | PC-LI-110 (-4" to +6" H2O) | Local ASDR |
| ECST Level | CM-LI-1681B (0 to 16' H2O) | Local ASDR |
| ECST Level | HPCI-PI-117A, convert pressure to level | Local rack |
| Spent Fuel Pool Level | TBD, NRC Order EA-12-051 | |
| Spent Fuel Pool Level | Visual | Local at SFP |
| Spent Fuel Pool Temperature | M&TE | Local at SFP |

ASDR - Aux Shutdown Room
TAF = -158"

| Deployment Conceptual Modification<br>(Attachment 3 contains Conceptual Sketches) | | |
|---|---|---|
| Strategy | Modifications | Protection of connections |
| *Identify Strategy including how the equipment will be deployed to the point of use* | *Identify modifications* | *Identify how the connection is protected* |
| Phase 3 equipment will be provided by the 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 at a staging area yet to be determined. | See above potential modifications regarding connection points. | See Phase 2 for the external connection point for RHRSW. The 4160 RCC FLEX DG connection will be in the existing Class I Critical SWGR Rooms. |
| Notes: None. | | |

## Maintain Containment

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

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

### BWR Installed Equipment Phase 1:

*Provide a general description of the coping strategies using installed equipment including modifications that are proposed to maintain core cooling. 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 RHCV. In accordance with NEI 12-06 (Reference 1), 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 level rises due to the transfer of inventory from the ECST to the torus (via RCIC and SRVs). According to BWROG analysis (Reference 2) containment parameters can be controlled within design limits by utilization of the RHCV and venting the containment. In this case, the RHCV is used as implemented per EA-12-050, Reliable Hardened Containment Vents (Reference 4) with control from the Main Control Room (MCR). CNS has performed a Probabilistic Risk Assessment level MAAP analysis to validate the strategy in the BWROG analysis (Reference 3) and will perform additional calculations to establish the exact timing and duration of containment venting.

The containment design pressure is 62 psig (Reference 5, Section V-2.3). Containment pressure limits are not expected to be reached during the event as indicated by MAAP analysis (Reference 3), because the RHCV will be opened prior to exceeding any containment pressure limits.

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:

1. NEI 12-06, Diverse and Flexible Coping Strategies (FLEX) Implementation Guide, Revision 0, August 2012
2. NEDC 33771P, GEH Evaluation of FLEX Implementation Guidelines, Revision 1
3. NEDC 13-004, CNS Evaluation of Diverse and Flexible Coping Strategies for Extended Loss of AC Power
4. Interim Staff Guidance JLD-ISG-2012-02, Compliance with Order EA-12-050, Reliable Hardened Containment Vents, Revision 0
5. Cooper Nuclear Station Updated Safety Analysis Report

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

Details:

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

CNS 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.* |

Hardened Containment Vent System (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 for this coping evaluation.* |

| Parameter | Instrument | Indicator Location |
|---|---|---|
| Drywell Pressure | PC-PI-513 (0 to 2 psig), PC-PI-2104AG (0 to 100 psig) | Local rack |
| Torus Pressure | PC-PI-20 (0 to 2 psig), PC-PI-2104BG (0 to 100 psig) | Local rack |
| Drywell Temperature | PC-TI-505A, B, C, D and E (50 to 600F) | Control Room |
| Drywell Temperature | PC-TE-505A,B, C, D and E, with use of M&TE (50 to 600F) | Control Room |
| Torus Temperature | PC-TE-1A thru H and PC-TE-2A thru H with use of M&TE (0 to 250F) | Local, Cable Spreading Room |
| Torus Temperature | PC-TI-2A, C, E and G (0 to 250F) | Local ASDR |
| Torus Level | PC-LI-110 (-4" to +6" H2O) | Local ASDR |
| Hard Pipe Vent Open Indication | PC-RIL-SPV32 | Control Room |
| Hard Pipe Vent Closed Indication | PC-GIL-SPV32 | Control Room |
| PC 233MV Open Indication | PC-RIL-MV233 | Control Room |
| PC 233 MV Closed Indication | PC-GIL-MV233 | Control Room |
| PC 237AV Open Indication | PC-RIL-SPV237 | Control Room |
| PC 237AV Closed Indication | PC-RIL-SPV237 | Control Room |

ASDR - Aux Shutdown Room

Notes: None.

| **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 core cooling. Identify methods (containment vent or alternative / Hydrogen Igniters) and strategy(ies) utilized to achieve this coping time.*<br><br>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.* |
| CNS 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.* |
| See modifications listed in Phase 2 discussion. | |

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

| Parameter | Instrument | Indicator Location |
|---|---|---|
| Drywell Pressure | PC-PI-513 (0 to 2 psig), PC-PI-2104AG (0 to 100 psig) | Local rack |
| Torus Pressure | PC-PI-20 (0 to 2 psig), PC-PI-2104BG (0 to 100 psig) | Local rack |
| Drywell Temperature | PC-TI-505A, B, C, D and E (50 to 600F) | Control Room |
| Drywell Temperature | PC-TE-505A,B, C, D and E, with use of M&TE (50 to 600F) | Control Room |
| Torus Temperature | PC-TE-1A thru H and PC-TE-2A thru H with use of M&TE (0 to 250F) | Local, Cable Spreading Room |
| Hard Pipe Vent Open Indication | PC-RIL-SPV32 | Control Room |
| Hard Pipe Vent Closed Indication | PC-GIL-SPV32 | Control Room |
| PC 233MV Open Indication | PC-RIL-MV233 | Control Room |
| PC 233 MV Closed Indication | PC-GIL-MV233 | Control Room |
| PC 237AV Open Indication | PC-RIL-SPV237 | Control Room |
| PC 237AV Closed Indication | PC-RIL-SPV237 | Control Room |

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

| Seismic | *List how equipment is protected or schedule to protect.* |
|---|---|

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.

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

| Flooding<br>Note: if stored below current flood level, then ensure procedures exist to move equipment prior to exceeding flood level. | *List how equipment is protected or schedule to protect.* |
|---|---|

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

| Severe Storms with High Winds | *List how equipment is protected or schedule to protect.* |
|---|---|

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.

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

| Snow, Ice, and Extreme Cold | *List how equipment is protected or schedule to protect.* |
|---|---|

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.

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

| High Temperatures | *List how equipment is protected or schedule to protect.* |
|---|---|

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.

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

Deployment Conceptual Design
(Attachment 3 contains Conceptual Sketches)

| Strategy | Modifications | Protection of connections |
|---|---|---|
| *Identify Strategy including how the equipment will be deployed to the point of use.* | *Identify modifications.* | *Identify how the connection is protected.* |
| The RHCV is designed as permanently installed equipment. No deployment strategy is required. | The RHCV 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. | RHCV is designed as permanently installed equipment. No connection points are required. |

Notes: None.

| **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 core cooling. Identify methods (containment vent or alternative / Hydrogen Igniters) and strategy(ies) utilized to achieve this coping time.*<br><br>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.* |
| CNS 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.* |
| See Phase 2 discussion. | |
| Key Containment Parameters | *List instrumentation credited or recovered for this coping evaluation.* |
| See Phase 2 discussion. | |

| Deployment Conceptual Design<br>(Attachment 3 contains Conceptual Sketches) | | |
|---|---|---|
| Strategy | Modifications | Protection of connections |
| *Identify Strategy including how the equipment will be deployed to the point of use.* | *Identify modifications* | *Identify how the connection is protected* |
| See Phase 2 discussion. | See Phase 2 discussion. | See Phase 2 discussion. |
| Notes: None. | | |

| **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:<br>• Makeup with Portable Injection Source | |
| BWR Installed Equipment Phase 1: | |
| *Provide a general description of the coping strategies using installed equipment including modifications that are proposed to maintain spent fuel pool cooling. Identify methods (makeup with portable injection source) and strategy(ies) utilized to achieve this coping time.*<br><br>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.<br><br>The normal SFP water level at the event initiation provides for at least 21 feet, 6 inches (Reference 1, Specification 3.7.6) of water inventory above the top of the stored spent fuel.<br><br>Per Reference 2, the most limiting time to fuel uncovery is 45.67 hours (Per Reference 2, Attachment C), resulting from a full-core offload, 5 days after shutdown, the fuel pool gates installed and an initial SFP temperature of 150°F (Mode 5). For other Modes, 200.56 hours (8.36 days) are available resulting from a partial core off-load of 160 bundles, 30 days after shutdown, the fuel pool gates installed and an initial SFP temperature of 150°F.<br><br><u>References:</u><br><br>1. CNS Technical Specifications<br>2. NEDC 92-147, Estimation of Time to Fuel Pool Boiling and Fuel Uncovery with Loss of Decay Heat Removal, Revision 2 | |
| Details: | |
| Provide a brief description of Procedures / Strategies / Guidelines | N/A |
| Identify any equipment modifications | N/A |
| Key SFP Parameter | Per EA 12-051. |
| Notes: None. | |

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

| Maintain Spent Fuel Pool Cooling | |
|---|---|
| BWR Portable Equipment Phase 2: | |
| *Provide a general description of the coping strategies using on-site portable equipment including modifications that are proposed to maintain spent fuel pool cooling. Identify methods (makeup with portable injection source) and strategy(ies) utilized to achieve this coping time.*<br><br>Phase 2 equipment will be staged at approximately 8 to 12 hours into the event. Per Reference 4, a minimum of 45.67 hours is available prior to uncovery of fuel. The strategy in Phase 2 will be to supply makeup water to the SFP at rates greater that the SFP boil off rate using the methods below:<br><br><u>Primary Strategy Method 1:</u><br><br>The first method uses the same FLEX pump used for RPV injection pumping from the raw water source into the RHR (Reference 1) or RHRSW (Reference 2) Systems via the external connection points installed for RPV injection. The RHR to Fuel Pool Cooling (FPC) crosstie valve (FPC-83) is opened to allow injection into the FPC System (Reference 3).<br><br><u>Primary Strategy Method 2:</u><br><br>The second method uses the same FLEX pump as above but will tie into a FPC chemical decon connection at the aforementioned external connection point.<br><br><u>Primary Strategy Method 3:</u><br><br>The third method is the method CNS uses to satisfy the 10 CFR 50.54(hh)(2) commitment and uses a portable fire pump through hoses and nozzles to spray water into the fuel pool. The FLEX pump is rated at 925 gpm and the portable fire pump is rated at 4000 gpm. Per Reference 5 the maximum boiloff rate is 70 gpm.<br><br><u>References:</u><br><br>1. B&R Drawing 2040, RHR System<br>2. B&R Drawing 2036, Reactor Building Service Water System<br>3. B&R Drawing 2030, Fuel Pool Cooling and Clean-up System<br>4. NEDC 92-147, Estimation of Time to Fuel Pool Boiling and Fuel Uncovery with loss of Decay Heat Removal<br>5. NEDC 05-008, Bulk Thermal-Hydraulic Analyses for the Cooper SFP with GE14 and GNF2 Fuel Assemblies | |
| Schedule: | |
| Provide a brief description of Procedures / Strategies / Guidelines. | *Confirm that procedure/guidance exists or will be developed to support implementation.* |

| | |
|---|---|
| CNS 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* |
| NPPD will evaluate the following potential modification to address this phase:<br>• Modify the SFP system to connect the decon connection to the external connection point. | |
| Key SFP Parameter | Per EA 12-051. |
| Storage / Protection of Equipment:<br>Describe storage / protection plan or schedule to determine storage requirements | |
| Seismic | *List how equipment is protected or schedule to protect.* |
| 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.<br><br>CNS procedures and programs are being developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to CNS. | |
| Flooding<br>Note: if stored below current flood level, then ensure procedures exist to move equipment prior to exceeding flood level. | *List how equipment is protected or schedule to protect.* |
| Not applicable per NEI 12-06 as outlined within the first section of this Integrated Plan. | |
| Severe Storms with High Winds | *List how equipment is protected or schedule to protect.* |
| 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.<br><br>CNS procedures and programs are being developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to CNS. | |
| Snow, Ice, and Extreme Cold | *List how equipment is protected or schedule to protect.* |

| | |
|---|---|
| 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.<br><br>CNS procedures and programs are being developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to CNS. | |
| High Temperatures | *List how equipment is protected or schedule to protect.* |
| 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.<br><br>CNS procedures and programs are being developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to CNS. | |

| Deployment Conceptual Design<br>(Attachment 3 contains Conceptual Sketches) | | |
|---|---|---|
| Strategy | Modifications | Protection of connections |
| *Identify Strategy including how the equipment will be deployed to the point of use.* | *Identify modifications.* | *Identify how the connection is protected.* |
| Tentative storage locations have been proposed. Once these are finalized, clear deployment paths will be identified and controlled by administrative procedures to allow connection of the FLEX equipment to the external connection point. | See above potential modification regarding connection points. | • An external connection point structure for FLEX equipment is planned to be constructed on the exterior of the Control Building. This will house all of the external connections to plant systems with the exception of the larger FLEX 480 VAC generator. This structure will be designed to withstand the applicable hazards.<br>• New FLEX piping will be installed to meet necessary seismic requirements. |
| Notes: None. | | |

| **Maintain Spent Fuel Pool Cooling** | | |
|---|---|---|
| BWR Portable Equipment Phase 3: | | |
| *Provide a general description of the coping strategies using phase 3 equipment including modifications that are proposed to maintain spent fuel pool cooling. Identify methods (makeup with portable injection source) and strategy(ies) utilized to achieve this coping time.*<br><br>Same as Phase 2. | | |
| Schedule: | | |
| Provide a brief description of Procedures / Strategies / Guidelines | *Confirm that procedure/guidance exists or will be developed to support implementation.* | |
| CNS 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.* | |
| See Phase 2 discussion. | | |
| Key SFP Parameter | Per EA 12-051. | |
| Deployment Conceptual Design<br>(Attachment 3 contains Conceptual Sketches) | | |
| Strategy | Modifications | Protection of connections |
| *Identify Strategy including how the equipment will be deployed to the point of use.* | *Identify modifications.* | *Identify how the connection is protected.* |
| See Phase 2 discussion. | See Phase 2 discussion. | See Phase 2 discussion. |
| Notes: None. | | |

| Safety Functions Support |
|---|
| Determine Baseline coping capability with installed coping[4] modifications not including FLEX modifications. |
| BWR Installed Equipment Phase 1 |

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

Main Control Room Accessibility:

MCR habitability must be maintained for the duration of the ELAP. During the ELAP, some Control Room vital electronics, instrumentation and emergency lighting remain energized from emergency DC power sources. The current CNS calculation for MCR heatup (Reference 1) documents the loss of ventilation analysis for the MCR. The calculation in Reference 1, determined that the MCR temperature quickly rose to about 92°F around 30 minutes into the transient and then slows to a gradual increase toward equilibrium thereafter. The maximum Control Room temperature at the end of 4 hours was determined to be 100.3°F. The heatup rate between hours 3 and 4 is 1.05°F/hour. Extrapolating this rate out to 8 hours results in a maximum temperature after 8 hours of 104.5°F. This temperature remains less than 110°F which is the assumed maximum temperature for efficient human performance as described in NUMARC 87-00 (Reference 2).

RCIC Room Accessibility:

The RCIC room will have a continuous heat load under ELAP conditions in Phases 1 and 2 of the BDBEE, since RCIC is utilized throughout the event as the primary source of core cooling. The current calculation for RCIC room heat up (Reference 3), determined that the RCIC room temperature reached a maximum of 145.1°F at 12 hours. Per the Reference 4, Section IV-7.5, the RCIC System is designed for continuous operation at a temperature of 148°F and 100% relative humidity.

References:

1. NEDC 89-1948 NED Review of SBO Control Room Heatup, Revision 0C5
2. NUMARC 87-00, Revision 1, Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors
3. NEDC 07-065, Reactor Building Heatup with a Loss of Cooling
4. CNS Updated Safety Analysis Report

[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.

| Details: | |
|---|---|
| Provide a brief description of Procedures / Strategies / Guidelines | *Confirm that procedure/guidance exists or will be developed to support implementation.* |
| CNS 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.* |
| None. | |
| Key Parameters | *List instrumentation credited for this coping evaluation phase.* |
| Temperature indication for the MCR is available from a battery powered thermometer in the MCR. | |
| Notes: None. | |

## 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:

Phase 2 cooling will consist of the use of portable fans powered from portable diesel generators to draw in outside air and provide circulation within the room and improve the heat removal to maintain lower temperatures. CNS will perform a calculation to determine the appropriate size fan to maintain temperature.

RCIC Room Habitability:

Phase 2 cooling will consist of the use of portable fans powered from portable diesel generators to draw in outside air and provide circulation within the room and improve the heat removal to maintain lower temperatures. CNS will perform a calculation to determine the appropriate size fan to maintain temperature.

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.

Battery Room Ventilation:

During battery charging operations in Phase 2, ventilation is required in the main battery rooms due to hydrogen generation. Portable ventilation fans are deployed with the deployment of the SAMG DG (Reference 1).

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 (Reference 2). The FLEX strategy to cope with the pressurization of the refueling floor and prevent buildup of steam and condensation is to open the Reactor Building roof hatch. In order to establish flow of air through the SFP area, it is also necessary to open the Reactor Building heating and ventilation room doors on the 3rd floor or the railroad doors on the ground level.

References:

1. Procedure 2.2.100, SAMG Diesel Generator System
2. NEI 12-06, Diverse and Flexible Coping Strategies (FLEX) Implementation Guide, Revision 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.* |
| CNS 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.* |
| NPPD will evaluate the following potential modification to address this phase:<br><br>• Modify the Reactor Building roof hatch to allow remote operation without having to access the refuel floor. | |
| Key Parameters | *List instrumentation credited or recovered for this coping evaluation.* |
| None. | |

| Storage / Protection of Equipment:<br>Describe storage / protection plan or schedule to determine storage requirements. | |
|---|---|
| Seismic | *List how equipment is protected or schedule to protect.* |
| 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.<br><br>CNS procedures and programs are being developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to CNS. | |
| Flooding<br>Note: if stored below current flood level, then ensure procedures exist to move equipment prior to exceeding flood level. | *List how equipment is protected or schedule to protect.* |
| Not applicable per NEI 12-06 as outlined within the first section of this Integrated Plan. | |
| Severe Storms with High Winds | *List how equipment is protected or schedule to protect.* |

| | |
|---|---|
| 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.<br><br>CNS procedures and programs are being developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to CNS. | |
| Snow, Ice, and Extreme Cold | *List how equipment is protected or schedule to protect.* |
| 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.<br><br>CNS procedures and programs are being developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to CNS. | |
| High Temperatures | *List how equipment is protected or schedule to protect.* |
| 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.<br><br>CNS procedures and programs are being developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the hazards applicable to CNS. | |

| Deployment Conceptual Design<br>(Attachment 3 contains Conceptual Sketches) | | |
|---|---|---|
| Strategy | Modifications | Protection of connections |
| *Identify Strategy including how the equipment will be deployed to the point of use.* | *Identify modifications.* | *Identify how the connection is protected.* |
| The fans that will be deployed for room cooling will be stored in the FLEX Storage Building and deployed via identified and evaluated haul routes to the power block and their staging areas. | No other modifications are necessary, beyond those already identified (buildings, roads, etc.) for deployment of the strategies associated with the Phase 2 support function. | None. |
| Notes: None. | | |

| 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 Habitability:

The primary and alternate strategies for cooling the MCR are the same in Phase 3 as for Phase 2. However, the power for the MCR Supply Fans, Exhaust Fans and A/C unit will be powered from the 4160 VAC critical bus when the bus is re-energized by the RRC FLEX 4160 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 room 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). This can be accomplished once the RRC 4160 VAC FLEX DG will be connected to the 4160 VAC critical bus at which time the normal Reactor Building heating and ventilation can be restored. This will also restore power to the RHR room cooler; however no cooling water is available due to the loss of Service Water (SW) (ultimate heat sink) cooling to the Reactor Equipment Cooling (REC) System (References 1 and 2). CNS will modify the SW supply to REC to allow cooling water to be supplied from the FLEX pump via the external connection point.

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. B&R Drawing 2031, Reactor Building Closed Cooling Water System
2. B&R Drawing 2006, Circulation Screen Wash and Service Water Systems

<table>
<tr><td colspan="3">Details:</td></tr>
<tr><td>Provide a brief description of Procedures / Strategies / Guidelines.</td><td colspan="2">Confirm that procedure/guidance exists or will be developed to support implementation with a description of the procedure / strategy / guideline.</td></tr>
<tr><td colspan="3">CNS 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.</td></tr>
<tr><td>Identify modifications</td><td colspan="2">List modifications necessary for phase 3</td></tr>
<tr><td colspan="3">NPPD will evaluate the following potential modification to address this phase:<br>• Modify the SW supply piping to REC to allow connection of the FLEX pump to supply cooling to the RHR room cooler.</td></tr>
<tr><td>Key Parameters</td><td colspan="2">List instrumentation credited or recovered for this coping evaluation.</td></tr>
<tr><td colspan="3">None.</td></tr>
<tr><td colspan="3">Deployment Conceptual Design<br>(Attachment 3 contains Conceptual Sketches)</td></tr>
<tr><td>Strategy</td><td>Modifications</td><td>Protection of connections</td></tr>
<tr><td>Identify Strategy including how the equipment will be deployed to the point of use.</td><td>Identify modifications.</td><td>Identify how the connection is protected.</td></tr>
<tr><td>See Phase 2, Safety Functions Support.</td><td>See Phase 2, Safety Functions Support.</td><td>See Phase 2, Safety Functions Support.</td></tr>
<tr><td colspan="3">Notes: None.</td></tr>
</table>

| BWR Portable Equipment Phase 2 | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Use and (potential / flexibility) diverse uses* | | | | | | *Performance Criteria* | *Maintenance* |
| *List portable equipment* | Core | Containment | SFP | Instrumentation | Accessibility | | Maintenance / PM requirements |
| Two (2) self-priming DG driven FLEX pumps | X | -- | X | -- | -- | 925 gpm, 378' head | Will follow EPRI template requirements |
| Two (2) temporary water storage tanks or bladders | X | X | X | -- | -- | 20,000 gallons, with small portable heaters | Will follow EPRI template requirements |
| Two (2) portable diesel driven air compressors | X | -- | -- | -- | -- | 300 cfm @ 200 psi | Will follow EPRI template requirements |
| Two (2) 480 VAC Diesel Generators | X | X | -- | -- | -- | 175kW | Will follow EPRI template requirements |
| Two (2) 240/120 VAC Diesel Generators | -- | -- | -- | -- | X | 12kW<br>Control Room lights, fans | Will follow EPRI template requirements |
| Three (3) 240/120 VAC Diesel Generators | -- | -- | -- | -- | X | 6kW<br>Battery Room fans<br>RCIC Room Fan | Will follow EPRI template requirements |

| BWR Portable Equipment Phase 2 | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Use and (potential / flexibility) diverse uses* | | | | | | *Performance Criteria* | *Maintenance* |
| *List portable equipment* | Core | Containment | SFP | Instrumentation | Accessibility | | Maintenance / PM requirements |
| Two (2) refueling trailers | -- | -- | -- | -- | X | 100 gallons | Will follow EPRI template requirements |
| Two (2) Monitor Spray Nozzles for SFP Spray and required hoses | -- | -- | X | -- | -- | Sized for 250 gpm | Will follow EPRI template requirements |
| Two (2) tow vehicles | -- | -- | -- | -- | X | Capable of towing pumps, DGs and compressors | Will follow EPRI template requirements |

Notes: The number of storage locations has not been determined (OPEN ITEM). For the purposes of this table two storage locations have been assumed which results in the number of sets of FLEX equipment to be equal to n+1.

| BWR Portable Equipment Phase 3 | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Use and (potential / flexibility) diverse uses* | | | | | | *Performance Criteria* | *Notes* |
| *List portable equipment* | Core | Containment | SFP | Instrumentation | Accessibility | -- | -- |
| Large FLEX Pump | X | X | X | -- | -- | 4000 gpm | Capacity to supply RHRSW for shutdown cooling |
| 4160 VAC Diesel Generator | X | X | X | X | X | 4160 VAC, 3250kW | Portable 4160 VAC generator will power one installed SDC train |
| Two (2) sets of suction/discharge hoses, strainers and fittings | X | X | X | -- | -- | N/A | Discharge hoses will fit on FLEX pump and connect to external connection point |
| Two (2) sets of cables for connecting portable generators | X | -- | -- | X | X | N/A | -- |
| Three (3) portable ventilation fans | X | X | X | X | -- | N/A | -- |
| Two (2) Diesel Generator fuel oil transfer pumps and hoses | X | X | X | X | -- | N/A | -- |

| **Phase 3 Response Equipment/Commodities** | |
|---|---|
| Item | Notes |
| Radiation Protection Equipment<br>• Survey instruments<br>• Dosimetry<br>• Off-site monitoring/sampling | -- |
| Commodities<br>• Food<br>• Potable water | -- |
| Fuel Requirements | -- |
| Heavy Equipment<br>• Transportation equipment<br>• Debris clearing equipment | -- |

# Attachment 1A
## Sequence of Events Timeline

| Action item | Elapsed Time | Action | Time Constraint Y/N [5] | Remarks / Applicability |
|---|---|---|---|---|
| | 0 | Event Starts | NA | Plant @ 100% power |
| 1 | 1 - 3m | HPCI/RCIC start on low level | N | Normal plant response for trip from 100% power |
| 2 | 11 -13m | Secure HPCI after one cycle or 10 minutes after HPCI starts | Y | -- |
| 3 | 30m | Open DC SWGR room doors and Control Room panel doors | Y | -- |
| 4 | 1h | Designate as ELAP | Y | -- |
| 5 | 1h | Secure MTELOP | Y | -- |
| 6 | 6h | Begin aligning SAMG DG to battery chargers | Y | -- |
| 7 | 6h | Begin aligning to transfer hotwell water to ECST | Y | -- |
| 8 | 6-8h | Transfer RCIC suction to the Torus | N | This is not driven by time, but by ECST level |
| 9 | 7h | Approach HCTL, lower pressure as low as possible and keep RCIC in service | N | This is not driven by time, but by RPV Pressure and Torus Temperature |
| 10 | 8h | Refill ECSTs from hotwell | Y | -- |
| 11 | 8h | Begin torus venting to maintain within limits | Y | -- |
| 12 | 9h | Place SAMG DG in service | Y | -- |
| 13 | 9h | Re-align RCIC Suction back to the ECSTs | N | This is not driven by time, but by ECST level as it is being |

[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

| | | | | |
|---|---|---|---|---|
| | | | | refilled from the hotwell |
| 14 | 13h | Align RCIC suction to Torus to allow continued RCIC operation | N | This is not driven by time but ECST level after hotwell inventory is exhausted |
| 15 | 18h | Begin aligning raw water sources for torus makeup | Y | -- |
| 16 | 24h | Begin makeup to Torus | Y | -- |

# 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 0, December 2012) | WCAP page | Plant applied value | Gap and discussion |
|---|---|---|---|---|---|
| | None | -- | -- | -- | -- |

# Attachment 2
# Milestone Schedule

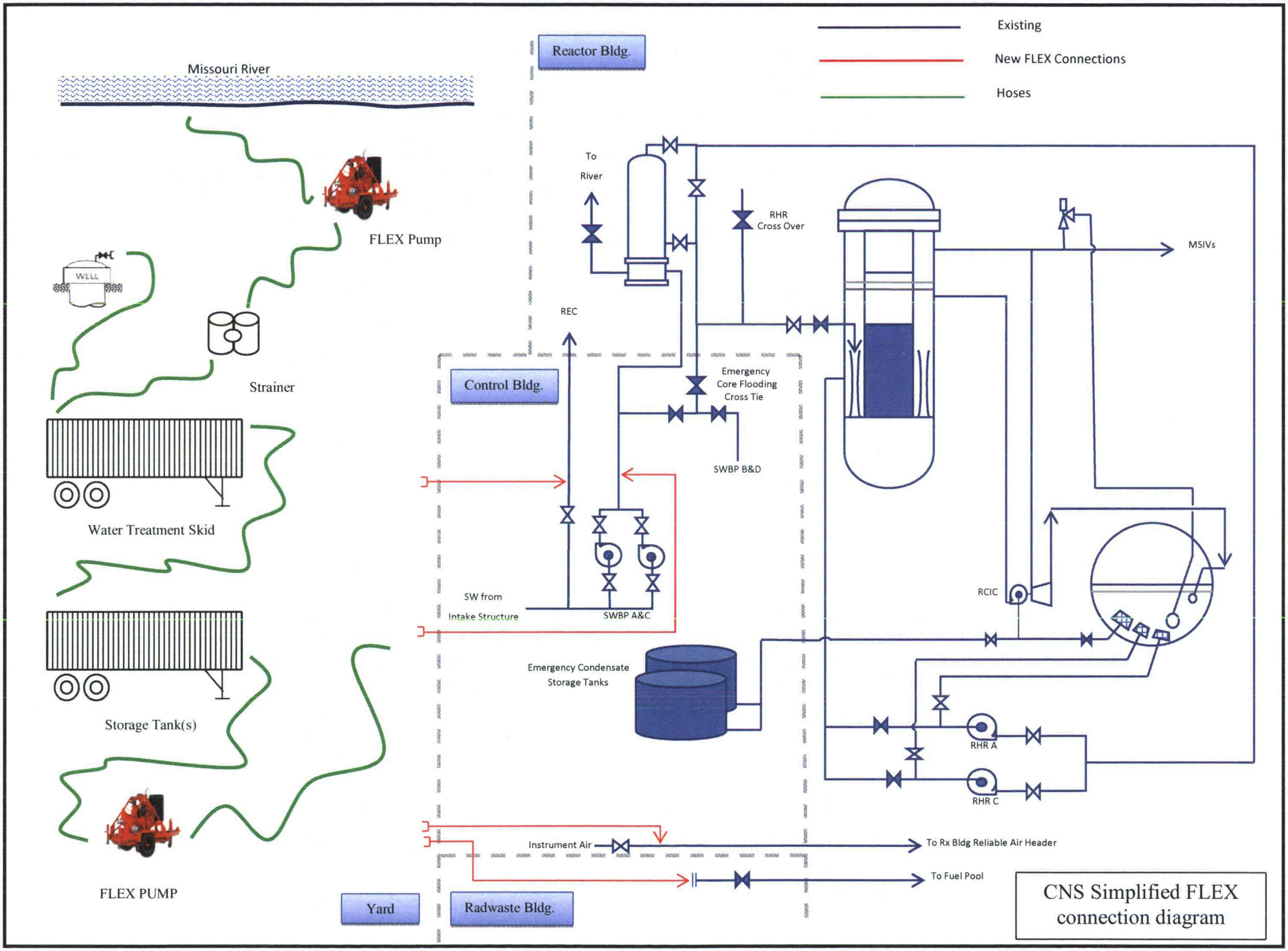
The dates are planning dates subject to change as design and implementation details are developed. Any changes to the following target dates will be reflected in the subsequent 6-month status reports. Full compliance planned after 2016 refueling outage (see "*")

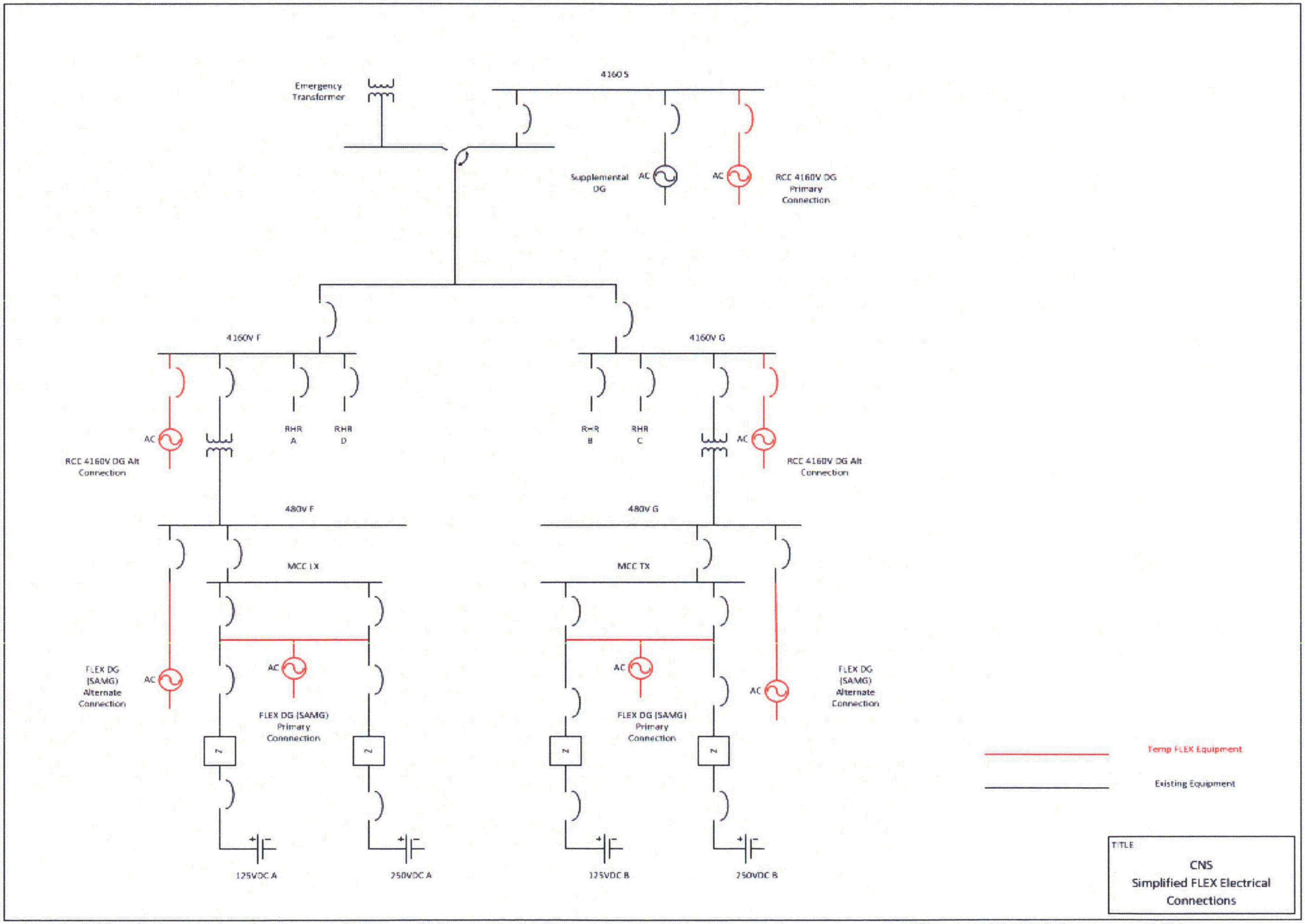
| Milestone | Target Date | Status |
|---|---|---|
| 60-day Status Update | October 2012 | Complete |
| Submit Overall Integrated Plan | February 2013 | Complete |
| 6-month Status Update | August 2013 | Complete |
| 6-month Status Update | February 2014 | Complete |
| Regional Response Center Operations | TBD | |
| Develop Storage Plan | May 2014 | |
| Purchase FLEX Equipment | June 2014 | |
| Refine Strategies (post-NRC review) | June 2014 | |
| Issue Maintenance Procedures (for FLEX equipment) | August 2014 | |
| 6-month Status Update | August 2014 | |
| Develop Strategies / Contract with RRC | August 2014 | |
| Develop Training Plan | October 2014 | |
| Available Implementation Outage 1 | Fall 2014 | |
| Develop Online Mods and Implementing Procedures | December 2014 | |
| 6-month Status Update | February 2015 | |
| Walk-throughs or Demonstrations | April 2015 | |
| Implement Training | May 2015 | |
| 6-month Status Update | August 2015 | |
| Develop Outage Mods and Implementing Procedures | October 2015 | |
| Implement Online Mods and Procedures | December 2015 | |
| 6-month Status Update | February 2016 | |
| Perform Staffing Assessment | May 2016 | |
| 6-month Status Update | August 2016 | |
| Available Implementation Outage 2* | Fall 2016 | |
| Implement Outage Mods and Procedures* | Fall 2016 | |
| Implement Training Updates* | Fall 2016 | |
| Submit Completion Report* | Fall 2016 | |

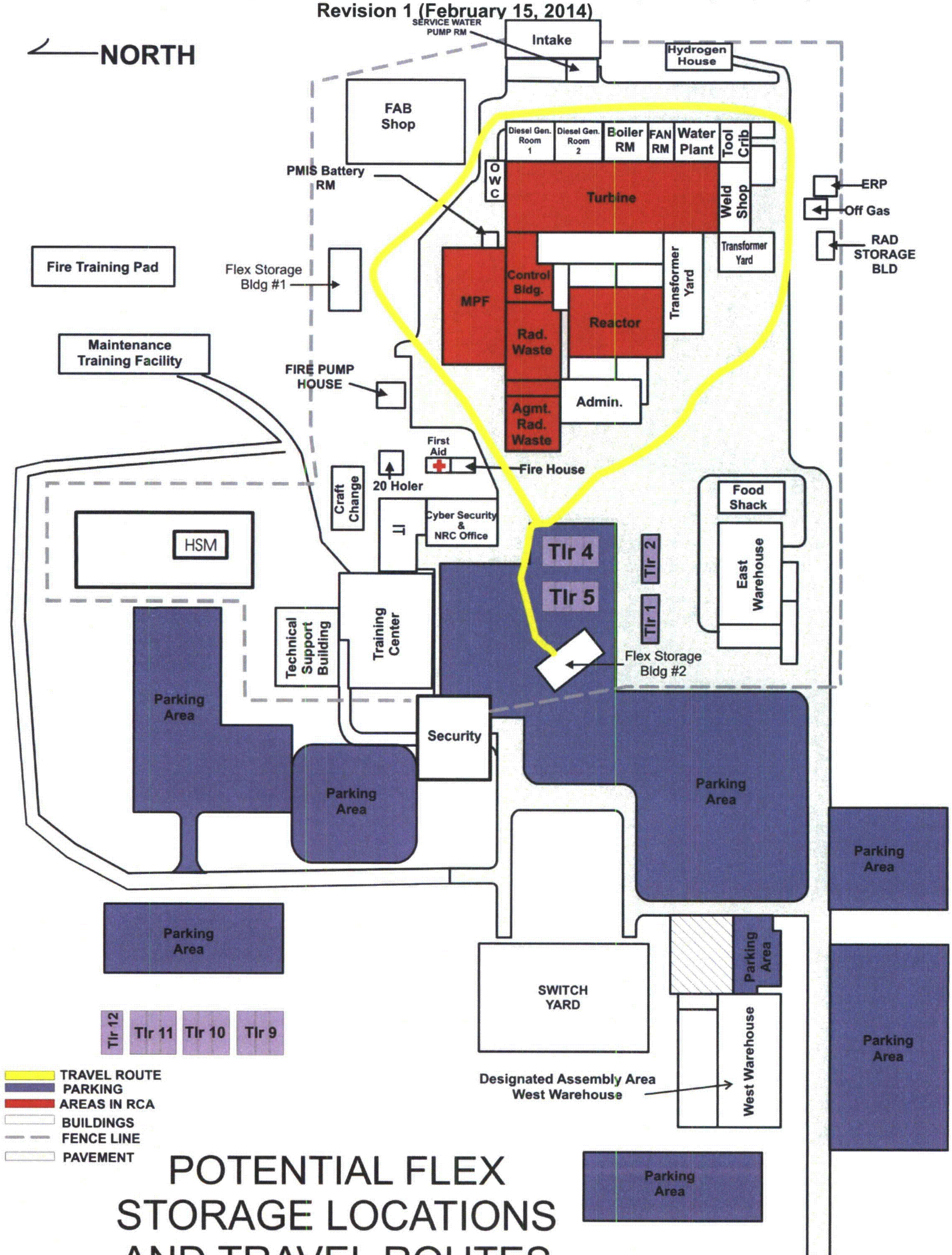
# Attachment 3
# Conceptual Sketches

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

- CNS Simplified FLEX Connection Diagram
- CNS Simplified Electrical Connection Diagram
- CNS Potential Storage Location and Deployment Path Diagram


Existing
New FLEX Connections
Hoses
Reactor Bldg.
Missouri River
To River
RHR Cross Over
MSIVs
FLEX Pump
WELL
Strainer
REC
Control Bldg.
Emergency Core Flooding Cross Tie
SWBP B&D
Water Treatment Skid
SW from Intake Structure
SWBP A&C
RCIC
Emergency Condensate Storage Tanks
Storage Tank(s)
RHR A
RHR C
FLEX PUMP
Instrument Air
To Rx Bldg Reliable Air Header
To Fuel Pool
Yard
Radwaste Bldg.
CNS Simplified FLEX connection diagram


Emergency Transformer
4160 S
Supplemental DG
AC
RCC 4160V DG Primary Connection
4160V F
4160V G
RHR A
RHR D
RHR B
RHR C
RCC 4160V DG Alt Connection
480V F
480V G
MCC LX
MCC TX
FLEX DG (SAMG) Alternate Connection
FLEX DG (SAMG) Primary Connection
125VDC A
250VDC A
125VDC B
250VDC B
Temp FLEX Equipment
Existing Equipment
TITLE
CNS
Simplified FLEX Electrical Connections




# POTENTIAL FLEX STORAGE LOCATIONS AND TRAVEL ROUTES