Mega-Tech Services, LLC

Technical Evaluation Report Related to Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events, EA-12-049

Revision 1

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Indiana Michigan Power
Donald C. Cook Nuclear Plant, Units 1 & 2
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1.0 BACKGROUND

Following the events at the Fukushima Dai-ichi nuclear power plant on March 11, 2011, the U.S. Nuclear Regulatory Commission (NRC) established a senior-level agency task force referred to as the Near-Term Task Force (NTTF). The NTTF was tasked with conducting a systematic, methodical review of NRC regulations and processes to determine if the agency should make additional improvements to these programs in light of the events at Fukushima Dai-ichi. As a result of this review, the NTTF developed a comprehensive set of recommendations, documented in SECY-11-0093, "Near-Term Report and Recommendations for Agency Actions Following the Events in Japan," dated July 12, 2011. These recommendations were enhanced by the NRC staff following interactions with stakeholders. Documentation of the staff's efforts is contained in SECY-11-0124, "Recommended Actions to be Taken without Delay from the Near-Term Task Force Report," dated September 9, 2011, and SECY-11-0137, "Prioritization of Recommended Actions to be Taken in Response to Fukushima Lessons Learned," dated October 3, 2011.

As directed by the Commission's staff requirement memorandum (SRM) for SECY-11-0093, the NRC staff reviewed the NTTF recommendations within the context of the NRC's existing regulatory framework and considered the various regulatory vehicles available to the NRC to implement the recommendations. SECY-11-0124 and SECY-11-0137 established the staff's prioritization of the recommendations.

After receiving the Commission's direction in SRM-SECY-11-0124 and SRM-SECY-11-0137, the NRC staff conducted public meetings to discuss enhanced mitigation strategies intended to maintain or restore core cooling, containment, and spent fuel pool (SFP) cooling capabilities following beyond-design-basis external events (BDBEE). At these meetings, the industry described its proposal for a Diverse and Flexible Mitigation Capability (FLEX), as documented in Nuclear Energy Institute's (NEI) letter, dated December 16, 2011 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML11353A008). FLEX was proposed as a strategy to fulfill the key safety functions of core cooling, containment integrity, and spent fuel cooling. Stakeholder input influenced the NRC staff to pursue a more performance-based approach to improve the safety of operating power reactors relative to the approach that was envisioned in NTTF Recommendation 4.2, SECY-11-0124, and SECY-11-0137.

On February 17, 2012, the NRC staff provided SECY-12-0025, "Proposed Orders and Requests for Information in Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Tsunami," to the Commission, including the proposed order to implement the enhanced mitigation strategies. As directed by SRM-SECY-12-0025, the NRC staff issued Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events."

Guidance and strategies required by the Order would be available if a loss of power, motive force and normal access to the ultimate heat sink needed to prevent fuel damage in the reactor and SFP affected all units at a site simultaneously. The Order requires a three-phase approach for mitigating BDBEEs. The initial phase requires the use of installed equipment and resources to maintain or restore key safety functions including core cooling, containment, and SFP cooling. The transition phase requires providing sufficient portable onsite equipment and consumables to maintain or restore these functions until they can be accomplished with resources brought from offsite. The final phase requires obtaining sufficient offsite resources to sustain those functions indefinitely.

NEI submitted its document NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide" in August 2012 (ADAMS Accession No. ML12242A378) to provide specifications for an industry-developed methodology for the development, implementation, and maintenance of guidance and strategies in response to Order EA-12-049. The guidance and strategies described in NEI 12-06 expand on those that industry developed and implemented to address the limited set of BDBEEs that involve the loss of a large area of the plant due to explosions and fire required pursuant to paragraph (hh)(2) of 10 CFR 50.54, "Conditions of licenses."

As described in Interim Staff Guidance (ISG), 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," the NRC staff considers that the development, implementation, and maintenance of guidance and strategies in conformance with the guidelines provided in NEI 12-06, Revision 0, subject to the clarifications in Attachment 1 of the ISG are an acceptable means of meeting the requirements of Order EA-12-049.

In response to Order EA-12-049, licensees submitted Overall Integrated Plans (hereafter the Integrated Plan) describing their course of action for mitigation strategies that are to conform with the guidance of NEI 12-06, or provide an acceptable alternative to demonstrate compliance with the requirements of Order EA-12-049.

2.0 EVALUATION PROCESS

In accordance with the provisions of Contract NRC-HQ-13-C-03-0039, Task Order No. NRC-HQ-13-T-03-0001, Mega-Tech Services, LLC (MTS) performed an evaluation of each licensee's Integrated Plan. As part of the evaluation, MTS, in parallel with the NRC staff, reviewed the original Integrated Plan and the first 6-month status update, and conducted an audit of the licensee documents. The staff and MTS also reviewed the licensee's answers to the NRC staff's and MTS's questions as part of the audit process. The objective of the evaluation was to assess whether the proposed mitigation strategies conformed to the guidance in NEI 12-06, as endorsed by the positions stated in JLD-ISG-2012-01, or an acceptable alternative had been proposed that would satisfy the requirements of Order EA-12-049. The audit plan that describes the audit process was provided to all licensees in a letter dated August 29, 2013 from Jack R. Davis, Director, Mitigating Strategies Directorate (ADAMS Accession No. ML13234A503).

The review and evaluation of the licensee's Integrated Plan was performed in the following areas consistent with NEI 12-06 and the regulatory guidance of JLD-ISG-2012-01:

- Evaluation of External Hazards
- Phased Approach
    - Initial Response Phase
    - Transition Phase
    - Final Phase
- Core Cooling Strategies

- Spent Fuel Pool Cooling Strategies
- Containment Function Strategies
- Programmatic Controls
    - Equipment Protection, Storage, and Deployment
    - Equipment Quality

The technical evaluation in Section 3.0 documents the results of the MTS evaluation and audit results. Section 4.0 summarizes Confirmatory Items and Open Items that require further evaluation before a conclusion can be reached that the Integrated Plan is consistent with the guidance in NEI 12-06 or an acceptable alternative has been proposed that would satisfy the requirements of Order EA-12-049. For the purpose of this evaluation, the following definitions are used for Confirmatory Item and Open Item.

> Confirmatory Item – an item that is considered conceptually acceptable, but for which resolution may be incomplete. These items are expected to be acceptable, but are expected to require some minimal follow up review or audit prior to the licensee's compliance with Order EA-12-049.
>
> Open Item – an item for which the licensee has not presented a sufficient basis to determine that the issue is on a path to resolution. The intent behind designating an issue as an Open Item is to document items that need resolution during the review process, rather than being verified after the compliance date through the inspection process.

Additionally, for the purpose of this evaluation and the NRC staff's interim staff evaluation (ISE), licensee statements, commitments, and references to existing programs that are subject to routine NRC oversight (Updated Final Safety Analysis Report (UFSAR) program, procedure program, quality assurance program, modification configuration control program, etc.) will generally be accepted. For example, references to existing UFSAR information that supports the licensee's overall mitigating strategies plan, will be assumed to be correct, unless there is a specific reason to question its accuracy. Likewise, if a licensee states that they will generate a procedure to implement a specific mitigating strategy, assuming that the procedure would otherwise support the licensee's plan, this evaluation accepts that a proper procedure will be prepared. This philosophy for this evaluation and the ISE does not imply that there are any limits in this area to future NRC inspection activities.

3.0 TECHNICAL EVALUATION

By letter dated February 27, 2013 (ADAMS Accession No. ML13070A079), and as supplemented by the first six-month status report in letter dated August 26, 2013 (ADAMS Accession No. ML13240A308) Indiana Michigan Power (the licensee or I&M) provided the Donald C. Cook Nuclear Plant Units 1 & 2 Integrated Plan for compliance with Order EA-12-049. The Integrated Plan describes the strategies and guidance under development for implementation by I&M for the maintenance or restoration of core cooling, containment, and SFP cooling capabilities following a BDBEE, including modifications necessary to support this implementation, pursuant to Order EA-12-049. By letter dated August 28, 2013 (ADAMS Accession No. ML13234A503), the NRC notified all licensees and construction permit holders that the staff is conducting audits of their responses to Order EA-12-049. That letter described the process used by the NRC staff in its review, leading to the issuance of an interim staff evaluation and audit report. The purpose of the staff's audit is to determine the extent to which the licensees are proceeding on a path towards successful implementation of the actions needed to achieve full compliance with the Order.

3.1 EVALUATION OF EXTERNAL HAZARDS

Sections 4 through 9 of NEI 12-06 provide the NRC-endorsed methodology for the determination of applicable extreme external hazards in order to identify potential complicating factors for the protection and deployment of equipment needed for mitigation of BDBEEs leading to an extended loss of all alternating current (ac) power (ELAP) and loss of normal access to the ultimate heat sink (UHS). These hazards are broadly grouped into the categories discussed below in Sections 3.1.1 through 3.1.5 of this evaluation. Characterization of the applicable hazards for a specific site includes the identification of realistic timelines for the hazard, characterization of the functional threats due to the hazard, development of a strategy for responding to events with warning, and development of a strategy for responding to events without warning.

3.1.1 Seismic Events

NEI 12-06, Section 5.2 states:

> All sites will address BDB [beyond-design-basis] seismic considerations in the implementation of FLEX strategies, as described below. The basis for this is that, while some sites are in areas with lower seismic activity, their design basis generally reflects that lower activity. There are large, and unavoidable, uncertainties in the seismic hazard for all U.S. plants. In order to provide an increased level of safety, the FLEX deployment strategy will address seismic hazards at all sites.
>
> These considerations will be treated in four primary areas: protection of FLEX equipment, deployment of FLEX equipment, procedural interfaces, and considerations in utilizing off-site resources.

In the section of its Integrated Plan regarding determination of applicable extreme external hazards, page 1, the licensee stated that per the UFSAR Section 2.8.6, the seismic criteria for Donald C Cook Nuclear Power Plant (CNP) include two earthquake spectra: Operating Basis Earthquake (OBE) and Design Basis Earthquake (DBE). The DBE and OBE are 0.20g and 0.10g, respectively, horizontal ground acceleration and two-thirds this value acting vertically. The Integrated Plan confirms that the seismic hazard is applicable to CNP.

In the section of its Integrated Plan regarding general plan elements, page 2, the licensee stated that the seismic re-evaluations pursuant to the 10 CFR 50.54(f) letter of March 12, 2012 are not completed and therefore not assumed in their submittal. As the re-evaluations are completed, appropriate issues will be entered into the corrective action system and assessed on a schedule commensurate with other licensing bases changes.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to screening for seismic hazards, if these requirements are implemented as described.

3.1.1.1 Protection of FLEX Equipment - Seismic Hazard

NEI 12-06, Section 5.3.1 states:

1. FLEX equipment should be stored in one or more of following three configurations:

    a. In a structure that meets the plant's design basis for the Safe Shutdown Earthquake (SSE) (e.g., existing safety-related structure).

    b. In a structure designed to or evaluated equivalent to [American Society of Civil Engineers] ASCE 7-10, *Minimum Design Loads for Buildings and Other Structures*.

    c. Outside a structure and evaluated for seismic interactions to ensure equipment is not damaged by non-seismically robust components or structures.

2. Large portable FLEX equipment such as pumps and power supplies should be secured as appropriate to protect them during a seismic event (i.e., Safe Shutdown Earthquake (SSE) level).

3. Stored equipment and structures should be evaluated and protected from seismic interactions to ensure that unsecured and/or non-seismic components do not damage the equipment.

On page 18 of its Integrated Plan, the licensee stated that storage of portable equipment will be within existing Seismic Class I structures, within existing structures qualified to meet NEI 12-06 requirements, or within new structures that will be constructed to meet NEI 12-06 requirements. Similar statements are made on pages 30, 36, and 51. During the audit process the licensee expanded on the means for protection of FLEX equipment considering the seismic hazard by stating that a substantial single new building will be constructed in accordance with the criteria in NEI 12-06. The single storage building will house the FLEX equipment, the debris removal equipment and the deployment vehicles. Equipment will be stored such that large portable equipment will be restrained through the use of anchor bolts and straps to prevent interaction during a seismic event.

FLEX equipment stored inside the plant will be stored in accordance with CNP procedure "Restraint of Transient Material."

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to protection of FLEX equipment considering the seismic hazard, if these requirements are implemented as described.

3.1.1.2 Deployment of FLEX Equipment – Seismic Hazard

NEI 12-06, Section 5.3.2 states:

> There are five considerations for the deployment of FLEX equipment following a seismic event:

1. If the equipment needs to be moved from a storage location to a different point for deployment, the route to be traveled should be reviewed for potential soil liquefaction that could impede movement following a severe seismic event.

2. At least one connection point of FLEX equipment will only require access through seismically robust structures. This includes both the connection point and any areas that plant operators will have to access to deploy or control the capability.

3. If the plant FLEX strategy relies on a water source that is not seismically robust, e.g., a downstream dam, the deployment of FLEX coping capabilities should address how water will be accessed. Most sites with this configuration have an underwater berm that retains a needed volume of water. However, accessing this water may require new or different equipment.

4. If power is required to move or deploy the equipment (e.g., to open the door from a storage location), then power supplies should be provided as part of the FLEX deployment.

5. A means to move FLEX equipment should be provided that is also reasonably protected from the event.

With respect to consideration 1: On page 7 in the section of its Integrated Plan regarding general plan elements, the licensee stated that deployment of portable equipment to the staging areas will be identified in the FLEX mitigation strategies. The pathways to the identified areas will be cleared of any debris per the mitigation strategy. On page 20 the licensee stated that deployment paths onsite for the transportation of FLEX equipment and controls to ensure a clear deployment path will be developed upon completion of the ongoing security upgrade project and specific locations for the storage facility has been finalized. Potential for soil liquefaction that might impede vehicle movement following a seismic event will need to be evaluated once the deployment routes are finalized. This is identified as Confirmatory Item 3.1.1.2.A in Section 4.2.

With respect to consideration 2: On page 20 of the Integrated Plan, the licensee further stated that for long term cooling and steam generator (SG) makeup, the connection points to the feed water lines and the turbine driven auxiliary feedwater (TDAFW) pump essential service water (ESW) suction piping are contained in a structure which is designed to withstand all external applicable external events. Primary interior connections and disconnects will be in a Seismic Class I structure protected from all hazards.

With respect to consideration 3: The plant’s mitigation strategy does not rely on water sources that are not seismically robust. On page 11 of the Integrated Plan, the licensee stated that the initial sources of water during the ELAP are the condensate storage tanks (CST). These tanks are qualified to Seismic Class I loads. Lake Michigan is the source of water for long term cooling.

With respect to consideration 4: The specific design features of the new FLEX storage building have not yet been defined, including the need for ac power to support deployment. The need for power supplies to compensate for the loss of ac power, if any, to deploy equipment is to be confirmed. This is identified as Confirmatory Item 3.1.1.2.B in section 4.2.

With respect to consideration 5: As discussed in Section 3.1.1.1, above, the deployment vehicles will be stored in the new storage building. During the audit process, the licensee stated that it is anticipated that large four wheel drive vehicles equipped with debris/snow removal equipment would be used for both purposes. Additional debris removal equipment will be stored with the vehicles. This equipment is expected to include cutting equipment, straps, chains, and winches.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and subject to the successful closure of issues related to the Confirmatory Items, provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to deployment of FLEX equipment considering the seismic hazard, if these requirements are implemented as described.

3.1.1.3 Procedural Interfaces – Seismic Hazard

NEI 12-06, Section 5.3.3 states:

> There are four procedural interface considerations that should be addressed.
>
> 1. Seismic studies have shown that even seismically qualified electrical equipment can be affected by BDB [beyond-design-basis] seismic events. In order to address these considerations, each plant should compile a reference source for the plant operators that provides approaches to obtaining necessary instrument readings to support the implementation of the coping strategy (see Section 3.2.1.10). This reference source should include control room and non-control room readouts and should also provide guidance on how and where to measure key instrument readings at containment penetrations, where applicable, using a portable instrument (e.g., a Fluke meter). Such a resource could be provided as an attachment to the plant procedures/guidance. Guidance should include critical actions to perform until alternate indications can be connected and on how to control critical equipment without associated control power.
>
> 2. Consideration should be given to the impacts from large internal flooding sources that are not seismically robust and do not require ac power (e.g., gravity drainage from lake or cooling basins for non-safety-related cooling water systems).
>
> 3. For sites that use ac power to mitigate ground water in critical locations, a strategy to remove this water will be required.
>
> 4. Additional guidance may be required to address the deployment of FLEX for those plants that could be impacted by failure of a not seismically robust downstream dam.

On pages 14, 26 and 35 of the Integrated Plan, the licensee listed the installed instrumentation credited for monitoring the effectiveness of the FLEX coping strategies. These instruments are discussed in more detail in Section 3.2.1.5. The licensee's plan with regards to procedural interface (seismic) did not address 1) reference sources for the plant operators that provide approaches to obtaining necessary instrument readings using a portable instrument and 2) guidance for critical actions to perform until alternate indications can be connected and on how to control critical equipment without associated control power. This has been identified as Confirmatory Item 3.1.1.3.A in Section 4.2.

The licensee's Integrated Plan did not address large internal flooding sources or the use of ac power to mitigate ground water in critical locations. During the audit process, the licensee addressed these considerations by stating that the maximum lake levels are below the elevation of equipment expected to be utilized in the FLEX strategies and there are no other cooling basins for non safety related cooling systems on site. The licensee further stated that there is no equipment utilized in the FLEX strategies that relies on ac power to mitigate ground water.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and subject to the successful closure of issues related to the Confirmatory Item, provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to seismic procedural interfaces considerations, if these requirements are implemented as described.

3.1.1.4 Considerations in Using Offsite Resources – Seismic Hazard

NEI 12-06, Section 5.3.4 states:

> Severe seismic events can have far-reaching effects on the infrastructure in and around a plant. While nuclear power plants are designed for large seismic events, many parts of the Owner Controlled Area and surrounding infrastructure (e.g., roads, bridges, dams, etc.) may be designed to lesser standards. Obtaining off-site resources may require use of alternative transportation (such as air-lift capability) that can overcome or circumvent damage to the existing local infrastructure.
>
> 1. The FLEX strategies will need to assess the best means to obtain resources from off-site following a seismic event.

With respect to the licensee's plans regarding its use of the offsite resources through the industry Strategic Alliance for FLEX Emergency Response (SAFER) program, on page 9 of the Integrated Plan the licensee stated they had issued a contract for the Regional Response Center (RRC) but had not yet identified the local staging area and method of transportation to the site. During the audit process, the licensee stated that it is working with the SAFER strategic alliance to finalize the industry generic Deployment Plan or Playbook. Once this template is finalized, a site specific plan will be developed. The offsite staging areas are still being evaluated. The methods for delivery of equipment from offsite sources under various conditions such as seismic, flooding, high winds, and snow, ice and extreme cold will be addressed and will meet the requirements of NEI 12-06, Section 5.3.4. This has been identified as Confirmatory Item 3.1.1.4.A. in Section 4.2.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and subject to the successful closure of issues related to the Confirmatory Item, provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to the use of off-site resources, if these requirements are implemented as described.

3.1.2 Flooding

NEI 12-06, Section 6.2 states:

> The evaluation of external flood-induced challenges has three parts. The first part is determining whether the site is susceptible to external flooding. The second part is the characterization of the applicable external flooding threat. The third part is the application of the flooding characterization to the protection and deployment of FLEX strategies.

NEI 12-06, Section 6.2.1 states:

> Susceptibility to external flooding is based on whether the site is a “dry” site, i.e., the plant is built above the design basis flood level (DBFL). For sites that are not “dry”, water intrusion is prevented by barriers and there could be a potential for those barriers to be exceeded or compromised. Such sites would include those that are kept “dry” by permanently installed barriers, e.g., seawall, levees, etc., and those that install temporary barriers or rely on watertight doors to keep the design basis flood from impacting safe shutdown equipment.

On page 1, in the section of its Integrated Plan regarding the determination of applicable extreme external hazards, the licensee stated that the most plausible flood for CNP is a seiche condition from Lake Michigan. Plant configuration provides passive flood protection from the maximum seiche level and the portable FLEX equipment will be stored above the maximum seiche level. Considering a seiche is a relatively short duration event, the maximum seiche level is considered in the deployment of portable FLEX equipment.

On page 2, in its Integrated Plan under the section to determine extreme external hazards, the licensee stated that the flooding hazard is applicable to CNP. The licensee further stated that the flood re-evaluations pursuant to the 10 CFR 50.54(f) letter of March 12, 2012 are not completed and therefore not assumed in the Integrated Plan. As the re-evaluations are completed, appropriate issues will be entered into the corrective action system and assessed on a schedule commensurate with other licensing bases changes.

During the audit process, the licensee stated that a flood hazard evaluation for all nine flood causing mechanisms is in progress. Preliminary evaluations indicate the newly evaluated seiche from Lake Michigan is at an elevation lower than the current design basis elevation. At the lower elevation, the seiche is unlikely to overtop the lake front retaining wall and come on the plant site from the west (lake side). The duration of the seiche impact to the plant site is likely to be less than one hour if it does overtop the lake front retaining wall.

Based upon preliminary and in progress flood hazard evaluation, it is anticipated that local intense precipitation with surface run-off (LIP) will be the most limiting external flood hazard evaluation for the Cook Plant Site. The LIP evaluation is currently in progress. The warning time and the flood event duration are elements of the flood evaluations currently being developed.

The licensee’s approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to screening and characterization of the flooding hazard, if these requirements are implemented as described.

3.1.2.1 Protection of FLEX Equipment – Flooding Hazard

NEI 12-06, Section 6.2.3.1 states:

> These considerations apply to the protection of FLEX equipment from external flood hazards:
>
> 1. The equipment should be stored in one or more of the following configurations:
>
>   a. Stored above the flood elevation from the most recent site flood analysis. The evaluation to determine the elevation for storage should be informed by flood analysis applicable to the site from early site permits, combined license applications, and/or contiguous licensed sites.
>
>   b. Stored in a structure designed to protect the equipment from the flood.
>
>   c. FLEX equipment can be stored below flood level if time is available and plant procedures/guidelines address the needed actions to relocate the equipment. Based on the timing of the limiting flood scenario(s), the FLEX equipment can be relocated to a position that is protected from the flood, either by barriers or by elevation, prior to the arrival of the potentially damaging flood levels. This should also consider the conditions on-site during the increasing flood levels and whether movement of the Flex equipment will be possible before potential inundation occurs, not just the ultimate flood height.
>
> 2. Storage areas that are potentially impacted by a rapid rise of water should be avoided.

On page 1, in the section of its Integrated Plan regarding external flood assessment, the licensee stated that portable FLEX equipment will be stored above the maximum seiche level. During the audit process the licensee expanded on the means for protection of FLEX equipment considering the flood hazard by stating that a single new building will be constructed in accordance with the criteria in NEI 12-06. The single storage building will house the FLEX equipment, the debris removal equipment and the deployment vehicles and provide protection from the flood hazard.

FLEX equipment pre-staged in the auxiliary building, which is a Seismic Class I structure, is protected from all hazards.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to protection of FLEX equipment considering the flooding hazard, if these requirements are implemented as described.

3.1.2.2 Deployment of FLEX Equipment – Flooding Hazard

NEI 12-06, Section 6.2.3.2 states:

There are a number of considerations which apply to the deployment of FLEX equipment for external flood hazards:

1. For external floods with warning time, the plant may not be at power. In fact, the plant may have been shut down for a considerable time and the plant configuration could be established to optimize FLEX deployment. For example, the portable pump could be connected, tested, and readied for use prior to the arrival of the critical flood level. Further, protective actions can be taken to reduce the potential for flooding impacts, including cooldown, borating the [reactor coolant system] RCS, isolating accumulators, isolating [reactor coolant pump] RCP seal leak off, obtaining dewatering pumps, creating temporary flood barriers, etc. These factors can be credited in considering how the baseline capability is deployed.

2. The ability to move equipment and restock supplies may be hampered during a flood, especially a flood with long persistence. Accommodations along these lines may be necessary to support successful long-term FLEX deployment.

3. Depending on plant layout, the UHS may be one of the first functions affected by a flooding condition. Consequently, the deployment of the equipment should address the effects of LUHS [loss of normal access to the ultimate heat sink], as well as ELAP.

4. Portable pumps and power supplies will require fuel that would normally be obtained from fuel oil storage tanks that could be inundated by the flood or above ground tanks that could be damaged by the flood. Steps should be considered to protect or provide alternate sources of fuel oil for flood conditions. Potential flooding impacts on access and egress should also be considered.

5. Connection points for portable equipment should be reviewed to ensure that they remain viable for the flooded condition.

6. For plants that are limited by storm-driven flooding, such as Probable Maximum Surge or Probable Maximum Hurricane (PMH), expected storm conditions should be considered in evaluating the adequacy of the baseline deployment strategies.

7. Since installed sump pumps will not be available for dewatering due to the ELAP, plants should consider the need to provide water extraction pumps capable of operating in an ELAP and hoses for rejecting accumulated water for structures required for deployment of FLEX strategies.

8. Plants relying on temporary flood barriers should assure that the storage location for barriers and related material provides reasonable assurance that the barriers could be deployed to provide the required protection.

9. A means to move FLEX equipment should be provided that is also reasonably protected from the event.

With respect to consideration 1: Since the flooding hazard is a short persistent seiche with minimal warning time, the FLEX strategies do not depend on deployment of FLEX equipment prior to arrival of the critical flood level.

With respect to consideration 2: Considering the short duration of a seiche restocking of supplies from offsite resources is not expected to be hampered by the flood hazard.

With respect to consideration 3: Access to the UHS is not affected since the maximum lake levels are below the elevation of equipment expected to be utilized in the FLEX strategies.

With respect to consideration 4: During the audit process, the licensee stated that fueling of the portable FLEX equipment will be done using two portable refueling trailers that obtain fuel from underground emergency diesel generator fuel storage tanks. Both of these refueling tankers will be stored in the new FLEX equipment storage building to ensure protection from external events. Site specific flooding analysis is in progress to determine if the fuel oil tanks and fuel oil transfer sites would be inundated by a flood. Depending on the flood evaluation, fuel oil supply strategies may need to be developed to compensate for flooding hazard. This is identified as Confirmatory Item 3.1.2.2.A in Section 4.2.

With respect to consideration 5: On page 20 of the Integrated Plan, the licensee stated that the connection points to the feed water lines and the TDAFW pump ESW suction piping are contained in a structure which is designed to withstand all external applicable external events. Primary interior connections and disconnects will be in a Seismic Class I structure protected from all hazards.

With respect to consideration 9: On page 7, in the section of its Integrated Plan regarding general plan elements, the licensee stated that deployment of portable equipment to the staging areas will be identified in the FLEX mitigation strategies. The pathways to the identified areas will be cleared of any debris per the mitigation strategy. The debris clearing equipment will be stored in the planned to be constructed storage building. During the audit process, the licensee stated that debris removal equipment is in the process of being selected, but expected to be capable of clearing a debris field sufficient to deploy FLEX equipment from the protected storage location into the Protected Area. The licensee stated that it is anticipated that large four wheel drive vehicles equipped with debris/snow removal equipment would be used for both purposes. Additional debris removal equipment will be stored with the vehicles. This equipment is expected to include cutting equipment, straps, chains, and winches. Depending on the size and weight of the specific FLEX equipment it will be towed by a reasonably protected truck or smaller vehicle. The specific transport vehicles are still under evaluation for selection and purchase.

Considerations 6, 7, and 8 are not applicable to CNP.

The licensee’s approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and subject to the successful closure of issues related to the Confirmatory Item, provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to deployment of FLEX equipment considering the flooding hazard, if these requirements are implemented as described.

3.1.2.3 Procedural Interfaces – Flooding Hazard

NEI 12-06, Section 6.2.3.3 states:

> The following procedural interface considerations should be addressed.
>
> 1. Many sites have external flooding procedures. The actions necessary to support the deployment considerations identified above should be incorporated into those procedures.
>
> 2. Additional guidance may be required to address the deployment of FLEX for flooded conditions (i.e., connection points may be different for flooded vs. non-flooded conditions).
>
> 3. FLEX guidance should describe the deployment of temporary flood barriers and extraction pumps necessary to support FLEX deployment.

On page 4 of the Integrated Plan, under key assumptions, the licensee stated that preplanned strategies developed to protect the public health and safety will be incorporated into the unit emergency operating procedures (EOP)s in accordance with established EOP change process and their impact to the design basis capabilities of the unit evaluated under 10 CFR 50.59. The licensee plans to develop FLEX support guidelines (FSGs) and associated procedure revisions to implement FLEX mitigation strategies.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to procedural interfaces considering the flood hazard, if these requirements are implemented as described.

3.1.2.4 Considerations in Using Offsite Resources – Flooding Hazard

NEI 12-06, Section 6.2.3.4 states:

> Extreme external floods can have regional impacts that could have a significant impact on the transportation of offsite resources.
>
> 1. Sites should review site access routes to determine the best means to obtain resources from off-site following a flood.
>
> 2. Sites impacted by persistent floods should consider where equipment delivered from offsite could be staged for use on-site.

With respect to the licensee's plans regarding its use of the offsite resources through the industry SAFER program, on page 9 of the Integrated Plan the licensee stated they had issued a contract for the RRC but had not yet identified the local staging area and method of transportation to the site. During the audit process, the licensee stated that it is working with the SAFER strategic alliance to finalize the industry generic Deployment Plan or Playbook. Once this template is finalized, a site specific plan will be developed. The offsite staging areas are still being evaluated. The methods for delivery of equipment from offsite sources under various conditions such as seismic, flooding, high winds, and snow, ice and extreme cold will be addressed and will meet the requirements of NEI 12-06, Section 6.2.3.4. This has been previously identified in section 3.1.1.4 as Confirmatory Item 3.1.1.4.A.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and subject to the successful closure of issues related to the Confirmatory Item, provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to the use of off-site resources, if these requirements are implemented as described.

3.1.3 High Winds

NEI 12-06, Section 7, provides the NRC-endorsed screening process for evaluation of high wind hazards. This screening process considers the hazard due to hurricanes and tornadoes. The first part of the evaluation of high wind challenges is determining whether the site is potentially susceptible to different high wind conditions to allow characterization of the applicable high wind hazard. The second part is the characterization of the applicable high wind threat.

The screening for high wind hazards associated with hurricanes should be accomplished by comparing the site location to NEI 12-06, Figure 7-1 (Figure 3-1 of U.S. NRC, "Technical Basis for Regulatory Guidance on Design Basis Hurricane Wind Speeds for Nuclear Power Plants," NUREG/CR-7005, December, 2009; if the resulting frequency of recurrence of hurricanes with wind speeds in excess of 130 mph exceeds 10^{-6} per year, the site should address hazards due to extreme high winds associated with hurricanes.

The screening for high wind hazard associated with tornadoes should be accomplished by comparing the site location to NEI 12-06, Figure 7-2, from U.S. NRC, "Tornado Climatology of the Contiguous United States," NUREG/CR-4461, Rev. 2, February 2007; if the recommended tornado design wind speed for a 10^{-6}/year probability exceeds 130 mph, the site should address hazards due to extreme high winds associated with tornadoes.

On page 2, in the section of its Integrated Plan regarding the determination of applicable extreme external hazards, the licensee stated that Figure 7-2 from NEI 12-06 was used for assessment of the high wind hazard. It was determined that the CNP site is in Region 1 with wind speeds of 200 mph. CNP Site is Latitude N41.98 Longitude W86.57. Based upon this evaluation the licensee stated that the high wind hazard is applicable to CNP.

The Integrated Plan is silent on the susceptibility of CNP to hurricanes. The reviewer compared the documented location for CNP with NEI 12-06, Figure 7-1 and verified that the site is in an area that has a frequency of recurrence of hurricanes with wind speeds in excess of 130 mph less than 10^{-6} per year, which would screen out the high wind hazard due to hurricanes, leaving only the high wind hazard due to tornados, which was the screening documented in the Integrated Plan.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to screening for high wind hazards, if these requirements are implemented as described.

3.1.3.1 Protection of FLEX Equipment - High Wind Hazard

NEI 12-06, Section 7.3.1 states:

> These considerations apply to the protection of FLEX equipment from high wind hazards:

1. For plants exposed to high wind hazards, FLEX equipment should be stored in one of the following configurations:

   a. In a structure that meets the plant's design basis for high wind hazards (e.g., existing safety-related structure).

   b. In storage locations designed to or evaluated equivalent to ASCE 7-10, *Minimum Design Loads for Buildings and Other Structures* given the limiting tornado wind speeds from Regulatory Guide 1.76 or design basis hurricane wind speeds for the site.

      - Given the FLEX basis limiting tornado or hurricane wind speeds, building loads would be computed in accordance with requirements of ASCE 7-10. Acceptance criteria would be based on building serviceability requirements not strict compliance with stress or capacity limits. This would allow for some minor plastic deformation, yet assure that the building would remain functional.

      - Tornado missiles and hurricane missiles will be accounted for in that the FLEX equipment will be stored in diverse locations to provide reasonable assurance that N sets of FLEX equipment will remain deployable following the high wind event. This will consider locations adjacent to existing robust structures or in lower sections of buildings that minimizes the probability that missiles will damage all mitigation equipment required from a single event by protection from adjacent buildings and limiting pathways for missiles to damage equipment.

      - The axis of separation should consider the predominant path of tornados in the geographical location. In general, tornadoes travel from the West or West Southwesterly direction, diverse locations should be aligned in the North-South arrangement, where possible. Additionally, in selecting diverse FLEX storage locations, consideration should be given to the location of the diesel generators and switchyard such that the path of a single tornado would not impact all locations.

      - Stored mitigation equipment exposed to the wind should be adequately tied down. Loose equipment should be in protective boxes that are adequately tied down to foundations or slabs to prevent protected equipment from being damaged or becoming airborne. (During a tornado, high winds may blow away metal siding and metal deck roof, subjecting the equipment to high wind forces.)

   c. In evaluated storage locations separated by a sufficient distance that minimizes the probability that a single event would damage all FLEX mitigation equipment such that at least N sets of FLEX equipment would remain deployable following the high wind event. (This option is not applicable for hurricane conditions).

- Consistent with configuration b., the axis of separation should consider the predominant path of tornados in the geographical location.

- Consistent with configuration b., stored mitigation equipment should be adequately tied down.

On page 19, in the section of its Integrated Plan regarding the strategies for maintaining core cooling and heat removal in the transition phase (Phase 2), the licensee stated that protection of associated portable equipment from severe storms with high winds would be provided by storage of portable equipment within existing Class I structures, within existing structures qualified to the meet NEI 12-06 requirements, or within new structures that will be constructed to meet NEI 12-06 requirements. Temporary locations that provide reasonable protection may be used until building construction completion. Similar statements are made on pages 30, 37, 45 and 52, in the sections of the Integrated Plan regarding the strategies for RCS inventory control, maintaining containment, maintaining SFP cooling, and safety functions support respectively. During the audit process the licensee expanded on the means for protection of FLEX equipment considering the high wind hazard by stating that a single new building will be constructed in accordance with the criteria in NEI 12-06. The single storage building will house the FLEX equipment, the debris removal equipment and the deployment vehicles.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to protection of FLEX equipment considering the high wind hazard, if these requirements are implemented as described.

3.1.3.2 Deployment of FLEX Equipment - High Wind Hazard

As discussed in NEI 12-06, Section 7.3.2, the following five considerations for the deployment of FLEX equipment for high wind hazards should be addressed:

1. For hurricane plants, the plant may not be at power prior to the simultaneous ELAP and LUHS condition. In fact, the plant may have been shut down and the plant configuration could be established to optimize FLEX deployment. For example, the portable pumps could be connected, tested, and readied for use prior to the arrival of the hurricane. Further, protective actions can be taken to reduce the potential for wind impacts. These factors can be credited in considering how the baseline capability is deployed.

2. The ultimate heat sink may be one of the first functions affected by a hurricane due to debris and storm surge considerations. Consequently, the evaluation should address the effects of ELAP/LUHS, along with any other equipment that would be damaged by the postulated storm.

3. Deployment of FLEX following a hurricane or tornado may involve the need to remove debris. Consequently, the capability to remove debris caused by these extreme wind storms should be included.

4. A means to move FLEX equipment should be provided that is also reasonably protected from the event.

5. The ability to move equipment and restock supplies may be hampered during a hurricane and should be considered in plans for deployment of FLEX equipment.

During the audit process, the licensee stated that the deployment vehicles will be stored in the new storage building. The new building will be designed to provide protection of the FLEX equipment against the high wind hazard. It is anticipated that large four wheel drive vehicles equipped with debris/snow removal equipment would be used for both purposes.

On page 20 of its Integrated Plan the licensee stated that the deployment paths onsite for the transportation of FLEX equipment and controls to ensure a clear deployment path will be developed upon completion of the ongoing security upgrade project and specific locations for the storage facilities have been finalized.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to deployment of FLEX equipment considering the high wind hazard, if these requirements are implemented as described.

3.1.3.3 Procedural Interfaces - High Wind Hazard

NEI 12-06, Section 7.3.3, states:

> The overall plant response strategy should be enveloped by the baseline capabilities, but procedural interfaces may need to be considered. For example, many sites have hurricane procedures. The actions necessary to support the deployment considerations identified above should be incorporated into those procedures.

On page 3 of its Integrated Plan, under key assumptions, the licensee stated that preplanned strategies developed to protect the public health and safety will be incorporated into the unit EOPs in accordance with established EOP change process and their impact to the design basis capabilities of the unit evaluated under 10CFR50.59. The licensee plans to develop FSGs and associated procedure revisions to implement FLEX mitigation strategies.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to procedural interfaces considering the high wind hazard, if these requirements are implemented as described.

3.1.3.4 Considerations in Using Offsite Resources - High Wind Hazard

NEI 12-06, Section 7.3.4 states:

> Extreme storms with high winds can have regional impacts that could have a significant impact on the transportation of off-site resources.
>
> 1. Sites should review site access routes to determine the best means to obtain resources from off-site following a hurricane.

2. Sites impacted by storms with high winds should consider where equipment delivered from off-site could be staged for use on-site.

With respect to the licensee's plans regarding its use of the offsite resources through the industry SAFER program, on page 9 of the Integrated Plan the licensee stated they had issued a contract for the RRC but had not yet identified the local staging area and method of transportation to the site. During the audit process, the licensee stated that it is working with the SAFER strategic alliance to finalize the industry generic Deployment Plan or Playbook. Once this template is finalized, a site specific plan will be developed. The offsite staging areas are still being evaluated. The methods for delivery of equipment from offsite sources under various conditions such as seismic, flooding, high winds, and snow, ice and extreme cold will be addressed and will meet the requirements of NEI 12-06, Section 7.3.4. This has been previously identified in section 3.1.1.4 as Confirmatory Item 3.1.1.4.A.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and subject to the successful closure of issues related to the Confirmatory Item, provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to the use of off-site resources, if these requirements are implemented as described.

3.1.4 Snow, Ice and Extreme Cold

As discussed in NEI 12-06, Section 8.2.1:

All sites should consider the temperature ranges and weather conditions for their site in storing and deploying their FLEX equipment consistent with normal design practices. All sites outside of Southern California, Arizona, the Gulf Coast and Florida are expected to address deployment for conditions of snow, ice, and extreme cold. All sites located North of the 35th Parallel should provide the capability to address extreme snowfall with snow removal equipment. Finally, all sites except for those within Level 1 and 2 of the maximum ice storm severity map contained in Figure 8-2 should address the impact of ice storms.

On page 1, in the section of its Integrated Plan regarding the determination of applicable extreme external hazards, the licensee stated that Figure 8-2 from the NEI 12-06 was used for this assessment. It was determined that the CNP site is located in an ice severity level 5 region.

On page 2 in the section of its Integrated Plan regarding the determination of applicable extreme external hazards, the licensee concluded that the snow, ice and extreme cold hazard is applicable to CNP.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to screening in the snow, ice and extreme cold hazard, if these requirements are implemented as described.

3.1.4.1 Protection of FLEX Equipment - Snow, Ice and Extreme Cold Hazard

NEI 12-06, Section 8.3.1 states:

These considerations apply to the protection of FLEX equipment from snow, ice, and extreme cold hazards:

1. For sites subject to significant snowfall and ice storms, portable FLEX equipment should be stored in one of the two configurations.

    a. In a structure that meets the plant's design basis for the snow, ice and cold conditions (e.g., existing safety-related structure).

    b. In a structure designed to or evaluated equivalent to ASCE 7-10, *Minimum Design Loads for Buildings and Other Structures* for the snow, ice, and cold conditions from the site's design basis.

    c. Provided the N sets of equipment are located as described in a. or b. above, the spare (N+1) set of equipment may be stored in an evaluated storage location capable of withstanding historical extreme weather conditions such that the equipment is deployable.

2. Storage of FLEX equipment should account for the fact that the equipment will need to function in a timely manner. The equipment should be maintained at a temperature within a range to ensure its likely function when called upon. For example, by storage in a heated enclosure or by direct heating (e.g., jacket water, battery, engine block heater, etc.).

On page 1 of its Integrated Plan, the licensee stated that portable FLEX equipment will be stored in a configuration that will maintain the equipment in a condition to perform its function in a timely manner when called upon. In addition, snow, ice, and extreme cold conditions are considered in the procurement and deployment of FLEX equipment.

During the audit process the licensee stated FLEX equipment will also be pre deployed within the powerblock or within the FLEX storage building. The new FLEX storage building will have electric resistance heating capable of maintaining a minimum temperature of 50 degrees F while protecting the FLEX equipment from weather and external events.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to protection of FLEX equipment considering the snow, ice and extreme cold hazard, if these requirements are implemented as described.

3.1.4.2 Deployment of FLEX Equipment - Snow, Ice and Extreme Cold

NEI 12-06, Section 8.3.2 states:

There are a number of considerations that apply to the deployment of FLEX equipment for snow, ice, and extreme cold hazards:

1. The FLEX equipment should be procured to function in the extreme conditions applicable to the site. Normal safety-related design limits for outside conditions may be used, but consideration should also be made for any manual operations required by plant personnel in such conditions.

2. For sites exposed to extreme snowfall and ice storms, provisions should be made for snow/ice removal, as needed to obtain and transport equipment from storage to its location for deployment.

3. For some sites, the ultimate heat sink and flow path may be affected by extreme low temperatures due to ice blockage or formation of frazil ice. Consequently, the evaluation should address the effects of such a loss of the UHS on the deployment of FLEX equipment. For example, if UHS water is to be used as a makeup source, some additional measures may need to be taken to assure that the FLEX equipment can utilize the water.

With respect to consideration 1: On page 1 of its Integrated Plan the licensee stated that portable FLEX equipment will be stored in a configuration that will maintain the equipment in a condition to perform its function in a timely manner when called upon. In addition, snow, ice, and extreme cold conditions are considered in the procurement and deployment of FLEX equipment.

With respect to consideration 2: During the audit process the licensee stated that under normal conditions, access to and from the FLEX storage building will be maintained by the Site Facilities group. The Site Facilities group has sufficient snow and ice removal equipment to ensure FLEX equipment deployment. This equipment is not intended to be stored or maintained in the FLEX equipment storage building. Trucks and snow removal vehicles are routinely maintained outside, used during winter months and mechanically maintained in good working order by an on-site maintenance crew from Fort Wayne Transmission/Dispatch Center and will form the line of defense. In addition to the onsite snow/ice removal equipment, the site has a standing contract with Oldenburg heavy equipment company (New Buffalo, MI) to provide supplemental snow removal services.

Snow removal equipment such as snowblowers are maintained in commercial storage buildings and deployed as needed. The large quantity and variety of snow removal equipment establishes a reasonable basis for ensuring site protected area remains accessible using the FLEX deployment routes.
.
With respect to consideration 3: During the audit process the licensee stated that winter storm conditions do not result in loss of the access to the normal heat sink. Access to Lake Michigan as a water supply source is through the circulating water system intake forebay. Water will be lifted from the forebay using deep-draft pumps. The three circulating water intake tunnels maintain communication with Lake Michigan below the level of winter ice cover. Forebay access is maintained through removable cover plates and manholes allowing FLEX equipment suction from the ultimate heat sink.

The UHS (Lake Michigan) is assumed to be available as the ultimate water source. These sources are aligned via large 16’ diameter piping. Lake Michigan has the potential for developing frazil ice. Frazil ice is associated with large bodies of water under extremely cold, windy and turbulent conditions. This results in emulsified ice crystals in the surface and subsurface of the large water body. The CNP intake structure and forebay connect to Lake Michigan through three large intake tunnels with intake cribs mounted on the lake bottom. The intake cribs are significantly below the lake surface.

During ELAP the circulating water and ESW and non-essential service water (NESW) pumps will all be stopped due to the loss of power condition. Under the reduced flow rates considered during ELAP, the forebay acts as a stilling well. Communication with Lake Michigan maintains the water supply while shielding the forebay from the adverse effects of surface freezing and frazil ice production. Based on the construction and design of the lake intake structures and circulating water forebay, the licensee concluded that reasonable assurance exists that induction of frazil ice will not be a concern.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to deployment of FLEX equipment considering the snow, ice and extreme cold hazard, if these requirements are implemented as described.

3.1.4.3 Procedural Interfaces - Snow, Ice and Extreme Cold Hazard

NEI 12-06, Section 8.3.3 states:

> The only procedural enhancements that would be expected to apply involve addressing the effects of snow and ice on transport the FLEX equipment. This includes both access to the transport path, e.g., snow removal, and appropriately equipped vehicles for moving the equipment.

On page 3, of its Integrated Plan, under key assumptions, the licensee stated that preplanned strategies developed to protect the public health and safety will be incorporated into the unit EOPs in accordance with established EOP change process and their impact to the design basis capabilities of the unit evaluated under 10 CFR 50.59. The licensee plans to develop FSGs and associated procedure revisions to implement FLEX mitigation strategies.

During the audit process the licensee stated that snow and ice storms are relatively slow moving and predictable. These storms can be monitored using commercial weather predictions and national weather forecasts. As such, the site has time and procedures to summon personnel to deploy and operate ice and snow removal equipment. PMP-5055-SWM-001, "Severe Weather Guidelines" and 12-OHP-4022-001-010, "Severe Weather Abnormal Operating Procedure" contain site guidance for maintaining site protected area access during adverse weather conditions.

FLEX procedures are under development for deploying FLEX equipment including under winter storm conditions. This includes a large truck specifically for FLEX deployment with a snow/debris removal plow.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to procedural interfaces considering the snow, ice, and extreme cold hazard, if these requirements are implemented as described.

3.1.4.4 Considerations in Using Offsite Resources - Snow, Ice and Extreme Cold

NEI 12-06, Section 8.3.4, states:

> Severe snow and ice storms can affect site access and can impact staging areas for receipt of off-site material and equipment.

With respect to the licensee's plans regarding its use of the offsite resources through the industry SAFER program, on page 9 of the Integrated Plan the licensee stated they had issued a contract for the RRC but had not yet identified the local staging area and method of transportation to the site. During the audit process, the licensee stated that it is working with the SAFER strategic alliance to finalize the industry generic Deployment Plan or Playbook. Once this template is finalized, a site specific plan will be developed. The offsite staging areas are still being evaluated. The methods for delivery of equipment from offsite sources under various conditions such as seismic, flooding, high winds, and snow, ice and extreme cold will be addressed and will meet the requirements of NEI 12-06, Section 8.3.4. This has been previously identified in section 3.1.1.4 as Confirmatory Item 3.1.1.4.A.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and subject to the successful closure of issues related to the Confirmatory Item, provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to the use of off-site resources, if these requirements are implemented as described.

3.1.5 High Temperatures

NEI 12-06, Section 9 states:

> All sites will address high temperatures. Virtually every state in the lower 48 contiguous United States has experienced temperatures in excess of 110 degrees F. Many states have experienced temperatures in excess of 120 degrees F.
>
> In this case, sites should consider the impacts of these conditions on deployment of the FLEX equipment.

On page 2, in the section of its Integrated Plan regarding the determination of applicable extreme external hazards, the licensee stated that the CNP site may experience extreme high temperatures for a prolonged duration. Based on NEI 12-06 guidance, the licensee stated that the high temperature hazard is applicable to CNP.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to screening in the high temperature hazard if these requirements are implemented as described.

3.1.5.1 Protection of FLEX Equipment - High Temperature Hazard

NEI 12-06, Section 9.3.1, states:

> The equipment should be maintained at a temperature within a range to ensure its likely function when called upon.

On page 19, in the section of its Integrated Plan regarding the strategies for maintaining core cooling in the transition phase (Phase 2), the licensee stated that storage/protection of equipment from high temperature hazard would be provided in storage structures that will be ventilated to allow equipment to function. Active cooling systems are not required as normal room ventilation will be utilized. Similar statements are made on pages 31, 37, 46, and 51 of the Integrated Plan, in the sections regarding RCS inventory control, maintaining containment, maintaining SFP cooling, and safety function support respectively.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to protection of FLEX equipment considering the high temperature hazard, if these requirements are implemented as described.

3.1.5.2 Deployment of FLEX Equipment - High Temperature Hazard

NEI 12-06, Section 9.3.2 states:

> The FLEX equipment should be procured to function, including the need to move the equipment, in the extreme conditions applicable to the site. The potential impact of high temperatures on the storage of equipment should also be considered, e.g., expansion of sheet metal, swollen door seals, etc. Normal safety-related design limits for outside conditions may be used, but consideration should also be made for any manual operations required by plant personnel in such conditions.

During the audit process, the licensee stated that a site specific evaluation will be performed to determine the impact of FLEX equipment operating in high temperature environments. When the impacts are determined, FLEX equipment will be procured designed for the expected environmental conditions and/or ventilation cooling strategies will be implemented. The FLEX boric acid transfer pump is the only FLEX pump that will be operated inside an enclosed area. This area is a large hallway inside the auxiliary building.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to deployment of FLEX equipment considering the high temperature hazard, if these requirements are implemented as described.

3.1.5.3 Procedural Interfaces - High Temperature Hazard

NEI 12-06, Section 9.3.3 states:

> The only procedural enhancements that would be expected to apply involve addressing the effects of high temperatures on the portable equipment.

On page 2 of the Integrated Plan, the licensee stated that the CNP site may experience extreme high temperatures for a prolonged duration. However, the extreme drought and high temperature events are slow meteorological evolutions. Existing plant administrated operational procedures are in place to ensure that the plant is shut down and is at safe conditions if the temperature of any required structures, systems, or components (SSC) exceed their respective design basis limiting conditions.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to procedural interfaces considering the high temperature hazard, if these requirements are implemented as described.

3.2 PHASED APPROACH

Attachment (2) to Order EA-12-049 describes the three-phase approach required for mitigating beyond-design-basis external events in order to maintain or restore core cooling, containment and spent fuel pool cooling capabilities. The phases consist of an initial phase using installed equipment and resources, followed by a transition phase using portable onsite equipment and consumables and a final phase using offsite resources.

To meet these EA-12-049 requirements, Licensees will establish a baseline coping capability to prevent fuel damage in the reactor core or spent fuel pool and to maintain containment capabilities in the context of a beyond-design-basis external event that results in the loss of all ac power, with the exception of buses supplied by safety-related batteries through inverters, and loss of normal access to the UHS.

As described in NEI 12-06, Section 1.3, plant-specific analyses will determine the duration of each phase.

3.2.1 RCS Cooling and Heat Removal, and RCS Inventory Control Strategies

NEI 12-06, Table 3-2 and Appendix D summarize one acceptable approach for the reactor core cooling strategies. This approach uses the installed auxiliary feedwater (AFW)/emergency feedwater (EFW) system to provide steam generator (SG) makeup sufficient to maintain or restore SG level in order to continue to provide core cooling for the initial phase. This approach relies on depressurization of the SGs for makeup with a portable injection source in order to provide core cooling for the transition and final phases. This approach accomplishes RCS inventory control and maintenance of long term subcriticality through the use of low leakage RCP seals and/or borated high pressure RCS makeup with a letdown path. In mode 5 (cold shutdown) and mode 6 (refueling) with SGs not available, this approach relies on an on-site pump for RCS makeup and diverse makeup connections to the RCS for long-term RCS makeup with borated water and residual heat removal from the vented RCS.

As described in NEI 12-06, Section 3.2.1.7 and JLD-ISG-2012-01, Section 2.1, strategies that have a time constraint to be successful should be identified and a basis provided that the time can be reasonably met. NEI 12-06, Section 3 provides the performance attributes, general criteria, and baseline assumptions to be used in developing the technical basis for the time constraints. Since the event is a beyond-design-basis event, the analysis used to provide the technical basis for time constraints for the mitigation strategies may use nominal initial values (without uncertainties) for plant parameters, and best-estimate physics data. All equipment used for consequence mitigation may be assumed to operate at nominal setpoints and capacities. NEI 12-06, Section 3.2.1.2 describes the initial plant conditions for the at-power mode of operation; Section 3.2.1.3 describes the initial conditions; and Section 3.2.1.4 describes boundary conditions for the reactor transient.

Acceptance criteria for the analyses serving as the technical basis for establishing the time constraints for the baseline coping capabilities described in NEI 12-06, which provide an acceptable approach, as endorsed by JLD-ISG-2012-01, to meeting the requirements of EA-12-049 for maintaining core cooling are 1) the preclusion of core damage as discussed in NEI 12-06, Section 1.3 as the purpose of FLEX; and 2) prevention of recriticality as discussed in Appendix D, Table D-1.

3.2.1.1 Computer Code Used for the ELAP Analysis

NEI 12-06, Section 1.3 states:

> To the extent practical, generic thermal hydraulic analyses will be developed to support plant- specific decision-making. Justification for the duration of each phase will address the on-site availability of equipment, the resources necessary to deploy the equipment consistent with the required timeline, anticipated site conditions following the beyond-design-basis external event, and the ability of the local infrastructure to enable delivery of equipment and resources from off- site.

On page 5 of its Integrated Plan, the licensee stated that a CNP specific evaluation has been performed to assess the analysis performed in support of WCAP-17601-P for the 4 loop Westinghouse plants and determine the applicability of the generic analysis to CNP. The analysis performed by the NSSS vendor, in WCAP-17601-P, was performed for plants with comparable core thermal power rating and plant configurations that were adequate to envelope the CNP configuration. Where required, plant specific differences were noted and documented for the applicable function and justification is documented in the area of that function.

The licensee's Integrated Plan makes reference to the use of WCAP analysis for determining the time constraints indicated in "Sequence of Events Timeline" in Attachment 1A.

During the audit process, the licensee stated that a site specific thermal-hydraulic FLEX response analysis is being developed and is currently under review. This site specific analysis was developed to support FLEX response to strategies outlined in NEI 12-06, the Pressurized Water Reactor Owner's Group (PWROG) Generic FLEX Guidelines and WCAP-17601-P. Plant modifications, FLEX equipment purchases, and FLEX response procedures are being developed consistent with the site specific analysis addressing each topic stipulated in WCAP-17601-P Section 3.1.

The licensee further stated that the CNP site specific analysis was developed using NOTRUMP. Westinghouse letter LTR-FSE-13-65 (posted on the licensee's e-portal) provides a point by point description of the application of the PWROG analysis contained in WCAP-17601-P to the CNP site specific analysis documented in CN-FSE-13-13-R. The letter contains a matrix identifying the key model inputs and assumptions and confirms that the CNP site specific analysis is consistent with the recommended approach in WCAP-17601-P.

Section 3.1 of WCAP-17601-P discusses the PWROG's objectives and recommendations for Westinghouse designed NSSS. These cover the following subjects for consideration in developing FLEX mitigation strategies: (1) RCS reference case with standard RCP seal package, (2) RCS inventory coping times, (3) instrumentation, (4) sub criticality (5) RCS makeup (6) RCP low leakage seal design (7) feedwater flow interruption, (8) feeding a single SG, (9) accumulator makeup, and (10) effect of TDAFW heat load on RCS.

The Westinghouse letter, noted above, addressed the applicability to CNP of the 10 objectives and recommendations contained in section 3.1 in WCAP-17601-P and determined that all, except the one related to the acceptability of feeding only one steam generator, apply to CNP and will be implemented.

The licensee has provided a Sequence of Events (SOE) in their Integrated Plan, which included the time constraints and the technical basis for the site. That SOE is based on an analysis using the industry-developed NOTRUMP computer code. NOTRUMP was written to simulate the response of pressurized water reactors (PWRs) to small break loss of coolant accident (LOCA) transients for licensing basis safety analysis.

The licensee has decided to use the NOTRUMP computer code for simulating the ELAP event. Although NOTRUMP has been reviewed and approved for performing small break LOCA analysis for PWRs, the NRC staff had not previously examined its technical adequacy for simulating an ELAP event. In particular, the ELAP scenario is differentiated from typical design-basis small-break LOCA scenarios in several key respects, including the absence of normal emergency core cooling system (ECCS) injection and the substantially reduced leakage rate, which places significantly greater emphasis on the accurate prediction of primary-to-secondary heat transfer, natural circulation, and two-phase flow within the RCS. As a result of these differences, concern arose associated with the use of the NOTRUMP code for ELAP analysis for modeling of two-phase flow within the RCS and heat transfer across the steam generator tubes as single-phase natural circulation transitions to two-phase flow and the reflux condensation cooling mode. This concern resulted in the following Confirmatory Item:

> Reliance on the NOTRUMP code for the ELAP analysis of Westinghouse plants is limited to the flow conditions prior to reflux condensation initiation. This includes specifying an acceptable definition for reflux condensation cooling. This is identified as Confirmatory Item 3.2.1.1.A in Section 4.2.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and subject to the successful closure of issues related to the Confirmatory Item, provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to the computer codes used to perform ELAP analysis if these requirements are implemented as described.

3.2.1.2 RCP Seal Leakage Rates

NEI 12-06, Section 1.3 states:

> To the extent practical, generic thermal hydraulic analyses will be developed to support plant specific decision-making. Justification for the duration of each phase will address the on-site availability of equipment, the resources necessary to deploy the equipment consistent with the required timeline, anticipated site conditions following the beyond-design-basis external event, and the ability of the local infrastructure to enable delivery of equipment and resources from offsite.

During an Extended Loss of ac Power (ELAP) event, cooling to the reactor coolant pump (RCP) seal packages will be lost and water at high temperatures may degrade seal materials leading to excess seal leakage from the reactor coolant system (RCS). Without ac power available to the emergency core cooling system, inadequate core cooling may eventually result from the leakage out of the seals. The ELAP analysis credits operator actions to align the high pressure RCS makeup sources and replenish the RCS inventory in order to ensure the core is covered with water, thus precluding inadequate core cooling. The amount of high pressure RCS makeup needed is mainly determined by the seal leakage rate, therefore the seal leakage rate is of primary importance in an ELAP analysis as greater values of the leakage rates will result in a shorter time period for the operator action to align the high pressure RCS makeup water sources.

The licensee provided a Sequence of Events (SOE) in their Integrated Plan, which included the time constraints and the technical basis for their site. The SOE is based on an analysis using specific RCP seal leakage rates. The issue of RCP seal leakage rates was identified as a Generic Concern and was addressed by NEI in the following submittals:

- WCAP-17601-P, Revision 1, “Reactor Coolant System Response to the Extended Loss of AC Power Event for Westinghouse, Combustion Engineering and Babcock & Wilcox NSSS Designs” dated January 2013 (ADAMS Accession No. ML13042A011 and ML13042A013 (Non-Publically Available)).

- A position paper dated August 16, 2013, entitled “Westinghouse Response to NRC Generic Request for Additional Information (RAI) on Reactor coolant (RCP) Seal Leakage in Support of the Pressurized Water reactor Owners Group (PWROG)” (ADAMS Accession No. ML13190A201 (Non-Publically Available)).

After review of these submittals, the NRC staff has placed certain limitations for Westinghouse designed plants. Those limitations and their corresponding Confirmatory Item numbers for this TER are provided as follows:

(1) For the plants using Westinghouse RCPs and seals that are not the SHIELD shutdown seals, the RCP seal initial maximum leakage rate should be greater than or equal to the upper bound expectation for the seal leakage rate for the ELAP event (21 gpm/seal) discussed in the PWROG position paper addressing the RCP seal leakage for Westinghouse plants. If the RCP seal leakage rates used in the plant-specific ELAP analyses are less than the upper bound expectation for the seal leakage rate discussed in the position paper, justification should be provided. If the seals are changed to non-Westinghouse seals, the acceptability of the use of non-Westinghouse seals should be addressed, and the RCP seal leakage rates for use in the ELAP analysis should be provided with acceptable justification.

(2) In some plant designs, such as those with 1200 to 1300 psia SG design pressures and no accumulator backing of the main steam system power-operated relief valve (PORV) actuators, the cold legs could experience temperatures as high as 580 ^{0}F before cooldown commences. This is beyond the qualification temperature (550 ^{0}F) of the O-rings used in the RCP seals. For those Westinghouse designs, a discussion of the information (including the applicable analysis and relevant seal leakage testing data) should be provided to justify that (1) the integrity of the associated O-rings will be maintained at the temperature conditions experienced during the ELAP event, and (2) the seal leakage rate of 21 gpm/seal used in the ELAP is adequate and acceptable.

(3) Some Westinghouse plants have installed or will install the SHIELD shutdown seals, or other types of low leakage seals, and have credited or will credit a low seal leakage rate (e.g., 1 gpm/seal) in the ELAP analyses for the RCS response. For those plants, information should be provided to address the impacts of the Westinghouse 10 CFR Part 21 report, “Notification of the Potential Existence of

Defects Pursuant to 10 CFR Part 21," dated July 26, 2013 (ADAMS No. ML13211A168) on the use of the low seal leakage rate in the ELAP analysis.

(4) If the seals are changed to the newly designed Generation 3 SHIELD seals, or non-Westinghouse seals, the acceptability of the use of the newly designed Generation 3 SHIELD seals, or non-Westinghouse seals should be addressed, and the RCP seal leakages rates for use in the ELAP analysis should be provided with acceptable justification.

During the audit process the licensee addressed the four concerns outlined above.

Regarding the first concern, the licensee stated that site plant specific analysis confirmed that the RCP seal initial maximum leakage rate of 21 gpm per RCP seal (WCAP-17601-P Section 5.2) is valid during the ELAP event. Inputs and assumptions associated with the plant specific analysis are consistent with LTR-FSE-13-45 "Westinghouse Response to NRC Generic Request for Additional Information (RAI) on RCP Seal Leakage in Support of the PWROG". Seal leakage rates assumed in the plant specific ELAP thermal-hydraulic analysis are derived from WCAP-10541 for standard Model 93A RCP seals. The size of the break is assumed to be constant and equivalent to the size of the break area based on the initial total RCP leakage rate. OHP-4023-ECA-0.0, "Loss of All AC Power," (hereinafter ECA-0.0) is the governing procedure during the ELAP event, and is compliant to vendor recommendations to avoid RCP seal thermal shock. RCP seal injection or thermal barrier cooling will not be established in the ELAP event. The RCS will be cooled down to cold shutdown following loss of RCP seal cooling.

Regarding the second concern, the licensee stated that the lowest main steam safety valve setpoint for CNP Units 1 and 2 is 1080 psia (Technical Specifications, ADAMS Accession Nos. ML053050305 and ML053050307, Table 3.7.1-2), which correlates to a saturation (RCS) temperature of 554°F. I&M will initiate a rapid RCS cooldown/depressurization within 2 hours following initiation of the ELAP event to limit the time at which the RCP seals are exposed to elevated fluid temperature. The PWROG is working on these issues and will submit to the NRC position papers that will contain test data regarding the maximum seal leakage rates of Westinghouse traditional and Generation 3 SHIELD seals, and FlowServe seals at higher cold-leg temperatures. The NRC will review the position papers when they are received. As such, resolution of this concern is identified as Confirmatory Item 3.2.1.2.A in Section 4.2.

Regarding the third concern, the licensee stated that although generation 1 SHIELD RCP seal modifications are currently installed in Unit 1 they are not being credited for the low leakage function based on industry operating experience related to post use testing failures at Farley and Beaver Valley nuclear stations. The low leakage function is not being credited in the plant PRA analysis pending resolution of the SHIELD design. Testing and qualification of SHIELD is ongoing. I&M is closely following the re-design of SHIELD and will modify analyses and FLEX strategies, as needed, based on the conclusions of the SHIELD modification program. After FLEX implementation dates, I&M will plan to credit safe shutdown low-leakage seals (SHIELD) for FLEX strategies. The plant specific ELAP thermal-hydraulic analysis CN-FSE-13-13-R provides analysis, recommended RCS boration, and RCS make up requirements for plant response with and without crediting SHIELD. Resolution to this issue is identified as Confirmatory Item 3.2.1.2.B in Section 4.2.

Regarding the fourth concern, the audit response makes no reference to a possible change to Generation 3 SHIELD seals in the future, but the potential is addressed as Confirmatory Item 3.2.1.2.C in Section 4.2.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and subject to the successful closure of issues related to the Confirmatory Items, provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to the reactor coolant pump seal leakages rates if these requirements are implemented as planned.

3.2.1.3 Decay Heat

NEI Section 3.2.1.2 under initial plant conditions states:

> The initial plant conditions are assumed to be the following:
>
> (1) Prior to the event the reactor has been operating at 100 percent rated thermal power for at least 100 days or has just been shut down from such a power history as required by plant procedures in advance of the impending event.

On page 6 of its Integrated Plan, the licensee stated that the best estimate decay heat curve was assumed to be consistent with the generic plant analysis of a 4 loop, 12 foot core, values used in WCAP-17601-P.

During the audit process, the licensee confirmed that the NEI assumption of operating at 100% power for at least 100 days is bounded by the site specific thermal hydraulic analysis contained in CN-FSE-13-13-R.

Additional information is required is to address the applicability of assumption 4 on page 4-13 of WCAP-17601-P, which states that "Decay heat is per ANS 5.1-1979 + 2 sigma, or equivalent." If the ANS 5.1-1979 + 2 sigma model is used in the ELAP analysis, values of the following key parameters used to determine the decay heat should be specified and the adequacy of the values used: (1) initial power level, (2) fuel enrichment, (3) fuel burnup, (4) effective full power operating days per fuel cycle, (5) number of fuel cycles, if hybrid fuels are used in the core, and (6) fuel characteristics are based on the beginning of the cycle, middle of the cycle, or end of the cycle. This is identified as Confirmatory Item 3.2.1.3.A in section 4.2.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and subject to the successful closure of issues related to the Confirmatory Item, provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to decay modeling, if these requirements are implemented as described.

3.2.1.4 Initial Values for Key Plant Parameters and Assumptions

NEI 12-06, Section 3.2 provides a series of assumptions to which initial key plant parameters (core power, RCS temperature and pressure, etc.) are required to conform. When considering the code used by the licensee and its use in supporting the required event times for the SOE, it is important to ensure that the initial key plant parameters not only conform to the assumptions provided in NEI 12-06, Section 3.2, but that they also represent the starting conditions of the code used in the analyses and that they are included within the code's range of applicability.

On page 3 in its Integrated Plan, in regards to key site assumptions to implement NEI 12-06 strategies, the licensee stated:

1. Seismically designed DC battery banks are available
2. Seismically designed AC and DC distribution systems are available
3. Plant initial response is the same as SBO event
4. Best estimate analysis and decay heat is used to establish operator time and action
5. No single failure of SSC is assumed except those in the base scenario assumptions

The licensee further stated that the plan defines strategies capable of mitigating a simultaneous loss of ac power and loss of normal access to the UHS resulting from a BDBEE by providing adequate capability to maintain or restore core cooling, containment, and SFP cooling capabilities at all units on a site.

During the NRC audit process the licensee was requested to specify which analysis performed in WCAP-17601-P is being applied to CNP. Additionally, the licensee was requested to justify the use of that analysis by identifying and evaluating the important parameters and assumptions demonstrating that they are representative of CNP and appropriate for simulating the ELAP transient. The licensee has provided a table comparing plant specific applied values and PWROG reference values. However, the FLEX response strategies have not been completely finalized and the sequence of events timeline presented in the Integrated Plan requires further validation. The final FLEX strategies, procured equipment and the implementing FSGs will need to be validated against the key plant parameters and input assumptions used in the site specific analysis which is based on the WCAP-17601-P methodology. This is identified as Confirmatory Item 3.2.1.4.A in Section 4.2.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and subject to the successful closure of issues related to the Confirmatory Item provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to initial values for key plant parameters and assumptions, if these requirements are implemented as described.

3.2.1.5 Monitoring Instrumentation and Controls

NEI 12-06, Section 3.2.1.10 states in part:

> The parameters selected must be able to demonstrate the success of the strategies at maintaining the key safety functions as well as indicate imminent or actual core damage to facilitate a decision to manage the response to the event within the Emergency Operating Procedures and FLEX Support Considerations or within the SAMGs. Typically, these parameters would include the following:
>
> - SG Level
> - SG Pressure
> - RCS Pressure
> - RCS Temperature
> - Containment Pressure
> - SFP Level
>
> The plant-specific evaluation may identify additional parameters that are needed

in order to support key actions identified in the plant procedures/guidance or to indicate imminent or actual core damage.

On page 14 of the Integrated Plan regarding maintaining RCS core cooling and heat removal, the licensee listed the installed instrumentation credited for maintaining core cooling and heat removal during Phase 1 of an ELAP. They included the following parameters:

SG Pressure
SG Level
RCS Temperature (Thot, Tcold)
RCS Pressure

On page 11 of the Integrated Plan, the licensee stated that the CST tank level will be monitored to determine when to align makeup to the CST or align an alternate water source to the TDAFW pumps. However, CST level instrumentation was not listed as credited for supporting the core cooling strategy. During the audit, the licensee clarified that following a loss of all ac electrical power, control room monitoring of CST level instruments will be maintained from vital control room instrument distribution (CRID) 120 VAC instrument distribution. CST level instruments 1-CLI-113 and 1-CLI-114 are powered by the CRID vital instrument inverters which are supplied by Train A and B station 250 V dc distribution. Both instruments remain powered during the ELAP event.

On page 26 of the Integrated Plan, regarding maintaining core inventory, the licensee listed the installed instruments credited for maintaining core inventory during Phase 1 of the ELAP. They included the following parameters:

RCS Pressure
Pressurizer Level
Boric Acid Storage Tank (BAST) Level
Refueling Water Storage Tank (RWST) Level
Source Range Nuclear Instrument

On page 35 of the Integrated Plan, regarding maintaining containment, the licensee lists as essential instrumentation the containment pressure. During the audit process, in response to a question related to measurement of temperature in containment during the ELAP event, the licensee stated that site specific analysis is in progress to develop the analytical basis for ELAP containment pressure and temperature response. The analysis will specifically address steam generator, safety injection accumulator, pressurizer, and reactor cavity sub compartment response. Bulk containment pressure and temperature response will also be addressed in the GOTHIC modeled technical evaluation. This is identified as Confirmatory item 3.2.1.5.A in Section 4.2.

On page 47 of its Integrated Plan the licensee stated that per NRC Order EA-12-051, SFP level indication will be modified to provide enhanced indication to support SFP cooling.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and subject to the successful closure of issues related to the Confirmatory Item, provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to monitoring instrumentation and control, if these requirements are implemented as described.

3.2.1.6 Sequence of Events

NEI 12-06, Section 3.2.1.7, Item (6) states:

> Strategies that have a time constraint to be successful should be identified and a basis provided that the time can reasonably be met.

NEI 12-06, Section 3.2.2 addresses the minimum baseline capabilities:

> Each site should establish the minimum coping capabilities consistent with unit-specific evaluation of the potential impacts and responses to an ELAP and LUHS. In general, this coping can be thought of as occurring in three phases:
>
> - Phase 1: Cope relying on installed plant equipment.
> - Phase 2: Transition from installed plant equipment to on-site FLEX equipment.
> - Phase 3: Obtain additional capability and redundancy from off-site equipment until power, water, and coolant injection systems are restored or commissioned.

The initial coping phase is consistent with NEI guidance as only installed plant equipment is used for core cooling. The TDAFW pump is used to feed the steam generators and can draw on a variety of water sources. The primary source of water is the CST and if damaged during a tornado event, other sources can be manually aligned. The licensee has identified the need to validate a time critical action. If the CSTs are not available due to being damaged by a tornado borne missile, an alternate water source needs to be connected manually to the suction of the TDAFW pumps. This action needs to be accomplished prior to SG dryout conditions, within approximately 55 minutes of the ELAP event. This is identified as Confirmatory Item 3.2.1.6.A in Section 4.2.

Reactor coolant system inventory during the initial phase will be made up by partial injection of accumulator contents.

During the transition phase, core cooling is provided by portable FLEX pumps which will continue to feed the steam generators, drawing on Lake Michigan if sources of clean water are unavailable. The SOE timeline presented in the Integrated Plan in Attachment 1A is based on the WCAP-17601-P analysis and credits the use of low leakage reactor coolant pump seals. This affects the timing for RCS inventory control using FLEX equipment. On page 65, the licensee states that boration to ensure subcriticality starts at time 6-8 hours after an ELAP event. Pre-staged high pressure pumps are to be used to inject boric acid into the RCS taking suction from the BAST. Pre-staging the pumps enhances their availability within the required time. The high pressure pumps also function to restore water inventory in the RCS.

.

During the audit process, the licensee described changes that would potentially affect the SOE timeline. Additional site specific analyses related to boration as discussed in Section 3.2.1.8, “Core Sub Criticality” have been performed. Furthermore, the licensee will not be taking credit for the RCP low leakage seals as discussed in Section 3.2.1.2, “RCP Seal Leakage Rates”.

Based on the revised approach to RCP seal leakage rate assumptions and changes to the boration rate, revised from 10 gpm to 21 gpm, the sequence of events timeline needs to be reconfirmed and updated as needed to reflect the results of the new site specific NOTRUMP analysis. This is identified as Confirmatory Item 3.2.1.6.B in Section 4.2.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and subject to the successful closure of issues related to the Confirmatory Items, provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to the sequence of events timeline, if these requirements are implemented as described.

3.2.1.7 Cold Shutdown and Refueling

NEI 12-06 Table 1-1 lists the coping strategy requirements as presented in Order EA-12-049. Item (4) of that list states:

> Licensee or CP holders must be capable of implementing the strategies in all modes.

The NRC staff reviewed the licensee's Integrated Plan and determined that the Generic Concern related to shutdown and refueling requirements is applicable to the plant. This Generic Concern has been resolved generically through the NEI position paper entitled "Shutdown/Refueling Modes" (ADAMS Accession No. ML13273A514); and has been endorsed by the NRC in a letter dated September 30, 2013 (ADAMS Accession No. ML13267A382).

The position paper describes how licensees will, by procedure, maintain equipment available for deployment in shutdown and refueling modes. The NRC staff concluded that the position paper provides an acceptable approach for demonstrating that the licensees are capable of implementing mitigating strategies in all modes of operation. The NRC staff will evaluate the licensee's resulting program through the audit and inspection process.

Pending the licensee informing the NRC staff of their decision to follow the position paper, the licensee's plan for cold shutdown and refueling is identified as Confirmatory Item 3.2.1.7.A in Section 4.2.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and subject to the successful closure of issues related to the Confirmatory Item, provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to the plant response to an ELAP during Cold Shutdown or Refueling, if these requirements are implemented as described.

3.2.1.8 Core Sub-Criticality

NEI 12-06 Table 3-2 states in part that:

> All plants provide means to provide borated RCS makeup.

On page 27 in its Integrated Plan the licensee stated that to address a potential return to criticality event, an electric powered portable pump will be used to inject boric acid into the RCS. The pump for each unit will be permanently located, on a cart, on the 587 ft. elevation of the auxiliary building.

The boric acid storage tanks (BASTs) are the primary suction source for the portable pump since they have a higher boric acid concentration (6550 ppm minimum), and they are protected from applicable external hazards. The RWST is an alternate suction source; however, it is not protected against high wind generated missiles and has a lower boron concentration (2400 ppm minimum). The BASTs contain sufficient volume to maintain subcriticality after the RCS cooldown resulting from the SG depressurization.

During the audit process, the licensee stated that the high pressure boric acid (BA) FLEX electrically driven pumps are being sized for a minimum 21 gpm delivery. This is a change from the initial boric acid pump size of 10 gpm originally presented in the Integrated Plan.

The CNP site specific ELAP subcriticality analysis calculations are contained in Westinghouse Calculation-Note CN-FSE-13-13-R. This analysis assumes operator response to commence RCS cooldown within 2 hours of ELAP; RCS cooldown to reduced temperature and pressure completes in the next 2 hours; RCS boration starts within 16 hours of ELAP (at 21 gpm); and completes with required RCS boration injected within 24 hours of ELAP. This analysis assumes standard Westinghouse RCP seal performance.

I&M is in the process of developing FLEX guidelines designed to borate the RCS during the ELAP event. As a primary RCS makeup/boration strategy, the FLEX BA pump will inject BAST inventory into the RCS via the reciprocating charging pump (PP-49) discharge vent or the safety injection (SI) pump discharge vent/drain lines. As an alternate RCS makeup strategy, a FLEX BA pump will inject the RWST inventory into the RCS via the reciprocating charging pump discharge header tee and blind flange or SI discharge header vents/drains. The FLEX BA pumps will be electrically driven and powered by a dedicated FLEX DG.

During the audit process, the licensee stated that CNP site specific ELAP subcriticality analysis calculations contained in Westinghouse Calculation Note CN-FSE-13-13-R (posted on the licensee's e-portal) are based on the uniform boron mixing model. Discussion of the site specific application of the uniform boron mixing model and disposition of the PWROG recommendations contained in LTR-FSE-13-46-P, "Westinghouse Response to NRC Generic Request for Additional Information (RAI) on Boron Mixing in Support of the Pressurized Water Reactor Owners Group (PWROG)," are contained in Westinghouse letter LTR-FSE-13-66 also posted on the licensee's e-portal. The limiting long-term subcriticality cases evaluated in Calc-Note CN-FSE-13-13-R assume an initial RCS inventory based on a maximum normal operating pressure (NOP), a hot zero power (HZP) RCS temperature, a maximum normal pressurizer level, and no RCP seal package or RCS Technical Specifications (TS) leakage. These assumptions increase the time and makeup necessary to achieve the required RCS shutdown concentration.

During the audit process, the licensee further stated that site specific analysis is in progress to develop the analytical basis supporting I&M FLEX response. This analysis will ensure the boron mixing model is compliant with PWROG recommendations. NEI 12-06 Section 3.2.1.7 (6) is applicable to the RCS boration strategy in that the timing to commence and complete RCS boration using FLEX equipment is relevant. Generic FLEX Support Guidelines specify a new setpoint for the time after reactor trip when RCS boration is required. This new FSG setpoint is being developed and will be included as required in the applicable FSGs under development. Reactor subcriticality is assured based on the assumed operator response detailed in Calculation-Note CN-FSE-13-13-R.

The NRC staff reviewed the licensee's Integrated Plan and determined that the Generic Concern associated with the modeling of the timing and uniformity of the mixing of a liquid boric acid solution injected into the reactor coolant system (RCS) under natural circulation conditions potentially involving two-phase flow was applicable to CNP.

The Pressurized Water Reactor Owners Group submitted a position paper, dated August 15, 2013 (withheld from public disclosure due to proprietary content), which provides test data regarding boric acid mixing under single-phase natural circulation conditions and outlined applicability conditions intended to ensure that boric acid addition and mixing would occur under conditions similar to those for which boric acid mixing data is available. The NRC staff concluded that the August 15, 2013, position paper was not adequately justified and has not endorsed this position paper. As such, resolution of this concern for CNP is identified as Open Item 3.2.1.8.A in Section 4.1.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and subject to the successful closure of issues related to the Open Item, provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to core subcriticality, if these requirements are implemented as described.

3.2.1.9 Use of Portable Pumps

NEI 12-06, Section 3.2.2, Guideline (13), states in part:

> Regardless of installed coping capability, all plants will include the ability to use portable pumps to provide RPV/RCS/SG makeup as a means to provide diverse capability beyond installed equipment. The use of portable pumps to provide RPV/RCS/SG makeup requires a transition and interaction with installed systems. For example, transitioning from RCIC to a portable FLEX pump as the source for RPV makeup requires appropriate controls on the depressurization of the RPV and injection rates to avoid extended core uncovery. Similarly, transition to a portable pump for SG makeup may require cooldown and depressurization of the SGs in advance of using the portable pump connections. Guidance should address both the proactive transition from installed equipment to portable and reactive transitions in the event installed equipment degrades or fails. Preparations for reactive use of portable equipment should not distract site resources from establishing the primary coping strategy. In some cases, in order to meet the time-sensitive required actions of the site-specific strategies, the FLEX equipment may need to be stored in its deployed position.
>
> The fuel necessary to operate the FLEX equipment needs to be assessed in the plant specific analysis to ensure sufficient quantities are available as well as to address delivery capabilities.

NEI 12-06 Section 11.2 states in part:

> Design requirements and supporting analysis should be developed for portable equipment that directly performs a FLEX mitigation strategy for core, containment, and SFP that provides the inputs, assumptions, and documented analysis that the mitigation strategy and support equipment will perform as

intended.

During the initial coping phase only installed plant equipment is credited for coping at the onset of the ELAP. The TDAFW pumps are used to supply water to the SGs. Available sources of water during Phase 1 are described in Section 3.2.4.7.

Phase 2 core cooling will be achieved with a portable low pressure lift pump as described on page 15, in the section of the Integrated Plan discussing the strategy for maintaining core cooling and heat removal in the transition phase. When the initial sources of water (CSTs, fire water header) become unavailable and the TDAFW pump is still operable, a single portable lift pump can supply the suction to the TDAFW pumps from Lake Michigan using the modified ESW connections. If the TDAFW pumps are not available and portable pumps are deployed, two pumps in series will be required with suction from Lake Michigan via the forebay or a connection installed on an abandoned fire pump suction piping from the circulating water discharge header. The low pressure lift pump will feed two booster pumps each aligned to feed the steam generators at each unit. These pumps would be aligned to discharge to the main feed water lines near the current B.5.b connections.

To use the portable pumps to feed the steam generators, the steam generators must be depressurized. On page 12 of the Integrated Plan it is stated that if control air (CA) pressure is lost PORVs can be operated using the backup nitrogen supply system using procedure ECA.0-0 which implements OHP-4025-LS-3 and OHP-4025-LS-4. If the nitrogen supply system is unavailable, manual operation of the SG PORVs is possible. The steam generator level can also be manually controlled using these procedures.

The low pressure lift pump is sized at 800 gpm to feed the TDAFW pumps simultaneously in both units or both booster pumps as well as providing 200 gpm makeup water to the spent fuel pool. Two low pressure lift pumps are provided thus meeting the N+1 criterion. Four booster pumps are provided thus meeting the N+1 criterion. Mechanical design calculations are currently under development to determine appropriate SG booster pump size, number and capacity. The FLEX booster pump number, size and capacity will be updated in the six month update.

On page 27 in its Integrated Plan, the licensee stated that to address a potential return to criticality event, an electric powered portable pump will be used to inject boric acid into the RCS. Two pumps will be permanently located on the 587 ft. elevation of the auxiliary building on carts. Each pump will deliver 21 gpm to each unit. A third high pressure boric acid FLEX pump is stored on site thus meeting the N+1 criterion. Each electric pump will be powered by a 500kW portable FLEX diesel generator. Three 500 kW generators are maintained on site, thus meeting the N+1 criterion.

Fuel for the portable pumps and generators is discussed in section 3.2.4.9.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to use of portable pumps, if these requirements are implemented as described.

3.2.2 Spent Fuel Pool Cooling Strategies

NEI 12-06, Table 3-2 and Appendix D summarize one acceptable approach for the SFP cooling strategies. This approach uses a portable injection source to provide 1) makeup via hoses on the refuel deck/floor capable of exceeding the boil-off rate for the design basis heat load; 2) makeup via connection to spent fuel pool cooling piping or other alternate location capable of exceeding the boil-off rate for the design basis heat load; and alternatively 3) spray via portable monitor nozzles from the refueling deck/floor capable of providing a minimum of 200 gallons per minute (gpm) per unit (250 gpm to account for overspray). This approach will also provide a vent pathway for steam and condensate from the SFP.

As described in NEI 12-06, Section 3.2.1.7 and JLD-ISG-2012-01, Section 2.1, strategies that have a time constraint to be successful should be identified and a basis provided that the time can be reasonably met. NEI 12-06, Section 3 provides the performance attributes, general criteria, and baseline assumptions to be used in developing the technical basis for the time constraints. Since the event is a beyond-design-basis event, the analysis used to provide the technical basis for time constraints for the mitigation strategies may use nominal initial values (without uncertainties) for plant parameters, and best-estimate physics data. All equipment used for consequence mitigation may assume to operate at nominal setpoints and capacities. NEI 12-06, Section 3.2.1.2 describes the initial plant conditions for the at-power mode of operation; Section 3.2.1.3 describes the initial conditions; and Section 3.2.1.6 describes SFP initial conditions.

NEI 12-06, Section 3.2.1.1 provides the acceptance criterion for the analyses serving as the technical basis for establishing the time constraints for the baseline coping capabilities described in NEI 12-06, which provide an acceptable approach to meeting the requirements of EA-12-049 for maintaining SFP cooling. This criterion is keeping the fuel in the SFP covered.

On page 42 in its Integrated Plan, in regards to maintaining SFP cooling during the initial phase, the licensee stated that there are no actions required during Phase 1. The SFP makeup requirements during ELAP events are based on the maximum design basis heat load in the SFP. The bounding heat load for the SFP is 55.3 MBtu/hr. The maximum boil off rate for the bounding condition is equal to approximately 115 gpm. Information obtained from CNP study PRA-STUDY-095 shows that with neither unit defueled it takes the SFP approximately 26 hours to heat up to 200 degrees F. If one unit is defueled, it takes approximately 11.5 hours to reach 200 degrees F. Both conditions allow the operators enough time to arrange for SFP makeup.

The sequence of events timeline, on page 65, shows that the strategies for providing makeup to the SFP are initiated 20-24 hrs into the ELAP event.

On page 44 in its Integrated Plan, in regards to maintaining SFP cooling during the transition phase, the licensee stated that the primary strategy is to use inventory from the primary water storage tank (PWST) and/or the RWST. This water can be transferred with either the primary water pump or refueling water purification (RWP) pump when power is provided to the 600 Vac bus by the 500 kW portable diesel generators. During the audit process, the licensee stated that an evaluation will be performed to determine if the piping to be used for makeup to the SFP will survive an ELAP event. This is identified as Confirmatory Item 3.2.2.A in Section 4.2.

An alternate strategy is to supply water to the SFP via a hose connection. The hose will be routed to the auxiliary building at the 609 ft. elevation. The water source is from either the firewater header if it remains intact, or the portable low pressure lift pump deployed for SG makeup drawing water from Lake Michigan as described in Section 3.2.1.9 above. The low pressure lift pump is sized at 800 gpm to feed the TDAFW pumps simultaneously in both units as well as providing 200 gpm makeup water to the spent fuel pool. Two lift pumps are stored on site thus meeting the N+1 requirement. Preliminary hose routes have been identified and assessed to support the alternate SFP makeup strategies.

Currently, three procedures exist which provide SFP makeup guidance (one normal, one abnormal, and the B.5.b procedure). FSGs will be developed to incorporate use of all three based on conditions encountered during an ELAP event. New guidelines will include makeup from Lake Michigan using the FLEX portable lift pump. The FLEX guidelines will be consistent with the PWROG developed recommendations.

Access to the SFP area as part of Phase 2 response could be a challenge due to environmental conditions near the pool. Therefore, the required action is to establish ventilation in this area and deploy any equipment local to the SFP required to accomplish the coping strategies. If the air environment in the SFP area requires the building to be ventilated, doors should be opened to establish air movement and venting the SFP area. For accessibility, establishing the SFP vent and any other actions required inside the fuel handling building should be completed before boil-off occurs.

During the audit process the licensee addressed the potentially challenging environmental conditions near the pool. The licensee stated that the strategies to vent steam and drain condensate from the spent fuel pool area are currently under development. The PWROG has issued FSG-11 entitled "Alternate Spent Fuel Pool Cooling and Makeup" which provides actions to vent SFP steam and drain condensate. Draining condensate will be through static drainage via gravity drains. An alternate strategy under development would pre stage a fire hose early in the ELAP event from the SFP operating deck to a remote location outside the building. A backup strategy would fill the SFP from a remote demineralizer bed connection.

On page 43 in its Integrated Plan, in regards to maintaining SFP cooling during the initial phase, the licensee stated that per NRC Order EA-12-051, "Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," SFP level indication will be modified to provide enhanced indication to support SFP cooling strategies.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and subject to the successful closure of issues related to the Confirmatory Item, provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to spent fuel pool cooling, if these requirements are implemented as described.

3.2.3 Containment Functions Strategies

NEI 12-06, Table 3-2 and Appendix D provide some examples of acceptable approaches for demonstrating the baseline capability of the containment strategies to effectively maintain containment functions during all phases of an ELAP. For example: containment pressure control/heat removal utilizing containment spray and repowering hydrogen igniters for ice condenser containments. CNP has an ice condenser containment.

In support of the original Integrated Plan, the licensee performed MAAP calculations to demonstrate that no actions would be required to remove heat and protect the containment functions in Phases 1 or 2 following an ELAP event. I&M planned to replace all RCP seals with Westinghouse SHIELD® low leakage seals which would prevent significant leakage from the RCS into containment. During Phase 1, containment pressure was to be monitored, but there was no significant mass release expected to the containment and the containment safety function was not challenged.

During the audit process, the licensee stated that credit for low leakage seals will not be taken because of the issues associated with the SHIELD seal performance. The increased RCS mass release into containment may affect the containment pressure and temperature response. As such, the proposed mitigation strategy for maintaining containment functions needs to be re-verified considering the change in seal leakage assumption. This is identified as Open Item 3.2.3.A in Section 4.1.

On page 36 in its Integrated Plan, the licensee stated that for Phase 2 hydrogen igniters will be provided power with connection of a 500 kW portable generator to 600 Vac buses. This action is stated to take place between 6 and 8 hours after the ELAP event. During the audit process, the licensee clarified that one train of igniters will be powered and the igniters will be turned on.

On page 39 of its Integrated Plan, the licensee stated that for Phase 3 containment integrity was reviewed by use of MAAP as part of Calculation PRA-TH-LI-1. This calculation showed containment pressure increasing just 2 psi over the duration of the 24 hour event. The final pressure was far less than the containment design pressure of 12 psig specified in the UFSAR. I&M intends to perform further containment analysis to show that containment integrity can be maintained up until a point in time when containment cooling can be restored during Phase 3. This analysis is also associated with the resolution of Open Item 3.2.3.A above.

Since the original MAAP analysis reflected that CNP can wait until a time in Phase 3 where containment cooling can be provided, I&M plans to utilize resources received from offsite to provide power to the containment ventilation system thereby ensuring long-term pressure control in containment. To accomplish this function, power would be supplied to a containment ventilation fan and a corresponding NESW pump by the 4160 Vac generator delivered from offsite. Only one pump will be required to operate because the NESW system pumps are cross-tied. All NESW system valves that require power and air to allow the system to perform the cooling function are powered by the 250 Vdc buses.

If the NESW system is not available to provide cooling to the containment ventilation units, an alternate method to control containment atmosphere exists by using a Containment Spray (CS) pump taking suction from the containment recirculation sump with cooling provided by forebay water to the associated CS heat exchanger. Ice bed melt will provide adequate sump suction volume for CS pump operation. In the event ice bed melt does not provide adequate sump suction volume for CS pump operation, a self-powered pump will be aligned to supply water from Lake Michigan to the residual heat removal (RHR) spray header as described in the CNP Fire Pre-Plans or to the test connections located on the cross-ties between upper and lower containment spray headers.

During the audit process, in response to a question related to measurement of temperature in containment during the ELAP event, the licensee stated that site specific analysis is in progress to develop the analytical basis for ELAP containment pressure and temperature response. The analysis will specifically address steam generator, safety injection accumulator, pressurizer, and reactor cavity sub compartment response. Bulk containment pressure and temperature response will also be addressed in the GOTHIC modeled technical evaluation. This has been previously identified as Confirmatory Item 3.2.1.5.A.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01 and subject to the successful closure of issues related to the Open and Confirmatory Items, provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to containment functions, if these requirements are implemented as described.

3.2.4 Support Functions

3.2.4.1 Equipment Cooling – Cooling Water

NEI 12-06, Section 3.2.2, Guideline (3) states:

> *Plant procedures/guidance should specify actions necessary to assure that equipment functionality can be maintained (including support systems or alternate method) in an ELAP/LUHS or can perform without ac power or normal access to the UHS.*
>
> Cooling functions provided by such systems as auxiliary building cooling water, service water, or component cooling water may normally be used in order for equipment to perform their function. It may be necessary to provide an alternate means for support systems that require ac power or normal access to the UHS, or provide a technical justification for continued functionality without the support system.

In its Integrated Plan, the licensee made no reference regarding the need for, or use of, additional cooling systems necessary to assure that coping strategy functionality can be maintained. The only portable equipment used for coping strategies identified in the Integrated Plan that would require some form of cooling are portable diesel powered pumps and generators. These self-contained commercially available units would not be expected to require an external cooling system nor would they require ac power or normal access to the UHS.

On page 11 in its Integrated Plan, in regards to maintaining RCS core cooling in the initial phase, the licensee stated that the initial plant response to an ELAP condition will maintain core cooling with the actuation and operation of the TDAFW pump. During the audit process, the licensee stated that the TDAFW pumps are self cooled and not reliant on external water sources. No other plant equipment used in Phase 1 or Phase 2 coping relying on external water for cooling has been identified.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect equipment cooling, if these requirements are implemented as described.

3.2.4.2 Ventilation – Equipment Cooling

NEI 12-06, Section 3.2.2, Guideline (10) states in part:

> *Plant procedures/guidance should consider loss of ventilation effects on specific energized equipment necessary for shutdown (e.g., those containing internal electrical power supplies or other local heat sources that may be energized or present in an ELAP.*

ELAP procedures/guidance should identify specific actions to be taken to ensure that equipment failure does not occur as a result of a loss of forced ventilation/cooling. Actions should be tied to either the ELAP/LUHS or upon reaching certain temperatures in the plant. Plant areas requiring additional air flow are likely to be locations containing shutdown instrumentation and power supplies, turbine-driven decay heat removal equipment, and in the vicinity of the inverters. These areas include: steam driven AFW pump room, the control room, and logic cabinets. Air flow may be accomplished by opening doors to rooms and electronic and relay cabinets, and/or providing supplemental air flow.

Air temperatures may be monitored during an ELAP/LUHS event through operator observation, portable instrumentation, or the use of locally mounted thermometers inside cabinets and in plant areas where cooling may be needed. Alternatively, procedures/guidance may direct the operator to take action to provide for alternate air flow in the event normal cooling is lost. Upon loss of these systems, or indication of temperatures outside the maximum normal range of values, the procedures/guidance should direct supplemental air flow be provided to the affected cabinet or area, and/or designate alternate means for monitoring system functions.

For the limited cooling requirements of a cabinet containing power supplies for instrumentation, simply opening the back doors is effective. For larger cooling loads, such as AFW pump rooms, portable engine-driven blowers may be considered during the transient to augment the natural circulation provided by opening doors. The necessary rate of air supply to these rooms may be estimated on the basis of rapidly turning over the room’s air volume.

Temperatures in the HPCI pump room and/or steam tunnel for a BWR may reach levels which isolate HPCI or RCIC steam lines. Supplemental air flow or the capability to override the isolation feature may be necessary at some plants. The procedures/guidance should identify the corrective action required, if necessary.

Actuation setpoints for fire protection systems are typically at 165-180°F. It is expected that temperature rises due to loss of ventilation/cooling during an ELAP/LUHS will not be sufficiently high to initiate actuation of fire protection systems. If lower fire protection system setpoints are used or temperatures are expected to exceed these temperatures during an ELAP/LUHS, procedures/guidance should identify actions to avoid such inadvertent actuations or the plant should ensure that actuation does not impact long term operation of the equipment.

On page 6 in its Integrated Plan, the licensee stated that the environmental conditions within the station compartments were evaluated using Generation of Thermal Hydraulic Information for Containment (GOTHIC) code and the NUMARC 87-00 methodologies for the other dominant rooms of interest. The TDAFW pump room temperatures have been considered in a GOTHIC analysis that was performed to assess the heat up during an SBO event as well as an Appendix R event. The SBO event considered lasted four hours and the analysis concluded that at the end of the four hours, the TDAFW pump room temperature was approximately 131.5 degrees F. (Personnel Habitability-Elevated Temperature is discussed in Section 3.2.4.6 below). The Appendix R event duration of 72 hours resulted in a temperature of 167 degrees F. This evaluation assumed the TDAFW pump was required for 32 hours after event initiation. The temperature at 32 hours was 153 degrees F. The equipment survivability temperature limit for the TDAFW pump room is 200 degrees F for 15 days. These temperatures were evaluated as acceptable for the events described. For an ELAP event as discussed in NEI 12-06, the time of TDAFW pump operation is comparable to the conditions used in this evaluation.

On page 48 in its Integrated Plan, regarding control room environmental conditions, the licensee stated that it may be desirable to open the control room complex doors during Phase 1 to provide control room cooling if it is determined that no unplanned radiological release is in progress. The limiting factor is control room habitability, not equipment survivability.

The licensee also stated that It may be desirable to open the control room complex doors during Phase 2 to provide control room cooling if it is determined that no unplanned radiological release is in progress. Portable fans will be available and are identified in existing procedures and can be implemented to further reduce room temperatures. Power for these fans will be provided by portable 6kW single phase 120/240 Vac generators. The limiting factor in Phase 2 is control room habitability, not equipment survivability.

While the licensee's Integrated Plan discussed the expected post ELAP environmental conditions in the TDAFW pump room and the main control room, it did not address the need for ventilation in other plant areas where FLEX equipment, such as the portable boric acid pumps are deployed or the battery room. During the audit process the licensee stated that evaluation of equipment functionality, including the TDAFW pump, in environmental conditions with low ventilation capabilities has not been completed. This is identified as Confirmatory Item 3.2.4.2.A in Section 4.2.

During the audit process, the licensee stated that power restoration using the N and N+1 FLEX generators ensures re-powering of the station battery chargers and battery exhaust fans to disperse hydrogen generated during battery charging. I&M is still in the process of developing FLEX support guidelines to recharge vital batteries and ventilate hydrogen gas using installed battery room ventilation system. The PWROG has issued FSG-4, "ELAP DC Bus Load Shed/Management" that includes actions to restore battery charger operation and run associated battery room exhaust fans. I&M will develop FLEX guidelines consistent with PWROG recommendations. This is identified as Confirmatory Item 3.2.4.2.B in Section 4.2.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and subject to the successful closure of issues related to the Confirmatory Items, provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to ventilation of areas containing FLEX equipment, if these requirements are implemented as described.

3.2.4.3 Heat Tracing

NEI 12-06, Section 3.2.2, Guideline (12) states:

> *Plant procedures/guidance should consider loss of heat tracing effects for equipment required to cope with an ELAP. Alternate steps, if needed, should be identified to supplement planned action.*
>
> Heat tracing is used at some plants to ensure cold weather conditions do not result in freezing important piping and instrumentation systems with small diameter piping. Procedures/guidance should be reviewed to identify if any heat

traced systems are relied upon to cope with an ELAP. For example, additional condensate makeup may be supplied from a system exposed to cold weather where heat tracing is needed to ensure control systems are available. If any such systems are identified, additional backup sources of water not dependent on heat tracing should be identified.

The licensee did not directly address loss of heat tracing effects for equipment required to cope with an ELAP. In a related reference on page 19 in the Integrated Plan in regards to protection of equipment from extreme cold, the licensee stated that structures (including temporary storage) will provide protection from extreme cold conditions (e.g., block heaters as applicable). FLEX equipment has been/will be procured such that it will operate in extreme cold conditions.

During the audit process, the licensee stated that the loss of heat tracing is not considered a vulnerability during the FLEX implementation timeframe. The loss of heat tracing to piping and instrumentation was evaluated in Westinghouse Letter LTR-FSE-13-69. The Westinghouse letter also evaluated the potential for freezing of the CST which is the water source required in the early stages of an ELAP for core cooling. It was concluded that due to the large volume of water inventory in the CST, freezing would not occur during the limited time period that it is in use. The letter also discussed the potential for precipitation of the boric acid in the BAST tanks used for boration of the RCS during the course of the ELAP. The BAST contents are maintained at 105 degrees F and are located inside the heated auxiliary building. Upon loss of ac, the BASTs and the areas in which they are located will begin to cool. It is not expected that temperatures will decrease to 63 degrees F, the operability limit for the BASTs, during the time frame that the BASTs are used to borate the reactor.

The PWROG has issued FSG-5, “Initial Assessment and FLEX Equipment Staging” which provides actions to identify plant components susceptible to freezing conditions and identify strategies for use in response to freezing conditions. I&M will develop FLEX guidelines consistent with PWROG recommendations.

The licensee’s approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to heat tracing, if these requirements are implemented as described.

3.2.4.4 Accessibility - Lighting and Communications

NEI 12-06, Section 3.2.2, Guideline (8) states:

> *Plant procedures/guidance should identify the portable lighting (e.g., flashlights or headlamps) and communications systems necessary for ingress and egress to plant areas required for deployment of FLEX strategies.*
>
> Areas requiring access for instrumentation monitoring or equipment operation may require portable lighting as necessary to perform essential functions.
>
> Normal communications may be lost or hampered during an ELAP. Consequently, in some cases, portable communication devices may be required to support interaction between personnel in the plant and those providing overall command and control.

On page 48 in its Integrated Plan, in regards to accessibility during Phase 1, the licensee stated that lighting is required for initial operator access in the plant to implement actions associated with plant procedures. Emergency lighting will not be available due to being stripped from the batteries in order to extend battery capability. Available lighting will be the battery-backed Appendix R light units and portable lighting that personnel can use, such as head lamps and flashlights. The Appendix R lighting is expected to remain in service for 8 hours following loss of power. During Phase 2 portable lighting units may be required to be set up outside in order to facilitate set up of the portable FLEX equipment if a BDBEE occurs at night. Set up of these lighting units must not detract nor delay the set up of portable generators and pumps. Initial setup needs to be simple enough that utilization of vehicle headlights and portable personal lighting such as head lamps and flashlights will be sufficient. Once in place, portable diesel-driven lighting units may be deployed in strategic locations to allow for refueling activities and preparation for Phase 3 equipment from the RRC. During Phase 3 portable generators will be utilized to provide power to surviving and available installed emergency ac lighting. Portable lighting units will be deployed externally as needed.

Communication will be provided using the PBX, PA system (if available), and hand held radios. Additionally, satellite phones have been purchased that can be used to notify off-site agencies. Battery life is limited for the hand held radios and satellite phones. Enhancements to the plant communication system were provided by I&M's Response to NTTF Recommendation 9.3 Communication Assessment.

Portable generators (6kW, 120/240 single phase) may be needed to power portable radio charging systems. A total of 153 batteries and 17 charging stations have been purchased for this purpose. A portable generator will be staged near the Operation Support Center (OSC) to allow for repowering of the OSC. Restoration of normal communications will be possible once generators from the RRC are placed in service. Satellite phones will still be available as needed, and portable radios will still be utilized and battery chargers will still be powered via small portable generators.

The NRC staff has reviewed the licensee communications assessment (ML12318A176 and ML13071A347) in response to the March 12, 2012 50.54(f) request for information letter for Donald C. Cook Nuclear Plant Units 1 and 2 and, as documented in the staff analysis (ML13148A294) has determined that the assessment for communications is reasonable, and the analyzed existing systems, proposed enhancements, and interim measures will help to ensure that communications are maintained. Therefore, there is reasonable assurance that the guidance and strategies developed by the licensee will conform to the guidance of NEI 12-06 Section 3.2.2 (8) regarding communications capabilities during an ELAP. Confirmation will be required that upgrades to the site's communications systems have been completed. This has been identified as Confirmatory Item 3.2.4.4.A in Section 4.2.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and subject to the successful closure of issues related to the Confirmatory Item, provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to accessibility considering the availability of lighting and communications, if these requirements are implemented as described.

3.2.4.5 Protected and Internal Locked Area Access

NEI 12-06, Section 3.2.2, Guideline (9) states:

Plant procedures/guidance should consider the effects of ac power loss on area access, as well as the need to gain entry to the Protected Area and internal locked areas where remote equipment operation is necessary.

At some plants, the security system may be adversely affected by the loss of the preferred or Class 1E power supplies in an ELAP. In such cases, manual actions specified in ELAP response procedures/guidance may require additional actions to obtain access.

On page 48 in its Integrated Plan, the licensee stated that plant access to controlled areas will be provided by use of keys maintained in the Shift Manager's office if the security system is without power.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to access to protected and internally locked areas, if these requirements are implemented as described.

3.2.4.6 Personnel Habitability – Elevated Temperature

NEI 12-06, Section 3.2.2, Guideline (11), provides that:

Plant procedures/guidance should consider accessibility requirements at locations where operators will be required to perform local manual operations.

Due to elevated temperatures and humidity in some locations where local operator actions are required (e.g., manual valve manipulations, equipment connections, etc.), procedures/guidance should identify the protective clothing or other equipment or actions necessary to protect the operator, as appropriate.

FLEX strategies must be capable of execution under the adverse conditions (unavailability of installed plant lighting, ventilation, etc.) expected following a BDBE resulting in an ELAP/LUHS. Accessibility of equipment, tooling, connection points, and plant components shall be accounted for in the development of the FLEX strategies. The use of appropriate human performance aids (e.g., component marking, connection schematics, installation sketches, photographs, etc.) shall be included in the FLEX guidance implementing the FLEX strategies.

NEI 12-06 Section 9.2 states,

Virtually every state in the lower 48 contiguous United States has experienced temperatures in excess of 110°F. Many states have experienced temperatures in excess of 120°F.

On page 12 in its Integrated Plan, in regards to manual operation of the TDAFW pump in Phase 1, the licensee stated that in the event that the N-Train battery were to be identified as depleted, OHP-4025-LS-2, "Start-Up AFW", provides operator instruction for local/manual initiation and control of the TDAFW pumps. Similarly it may be necessary to manually operate the steam generator PORVs, enter the spent fuel pool deck, man the control room and enter other critical areas for strategy deployment and operation under stressed environmental conditions.

During the audit process, the license stated that none of the plant areas identified for FLEX connection are expected to exceed requirements for personnel habitability. I&M is in the progress of developing FLEX response guidelines that will identify and provide habitability/accessibility actions for operators if needed. The guidelines will be developed to ensure compliance with NEI 12-06, Section 3.2.2 Guideline (11) requirements.

A site specific environmental condition evaluation will be developed to support development of ELAP strategies. The FLEX guideline validation process will address personnel accessibility and habitability concerns based on site specific evaluations. This has been identified as Confirmatory Item 3.2.4.6.A, in Section 4.2.

During the audit process, the licensee stated that no plant-specific, thermal hydraulic calculation has been performed to determine maximum control room temperature under NEI 12-06. Control room cabinet cooling is established in ECA-0.0, Step 8 using Attachment C, “Establishing Vital Cabinet Cooling”. This is a 30 minute time critical action credited for SBO response. ELAP event habitability will be assured by monitoring of control room conditions, heat stress countermeasures, and rotation of personnel to the extent feasible. At CNP, the impact to habitability would be primarily from elevated temperatures. As part of the CNP FLEX support guideline development process, actions to open control room doors and ventilate using portable fans will be evaluated.

The licensee’s approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and subject to the successful closure of issues related to the Confirmatory Item, provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to personnel accessibility/habitability under conditions of elevated temperatures, if these requirements are implemented described.

3.2.4.7 Water Sources

NEI 12-06, Section 3.2.2, Guideline (5) states:

> *Plant procedures/guidance should ensure that a flow path is promptly established for makeup flow to the steam generator/nuclear boiler and identify backup water sources in order of intended use. Additionally, plant procedures/guidance should specify clear criteria for transferring to the next preferred source of water.*
>
> Under certain beyond-design-basis conditions, the integrity of some water sources may be challenged. Coping with an ELAP/LUHS may require water supplies for multiple days. Guidance should address alternate water sources and water delivery systems to support the extended coping duration. Cooling and makeup water inventories contained in systems or structures with designs that are robust with respect to seismic events, floods, and high winds, and associated missiles are assumed to be available in an ELAP/LUHS at their nominal capacities. Water in robust UHS piping may also be available for use but would need to be evaluated to ensure adequate NPSH can be demonstrated and, for example, that the water does not gravity drain back to the UHS. Alternate water delivery systems can be considered available on a case-by-case basis. In general, all CSTs should be used first if available. If the normal source of makeup water (e.g., CST) fails or becomes exhausted as a result of the hazard, then robust demineralized, raw, or borated water tanks may be used as appropriate.

> Finally, when all other preferred water sources have been depleted, lower water quality sources may be pumped as makeup flow using available equipment (e.g., a diesel driven fire pump or a portable pump drawing from a raw water source). Procedures/guidance should clearly specify the conditions when the operator is expected to resort to increasingly impure water sources.

The licensee addressed water sources for coping strategies for core cooling, RCS inventory control, and SFP cooling. Makeup flow is immediately established to the SG during the initial phase of the ELAP strategies. Makeup water to the RCS and the spent fuel pool is not required in Phase 1. Water sources for those cooling strategies are described for use in Phase 2.

With respect to core cooling, on page 11 in its Integrated Plan the licensee stated that the CSTs are the primary source of inventory to the TDAFW pumps during the initial phase of an ELAP event. The alternate strategy in the unlikely event both CSTs are damaged or inaccessible is the fire water system. If the firewater header is not available and the TDAFW pump is still supplying the SGs, a single portable pump can be deployed to supply the suction to the TDAFW pumps from Lake Michigan using the modified ESW connections. Deployment of hoses from the fire water header or deployment of the low pressure lift pump to the forebay would have to be demonstrated within the time that the SGs would boil dry. This has been previously identified as Confirmatory Item 3.2.1.6.A in Section 4.2.

During the audit process, the licensee stated that the Lake Township water supply to the site has been identified as a candidate missile protected suction source to the TDAFW pump suction during Phase 1. An evaluation is currently underway to potentially use the Lake Township municipal water supply connection to the site as a source of water in case of unavailability of the CSTs and the fire water storage tanks since neither of these tanks is missile protected. Deployment would only consist of hooking up a hose from the municipal water hydrant to the ESW connection. An evaluation, scheduled for completion February 2014, is being performed to determine Lake Township hydrant missile protection scope.

I&M is developing FSG-2, “Alternate TDAFW Suction Guidelines” to incorporate use of the Lake Township water supply option. TDAFW pump suction supply from the Lake Township water supply does not require deployment of portable pumps. Time studies will be performed to confirm the TDAFW pump suction can be established from the Lake Township water supply within sufficient time to meet core cooling objectives. This is an alternate approach from the strategies identified in NEI 12-06 as it relies on separation distance during a tornado to take credit for a water source. This is identified as Open Item 3.2.4.7.A in Section 4.1. The use of a municipal water supply as a primary strategy, as proposed by the licensee, may be difficult to justify as a protected water source.

On page 20 in its Integrated Plan, the licensee stated that the source of long term cooling water and SG makeup is Lake Michigan. During the audit, the licensee addressed the issue of injecting raw water into the steam generators. Two mechanisms exist which could potentially impede the flow of water through the SGs. Drawing water from a natural body of water introduces the possibility of drawing in debris. In addition, due to the chemistry of raw water, precipitants may collect on susceptible portions of the SGs.

During the audit process the licensee stated that a strainer is not needed on the intake hose used to draw water from Lake Michigan for injection into the SGs. The intake location and flow rates are such that non-suspended solids will not be drawn into the suction hose. Suspended solids have been evaluated in Westinghouse Calculation CN-SEE-II-13-16, Revision 0-A, "D.C. Cook Units 1 and 2 FLEX Alternate Cooling Impact Evaluation." Preliminary calculations contained in CN-SEE-13-7 evaluated alternate cooling sources to the SGs and determined that makeup limits, as a result of potential steam generator blockage, significantly exceeds Phase 3 RRC projected FLEX equipment deployment time.

With respect to RCS inventory control, on page 27 in its Integrated Plan the licensee stated that the BASTs are the primary suction source for the portable boration pump since they have a higher boric acid concentration (6550 ppm minimum), and they are protected from applicable external hazards. The RWST is an alternate suction source; however, it is not protected against high wind generated missiles and has a lower boron concentration (2400 ppm minimum). The chemical and volume control system holdup tanks and boric acid reserve tank will be used to satisfy a longer term source of water if the RWST is not available.

Water sources for spent fuel pool cooling are discussed in Section 3.2.2 above.

During the audit process, the licensee stated that a specific evaluation will be performed to determine if permanently installed non-safety related equipment used in FLEX response guidelines will survive the postulated events. When the evaluation is complete, mitigating strategies will be revised, as necessary, to use equipment that can survive the postulated events. This is identified as a Confirmatory Item 3.2.4.7.B in Section 4.2.

The licensee's approach described above, as currently understood, has raised concerns which must be addressed before confirmation can be provided that the approach is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, such that there would be reasonable assurance that the requirements of Order EA-12-049 will be met with respect to water sources. This concern is identified as Open Item 3.2.4.7.A in Section 4.1.

3.2.4.8 Electrical Isolations and Interactions

NEI 12-06, Section 3.2.2, Guideline (13) states in part:

> The use of portable equipment to charge batteries or locally energize equipment may be needed under ELAP/LUHS conditions. Appropriate electrical isolations and interactions should be addressed in procedures/guidance.

On page 15 in its Integrated Plan, in regards to core cooling and heat removal in Phase 2, the licensee stated that to restore power to 250 Vdc battery chargers (AB-2 and CD-1), as well as other required loads, a 600 Vac, 500 kW portable diesel generator will be staged near transformers 1-TR-1AB and 1- TR-MAIN (2-TR-1AB and 2-TR-MAIN). Permanent conduit and cable will be installed to the location of the 600 Vac buses 11B and 11D (21B and 21D). A permanently mounted NEMA-4X disconnect will be mounted on the exterior wall near the auxiliary building 4kV rooms for a connection point to each 600 Vac bus. The connections will be physically separated to provide protection. At this point permanent disconnect(s) will be installed which will allow the connection of the portable diesel generator to 600 Vac buses 11B and 11D (21B and 21D).

During the audit process, the licensee stated that FLEX DG load calculations are in progress to ensure adequate bus voltage conditions for Class 1E equipment. This is identified as Confirmatory Item 3.2.4.8.A in Section 4.2.

The portable diesel generators will be designed with commercial protection. Individual loads will be powered using normal breakers, buswork and cabling. Individual load protection/fault protection remains available. The proposed strategies will ensure normal bus power supply breakers are locked open when the portable DG is providing power to onsite loads.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and subject to the successful closure of issues related to the Confirmatory Item, provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to electric power sources isolation and interactions, if these requirements are implemented as described.

3.2.4.9 Portable Equipment Fuel

NEI 12-06, Section 3.2.2, Guideline (13) states in part:

> The fuel necessary to operate the FLEX equipment needs to be assessed in the plant specific analysis to ensure sufficient quantities are available as well as to address delivery capabilities.

NEI 12-06, Section 3.2.1.3, initial condition (5) states:

> Fuel for FLEX equipment stored in structures with designs which are robust with respect to seismic events, floods and high winds and associated missiles, remains available.

On page 50 of the Integrated Plan, the licensee stated that fuel for the portable FLEX equipment will be drawn from the on-site fuel oil tanks into a fuel transfer trailer which can be towed to refuel the various components. During Phase 2, the 500 kW generators are expected to consume approximately 40 gph of fuel each, requiring refueling every 7.5 hours based on the 300 gallon tank. The 55 kW generators consume 4.5 gph each, the 54 kW generators consume 3.8 gph each, and the 6 kW generators consume 0.5 gph each. Additionally, the lift pumps consume 13 gph each, and the booster pumps consume 13 gph each. Fuel consumption data is estimated based on typical manufacturer data and will be finalized when equipment has been procured and tested. This is identified as Confirmatory Item 3.2.4.9.A in Section 4.2.

On page 54 in its Integrated Plan, regarding safety function, the licensee stated that in Phase 3, 4KV generators from the RRC will be deployed to the site. The fuel consumption for these generators will be determined when they are procured for the RRC. The Phase 2 generators will still be in service, so consumption from those generators must still be considered. A fuel bladder will be deployed from the RRC, and at this time off site fuel shipments may be received.

During the audit process the licensee stated that the portable FLEX equipment will be refueled using one of two portable refueling trailers that obtain fuel from the underground emergency diesel generator (EDG) fuel oil storage tanks (FOSTs). CNP has two EDG fuel oil storage tanks that will be the fuel oil source for the FLEX equipment. These underground storage tanks are designed to withstand natural phenomenon such as earthquake, tornado, flooding, high wind or heavy ice per UFSAR section 1.4.1 Design Criterion 2. Each tank is required by TS SR 3.8.3.1 to have $\geq$ 46,000 gallons of fuel oil and the fuel oil quality is maintained in accordance with diesel fuel oil testing program.

Site specific flooding analysis is in progress to determine if fuel oil storage tanks and fuel oil transfer sites would be inundated by a flood. Deployment strategies will account for expected flood levels resulting from the flood analysis. When the flooding evaluation is complete, fuel oil supply strategies will be developed to compensate for flooding hazards. This has been previously identified as Confirmatory Item 3.1.2.2.A. The PWROG has issued FSG-5, "Initial Assessment and FLEX Equipment Staging" which provides actions to establish diesel fuel sources and provide refueling means.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01 and subject to the successful closure of issues related to the Confirmatory Item, provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to portable equipment fuel, if these requirements are implemented as described.

3.2.4.10 Load Reduction to Conserve DC Power

NEI 12-06, Section 3.2.2, Guideline (6) states:

> *Plant procedures/guidance should identify loads that need to be stripped from the plant dc buses (both Class 1E and non-Class 1E) for the purpose of conserving dc power.*
>
> DC power is needed in an ELAP for such loads as shutdown system instrumentation, control systems, and dc backed AOVs and MOVs. Emergency lighting may also be powered by safety-related batteries. However, for many plants, this lighting may have been supplemented by Appendix R and security lights, thereby allowing the emergency lighting load to be eliminated. ELAP procedures/guidance should direct operators to conserve dc power during the event by stripping nonessential loads as soon as practical. Early load stripping can significantly extend the availability of the unit's Class 1E batteries. In certain circumstances, AFW/HPCI /RCIC operation may be extended by throttling flow to a constant rate, rather than by stroking valves in open-shut cycles.
>
> Given the beyond-design-basis nature of these conditions, it is acceptable to strip loads down to the minimum equipment necessary and one set of instrument channels for required indications. Credit for load-shedding actions should consider the other concurrent actions that may be required in such a condition.

On page 10 in the section of its Integrated Plan describing initial operator actions for core cooling and heat removal in Phase 1, the licensee stated that at the initiation of the event, operators will enter the existing SBO - EOPs. The governing procedure is ECA-0.0. This procedure provides the direction to initiate dc load shed actions, attempt to restore EDGs and supplemental diesel generators (SDGs), and to initiate RCS cooldown. On page 64 in the section of its Integrated Plan containing the SOE timeline, the licensee's plan shows dc load shedding starting at 30 minutes after the ELAP and dc load shedding completed at 1 hour after the ELAP.

On page 12 in the section of its Integrated Plan describing initial operator actions for core cooling and heat removal in Phase 1, the licensee stated that the N-Train battery power will be exhausted after approximately four hours with current load shed strategy. Anticipated transient without scram mitigation actuation circuitry (AMSAC) (also powered via this battery) is directed to be shed in ECA.0-0. Additional load shedding of the battery will be further analyzed and additional load shedding actions will be implemented in plant procedures. In the event that the N-Train batteries were to be identified as depleted, OHP-4025-LS-2, "Start-Up AFW," provides operator instruction for local/manual initiation and control of the TDAFW pumps.

During the audit process, the licensee further clarified that the dc load shedding strategy included development of a draft deep load shed procedure for maximizing dc battery life as it pertains to maintaining vital instrumentation and control during ELAP response. In order to allow adequate time for deployment of FLEX generators it was determined by review of existing electrical calculations that the availability of the vital station 250 Vdc batteries could be extended to 12 hours by reducing the station battery discharge rate below 90 amps within the first hour of the transient. A draft procedure has been developed as a supplement to ECA-0.0 and time validated with approximately 50% margin for required completion time. In response to an audit question the licensee stated that the minimum dc bus voltage for CNP is 210 Vdc. This limit is required to support operation of the control room instrument distribution (CRID) vital instrument inverters.

During the audit process, I&M stated that it is in the process of developing dc bus load shedding analysis that will determine what loads need to be shed and when. Once the dc load shedding analysis is complete, an evaluation will be performed to determine adverse impact to defense-in-depth features and the required operator actions will be developed. The load shedding analysis will define the dc load profile. The load profiles will be available once the analysis is complete. This is identified as Confirmatory Item 3.2.4.10.A in Section 4.2.

In response to an audit question, CNP stated that power is provided to the dc seal oil backup pump from a dc bus separate and apart from the safety related dc bus. This balance of plant dc bus will remain available during the ELAP event and no actions will be taken to shed the seal oil pump load. ECA-0.0, which is the controlling ELAP response procedure, provides actions to emergency degas the main generator to prevent fire or explosion.

The licensee's intent to extend battery coping time to 12 hours raises a concern. Review of the audit response for CNP revealed that the Generic Concern related to battery duty cycles beyond 8 hours is applicable to the plant. The Generic Concern related to extended battery duty cycles, has been resolved generically through the NRC endorsement of NEI position paper entitled "Battery Life Issue" (ADAMS Accession No. ML13241A186 (position paper) and ML13241A188 (NRC endorsement letter)).

The purpose of the Generic Concern and associated endorsement of the position paper was to resolve concerns associated with Integrated Plan submittals in a timely manner and on a generic basis, to the extent possible, and provide a consistent review by the NRC. Position papers provided to the NRC by industry further develop and clarify the guidance provided in NEI 12-06 related to industry's ability to meet the requirements of Order EA-12-049.

The Generic Concern related to extended battery duty cycles required clarification of the capability of the existing vented lead-acid station batteries to perform their expected function for durations greater than 8 hours throughout the expected service life of the battery. The position paper provided sufficient basis to resolve this concern by developing an acceptable method for demonstrating that batteries will perform as specified in a plant's Integrated Plan. The methodology relies on the licensee's battery sizing calculations developed in accordance with the Institute of Electrical and Electronics Engineers Standard 485, "Recommended Practice for Sizing Large Lead Storage Batteries for Generating Stations and Substations," load shedding schemes, and manufacturer data to demonstrate that the existing vented lead-acid station batteries can perform their intended function for extended duty cycles (i.e., beyond 8 hours). The NRC staff will evaluate a licensee's application of the guidance (calculations and supporting data) in its development of the final Safety Evaluation documenting review of the licensee's Integrated Plan.

The NRC staff concluded that the position paper provides an acceptable approach for licensees to use in demonstrating that vented lead-acid batteries can be credited for durations longer than 8 hours.

The change in strategy from what was in the Integrated Plan, of extending battery duty cycle from 8 hours to 12 hours, was not justified during the audit process considering the Generic Concern associated with battery duty cycles. Justification that the station batteries' duty cycle can be extended beyond 8 hours needs to be provided by the licensee. This is identified as Open Item 3.2.4.10.B in Section 4.1.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and subject to the successful closure of issues related to the Open and Confirmatory Items, provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to load reduction to conserve dc power, if these requirements are implemented as described.

3.3 PROGRAMMATIC CONTROLS

3.3.1 Equipment Maintenance and Testing

NEI 12-06, Section 3.2.2, following item (15) states:

> In order to assure reliability and availability of the FLEX equipment required to meet these capabilities, the site should have sufficient equipment to address all functions at all units on-site, plus one additional spare, i.e., an N+1 capability, where "N" is the number of units on-site. Thus, a two-unit site would nominally have at least three portable pumps, three sets of portable ac/dc power supplies, three sets of hoses & cables, etc. It is also acceptable to have a single resource that is sized to support the required functions for multiple units at a site (e.g., a single pump capable of all water supply functions for a dual unit site). In this case, the N+1 could simply involve a second pump of equivalent capability. In addition, it is also acceptable to have multiple strategies to accomplish a function (e.g., two separate means to repower instrumentation). In this case the equipment associated with each strategy does not require N+1. The existing 50.54(hh)(2) pump and supplies can be counted toward the N+1, provided it meets the functional and storage requirements outlined in this guide. The N+1 capability applies to the portable FLEX equipment described in Tables 3-1 and 3-2 (i.e., that equipment that directly supports maintenance of the key safety functions). Other FLEX support equipment only requires an N capability.

NEI 12-06, Section 11.5 states:

1. FLEX mitigation equipment should be initially tested or other reasonable means used to verify performance conforms to the limiting FLEX requirements. Validation of source manufacturer quality is not required.

2. Portable equipment that directly performs a FLEX mitigation strategy for the core, containment, or SFP should be subject to maintenance and testing[1] guidance provided in INPO AP 913, Equipment Reliability Process, to verify proper function. The maintenance program should ensure that the FLEX equipment reliability is being achieved. Standard industry templates (e.g., EPRI) and associated bases will be developed to define specific maintenance and testing including the following:
   a. Periodic testing and frequency should be determined based on equipment type and expected use. Testing should be done to verify design requirements and/or basis. The basis should be documented and deviations from vendor recommendations and applicable standards should be justified.
   b. Preventive maintenance should be determined based on equipment type and expected use. The basis should be documented and deviations from vendor recommendations and applicable standards should be justified.
   c. Existing work control processes may be used to control maintenance and testing. (e.g., PM Program, Surveillance Program, Vendor Contracts, and work orders).
3. The unavailability of equipment and applicable connections that directly performs a FLEX mitigation strategy for core, containment, and SFP should be managed such that risk to mitigating strategy capability is minimized.
   a. The unavailability of installed plant equipment is controlled by existing plant processes such as the Technical Specifications. When installed plant equipment which supports FLEX strategies becomes unavailable, then the FLEX strategy affected by this unavailability does not need to be maintained during the unavailability.
   b. Portable equipment may be unavailable for 90 days provided that the site FLEX capability (N) is available.
   c. Connections to permanent equipment required for FLEX strategies can be unavailable for 90 days provided alternate capabilities remain functional.
   d. Portable equipment that is expected to be unavailable for more than 90 days or expected to be unavailable during forecast site specific external events (e.g., hurricane) should be supplemented with alternate suitable equipment.
   e. The short duration of equipment unavailability, discussed above, does not constitute a loss of reasonable protection from a diverse storage location protection strategy perspective.
   f. If portable equipment becomes unavailable such that the site FLEX capability (N) is not maintained, initiate actions within 24 hours to restore the site FLEX capability (N) and implement compensatory measures (e.g., use of alternate suitable equipment or supplemental personnel) within 72 hours.

On page 8 in the section of its Integrated Plan, discussing programmatic controls, the licensee stated that I&M 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 designated for FLEX use and will have unique identification numbers. Installed structures, systems and components pursuant to 10 CFR 50.63(a) will continue to meet the augmented quality guidelines of Regulatory Guide 1.155, "Station Blackout." Standard industry preventive maintenance (PM) programs will be established for all components and testing procedures will be developed and frequencies established based on type of equipment and considerations made within Electric Power Research Institute (EPRI) guidelines and consistent with established CNP programs and processes.

On page 56 and 57 in its Integrated Plan, in the table listing PWR portable equipment, it is stated that maintenance “will follow EPRI template requirements”.

The NRC staff reviewed the licensee’s Integrated Plan and determined that the Generic Concern related to maintenance and testing of FLEX equipment is applicable to the plant. This Generic Concern has been resolved generically through the NRC endorsement of the EPRI technical report on preventive maintenance of FLEX equipment, submitted by NEI by letter dated October 3, 2013 (ADAMS Accession No. ML13276A573). The NRC staff’s endorsement letter is dated October 7, 2013 (ADAMS Accession No. ML13276A224).

This Generic Concern involves clarification of how licensees would maintain FLEX equipment such that it would be readily available for use. The technical report provided sufficient basis to resolve this concern by describing a database that licensees could use to develop preventative maintenance programs for FLEX equipment. The database describes maintenance tasks and maintenance intervals that have been evaluated as sufficient to provide for the readiness of the FLEX equipment. The NRC staff has determined that the technical report provides an acceptable approach for developing a program for maintaining FLEX equipment in a ready-to-use status. The NRC staff will evaluate the resulting program through the audit and inspection processes.

During the audit process, the licensee stated that the EPRI guidance was released on October 2, 2013. The licensee has not yet developed a CNP preventive maintenance program for FLEX equipment. This program will be developed using the EPRI guidance contained in the EPRI 2013 Technical Report, "Nuclear Maintenance Applications Center: Preventive Maintenance Basis for FLEX Equipment," and will conform to the guidance of NEI 12-06 Section 11.5.

The licensee’s approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to maintenance and testing, if these requirements are implemented as described.

3.3.2 Configuration Control

NEI 12-06, Section 11.8 States:

1. The FLEX strategies and basis will be maintained in an overall program document. This program document will also contain a historical record of previous strategies and the basis for changes. The document will also contain the basis for the ongoing maintenance and testing programs chosen for the FLEX equipment.
2. Existing plant configuration control procedures will be modified to ensure that changes to the plant design, physical plant layout, roads, buildings, and miscellaneous structures will not adversely impact the approved FLEX strategies.
3. Changes to FLEX strategies may be made without prior NRC approval provided:
   a) The revised FLEX strategy meets the requirements of this guideline.

b) An engineering basis is documented that ensures that the change in FLEX strategy continues to ensure the key safety functions (core and SFP cooling, containment integrity) are met.

On page 4 in the section of its Integrated Plan discussing key site assumptions to implement NEI 12-06 strategies, the licensee stated that pre-planned strategies developed to protect the public health and safety will be incorporated into the unit emergency operating procedures in accordance with established EOP change processes, and their impact to the design basis capabilities of the unit evaluated under 10 CFR 50.59. The plant Technical Specifications contain the limiting conditions for normal unit operations to ensure that design safety features are available to respond to a design basis accident and direct the required actions to be taken when the limiting conditions are not met. The result of the beyond-design-basis event may place the plant in a condition where it cannot comply with certain Technical Specifications, and, as such, may warrant invocation of 10 CFR 50.54(x) and/or 10 CFR 73.55(p).

On pages 8 and 9 in the section of its Integrated Plan discussing programmatic controls, the licensee stated in part that I&M will implement an administrative program. A program owner will be assigned with responsibility for configuration control, maintenance and testing.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to configuration control, if these requirements are implemented as described.

3.3.3 Training

NEI 12-06, Section 11.6, Training, states:

1. Programs and controls should be established to assure personnel proficiency in the mitigation of beyond-design-basis events is developed and maintained. These programs and controls should be implemented in accordance with an accepted training process.

2. Periodic training should be provided to site emergency response leaders on beyond- design-basis emergency response strategies and implementing guidelines. Operator training for beyond-design-basis event accident mitigation should not be given undue weight in comparison with other training requirements. The testing/evaluation of Operator knowledge and skills in this area should be similarly weighted.

3. Personnel assigned to direct the execution of mitigation strategies for beyond-design- basis events will receive necessary training to ensure familiarity with the associated tasks, considering available job aids, instructions, and mitigating strategy time constraints.

4. "ANSI/ANS 3.5, Nuclear Power Plant Simulators for use in Operator Training" certification of simulator fidelity (if used) is considered to be sufficient for the initial stages of the beyond-design-basis external event scenario until the current capability of the simulator model is exceeded. Full scope simulator models will not be upgraded to accommodate FLEX training or drills.

5. Where appropriate, the integrated FLEX drills should be organized on a team or crew basis and conducted periodically; with all time-sensitive actions to be evaluated over a period of not more than eight years. It is not the intent to connect to or operate permanently installed equipment during these drills and demonstrations.

On page 9 in its Integrated Plan, in regards to training, the licensee stated that new training of general station staff and emergency plan (EP) personnel will be performed in 2014, prior to the first unit design implementation. These programs and controls will be implemented in accordance with the Systematic Approach to Training. This approach will ensure that the training for beyond-design-basis event mitigation is not given undue weight in comparison with other training requirements.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to training, if these requirements are implemented as described.

3.4 OFFSITE RESOURCES

NEI 12-06, Section 12.2 lists the following minimum capabilities for offsite resources for which each licensee should establish the availability of:

1) A capability to obtain equipment and commodities to sustain and backup the site's coping strategies.
2) Off-site equipment procurement, maintenance, testing, calibration, storage, and control.
3) A provision to inspect and audit the contractual agreements to reasonably assure the capabilities to deploy the FLEX strategies including unannounced random inspections by the Nuclear Regulatory Commission.
4) Provisions to ensure that no single external event will preclude the capability to supply the needed resources to the plant site.
5) Provisions to ensure that the off-site capability can be maintained for the life of the plant.
6) Provisions to revise the required supplied equipment due to changes in the FLEX strategies or plant equipment or equipment obsolescence.
7) The appropriate standard mechanical and electrical connections need to be specified.
8) Provisions to ensure that the periodic maintenance, periodic maintenance schedule, testing, and calibration of off-site equipment are comparable/consistent with that of similar on-site FLEX equipment.
9) Provisions to ensure that equipment determined to be unavailable/non-operational during maintenance or testing is either restored to operational status or replaced with appropriate alternative equipment within 90 days.
10) Provision to ensure that reasonable supplies of spare parts for the off-site equipment are readily available if needed. The intent of this provision is to reduce the likelihood of extended equipment maintenance (requiring in excess of 90 days for returning the equipment to operational status).

On page 9 in the section of its Integrated Plan regarding the RRC plan, the licensee stated that the industry will establish two (2) RRCs to support utilities during beyond design basis events.

I&M has issued a contract for the RRC. Each RRC will hold five (5) sets of equipment, four (4) of which will be able to be fully deployed when requested, the fifth set will have equipment in a maintenance cycle. Equipment will be moved from an RRC to a local Assembly Area, established by the SAFER team and the licensee. Communications will be established between the affected nuclear site and the SAFER team and required equipment moved to the site as needed. First arriving equipment, as established during development of the nuclear site's response plan, will be delivered to the site within 24 hours from the initial request.

The licensee's Integrated Plan addressed the use of off-site resources to obtain equipment and commodities to sustain and backup the site's coping strategies (guideline 1). However, the plan did not address implementation guidelines 2 through 10. This has been identified as Confirmatory Item 3.4.A in Section 4.2.

The licensee's approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and subject to the successful closure of issues related to the Confirmatory Item, provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to off site resources, if these requirements are implemented as described.

4.0 OPEN AND CONFIRMATORY ITEMS

4.1 OPEN ITEMS

Item Number/ Status	Description	Notes
3.2.1.8.A	Core Sub-Criticality - Confirm resolution of the generic concern associated with the modeling of the timing and uniformity of the mixing of a liquid boric acid solution injected into the reactor coolant system under natural circulation conditions potentially involving two-phase flow.	
3.2.3.A	Containment Functions Strategies –Verify containment pressure and temperature response based on using conventional RCP seals.	
3.2.4.7.A	Water Sources-Determine if Lake Township water supply can be used to cope after a tornado event since neither the CSTs nor the fire water storage tanks are protected against tornado borne missiles. This is an alternate approach from the strategies identified in NEI 12-06 as it relies on separation distance during a tornado to take credit for a water source.	Significant
3.2.4.10.B	Battery Duty Cycle- Verify approach used to qualify the station batteries duty cycle to 12 hours.	

4.2 CONFIRMATORY ITEMS

Item Number/ Status	Description	Notes
3.1.1.2.A	Deployment of FLEX Equipment -Review the potential for soil liquefaction that might impede vehicle movement following a seismic event.	

3.1.1.2.B	Deployment of FLEX Equipment –Confirm final design features of the new storage building including the susceptibility to the loss of ac power. Reliance on ac power, if any, to deploy equipment is to be evaluated.	
3.1.1.3.A	Procedural Interface Considerations (Seismic) – Confirm FLEX support guidelines provide operators with direction on how to establish alternate monitoring and control capabilities.	
3.1.1.4.A	Offsite Resources- Confirm identification of offsite staging areas, access routes and methods of delivery of equipment to the site.	
3.1.2.2.A	Deployment of FLEX Equipment- Confirm whether the fuel oil tanks and fuel oil transfer sites would be inundated by a flood.	
3.2.1.1.A	Computer Code- Use of the NOTRUMP code for the ELAP analysis of Westinghouse plants is limited to the flow conditions prior to reflux condensation initiation. This includes specifying an acceptable definition for reflux condensation cooling.	
3.2.1.2.A	Reactor Coolant Pump Seals- Confirm applicable analysis and relevant seal leakage testing data, which justifies that (1) the integrity of the associated O-rings will be maintained at the temperature conditions experienced during the ELAP event, and (2) the seal leakage rate of 21 gpm/seal used in the ELAP is adequate and acceptable.	
3.2.1.2.B	Reactor Coolant Pump Seals - The low leakage seals are not currently credited in the FLEX strategies. Testing and qualification of SHIELD is ongoing. I&M is closely following the re-design of SHIELD and will modify analyses and FLEX strategies, as needed, based on the conclusions of the SHIELD modification program. Confirm FLEX strategies are appropriately modified if low leakage seals are credited.	
3.2.1.2.C	Reactor Coolant Pump Seals -If the seals are changed to the newly designed Generation 3 SHIELD seals, or non-Westinghouse seals, the acceptability of the use of the newly designed Generation 3 SHIELD seals, or non-Westinghouse seals should be addressed. Confirm that the RCP seal leakages rates used in the ELAP analysis have been acceptably justified.	
3.2.1.3.A	Decay Heat- Confirm the input parameters used to develop the decay heat model.	
3.2.1.4.A	Initial Values for Key Plant Parameters and Assumptions - Confirm that the important plant parameters and assumptions are appropriate for simulating the site specific ELAP transient and the model supports the final FLEX strategies, procured equipment, and implementing FSGs.	
3.2.1.5.A	Monitoring Instrumentation- Confirm need for containment temperature monitoring after completion of containment evaluations using the GOTHIC code.	
3.2.1.6.A	SOE Timeline- In the event that the CSTs are unavailable during the initial phase following an ELAP, confirm that alternate sources of water can be aligned to feed the TDAFW pumps before the SGs run dry.	
3.2.1.6.B	SOE Timeline- Confirm that the revised SOE timeline reflects the change in strategy of not taking credit for low leakage seals and	

	the new site specific boration analysis.	
3.2.1.7.A	Cold Shutdown and Refueling- Confirm licensee decision to follow NEI's position paper.	
3.2.2.A	Spent Fuel Pool Cooling Strategies-Confirm that makeup piping to the SFP is robust and will survive an ELAP event.	
3.2.4.2.A	Ventilation, Equipment Cooling-Confirm that functionality of all ELAP coping equipment such as for example the TDAFW pumps and the FLEX boric acid pumps and supporting equipment such as electrical panels which are located in areas with low ventilation is not compromised including the adequacy of the ventilation provided in the battery rooms to protect the batteries from the effects of extreme high and low temperatures.	
3.2.4.2.B	Ventilation, Equipment Cooling- Confirm that adequate ventilation is provided in the battery rooms to limit the potential hydrogen buildup during battery charging to less than the hydrogen combustibility limits.	
3.2.4.4.A.	Communications – Confirm that upgrades to the site's communication system have been completed.	
3.2.4.6.A	Personnel Habitability- Confirm that FLEX guideline validation process will address personnel accessibility and habitability concerns based on site specific evaluations.	
3.2.4.7.B	Water Sources- Confirm if permanently installed non-safety related equipment used in FLEX response guidelines will survive the postulated events.	
3.2.4.8.A	Electrical Power Sources- Confirm the sizing basis for the FLEX generators and their ability to start the planned individual loads identified in the FLEX strategies in Phases 2 and 3.	
3.2.4.9.A	Fuel Consumption Data – Confirm that sufficient fuel is available on-site for operation of FLEX equipment considering the as procured equipment fuel consumption rates and duration of operation before fuel needs to be replenished from off-site sources.	
3.2.4.10.A	Load Shedding-Confirm dc load profile, final load shedding approach including the actions necessary to complete each load shed, the equipment location (or location where the required action needs to be taken), the time to complete each action and identify which functions are lost as a result of shedding each load and any impact on defense-in-depth strategies and redundancy.	
3.4.A	Off-Site Resources - Review how conformance with NEI 12-06, Section 12.2 guidelines 2 through 10 is being met.	