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 0

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Florida Power and Light Company
Turkey Point Nuclear Plant, Units 3 and 4
Docket Nos. 50-250 and 50-251

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Technical Evaluation Report

Turkey Point Nuclear Plant, Units 3 and 4
Order EA-12-049 Evaluation

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 (BDBEEs). 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 (UHS) 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, Mitigation 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

- SFP 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 26, 2013, (ADAMS Accession No. ML13072A038, and as supplemented by the first six-month status report in a letter dated August 21, 2013 (ADAMS Accession No. ML13248A311), Florida Power & Light Company, (the licensee or FPL) provided the Turkey Point Nuclear Plant Units 3 & 4 (PTN) Integrated Plan for compliance with Order EA-12-049**.** The Integrated Plan describes the guidance and strategies under development for implementation by FPL 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 (LUHS). 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.

On page 1 of the Integrated Plan, the licensee stated the design criteria for the PTN Units 3 and 4 accounts for two design basis earthquake spectra: Design Basis Earthquake and the Safe Shutdown Earthquake. The ground accelerations for these spectra are 0.05 g and 0.15 g respectively. Structures, systems, and components (SSC's) important to safety are designed to withstand loads developed from these spectra. The licensee also states a seismic re-evaluation of the PTN site required by the 10 CFR 50.54(f) letter of March 12, 2012 has not yet been completed. Once completed, insights from the re-evaluation will be included in the FLEX 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 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.

In various sections of the Integrated Plan for Phase 2, the licensee stated that protection of associated portable equipment from seismic hazards would be provided by a storage facility that will be constructed in accordance with NEI 12-06 guidelines, which include seismic considerations. Temporary strategic locations will be used until building construction completion.

On pages 9 and 10 of the Integrated Plan, the licensee stated:

> The chosen location for the FLEX storage building will be in the protected area. The building elevation will be well above the surrounding land features with no significant barriers, foliage or overhead lines impeding access to the proposed staging areas. The protected area is built on compacted limerock fill that is not susceptible to liquefaction. The location and layout of the FLEX storage building will be meeting NEI 12-06 guidance for a single structure. FLEX storage building location and layout are shown in Attachment 5, Figures 1 and 2, respectively.
>
> A confirmatory analysis will be performed of the travel path, including review of barriers, obstructions, and liquefaction considerations, once the final building plans, routes, and staging areas are finalized. This action is being tracked as pending action 8, in Attachment 3.

On page 90 of the Integrated Plan, Enercon drawing SK-FPLTP080-C-001 Rev 0, Sheet 1 of 1 states:

> <u>STORAGE BUILDING DESIGN CRITERIA</u>
>
> FLEX EQUIPMENT STORAGE BUILDINGS WILL BE DESIGNED PER NEI 12-06. Rev. 0 (AUGUST 2012) FOR THE APPLICABLE SEISMIC, FLOOD, MISSILES, HIGH WINDS, SNOW, ICE AND COLD, AND EXTREME HEAT CONDITIONS.

1. SEISMIC: ONE BLDG. MAXIMUM OF PLANT DESIGN BASIS SEISMIC LOADG (DETERMINED BY CLIENT) AND ASCE 7-10 (MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES)

FPL's plans were reviewed for the storage and protection of portable equipment with regard to seismic hazard. Because FPL indicates that the structure protecting the equipment will be constructed to meet the requirements ASCE 7-10 there is reasonable assurance that those structures will conform to the guidance of NEI 12-06, Section 5.3.1, configuration 1.b. Although FPL has indicated PTN procedures and programs are being developed to address storage structure requirements, insufficient information was provided in the Integrated Plan to ascertain that these procedures and programs will provide for securing large portable equipment to protect them during a seismic event or to ensure unsecured and/or non-seismic components do not damage the equipment as is specified in NEI 12-06, Section 5.3.1, considerations 2 and 3. During the audit, the licensee stated the stored FLEX portable equipment will be secured as appropriate, evaluated and protected from seismic interactions to ensure they are not damaged from unsecured and/or non-seismic components. The portable equipment will be housed in one building located inside the protected area designed to withstand all applicable hazards that were identified in the Integrated Plan. Details will be provided as the design develops and in subsequent six month updates.

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 – 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:

> The baseline capability requirements already address loss of non-seismically robust equipment and tanks as well as loss of all AC. So, these seismic considerations are implicitly addressed.
>
> 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 for the 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.

On pages 9 and 10 of the Integrated Plan, the licensee stated the chosen location for the FLEX storage building will be in the protected area. The building elevation will be well above the surrounding land features with no significant barriers, foliage or overhead lines impeding access to the proposed staging areas. The protected area is built on compacted limerock fill that is not susceptible to liquefaction. Because the FLEX storage building and the deployed sites for the use of the equipment are both in the protected area, this adequately addresses the guidance of consideration 1 for review of deployment paths for potential soil liquefaction. Further review would be necessary for any pathways that depart from the protected area.

In various sections of the Integrated Plan, the licensee stated all connections for the FLEX equipment will be designed to withstand and be protected from the applicable hazards.

On pages 4 and 5 of the Integrated Plan, the licensee stated both condensate storage tanks (CSTs) and both refueling water storage tanks (RWSTs) are rugged structures designed to withstand the design basis seismic events.

The Integrated Plan did not provide sufficient information (e.g., routing of hoses and cables) to provide reasonable assurance that accessibility to at least one connection point of FLEX equipment is limited to seismically robust structures. In response to the audit, the licensee stated that all cables and hoses will be routed through seismically robust structures. All structures are class I except the Turbine Building (TB) which has been evaluated to maintain its structural integrity when subjected to the maximum potential earthquake (SSE). This adequately addresses consideration 2.

Consideration 3 is not applicable to PTN since the water source is well water for Phase 1 and 2, and the ocean for Phase 3.

The Integrated Plan does not address if power is required to move or deploy the FLEX equipment (e.g., to open the door from a storage location). If needed, power supplied should be provided as part of the FLEX deployment. During the audit, the licensee stated that power is not required to move or deploy equipment. Doors and gates have manual capability for opening that does not rely on power. New installations (i.e., FLEX storage building) will also have doors which are capable of being opened manually. Power is also not required to move equipment. This adequately addresses consideration 4.

On page 10 of the Integrated Plans, the licensee stated:

> Equipment Travel Paths and Staging Locations are shown in Attachment 5, Figure 3. Transport vehicles necessary to haul the FLEX equipment to the staging areas will be stored in the same FLEX storage structure and therefore will be protected from all hazards. In order to keep deployment pathways clear, equipment will be available and actions will be taken to clear the pathways if they

become obstructed. The identified deployment routes and deployment areas will be accessible during all modes of operation.

On page 90 of the Integrated Plan, Enercon drawing SK-FPLTP080-C-001 Rev 0, Sheet 1 of 1 identified two super duty trucks with fifth wheel towing capability stored in the FLEX storage building. This adequately addressed consideration 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 deployment of FLEX equipment for seismic hazards, 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 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 page 24 of the Integrated Plan for Phase 2, the licensee identified the following instrumentation for portable equipment:

- Pressure and flow for well pumps
- Pressure, flow and fuel for FLEX [steam generator] SG pumps
- Voltage, current, and fuel for FLEX diesel generators providing power to well pumps

On page 59 of the Integrated Plan for Phase 1, the licensee stated:

> Alternate means and procedures for taking measurements locally of critical instruments using hand-held devices will be developed in the next phase of the FLEX initiative. Temperatures in the [direct current] DC equipment rooms and control room (the only locations in the plant with a significant heat load and sensitive equipment required to support the FLEX strategy) have been analyzed and determined to remain within satisfactory ranges throughout Phase 1.

On page 60 of the Integrated Plan for Phase 1, the licensee stated procedural guidance for use of local instrument readings will be provided and included in the procedures milestone in Attachment 3.

On pages 92 through 94 of the Integrated Plan, the licensee identified the instrumentation for all measured parameters, including instrument identification, short term power, long term power and available alternative method of measurement (e.g., portable test equipment at instrument racks per 0-ONOP-103.3, "Severe Weather Preparations," local indications, local meters, and visual).

The Integrated Plan did not contain any information in regards to seismic hazards associated with large internal flooding sources that are not seismically robust and do not require ac power or whether the use of ac power to mitigate ground water in critical locations would be required. During the audit, the licensee identified that mitigation of large non-seismically robust hazards do not require ac power at PTN. The major potential contributors to internal flooding are the Circulating Water (CW), Fire Protection (FP), Service Water (SW) and Condensate systems. The threat from a system breach from these systems is minimized because of the loss of power. Mitigation of ground water does not require ac power since diesel driven pumps, and electric sump pumps with associated motor driven generators, are available onsite as part of storm stocks maintained for hurricane preparations and would be available to address ground water if required. Prior to a hurricane, these portable pumps would be pre-staged. Verification that the non-seismically robust internal flooding sources are not an issue when there is no ac has been identified as Confirmatory Item 3.1.1.3.A in Section 4.2.

Consideration 4 is not applicable to PTN because there are no downstream dams related to this site (water supply is the ocean or on-site wells).

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 procedural interfaces for seismic hazards, 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.

On page 12 of the Integrated Plan, the licensee stated that two Regional Response Centers (RRC) are being established to support Response Center plan utilities during beyond design basis events. Contracts are in place to develop the facilities, purchase equipment, support of the FLEX strategies, and maintenance of the equipment.

Each RRC will hold five sets of equipment, four of which will be able to be fully deployed when requested, and the fifth set will have equipment in a maintenance cycle. Equipment will be moved from an RRC to a local Staging Area, established by the Strategic Alliance for FLEX Emergency Response (SAFER) team and the utility. 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 will be delivered to the RRC staging area within 24 hours from the initial request with larger items arriving within 72 hours.

On page 30 of the Integrated Plan, the licensee stated:

> Attachment 5 identified the proposed deployment paths onsite for the transportation of FLEX equipment. For this function a clear deployment path has been shown from the identified roads in to power block to the staging areas. Note that the path and deployment of the Phase 3 equipment will be the same as the Phase 2 equipment in the protected area. A determination of the "drop off'" location from the RRC is pending. Once selected, the path to the site will be reviewed.

Transportation of offsite equipment to the site is not addressed and identification of the drop off location is pending. 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 after a seismic hazard, 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 in part:

> 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 pages 1 and 2 of the Integrated Plan regarding the determination of applicable extreme external hazards, the licensee stated, in part, that:

> PTN is designed to withstand flooding events associated with external natural hazards. The current licensing basis (CLB) for flooding is associated with hurricane surge conditions and is 18.3 ft above Mean Low Water (MLW).
>
> Flood protection for storm surge and wave run-up is provided by elevation of equipment and flood protection barriers. On the west side of the plant protection is provided to elevation 20 ft MLW and on the east side of the plant protection is provided to elevation 22 ft to account for wave run-up. PTN is not a "dry" site as defined in NEI 12-06 so temporary barriers are installed to protect equipment from storm surges during severe hurricanes.
>
> A flooding re-evaluation is being performed as required by 10 CFR 50.54(f) letter of March 12, 2012 has not yet been completed. The re-evaluation will include an updated storm surge assessment, a local intense precipitation assessment, and the effects of Tsunami, and Seiche. Once completed, insights from the re-evaluation will be included in the FLEX 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 flooding hazards, 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/guidance address the needed actions to relocate the equipment. Based on the timing of the limiting flood scenario(s), the

FLEX equipment can be relocated [footnote 2 omitted] 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.

The Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report (ADAMS Accession No. ML13008A412), Chapter 2, "Site Characteristics" and Section 2.4.5, "Probable Maximum Surge and Seiche Flooding" [PMSS], stated in part:

> 2.4.1.2.3 Biscayne Bay
> The mean low water datum [MLW] at the NOAA Virginia Key, Florida station is located at -1.9 ft. [North American Vertical Datum of 1988] NAVD88.
>
> 2.4.5.5 Protective Structures
> The PMSS still water level (21.1 NAVD88 per Section 2.4.5.2.2.6) at Units 6 & 7, along with coincidental wind-wave run-up (3.7 ft per Section 2.4.5.3.3), is conservatively estimated to be approximately 24.8 feet NAVD88.

Based on the datum conversion of 1.9 ft listed above for Biscayne Bay, the probable maximum storm surge at Units 6 & 7, along with coincidental wind-wave run-up, is conservatively estimated to be approximately 24.8 feet NAVD88 + 1.9 feet = 26.7 (MLW). The licensee used the current licensing basis for flooding of 18.3 ft. above MLW instead of the docketed analysis identifying a maximum flood level of 26.7 ft. MLW.

During the audit, the licensee was requested to clarify how the use of the current licensing basis for flooding for PTN Units 3 & 4 meets the guidance of NEI 12-06, Section 6.2.3.1, consideration 1, regarding the protection of FLEX equipment from external flood hazards. In response, the licensee stated in part:

> Turkey Point completed a flooding hazards reevaluation as required by recommendation 2.1 of the Fukushima Near-Term Task Force. In that reevaluation, which used more refined analytical methodologies than the Units 6 and 7 analysis, it was determined that hurricane storm surge is the predominant flooding hazard and established a storm surge level of 19.6 feet - MLW (including a sea level rise over the next 20 years of 0.4 feet). Although higher than the current licensing basis level of 18.3 feet - MLW, the new level remains below the level of protection provided by existing flooding protection features. An integrated assessment is being prepared to determine if additional flooding protection measures are needed for the reevaluated hazards. The mitigating strategies are not impacted by the reevaluated levels in that the portable equipment will be protected to the reevaluated level with margin, and the credited permanent plant equipment and connection points are protected from the reevaluated hazard. Note that the maximum flood level for Units 6 & 7 was based on a less refined methodology that added margin for uncertainties associated with the modeling and analytical methods used, a longer period of sea level rise associated with the new plant and other conservatisms.

In various sections of the Integrated Plan for Phase 2, the licensee stated

> The storage facility will be constructed in accordance with NEI 12-06 guidelines, which include flooding considerations. Temporary strategic locations will be used until building construction completion. If stored below current flood level, procedures will address the move of equipment prior to exceeding flood level.

On page 90 of the Integrated Plan, Enercon drawing SK-FPLTP080-C-001 Rev 0, Sheet 1 of 1 states:

> STORAGE BUILDING DESIGN CRITERIA
>
> 2. FLOODING: BUILDING FINISHED FLOOR LEVEL ABOVE PLANT DESIGN BASIS FLOOD LEVEL AND/OR SHALL BE WATERTIGHT AND ABLE TO WITHSTAND FLOOD FORCES.

As stated above in this Section, the FLEX equipment will be protected to the reevaluated level with margin.

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 for 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 RCS, isolating accumulators, isolating 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 ultimate heat sink may be one of the first functions affected by a flooding condition. Consequently, the deployment of the FLEX equipment should address the effects of LUHS, 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.

As noted in Section 3.1.2 above, the CLB for flooding is based on hurricane surge conditions.

On pages 15 and 16 of the Integrated Plan discussing safety function Maintain Core Cooling & Heat Removal in Modes 1 through 4, and Mode 5 with Steam Generators Available -.Hurricane Scenario, the licensee stated:

> PTN has substantial defense-in-depth preparation plans for the hazards posed by hurricanes and tropical storms due to the plant's geographic location. PTN has procedural guidance to mitigate potential impacts due to such storms. Current severe weather plant procedures direct the operating crew to cool down the plant to Mode 4 or Mode 5 at least 2 hours prior to the arrival of hurricane force winds, as well as pre-stage small gas/diesel generators, gas/diesel powered dewatering pumps, and fill the major water tanks to maximum level. Therefore, actions taken in response to hurricane events will be different from other events due to the state of the plant, the volume of water available, and limited access to plant areas due to high winds. For this reason, the strategy developed to cope with an ELAP and LUHS event initiated by a hurricane has different initial conditions and slightly different timelines compared to the other initiating events.
>
> For hurricane events, only one CST is assumed to survive with the surviving CST filled to the nominal capacity per plant severe weather preparation procedures. With the plants cooled down to Mode 5 in preparation for the hurricane, decay

heat calculations show that the inventory from a single, filled CST will last for approximately 24 hours when providing the SG makeup needs of both units. The initial coping strategy for this scenario would be to feed the SGs using the [auxiliary feedwater] AFW pumps and the surviving CST until Phase 2 FLEX equipment becomes available. As part of the preparations for the hurricane, 0-ONOP-103.3, directs operators to establish a fixed steam demand in the turbine building and set the required flow rate to the SGs by positioning the AFW [flow control valves] FCVs using their manual handwheels. This ensures that feed flow to the SGs is maintained regardless of any losses of power or instrument air which may be experienced because of the hurricane.

If the plant is cooled down to Mode 5 in preparation for the hurricane, the [residual heat removal] RHR system would be used [in use] for cooling when the ELAP and LUHS event occurred. Upon loss of RHR where the RCS is intact and at least 2 SGs are available, procedure 3/4-ONOP-050 ["Loss of AC EOP"] directs the operator to establish SG makeup. The means of providing this makeup in the loss of RHR procedure specifies the use of either the standby steam generator feedwater pumps (SSGFP), condensate pumps or condensate transfer pumps. These pumps cannot be considered available following the ELAP and LUHS event. For this scenario, PTN would allow the RCS to heat back up until sufficient steam could be produced in the steam generators to operate the AFW pumps. Analyses and procedural guidance will be performed to support heat up from Mode 5. This is tracked as pending action 3, in Attachment 3. Alternatively, the SG FLEX pumps would be used when available. This is the strategy for all ELAP and LUHS events which occur while the plant is in Mode 5 with its SGs available.

Because the A and C AFW pumps' steam supply valves are DC powered and both trains of AFW have their own nitrogen bottles for flow control, remote operation and control of AFW could be maintained for at least 4 hours (2 hours on each train's nitrogen tanks) without any local manual actions required. This time will be increased significantly by:

1 Valving in the additional nitrogen bottles for each train prior to the event (i.e., if the plant intends to shut down to Mode 5 in preparation for a hurricane, then the procedures should direct the operators to open the valves for all nitrogen bottles).
2 Operating the AFW flow control valves in manual rather than in automatic. Operating experience has demonstrated that this method of operation typically results in a slower depletion of the nitrogen supply because less valve hunting occurs.

If additional nitrogen supplies are valved in prior to the event, remote operation of the AFW FCVs would be available for a minimum of 7 hours. Alternatively, the plant could open the AFW FCVs using the handwheels prior to landfall of the hurricane. SG level could then be controlled by the starting and stopping of the AFW pumps using their steam admission or trip and throttle valves which are DC valves powered off the station batteries. Both methods will be included in the procedural guidance to be developed for the FLEX scenarios.

Based on a review of the above, this addresses NEI 12-06, Section 6.2.3.2, considerations 1, 6, and 7.

Consideration 2 is not applicable since flood persistence is short for hurricanes.

Phase 2 relies on new wells that are needed when the one surviving CST depletes after a minimum of 12 hours. The wells can provide adequate water until equipment is available to proceed to Phase 3 which uses the UHS (ocean) as a source. This addresses NEI 12-06, Section 6.2.3.2, consideration 3.

On page 61 of the Integrated Plan, the licensee stated:

> Refueling for Phase 2 equipment will be from the Unit 4 Emergency Diesel Storage Tanks. These tanks are contained within Class I structures. A fuel truck will be located in the FLEX storage building and used for that purpose. Fuel consumption analysis is pending for all temporary equipment. This will be completed as part of the equipment order and develop of the procedures for their use. This is tracked as pending action 5 in Attachment 3.

This addresses NEI 12-06, Section 6.2.3.2, consideration 4.

On pages 26 and 30 of the Integrated Plan describing deployment conceptual design for Phases 2 and 3 of its strategy for safety function Maintain Core Cooling & Heat Removal, the licensee stated all connections for the FLEX equipment will be designed to withstand and be protected from the applicable hazards.

During the audit, the licensee was requested to describe the physical location of connection points, and if they are different for flooded vs. non-flooded conditions, provide the guidance for deployment. The licensee responded that the connection points for the portable equipment will be within the plant areas that are adequately protected from the reevaluated flood hazards (see Section 3.1.2 above), at an elevation above the reevaluated flood hazards, or only needed after the flooding has subsided. Therefore, there is no difference in the connection points for the flooded vs. non-flooding conditions or the guidance for deployment.

The licensee stated the connections points are as follows:

- Condensate storage tanks make-up primary (above reevaluated flood level)
- Condensate storage tanks make-up alternate (above reevaluated flood level)
- Portable SG feed pump at AFW pumps (within the flood protection barriers)
- Boric Acid Batching tank (within the flood protection barriers)
- RWST primary connection (needed after flooding has subsided)
- RWST alternate makeup (above reevaluated flood level)
- SFP fill and spray (above the reevaluated flood level)
- SFP alternate makeup (within the flood protection barriers)
- Intake Cooling Water to Component Cooling Water [heat exchanger] Hx (needed after flooding has subsided)
- Electrical connections for 480VAC and 4160VAC (within the flood protection barriers)

The licensee's response addresses NEI 12-06, Section 6.2.3.2, consideration 5.

On page 2 of the Integrated Plan regarding the determination of applicable extreme external hazards, the licensee stated, in part, that:

> Flood protection for storm surge and wave run-up is provided by elevation of equipment and flood protection barriers. On the west side of the plant protection is provided to elevation 20 ft MILW and on the east side of the plant protection is provided to elevation 22 ft to account for wave run-up. PTN is not a "dry" site as defined in NEI 12-06 so temporary barriers are installed to protect equipment from storm surges during severe hurricanes.

The Integrated Plan does not address NEI 12-06; Section 6.2.3.2, consideration 8 that provides for assuring that the storage location for barriers and related material provides reasonable assurance that the barriers could be deployed to provide the required protection. During the audit, the licensee was requested to assure that the storage location for barriers and related material provides reasonable assurance that the barriers could be deployed to provide the required protection. The licensee responded that stoplogs, concrete barriers, and sand bags are the barriers deployed for flooding protection at Turkey Point. Deployment of the stoplogs, concrete barriers and sand bags is controlled by administrative procedure 0-ADM-116, "Hurricane Season Readiness." Appropriate preparations are initiated 72 hours prior to the projected arrival of hurricane winds at the site and deployment starts at 48 hrs. Deployment of the stoplogs, concrete barriers and sand bags would not be an issue as these efforts are initiated prior to the projected arrival of a severe hurricane at the site.

Stoplogs are stored in close proximity to their actual location of use. Concrete flood barriers are stored within the Owner Controlled Area dedicated and marked with signage for flood protection. The licensee's response adequately addresses consideration 8.

On page 10 of the Integrated Plan, the licensee stated, in part, that transport vehicles necessary to haul the FLEX equipment to the staging areas will be stored in the same FLEX storage structure and therefore will be protected from all hazards.

The Integrated Plan provides reasonable assurance that it conforms to the guidance in in NEI 12-06, Section 6.2.3.2, consideration 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 deployment of FLEX equipment for 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 pages 10 and 11 of the Integrated Plan, the licensee stated:

> NEI 12-06 details guidance associated with the implementation of the [FLEX Support Guidelines] FSGs. To provide guidance to deploy FLEX equipment and coping strategies, FSG will be generated which will provide available, pre-planned FLEX strategies for accomplishing specific tasks. The FSG will support the strategies described in the existing EOPs. Other procedures will be impacted due to FLEX. These procedures will include, but are not limited to, system operating procedures, valve lineups, preventive maintenance procedures, setpoint procedures, calibration procedures, and annunciator response procedures.

On page 15 of the Integrated Plan discussing, the licensee stated PTN has substantial defense-in-depth preparation plans for the hazards posed by hurricanes and tropical storms due to the plant's geographic location. PTN has procedural guidance to mitigate potential impacts due to such storms.

In various sections of the Integrated, the licensee stated all connections for the FLEX equipment will be designed to withstand and be protected from the applicable hazards.

During the audit, the licensee was requested to describe the physical location of connection points, and if they are different for flooded vs. non-flooded conditions, provide the guidance for deployment. The licensee responded that the connection points for the portable equipment will be within the plant areas that are adequately protected from the reevaluated flood hazards, at an elevation above the reevaluated flood hazards, or only needed after the flooding has subsided. Therefore, there is no difference in the connection points for the flooded vs. non-flooding conditions or the guidance for deployment.

On page 68 of the Integrated Plan, in the References, the licensee identified procedures 0-ADM-116 “Hurricane Season Readiness”, and 0-ONOP-103.3 “Severe Weather Preparations”. The reviewer verified that the procedures addressed the deployment of temporary flood barriers and dewatering pumps. This addresses considerations 1 and 3.

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 the procedural interfaces for a flooding 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 off-site 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 off-site could be staged for use on-site.

On page 30 of the Integrated Plan, the licensee stated that the path and deployment of the Phase 3 equipment will be the same as the Phase 2 equipment in the protected area. A determination of the "drop off" location from the RRC is pending. Once selected, the path to the site will be reviewed. This has been combined with 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 use of off-site resources following flooding events, 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 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 of the Integrated Plan, the licensee stated:

> Figure 7-1 of the NEI 12-06 guidance was used for the determination to consider this hazard.
>
> The PTN site is within the region where winds are expected to exceed 130 mph so the high wind hazard is applicable. Review of Figure 7-2 determined that PTN is subject to tornadoes and within the region 2 locations therefore subject to winds of 170 mph.
>
> The design basis for Turkey Point includes requirements for safety related structures, systems and equipment to withstand hurricanes, tornadoes, and wind

driven missiles. The design wind speeds are 145 mph for hurricanes and 225 mph for tornadoes.

Provisions for this hazard including high wind from hurricanes, tornadoes, and wind driven missiles will be included in the FLEX Integrated Plan. This includes qualification of installed equipment credited for the event and effects of the event on the FLEX 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 screening for severe storms with high winds, if these requirements are implemented as described.

3.1.3.1 Protection of FLEX Equipment - High Winds 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.

In various sections of the Integrated Plan, the licensee stated that protection of associated portable equipment from high winds would be provided by a storage facility that will be constructed in accordance with NEI guidelines, which include severe wind and wind driven missile considerations. Temporary strategic locations will be used until building construction completion.

On page 90 of the Integrated Plan, Enercon drawing SK-FPLTP080-C-001 Rev 0, Sheet 1 of 1 states, in part:

> <u>STORAGE BUILDING DESIGN CRITERIA</u>
>
> 3. HIGH WINDS: ONE BLDG.: MAXIMUM OF PLANT DESIGN BASIS FOR HIGH WINDS HAZARDS AND HURRICANE WIND SPEEDS.

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 in a high wind hazard, if these requirements are implemented as described.

3.1.3.2 Deployment of FLEX Equipment - High Winds Hazard

NEI 12-06, Section 7.3.2 states:

> There are a number of considerations which apply to the deployment of FLEX equipment for high wind hazards:

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.

On pages 15 and 16 of the Integrated Plan the licensee discusses the hurricane scenario. The plant is required to be shutdown prior to the arrival of hurricane force winds. Outdoor equipment is place in safe configurations e.g., cranes are moved. Tanks are filled with water, and the AFW system is aligned to enable cooling via natural circulation.

The water source in Phase 2 is from wells powered by FLEX diesel generators. NEI-12-06, Section 7.3.2 consideration 2 is not applicable.

On page 10 of the Integrated Plan, the licensee stated:

> Transport vehicles necessary to haul the FLEX equipment to the staging areas will be stored in the same FLEX storage structure and therefore will be protected from all hazards. In order to keep deployment pathways clear, equipment will be available and actions will be taken to clear the pathways if they become obstructed. The identified deployment routes and deployment areas will be accessible during all modes of operation.

On page 90 of the Integrated Plan, Enercon drawing SK-FPLTP080-C-001 Rev 0, Sheet 1 of 1 identified 2 Bobcats.

On page 95 of the Integrated Plan, the licensee stated:

> The overall coping strategies rely on providing active onsite equipment to provide flow and power. This equipment is required to be stored in structures that meet the external hazards requirements of NEI 12-06. Other equipment will be required to be in the qualified storage structure(s) as part of the overall coping strategies and includes hoses, hose to piping adapters, fans, electrical cables,

communications equipment, portable lighting, diesel fuel transfer tank, and debris removal equipment.

The licensee's plans for debris removal equipment and storage of debris removal equipment provide reasonable assurance that the Integrated Plan conforms to the guidance in NEI-12-06, Section 7.3.2 considerations 3 and 4.

The licensee's hurricane procedures prepare for the hurricane in advance and movement of equipment and supplies during the hurricane is not required.

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 in a high wind hazard, if these requirements are implemented as described.

3.1.3.3 Procedural Interfaces - High Winds 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 68 of the Integrated Plan, in the References, the licensee identified procedures 0-ADM-116, "Hurricane Season Readiness", and 0-ONOP-103.3, "Severe Weather Preparations". The reviewer verified deployment considerations are addressed in the procedures.

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, provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to procedural interfaces in a high wind hazard, if these requirements are implemented as described.

3.1.3.4 Considerations in Using Offsite Resources – High Winds 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.

On page 30 of the Integrated Plan, the licensee stated that the path and deployment of the Phase 3 equipment will be the same as the Phase 2 equipment in the protected area. A determination of the "drop off" location from the RRC is pending. Once selected, the path to the site will be reviewed. This has been combined with 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 use of off-site resources following high wind events, if these requirements are implemented as described.

3.1.4 Snow, Ice and Extreme Cold

As discussed in part 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. Excluding Arizona and Southern California, all sites located above 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 2 of the Integrated Plan, the licensee stated:

> PTN is located below the 35th parallel. Per review of Section 8 of the NEI 12-06 guidance, snow, ice, or extreme cold hazard conditions do not apply to PTN.
>
> Provisions for this hazard will not be included in the FLEX 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 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

The licensee screened out the need to address the hazards of snow, ice and extreme cold, and therefore does not need to address protection of FLEX equipment in the context of a snow, ice and extreme cold hazard.

3.1.4.2 Deployment of Portable Equipment - Snow, Ice and Extreme Cold Hazard

The licensee screened out the need to address the hazards of snow, ice and extreme cold, and therefore does not need to address deployment of FLEX equipment in the context of a snow, ice and extreme cold hazard.

3.1.4.3 Procedural Interfaces - Snow, Ice and Extreme Cold Hazard

The licensee screened out the need to address the hazards of snow, ice and extreme cold, and therefore does not need to address procedural interfaces in the context of a snow, ice and extreme cold hazard.

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

The licensee screened out the need to address the hazards of snow, ice and extreme cold, and therefore does not need to address considerations in using offsite resources in the context of a snow, ice and extreme cold hazard.

3.1.5 High Temperatures

NEI 12-06, Section 9.2 states:

> All sites will address high temperatures. 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.
>
> In this case, sites should consider the impacts of these conditions on deployment of the FLEX equipment.

On page 3 of the Integrated Plan, the licensee stated:

> PTN is located just south of Miami, Florida. Meteorological records for the area indicate that high temperatures approach 100°F in summer months but remain well below the threshold of 110°F discussed in NEI 12-06. While such temperatures present a challenge to the grid when customer usage is high, there has been no recent history of off-site power loss or plant equipment affected by them. On this basis, it would not be expected that FLEX equipment and deployment would be affected. Nonetheless, temperature considerations will be made with respect to maintaining equipment within design ratings and for personnel habitability.
>
> Provisions for this hazard will be included in the development and implementation of the overall FLEX Integrated Plan. This includes qualification of installed equipment credited for the event and effects of the event on the FLEX 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 screening for 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.

In various sections of the Integrated Plan, the licensee states that FLEX equipment (i.e., pumps, diesel generators, etc.) shall be capable of operating in hot weather in excess of the site extreme maximum of 100°F which is below the threshold or 110°F discussed in NEI 12-06 guidance. Temperature considerations will be made with respect to procuring and maintaining equipment within design ratings and for personnel habitability. Storage of FLEX equipment in the FLEX storage building will include ventilation to maintain temperatures within the manufacturer's 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 the protection of FLEX equipment in a 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.

On page 90 of the Integrated Plan, Enercon drawing SK-FPLTP080-C-001 Rev 0, Sheet 1 of 1 identified 2 super duty trucks with 5^{th} wheel towing, 2 trailers with fuel tanks, and 3 flatbed trailers for moving FLEX equipment.

In various sections of the Integrated Plan, the licensee states in part, that storage of FLEX equipment in the FLEX storage building will include ventilation to maintain temperatures within the manufacturer's recommendations. Also, temperature considerations will be made with respect to procuring and maintaining equipment within design ratings and for personnel habitability.

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 high temperatures hazards, 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 FLEX equipment.

On pages 10 and 11 of the Integrated Plan, the licensee stated, in part, that:

> Existing plant maintenance programs and procedures will be used to identify and document maintenance and testing requirements. Preventative Maintenance work orders (PMs) will be established and testing procedures will be developed in accordance with the PM program. Testing and PM frequencies will be established based on type of equipment and considerations made within EPRI

guidelines. The control and scheduling of the PMs will be administered under the existing site work control processes.

As noted in Section 3.1.5.1, above, the operation of portable equipment in high temperatures is being addressed.

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 for 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 BDBEEs in order to maintain or restore core cooling, containment and SFP 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 SFP and to maintain containment capabilities in the context of a BDBEE 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 discussed in NEI 12-06, Section 1.3, plant specific analysis 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 AFW/emergency feedwater (EFW) system to provide 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 reactor coolant system (RCS) inventory control and maintenance of long-term subcriticality through the use of low leak reactor coolant pump seals and/or borated high pressure RCS makeup with a letdown path.

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 3.2.1.4 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.

During the audit, the licensee was requested to specify which analysis performed in WCAP-17601-P is being applied to PTN and to justify the use of that analysis by identifying and evaluating the important parameters and assumptions demonstrating that they are representative of PTN and appropriate for simulating the ELAP transient. The licensee responded as follows:

> A. The WCAP analysis utilized for Turkey Point ELAP is as follows:
>
> (The below section numbers refer to WCAP 17601 section numbers)
>
> 5.1.3 Turbine Driven Auxiliary Feedwater [TDAFW] Pump Heat and RCS Heat Loss
>
> The WCAP analysis indicates that adequate steam pressure would be available for 16 days. After 8 hour the FLEX backup steam generator (S/G) pump will be available to supply AFW flow to the S/G when the pressure is too low to power the TDAFW pump.
>
> 5.6 Accumulator/SIT/CFT Injection for RCS Boration and makeup and Isolation/Venting to Prevent Gas Injection to the RCS
>
> Applicability: PTN will use accumulator injection as a means for boron addition to the RCS.

Reviewer comment: as stated on page 33 of the Integrated Plan, the accumulators are isolated when adequate injection has been made. Per licensee input made during the audit process, a modification will be made to enable accumulator level instrumentation. This would supersede reliance on RCS pressure limits to prevent nitrogen injection.

> 5.7.1 RCS Response with little or No RCS Leakage-Safe shutdown Seals/Low Leakage Seals/Alternate Cooling Systems
>
> Applicability: Turkey Point will be utilizing low leakage seals designed by Flowserve. As such, the coping analysis for low leakage seals discussed in section 5.7.1 applies to Turkey Point.

Reviewer comment: the applicable analysis would be 1B for a 3-loop plant.

> B. WCAP key Parameters and assumptions applicable to Turkey Point are:
>
> The following are key parameters applicable to Turkey Point from the WCAP Analysis:
>
> (The below section numbers refer to WCAP 17601 section numbers)

4.1.1.1 Westinghouse NSSS Case Matrix, Table 4.1.1.1-1: RCS Design - Volume Comparison

Applicability: The 3 loop (VRA) plant volumes and leak rates bound PTN values. Note that the leakrate of 64 gpm is for the currently installed RCP seals which will be replaced with low leakage seals.

4.1.1.2 NOTRUMP Code and Models

Applicability: The 3 loop plant model is based on a 312 hot leg (Thot) design with an operating core power of 2900 megawatts thermal (MWt).”. PTN is a Thot plant with a rated thermal power of 2644 MWt and thus the WCAP three loop generic analyses conservatively bounds the PTN design.

The following are the Key assumptions for Turkey Point from the list in WCAP 17601-P, section 4.2.1:

4.2.1 Input Assumptions – Common to All Plant Types

(The below assumption numbers refer to WCAP 17601-P assumption numbers.)

4. Decay heat is per ANS 5.1-1979 + 2 sigma, or equivalent.

Applicability: PTN utilized the American Nuclear Society (ANS) 5.1 predicted decay heat values in its recent EPU safety analysis [license amendment request] LAR-205 which was approved in license amendments 249 and 245 as acceptable for use at Turkey Point.

5. The emergency/auxiliary feedwater supply will be provided symmetrically to all steam generators (SGs), unless specifically indicated otherwise, such as for SG blind feed cases or asymmetric cooldown cases (due to an ADV failure).

Applicability: PTN will have ability to feed all 3 S/G during the extended loss of ac power (ELAP) event for a symmetrical cool down since each of the TDAFW pumps has the ability to feed all 3 SGs to both units simultaneously.

7. If possible, the accumulators/SITs/CFTs will be isolated at an appropriate time to simulate the effects of venting the nitrogen cover gas from these storage tanks. This is performed such that non-condensables will not be introduced in bulk into the RCS.

Applicability: The PTN strategy will utilize accumulator injection for boron injection for maintaining shutdown margin.

Reviewer comment: Per licensee input made during the audit process, a modification will be made to enable accumulator level measurement. Accumulator level will be available and the Integrated Plan identified on page 22 that accumulator isolation will be made after sufficient injection.

20. Best estimate physics data will be used and account for changes in the following, Xenon Reactivity, post trip vs. time after Shutdown, $\Delta\rho$ (or pcm)

Moderator Temperature Coefficient, Δρ/°F, Rod Worth with All Rods In (no stuck rods), Δρ (or pcm) Boron Worth, Δρ/ppm, Doppler coefficient , Δρ/°F.

Applicability: A plant specific shutdown margin calculation has been performed for PTN which shows boration is required in the worst case to be completed by 21 hours as indicated on page 8 of the Integrated Plan response FPL letter L-2013-061. Adequate charging capacity and boric acid storage tank (BAST) inventory exist to complete the boration with 21 hrs. This calculation is very conservative since it establishes a shutdown margin 1.77% boron concentration for an RCS temperature of 68°F rather than a best estimate calculation for Phase 2. Phase 2 will not cool the RCS to less than 200°F as recommended in WCAP 17601. FPL will re-calculate the boration requirements for Phase 2 cool down to provide additional margin and flexibility for the boration activity and provide the results in the 6 month update.

This has been identified as Confirmatory Item 3.2.1.A. in Section 4.2.

21. There is an unlimited source of AFW available and degradation of the TDAFW pump is not considered, except as noted in specific cases.

Applicability: Adequate supply of water is available from one CST to supply both units for removal of decay heat for 12 hrs. As stated in PTN [overall integrated plan] OIP page 6, PTN will install a well to provide an unlimited supply of water for the AFW pumps or FLEX S/G pumps.

4.2.2 Westinghouse Unique Assumptions

2. The NOTRUMP EM does not have all metal masses pertinent to the RCS stored energy. This includes the hot and cold legs, the SG lower head and RCP casing. This affects the amount of AFW required for the cool down evolution. As such, the integrated AFW flow from the code output does not account for this. However, the additional AFW needed to accomplish the cool down can be calculated and added to the overall integrated AFW flow. The added required AFW volume is provided in Section 5.2.2.

Applicability: Given the generic 3 loop plant uses a rated thermal power of 2900 MWt and PTN's rated thermal power is 2644 MWt, any slight differences in metal mass are considered bounded by the increased decay heat for the generic plant.

3. The SG PORV (atmospheric dump valve) capacity will be sufficient to depressurize and cool the RCS to target SG pressures in a timely manner. It is anticipated that the corresponding SG pressures will be high enough to preclude PORV choked flow conditions and thus will not affect the nominal 75°F/hour.

Applicability: The PTN S/G ADV's have the capacity to achieve a 75°F/hour cool down when using 3 S/G.

4. For Westinghouse plants it will be assumed that per ECA-0.0, it will take 2 hours for the cooldown of the RCS to commence.

Applicability: The Pressurized Water Reactor Owner's Group (PWROG) guidance given in WCAP-17601-P recommends cooling down the plant approximately 4-8 hours [2 hours] after the ELAP and LUHS event has occurred. This guidance does not consider CST inventory limitations which apply to PTN. One of the primary drivers in the WCAP for cooling down this early is to minimize RCS inventory loss due to RCP seal leakage. This issue is a larger concern for plants without "shutdown" (low leakage) RCP seal packages. PTN plans to install RCP low leakage seals which will reduce RCP seal leakage at normal operating pressure and temperature to a maximum of 1 gpm per RCP. Because of this, RCS inventory losses will not be as critical and the cool down can be delayed. A site-specific evaluation will be performed once the seal design is completed to validate that the cool down and depressurization time is supported. This is tracked as pending action number 9, Attachment 3 scheduled for completion in June of 2014.

This has been identified as Confirmatory Item 3.2.1.B. in Section 4.2.

7. Letdown isolates on the loss of ac. If this isolation occurs downstream of the letdown system relief valve, flow through this valve is not accounted for while RCS pressure remains above the relief setpoint (prior to cool down/depressurization).

Applicability: The PTN letdown isolation valves are failed closed valves upstream of the letdown relief valve. Therefore, the assumption is accurate for PTN and flow through the relief will not occur once letdown isolates.

8. RCS heat losses to containment are generally neglected. In some cases, the pressurizer vapor space heat losses are considered and are assumed to be on the order of approximately 40 kW.

Applicability: Given PTN's plan to install low leakage seals and the calculated time RCS makeup would be required for core cooling being greater than 1 week, this assumption is acceptable for use in the PTN ELAP strategy.

C. Integrated Plan correctly identified where the gap and discussion of the gap is located

Discussion of the gaps is located on page 8 and 22 of the Integrated Plan and are summarized below

Cool down Delay Discussion

Page 8 of the Integrated Plan indicates an RCS cool down will be performed at approximately 13 hrs. This deviates from the WCAP recommendation if current RCP seal design is maintained. Turkey Point plans on installing the Flowserve NX low leakage seals. Delay the cool down is also addressed in WCAP-17601-P section 5.7.1. For the three reference cases with low RCP seal leakage, no RCS cool down was assumed, but recognized that there may be other reasons for performing an RCS cool down when time and resources permit. Delaying the RCS cool down supports the FLEX coping strategies in 3 ways:

(1) extends the time in which initial CST inventory is available, thereby delaying

the time before which CST makeup is required;

(2) allows for a controlled plant cool down using steam dump to atmosphere (SDTA) valves supplemented with FLEX equipment and existing plant procedures; and

(3) ensuring 480VAC is available to close the Safety Injection (SI) Accumulator isolation valves to prevent injecting nitrogen as the RCS depressurizes.

The generic WCAP guidance recommends that a site-specific evaluation be performed once the RCP low leakage seal design is completed to validate that the cool down and depressurization time is supported. This is tracked as pending action number 9 in Attachment 3 of OIP scheduled for completion in June of 2014.

This has been previously identified as Confirmatory Item 3.2.1.B. in Section 4.2.

RCS Cool down Pressure Discussion

Page 22 of the Integrated Plan indicates the nuclear plant operators (NPOs) will depressurize the steam generators via the SDTAs to a pressure of approximately 170 psig.

On page 33 of the Integrated Plan, the licensee identifies that for RCS inventory control and long term sub-criticality in Phase 2, the credited action will be to cool down and depressurize the RCS for injection of boron and coolant inventory from the accumulators. This will be done after make-up has been established to the CST's. Depressurizing the RCS to inject the accumulators occurs when the steam generators are depressurized to 170 psig per EOP-ECA-0.0. The heat removed by depressurizing the steam generators also cools and depressurizes the RCS. The primary method for accomplishing RCS makeup in Phase 2 is the use of the accumulators to make up for losses from the RCP Low Leakage Seals and for contraction of the primary due to cool down. Alternate strategies involve the use of BAST or RWST inventories through installed charging and boric acid transfer pumps.

Following injection of sufficient accumulator volume, the accumulators are isolated to avoid nitrogen injection into the RCS. Accumulator isolation must occur prior to depressurizing below 170 psig [Reviewer comment: a modification will provide for monitoring accumulator level which would be more accurate than a calculated pressure when nitrogen would be injected since the value of gamma in the equation PV^{gamma} = constant varies between 1 and 1.4 depending if the process is isothermal or adiabatic. Licensee stated that the appropriate pressure would be calculated per the assumptions made in the PWROG Position Paper.] This isolation is done by repowering the 480VAC accumulator isolation valves (MOV-865A, MOV-865B, and MOV-865C) using the FLEX Diesel Generator (DG).

During the audit, the licensee identified the basis for having a lower RCS pressure after the cool down of 170 psig instead of the generic WCAP 17601 pressure of 300 psig is based on a PTN plant specific calculation.

The licensee did not address the PWROG recommendations made in Section 3.1 of WCAP-17601-P. During the audit, the licensee was requested to provide the following:

> 1. The licensee's position on each of the recommendations for developing the FLEX mitigation strategies.
>
> 2. A list the recommendations that are applicable to the plant, including the rationale for the applicability, including how the applicable recommendations are considered in the ELAP coping analysis, and the plan to implement the recommendations.
>
> 3. The rationale for each of the recommendations that are determined to be not applicable to the plant.

In response the licensee provided the following:

> Objective #1 of WCAP-17601 section 3.1 recommends performing a cool down of the RCS when time and resources permit. Turkey Point still plans on installing the Flowserve NX low leakage seals. The Turkey Point strategy delays RCS cool down for about 13 hours. Delay the cool down is also addressed in WCAP-17601-P section 5.7.1. For the three reference cases with low RCP seal leakage, no RCS cool down was assumed, but recognized that there may be other reasons for performing an RCS cool down when time and resources permit. Delaying the plant cool down until Phase 2 supports the FLEX coping strategies in 3 ways as noted above:
>
> Objective #2 of WCAP-17601 section 3.1 recommends developing coping times beyond the Reference case. Turkey Point plans on installing the Flowserve NX low leakage seals which extends the coping period for at least 1 week.
>
> Objective #3 of WCAP-17601 section 3.1 recommends developing a high level list of instrumentation for the RCS in order to confirm / maintain adequate core cooling. [PTN identified the parameters and instrumentation in the Integrated Plan. During the audit, accumulator level was added as a parameter and instrumentation for its measurement was identified.]
>
> Objective #4 of WCAP-17601 section 3.1 recommends a set of plant specific curves be developed for maintaining a subcritical condition. Turkey Point is developing plant specific curves or tables for the operators to use to determine the amount of borated water needed for maintaining adequate shutdown margin during a cool down as part of pending action 9 in the Integrated Plan.

See Confirmatory Item 3.2.1.A. above.

> Objective #5 of WCAP-17601 section 3.1 recommends providing a means of adding inventory and borating the RCS. Turkey Point will be re-powering the charging pumps [CP] and boric acid transfer pumps with a FLEX diesel generator to provide boration and RCS makeup capability.
>
> Objective #6 of WCAP-17601 section 3.1 recommends Quantifying RCS response with [shutdown seals] SDS / Low-Leakage seals. The use of the SDS

or Low-leakage seal reduces the complexity of the transient and eases operator burden as shown in Section 5.7.1. Turkey Point will be installing the Flowserve NX low leakage seals.

Objective #7 of WCAP-17601 section 3.1 recommends prioritizing of pre-staging a flex strategy for alternative feedwater additions when time and resources permit. Turkey Point will pre-stage a Godwin Pump nominally rated at 600 gpm @ 400 psi for an alternative feedwater source.

Objective #8 of WCAP-17601 section 3.1 recommends a portable feedwater system capable of delivering 300 gpm at 300 psig. A Goodwin Pump nominally rated at 600 gpm @ 400 psi, will be used to supply water to both units SGs.

Objective #9 of WCAP-17601 section 3.1 recommends

Evaluate the following strategy in PA-PSC-0965:

Align ELAP mitigation equipment as soon as practical for accumulator isolation or venting.

The necessary power for isolating the accumulators will be aligned at 8 hrs.

For boration purposes, using accumulator level, determine the amount of mass that has been delivered to the RCS. Note that reactor vessel level indicating system (RVLIS) and pressurizer level are not necessarily required here since an assumed full RCS will always dictate the highest volume to be injected to yield a particular boron concentration. [See Confirmatory Item 3.2.1.A. above.]

Objective #10 of WCAP-17601 section 3.1 recommends prioritizing staging of portable equipment to isolate/vent the accumulators. Turkey Point Integrated Plan stated the 480 VAC safeguards busses would be energized by portable diesel generators at 8 hours into the event; this would allow isolation of the SI accumulators. The timeline for isolating the accumulators is after the cool down stops which is approximately 17 hours into the event.

During the audit, the licensee was requested to provide a summary of non-safety-related installed equipment that is used in the mitigation strategies and discuss whether the equipment is qualified to survive all ELAP events. The licensee responded that the following installed non-safety related equipment is being used in the mitigation strategies:

Boric Acid Batching Tank & Associated Piping
The strategy for utilizing the Boric Acid Batching Tank to batch borated water for RCS injection is described in the OIP on page 23 which is not safety related. The Boric Acid Batching Tank and associated piping are located in the Class I Auxiliary building designed to protect against design basis wind and missile hazards. The tank and associated piping up to the Boric Acid Transfer Pump suction isolation valve have been qualified for a seismic event to remain functional. Therefore, the batching tank and piping meet the definition for robust structures per NEI 12-06 and can be credited for use in an ELAP event. This will be documented in the related FLEX basis documents.

Refueling Water Storage Tank (RWST) Drain /Overflow Line
The strategy for taking suction from the RWST to provide the borated water source for RCS injection is described in OIP. The six month update to the Integrated Plan changed the modification to the RWST from a valve and hose connection on the manway cover to modifying the drain / overflow line by adding additional isolation valves and hose connections. The proposed modification in the last six month update is being revised to utilize the existing drain/overflow line isolation valve and install a permanent hose connection in the non-safety related portion of the piping down-stream of the existing isolation valve. The alternate connection to the RWST will rely on connecting a hose to a permanent flanged connection on the manway cover on top of the RWST. The RWST connection modification will qualify the manway and drain / overflow line for all external hazards per NEI 12-06. This will be documented in the related FLEX basis documents.

Steam Generator Atmospheric Dump Valve (ADV) Controller
Each steam generator has a single atmospheric dump valve (ADV) with a single controller. The controller is located in the Class I main control room. The controller is powered from vital Class 1E instrument power and the mounting is seismically qualified. Given that no other failures are assumed during the ELAP event and the controller is protected from all external hazards by robust structures, it will remain functional. Part of the ELAP strategy includes stripping dc battery loads and de-energizing one train of batteries until the opposite train is depleted. As a result, one or more of the ADV controllers may lose power. When this occurs, existing procedures direct the operators to locally control the S/G ADVs with mechanical hand loaders and nitrogen bottles. The nitrogen supply and the hand loader tie in are located in robust structures and protected from all external hazards. If ADV local operation is delayed due to weather, the main steam safety valves will maintain the plant at hot shutdown 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 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 RCS cooling and heat removal, and RCS inventory control strategies, if these requirements are implemented as described.

3.2.1.1 Computer Code Used for the ELAP Analysis

NEI 12-06, Section 1.3 states in part:

> 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.

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. During the audit, the licensee identified that the generic Westinghouse calculations with the NOTRUMP code informed the development of the Integrated Plan for PTN. NOTRUMP was written to simulate the response of PWRs to small break loss of coolant accident (LOCA) transients for licensing basis safety analysis.

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 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 SG 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 below.

On page 73 of the Integrated Plan identifying NSSS Significant Reference Analysis Deviation Table, the licensee identified that WCAP-17601-P 2012 Revision 0, page 5-6, Table 5.2.2-1 used a RCS start time of 4-8 hours and PTN used a plant applied value of 13 hours. It also stated the gap and discussion was on page 60 of the Integrated Plan. A review of WCAP - 17601-P indicates that the timeline started cooling at 2 hours, not 4-8 hours. Page 60 addresses modifications and has nothing to do with the Gap. During the audit, the licensee identified the correct gap and discussion is on pages 8 and 14 of the Integrated Plan. The actual timeline of 2 hours instead of 4 hours does not impact the strategies.

On page 33, in the section of the Integrated Plan regarding safety function RCS inventory Control in Modes 1 through 5 with Steam Generators available, the licensee stated:

> For RCS inventory control and long term sub-criticality in Phase 2, the credited action will be to cooldown and depressurize the RCS for injection of boron and coolant inventory from the accumulators. This will be done after make-up has been established to the CST's. Depressurizing the RCS to inject the accumulators occurs when the steam generators are depressurized to 170 psig per EOP-ECA-0.0. The heat removed by depressurizing the steam generators also cools and depressurizes the RCS. The primary method for accomplishing RCS makeup in Phase 2 is the use of the accumulators to make up for losses from the [reactor coolant pump] RCP Low Leakage Seals and for contraction of the primary due to cooldown. Alternate strategies involve the use of Boric Acid Storage Tank (BAST) or RWST inventories through installed Charging and Boric Acid Transfer pumps or onsite portable RCS FLEX pump.

On the same page, the licensee stated:

> Following injection of sufficient accumulator volume, the accumulators are isolated to avoid nitrogen injection into the RCS. Per 3/4-EOP-ECA-0.0, “Loss of All AC,” accumulator isolation must occur prior to depressurizing below 80 psig [70 psig is actually identified in the EOP].

The PTN accumulators have a normal pressure of 660 psig and will start injection to the RCS when the RCS pressure is less than 660 psig. Based on the calculation method specified in Attachment 1 of PWROG PSC – ELAP CORE TEAM Core Cooling Management Interim Position Paper (PA-PSC-0965) using values for the PTN accumulator (i.e., 660 psig normal pressure, total volume 1200 ft^3, minimum water volume at operating conditions, 875 ft^3) the accumulator will start injecting nitrogen into the RCS when the steam generator is at approximately 146 psig (using a plant specific value of 33 psi pressure drop across the steam generator). The position paper provided another 100 psig to account for containment heat-up.

During the audit, the licensee was requested to address the significant difference between what the licensee states and what the PWROG position paper based calculation determined. The licensee responded that the Integrated Plan value was developed prior to the guidance in the PWROG position using [Emergency Response Guideline] ERG methodology and a plant specific SG tube differential pressure of 33 psi. (The reviewer noted that ERG methodology assumed an adiabatic process which results in the relationship between the pressure and volume of nitrogen of $PV^{1.4}$ = constant.) The PWROG position paper assumed an isothermal process which results in the relationship between the pressure and volume of nitrogen of $PV^{1.0}$ = constant and then added 100 psi to provide margin for containment temperature increase which would result in a SG pressure setpoint to prevent nitrogen injection of 246 psig.

The licensee stated the SG setpoint will be recalculated based on the guidance in the position paper and will be reflected in the next PTN Integrated Plan six month update due in February 2014. This has been identified as Confirmatory Item 3.2.1.1.B. in Section 4.2.

During the audit, the licensee was requested to address why cooldown does not begin until after 4 hours after CST makeup is available which is in conflict with the statement that the plant cooldown will occur when a CST makeup source has been established. The licensee responded that one CST has 210,000 gallons of inventory which is enough volume to provide decay heat removal from 2 units for 12 hrs. A cooldown to an RCS temperature of 350°F in 2 units requires an additional 156,000 gallons.

The portable FLEX pump that will supply CST makeup is sized for 600 gpm at 300 psi backpressure since it also serves as the backup for SG makeup if the installed TDAFW pump is unavailable or SG pressure becomes too low to provide adequate makeup to the SG. The required AFW flow rate during the RCS cool down slightly exceeds the capacity of the FLEX pump capacity. Therefore, the FLEX well pump starts makeup approximately 4 hours (T=9 hours) prior to the start of the cool down to build up additional inventory in the CST for the cool down such that the CST does not empty. Once the 2 to 4 hour cool down is completed, the FLEX pump capacity exceeds the required flow rate for decay heat removal at any time during the ELAP event. Following the guidance of WCAP-17601, FPL is performing the RCS cool down as soon as resources (CST inventory) become available.

The NRC has not conducted a detailed review of the capabilities of the MAAP code for application to ELAP conditions. The NRC notes that the MAAP code contains simplified models and correlations and allows user-specified inputs that can affect the accuracy of its predictions for significant parameters such as core two-phase level and system pressure. During the audit, the licensee was requested to provide adequate technical basis to support the conclusion that the capability of the MAAP code used to perform the analysis (taking into account any version differences) is sufficient to predict whether the intended mitigating strategies would adequately cool the reactor core during an ELAP event. Include a discussion of the adequacy of the code's relevant models and correlations, benchmarking of code calculations against relevant experimental data, and relevant comparisons to calculations with state-of-the-art thermal-hydraulic codes

The licensee's response was that the MAAP program that was used for the Turkey Point containment analysis to determine when a containment spray (CS) pump must be started to control pressure. The MAAP program was not used to model the RCS for controlling the RCS parameters. In the NRC letter to NEI dated October 3, 2013; the NRC indicated that use of the MAAP computer code is acceptable for BWR and PWR containment analysis. As noted above, PTN has eliminated the use of CS as the strategy for controlling containment pressure and will use containment venting. However, MAAP will be used to predict when containment venting must be initiated. The next PTN FLEX Integrated Plan six month update report due in February 2014 will include the change in strategy for containment pressure control. PTN also has pending action 9 to perform a site-specific RCS cool down and depressurization analysis once the seal design is completed. This analysis will be done with a previously reviewed NRC code for this type of analysis. This has been previously identified as Confirmatory Item 3.2.1.B. in Section 4.2.

During the audit, the licensee was requested to provide a discussion of the quality assurance controls in place for the MAAP calculation process when the MAAP analysis is performed. The licensee responded that FPL will provide the requested quality assurance control process for the containment MAAP analysis in the February 2014 six month update report.

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 computer code used for the 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 ELAP event, cooling to the Reactor Coolant Pump (RCPs) seal packages will be lost and water at high temperatures may degrade seal materials leading to excess seal leakage from the 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 the 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 Nos. 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 (Reference 2). 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°F before cooldown commences. This is beyond the qualification temperature (550°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 Accession 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.

On page 15 of the Integrated Plan, the licensee stated:

> PTN plans to install RCP low leakage seals which will reduce RCP seal leakage at normal operating pressure and temperature to a maximum of 1 gpm per RCP.

The licensee identified Pending Action 9 on Attachment 3 of the Integrated Plan (page 75) to implement the generic WCAP guidance that recommends that a site-specific evaluation be performed once the seal design is completed to validate that the cooldown and depressurization time is supported.

During the audit, the licensee responded to limitation (1) by stating that PTN will be installing the FlowServe NX seals with the TN model 93 RCPs. The purchase order was recently issued and FPL does not have the technical data supporting the seal performance in an ELAP condition. Once FPL receives the data and performs the RCS cooldown analysis associated with pending action 9, FPL will include the requested information in a six month update to the integrated Plan. This has been identified as Confirmatory Item 3.2.1.2.A. in Section 4.2.

During the audit, the licensee responded to limitation (2) by stating that PTN will be installing the FlowServe NX seals. The backup or shutdown Abeyance seal does not rely on O-rings or seals and is therefore does not degrade at the slightly higher cold leg temperatures. The normal 3 seals upstream of the Abeyance seal in the Flowserve seal package do rely on O-rings which have the same temperature limitations as current O-rings. The Abeyance seal is rated for full RCS pressure and its leak rate is not dependent on functionality of the upstream seals.

Limitation (3) is not applicable to PTN because Westinghouse seals are not used.

Limitation (4) is addressed in licensee response to limitation (1) above.

During the audit, the licensee was requested to discuss how the pressure-dependent RCP seal leakage rates are calculated. If the analysis uses the equivalent size of the break area based on the initial total RCP leakage rate and a specific flow model to calculate the pressure-dependent RCP seal leakage rates during the ELAP, discuss and justify the flow rate model used. Discuss whether the size of the break area is changed or not in the analysis for the ELAP event. If the size is changed, discuss the changed sizes of the break area and address the adequacy of the sizes. If the break size remains unchanged, address the adequacy of the unchanged break size throughout the ELAP event in conditions with various pressure, temperature (considering that the seal material may fail due to an increased stress induced by cooldown) and flow conditions that may involve two-phase flow which is different from the single phase flow modeled for the RCP seal tests that are used to determine the initial total RCP seal leakage rate assumed in the ELAP analysis.

The licensee responded that PTN has not performed its plant specific RCS ELAP analysis which is pending action 9 in the Integrated Plan. However, Flowserve provides test data of seal leakoff for loss of cooling. The Flowserve “Abeyance” backup seal does not rely on any gaskets or seals and acts like an orifice to limit leakoff. The seal will be modeled as an orifice based on vendor data.

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 seal leakage rates used for the ELAP analysis, if these requirements are implemented as described.

3.2.1.3 Decay Heat

NEI Section 3.2.1.2 states in part:

> 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 71 of the Integrated Plan, the licensee stated the event is initiated with plant at 100% power after 100 days of (equivalent full power) EFP operation or shutdown in Mode 3 per plant procedures to meet NEI 12-06 assumption.

During the NRC licensing process, the licensee identified that PTN utilized the American Nuclear Society (ANS) 5.1 1979 predicted decay heat values in its recent EPU safety analysis LAR-205 which was approved in license amendments 249 and 245 as acceptable for use at Turkey Point. This is the decay heat that was used in the containment MAAP analysis and is the decay heat that will be used in the site specific analysis of the RCS cooldown analysis associated with pending action 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 decay heat, 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.) should 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 of the licensee’s Integrated Plan, General Integrated Plan Elements, in the section Key Site assumptions, the licensee states:

> This plan defines strategies capable of mitigating a simultaneous loss of all

alternating current (ac) power and loss of normal access to the ultimate heat sink resulting from a beyond-design-basis event by providing adequate capability to maintain or restore core cooling, containment, and SFP cooling capabilities at all units on a site. Though specific strategies are being developed, due to the inability to anticipate all possible scenarios, the strategies are also diverse and flexible to encompass a wide range of possible conditions.

Based on a review of the Integrating Plan key site assumptions on pages 3 and 4 and the identified strategies, the initial conditions assumed conform to all assumption in NEI 12-06, Sections 3.2.1.2 and 3.2.1.3 except assumption 10 which is not applicable because the strategies do not rely on the fire protection system.

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 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 Guidelines 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 pages 20 of the Integrated Plan for safety function Maintain Core Cooling & Heat Removal, Phase 1; the licensee listed the following Key Reactor Parameters:

AFW pump flow
CST level
Steam generator water level (narrow range)
Steam Generator pressure
Reactor coolant system pressure (wide range)
Reactor coolant system pressurizer level
Reactor coolant system hot and cold leg temperatures
Core exit thermocouples
Reactor vessel level
Neutron flux

On pages 24 of the Integrated Plan for safety function Maintain Core Cooling & Heat Removal, Phase 2; the licensee identified the same parameters as in Phase 1 plus the following:

Portable equipment instrumentation

Pressure and flow for well pumps
Pressure, flow and fuel for FLEX SG pumps
Voltage, current, and fuel for FLEX diesel generators providing power to well pumps

On page 35 of the Integrated Plan regarding safety function Maintain RCS Inventory Control, Phase 2; the licensee identified the following:

Installed instrumentation
Accumulator Tank Level
Pressurizer Pressure
Steam Generator Pressure
Reactor Vessel Level Indicating System
RCS WR T hot
RCS WR T cold
Reactor Vessel Level Indicating System
Pressurizer Level
RWST Level

On page 44 of the Integrated Plan regarding Maintain Containment Pressure Control/Heat Removal, Phase 2; the licensee added the following:

Installed instrumentation
Containment pressure
Containment temperature

Portable equipment
Voltage, current, and fuel for Flex diesel generators providing power to the spray pumps

On page 51 of the Integrated Plan regarding maintaining spent fuel pool cooling, the licensee identified the following:

Spent fuel pool level

On page 62 of the Integrated Plan regarding safety functions support, Phase 2; the licensee added the following:

DC bus voltage
Accumulator pressure

Page 94 of the Integrated Plan identified instrumentation used for the strategies and short term power, long term power, available alternative methods of measurement. Alternative methods identify which instrument racks to use for portable instruments, where there are local gauges, local meters, and visual (i.e., SFP level).

The licensee's plans in regards to instrumentation and controls as described above, includes those parameters listed in NEI 12-06, Section 3.2.1.10; however, the licensee did not provide justification that the instrumentation to measure the listed parameters and the associated setpoints credited in the ELAP analysis for automatic actuations and indications required for the operator to take appropriate actions are reliable and accurate in the containment harsh conditions with high moisture levels, temperature and pressure during the ELAP event. The information should (1) include a discussion of the analysis that is used to determine the containment temperature, pressure, and moisture profiles during the ELAP event, and (2) address the adequacy of the computer codes/methodologies, and assumptions used in the analysis. This has been identified as Confirmatory Item 3.2.1.5.A. in Section 4.2.

As noted above, page 35 of the Integrated Plan regarding safety function Maintain RCS Inventory Control, Phase 2, the licensee identified accumulator tank level as a key reactor parameter. During the audit, the licensee was requested to provide justification for the statement that "cold leg accumulator wide range is not required by current strategies." The licensee responded that PTN will add the accumulator level indicators to the list of key instrument parameters for use during accumulator injection. Attachment 6 from the Integrated Plan will be updated and included in the next Integrated Plan six moth update scheduled for February 2014.

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 controls, if these requirements are implemented as described.

3.2.1.6 Sequence of Events

NEI 12-06 discusses an event timeline and time constraints in several sections of the document, for example Section 1.3, Section 3.2.1.7 principle (4) and (6), Section 3.2.2 Guideline (1) and Section 12.1.

NEI 12-06, Section 3.2.2, in part, 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.
>
> In order to support the objective of an indefinite coping capability, each plant will be expected to establish capabilities consistent with Table 3-2 (PWRs). Additional explanation of these functions and capabilities are provided in NEI 12-

06 Appendix D, "Approach to PWR Functions."

On pages 5 through 9 of the Integrated Plan, the licensee provided an SOE and the technical basis for each event. The licensee also provided SOE timeline in Attachment 1A of the Integrated Plan. Page 4 of the Integrated Plan identified that best estimate analysis and decay is used to establish critical actions. When the plant specific analysis, design and strategies are finalized, a validation of the timeline is needed.

Phase 1
On pages 13 and 14 of the Integrated Plan, the licensee stated that immediately following the event, reactor core cooling is accomplished by natural circulation of RCS through the SGs. The SGs are supplied by the AFW system taking suction from one of the CSTs.

On page 31 of the Integrated Plan, the licensee stated reactor coolant makeup strategies are not required in Phase 1 because of low leak seals and availability of accumulators.

On page 6 of the Integrated Plan, the licensee discusses that the station batteries are in use until 8 hours into the event when the DGs are available and the battery chargers are powered.

Phase 2
On page 21 of the Integrated Plan, the license describes the use of new well pumps (9 hours in Attachment 1) to fill the CST(s) to enable use of the AFW system as long as there is sufficient steam pressure to drive the AFW pump turbines. When the steam pressure becomes insufficient to drive the AFW pump turbines, the SGs are depressurized to allow for makeup with the portable diesel driven FLEX pumps which still take suction from the new wells.

On page 33 of the Integrated Plan, the licensee describes RCS inventory control in Phase 2. The credited action is to cooldown and depressurize the RCS for injection of boron and coolant inventory from the accumulators (13 hours in Attachment 1).

Phase 3
On page 27 of the Integrated Plan, the licensee describes Phase 3 long term cooling provided by the RHR and CCW systems. The CCW heat exchangers will be cooled by canal water supplied by a pump provided by the RRC (120 hours on Attachment 1).

The timeline will need to be modified as the design is finalized. The licensee identified during the audit that the strategy to use containment spray (12 hours) has been superseded by a strategy to use containment venting at a time to be developed via future MAAP analysis. The licensee committed to include this strategy revision in a future six-month update. This has been identified as Confirmatory Item 3.2.1.6.A in section 4.2.

During the NRC audit, the licensee was requested to address if the SG ADV and upstream/downstream associated piping is a safety system, protecting from external events such as tornados.

Upstream Piping
The licensee responded that the ADVs and associated upstream piping are safety related are located on separate platforms adjacent to containment with sides enclosed by seismically supported grating. The licensee further stated:

The current licensing basis for tornado missiles relies on separation between loops to ensure at least one MS and FW line remains intact. However, PTN has installed grating around all openings for security. The grating and its support members are seismically anchored. As part of the design of the recently installed control room HVAC intake lines, 12 inch pipe with a 0.374 wall thickness was shown to be capable of resisting the design basis missile. In addition, heavy grating approximately 3 inches deep was also shown to resist the design basis missile. The FW and MS piping is significantly thicker than 0.374. The security grating installed around the platform is approximately ½ the load capacity of other grating that has been qualified for missile protection. Given the energy absorbing capability of the security grating around the platforms and the thick wall MS and FW lines, the lines are considered robust structures and are protected from tornado missiles during a BDBEE.

Downstream Piping
The licensee responded:

> The downstream exhaust piping from each SG ADV is non-safety related. However, the piping has been seismically qualified up to an including the silencer. All three ADV 6 and 10 inch exhaust lines connect to a common 30 inch header within the MS caged platform. The 30 inch header connects to an 8.5 foot diameter silencer which vertically exits the roof of the MS platform cage. Half of the silencer is within the MS platform cage and half (approximately 6 feet) is outside.
>
> All of the ADV exhaust system piping within the cage is considered robust since the security grating will significantly reduce any missile energy and any piping directly exposed inside the cage has a wall thickness of 0.375 or greater. The 6 foot section of the common silencer piping outside the cage is subject to potential missiles. The east side of the silencer is protected by the containment building. The silencer is constructed of 0.25 inch carbon steel with internal baffle tubes and fiberglass insulation. The top and bottom portion of the silencer section protruding the roof has internal or external flanges that act as re-enforcement to prevent completely crushing the silencer. The internal structures of the silencer are constructed of thin gauge carbon steel tubes. Given the small target area of the silencer and the partial protection provided by the containment building, a missile strike is not likely. If a missile does strike the silencer, it could cause significant deformation or puncture the silencer. This may cause the silencer to lose its ability to attenuate flow noise but not prevent it from providing adequate steam flow due to its large diameter compared to the ADV exhaust line diameter.

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 SOE, 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's review of the Integrated Plan for Turkey Point revealed that the Generic Concern related to shutdown and refueling requirements is applicable to the plant. This Generic Concern has been resolved generically through the NRC endorsement of 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. During the audit, the licensee has informed the NRC of their plans to abide by this generic resolution. The NRC staff will evaluate the licensee's resulting program through the audit and inspection process.

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 the analysis of 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:

> All plants provide means to provide borated RCS makeup.

On page 31 of the Integrated Plan, in the section regarding safety function Maintain RCS Inventory Control, PWR Installed Equipment Phase 1, for Modes 1 through 5 with SGs available, the licensee states:

> In order to maintain sufficient reactor coolant inventory, an evaluation of BDBEEs resulting in an ELAP and LUHS has concluded that PTN will maintain sufficient RCS inventory for greater than 120 hours following event initiation with no reliance on onsite or offsite FLEX equipment. This analysis was based on the proposed safe shutdown/low leakage reactor coolant pump (RCP) seal modification (with total RCS leakage of 4 gpm - 1 gpm seal leakage from each of 3 reactor coolant pumps plus I gpm from unidentified RCS sources, Table 4.1.1.1-2) and the availability of the accumulators. Thus, reactor coolant makeup strategies are not required until Phase 2.

On pages 33 and 34 of the Integrated Plan, in the section regarding safety function Maintain RCS Inventory Control, PWR Installed Equipment Phase 2, for Modes 1 through 5 with SGs available, the licensee states:

> For RCS inventory control and long term sub-criticality in Phase 2, the credited action will be to cooldown and depressurize the RCS for injection of boron and coolant inventory from the accumulators. This will be done after make-up has

been established to the CST's. Depressurizing the RCS to inject the accumulators occurs when the steam generators are depressurized to 170 psig per EOP-ECA-0.0. The heat removed by depressurizing the steam generators also cools and depressurizes the RCS. The primary method for accomplishing RCS makeup in Phase 2 is the use of the accumulators to make up for losses from the RCP Low Leakage Seals and for contraction of the primary due to cooldown. Alternate strategies involve the use of Boric Acid Storage Tank (BAST) or RWST inventories through installed Charging and Boric Acid Transfer pumps or onsite portable RCS FLEX pump.

Following injection of sufficient accumulator volume, the accumulators are isolated to avoid nitrogen injection into the RCS. Per 3/4-EOP-ECA-0.0, "Loss of All AC" accumulator isolation must occur prior to depressurizing below 80 psig [70 psig in the procedure]. This isolation is done by repowering the 480VAC accumulator isolation valves (MOV-865A, MOV-865B, and MOV-865C) using the FLEX Diesel Generator (DG). These valves also have their breakers at their associated MCCs locked open during normal operations. These breakers would need to be closed after power is restored to the MCCs. The restoration of power to the accumulator isolation valves should be done prior to plant cooldown if possible to mitigate the potential for nitrogen injection into the RCS. This is a basis for delaying the cooldown and depressurization until Phase 2 because 480VAC power would not be available until the FLEX DG is operational. The other method of stopping accumulator injection, the accumulator vents, is air operated. Instrument air is assumed to not survive the event. Delaying the cooldown allows for additional support personnel being available to assist with the cooldown evolution and also extends available CST inventory by only removing decay heat and not sensible heat. Due to the low leakage RCP seals associated with the Phase 1 core cooling strategy, it is not expected that additional makeup beyond that of the accumulators will be required for the RCS until Phase 3. However, per Technical Specifications, 21,750 gallons (for 5245 ppm boric acid, 13,750 gallons for 6993 ppm boric acid) of highly borated water is available between the 3 BASTs with both units operating and 13,775 gallons (for 5245 ppm boric acid, 9,775 gallons for 6993 ppm boric acid) with a single unit operating. The Technical Specification minimum of 320,000 gallons of borated water inventory will remain available in the surviving RWST for RCS injection into both units as needed. The method of injecting this water into the RCS would either be to repower a Charging pump and Boric Acid Transfer pump from the FLEX DG or to connect the RCS FLEX pump to allow pumping of RWST water into the RCS. Operation of the Charging pump must be done at full speed because cooling to the hydraulic coupling oil cooler from [closed cooling water] CCW is not available. Suction for the RCS FLEX pump would come from a connection in the RWST manway and its discharge would be to the drain lines off each Charging pump's discharge.

The methods for injecting borated water into the RCS will also provide sufficient negative reactivity to ensure that shutdown margin is maintained following cooldown and xenon decay. Injection for reactivity control is required at approximately 21 hours to ensure adequate boric acid concentration is provided to the RCS. The primary method for reactivity control in Phase 2 is the use of the accumulators and BAST. The alternate strategy involves the use of RWST inventory through the onsite portable RCS FLEX pump.

On page 72 of the Integrated Plan, Sequence of Events Timeline (Attachment 1) identified an action at 24 hours to repower boric acid transfer pumps and charging pumps for RCS makeup, boration, and long term cooling as a backup to SI tank (accumulator) boration and for long term cooling.

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 RCS under natural circulation conditions potentially involving two-phase flow is applicable to PTN.

The Pressurized Water Reactor Owners Group (PWROG) 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. In an endorsement letter dated January 8, 2014 (ADAMS Accession No. ML13276A183), the NRC staff concluded that the August 15, 2013, position paper constitutes an acceptable approach for addressing boric acid mixing under natural circulation during an ELAP event, provided that the following additional conditions are satisfied:

(1) The required timing for providing borated makeup to the primary system should consider conditions with no reactor coolant system leakage and with the highest applicable leakage rate for the reactor coolant pump seals and unidentified reactor coolant system leakage.

(2) For the condition associated with the highest applicable reactor coolant system leakage rate, two approaches have been identified, either of which is acceptable to the staff:

   a. Adequate borated makeup should be provided such that the loop flow rate in two-phase natural circulation does not decrease below the loop flow rate corresponding to single-phase natural circulation.

   b. If loop flow during two-phase natural circulation has decreased below the single-phase natural circulation flow rate, then the mixing of any borated primary makeup added to the reactor coolant system is not to be credited until one hour after the flow in all loops has been restored to a flow rate that is greater than or equal to the single-phase natural circulation flow rate.

   (3) In all cases, credit for increases in the reactor coolant system boron concentration should be delayed to account for the mixing of the borated primary makeup with the reactor coolant system inventory. Provided that the flow in all loops is greater than or equal to the corresponding single-phase natural circulation flow rate, the staff considers a mixing delay period of one hour following the addition of the targeted quantity of boric acid to the reactor coolant system to be appropriate.

At the time the audit was conducted, the licensee had neither (1) committed to abide by the generic approach discussed above, including the additional conditions specified in the NRC's endorsement letter, nor (2) identified an acceptable alternate approach for justifying the boric acid mixing assumptions in the analyses supporting its mitigating strategy. As such, resolution of this concern for PTN is identified as Open Item 3.2.1.8.A in Section 4.1.

During the audit, the licensee stated that since the cool down RCS temperature is approximately 420°F and will start at peak xenon conditions, boration should not be required for the cool down. However, current reactivity calculation uses a cool down to 350°F and a (shutdown margin) SDM of 1.77%. The calculation will be revised to address the cool down strategy at different times after shutdown with different end point RCS temperatures and any required boration to maintain a 1.0% SDM. Results of the calculation will be incorporated into the FSG procedures. Re-calculation of boration requirements has been previously identified as Confirmatory Item 3.2.1.A. in Section 4.2.

During the audit, the licensee stated that an SDM calculation has been performed to determine the required boron addition to maintain a SDM of 1.77% considering xenon free conditions and an RCS temperature of 68°F. The results of this calculation will be provided in a six month update to Integrated Plan and incorporated into appropriate FSG procedures along with the delay time required for adequate mixing.

The licensee's approach described above, as currently understood, has raised a concern 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 core sub-criticality. This concern has been identified as Open Item 3.2.1.8.A. in Section 4.1.

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.

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.

On pages 21 of the Integrated Plan discussing the strategy for safety function Maintain Core Cooling and Heat Removal in the transition phase, the licensee stated:

> Several actions are required during Phase 2 following the event for reactor core cooling. The main strategy is dependent upon the continual operation of the AFW pumps, which are only capable of feeding the steam generators as long as there is sufficient steam pressure to drive the AFW pump turbines. The new well pumps will be used to refill the surviving CST(s) for the duration of the Phase 2 coping time. Each well pump will be capable of supplying 600 gpm to ensure that the inventory requirements in Phase 2 will be met based on WCAP-17601-P.
>
> Per guidance of NEI 12-06, Phase 2 also requires a baseline capability for reactor core cooling to connect an onsite, portable pump (SG FLEX pump) for injection into the steam generators in the event that the AFW pumps fail or when sufficient steam pressure is no longer available to drive the turbines. The method to implement this capability is to depressurize the steam generators to allow for makeup with the portable diesel driven FLEX pumps. To achieve the baseline capability of providing a portable pump for the Phase 2 strategy of core cooling, deployment of the portable pump will be completed so that they are available for operation 13 hours following the event to coincide with the SG depressurization.

On page 22 of the Integrated Plan discussing the strategy for safety function Maintain Core Cooling and Heat Removal in the transition phase, the licensee stated:

> To meet the recommendation of WCAP-17601-P, the portable pump designated for steam generator injection, or SG FLEX pump, must be rated for a minimum flow rate of 300 gpm at a discharge pressure equal to the steam generator pressure in addition to any line losses associated with its connecting equipment (300 psig per the WCAP). For injection using the SG FLEX pump, the pump would normally be staged at a location near the CST. The normal supply for the SG FLEX pump is the CSTs (note that this strategy assumes that the AFW pumps are no longer available and therefore supplying water makeup from the CSTs to the SG FLEX pump is acceptable).

On page 33 of the Integrated Plan discussing the strategy for Maintain RCS Inventory Control in Phase 2 for Modes 1 through 5 with Steam Generators Available, the licensee stated:

> The primary method for accomplishing RCS makeup in Phase 2 is the use of the accumulators to make up for losses from the RCP Low Leakage Seals and for contraction of the primary due to cooldown. Alternate strategies involve the use of Boric Acid Storage Tank (BAST) or RWST inventories through installed Charging and Boric Acid Transfer pumps or onsite portable RCS FLEX pump.

and,

> Due to the low leakage RCP seals associated with the Phase 1 core cooling strategy, it is not expected that additional makeup beyond that of the

> accumulators will be required for the RCS until Phase 3. However, per Technical Specifications, 21,750 gallons (for 5245 ppm boric acid, 13,750 gallons for 6993 ppm boric acid) of highly borated water is available between the 3 BASTs with both units operating and 13,775 gallons (for 5245 ppm boric acid, 9,775 gallons for 6993 ppm boric acid) with a single unit operating. The Technical Specification minimum of 320,000 gallons of borated water inventory will remain available in the surviving RWST for RCS injection into both units as needed. The method of injecting this water into the RCS would either be to repower a Charging pump and Boric Acid Transfer pump from the FLEX DG or to connect the RCS FLEX pump to allow pumping of RWST water into the RCS. Operation of the Charging pump must be done at full speed because cooling to the hydraulic coupling oil cooler from CCW is not available. Suction for the RCS FLEX pump would come from a connection in the RWST manway and its discharge would be to the drain lines off each Charging pump's discharge.

On page 34 of the Integrated Plan discussing the strategy for safety function Maintain RCS Inventory Control in Phase 2 for Modes 5 and 6 without Steam Generators Available, the licensee stated:

> The primary method for making up for the boil-off from the RCS in modes 5 and 6 without steam generators available is gravity feeding from the surviving RWST or discharging the accumulators as described in Phase 1 Core Cooling. Additional inventory or flow may be provided by re-powering the charging pump from the FLEX DG to supply water from the surviving RWST. The alternate method is to use the RCS FLEX pump to inject water from the RWST to the RCS. Suction for the RCS FLEX pump would come from a connection in the RWST manway and its discharge would be to the drain valve off the charging pump drain line.

During the audit, the licensee identified a change in strategy which would repower the charging pumps from multiple power connection points from the FLEX generator. The charging pumps would supply water from the surviving RWST which would satisfy NEI 12-06 requirements for diversity. The alternate method of utilizing the RCS FLEX pump to inject water from the RWST to the RCS is no longer required. The change in strategies does not meet the guidance in NEI 12-06 Guideline (13) and would be an alternate approach to satisfying Order EA 12-049. The licensee was requested to provide justification for the proposed alternate approach.

The licensee responded that the current plans for modes 1 through 5 with SG available and modes 5 and 6 without SG available are to only repower the three independent charging pumps from multiple power connection points from the two 100% capacity FLEX DGs. The charging pumps and all required support systems meet or will meet the robustness criteria in NEI 12-06 section 3.2.1.3(6). Each unit’s charging pump can be supplied suction from either unit’s RWST. Utilizing the two portable FLEX DG’s to repower independent trains of 480VAC power and use the permanently installed charging pumps is equivalent to providing a portable RCS FLEX pump described in NEI 12-06 section 3.2.2(13). The independent 480VAC busses that supply each charging pump are robust satisfying NEI 12-06 section 3.2.1.3(8) requirements for diversity. Based on the current plans, the alternate method of utilizing the RCS FLEX pump to inject water from the RWST to the RCS is no longer required. The change in RCS makeup strategy will be included in the six month update report scheduled for February 2014.

Pending evaluation of the final design, this has been identified as Open Item 3.2.1.9.A. in Section 4.1.

On page 10 of the Integrated Plan, the licensee stated:

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

As stated in the Integrated Plan, the licensee's engineering designs have not yet been finalized. This has been identified as Confirmatory Item 3.2.1.9.B. in Section 4.2.

The licensee's approach described above, as currently understood, has raised a concern 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, or that an acceptable alternative was provided, such that there would be reasonable assurance that the requirements of Order EA-12-049 will be met with respect to guidance concerning the use of portable pumps. This concern has been identified as Open Item 3.2.1.9.A. above and in Section 4.1.

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 SFP 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 pages 49 and 50 of the Integrated Plan for safety function Maintain Spent Fuel Pool Cooling during Phase 1, the licensee stated:

The initial phase of the FLEX SFP cooling strategy is reliant upon onsite personnel actions. The timing for these actions is dependent on SFP conditions at the time of the ELAP and LUHS event. Actions would need to be taken very early in the event if an emergency full core discharge (worst case design basis heat load) had just taken place. If the plant is late in the cycle, then these actions can be delayed. Therefore, the Phase 2 strategy is listed under Phase 1 discussion because actions may be initiated early for the worst case design basis heat load in the SFP.

Onsite personnel actions include propping open doors to the spent fuel pool room and running hoses and spray monitors for portable makeup or spray from the SFP FLEX pump staging area. Propping open these doors provides a ventilation pathway to maintain room habitability by venting steam created by pool boil off in addition to a pathway for laying hoses. Using the design basis heat load and worst case fuel offload timing, the pool will start boiling at 2.7 hours after cooling is lost. The 2.7 hours occurs only for the case of an emergency core offload, in which case core cooling and containment integrity should not be required functions for that unit.

Prior to boiling in the pool (i.e., before 2.7 hours for the emergency offload), SFP makeup and spray hoses should be connected and run outside of the refueling building through the propped open door. This would preclude the need to re-enter the refueling floor after boiling has occurred, when environmental conditions may prevent access. Remaining hose runs from the SFP hose pumps to the refuel floor door may be connected later as resources become available. In the event that access to the refuel floor is not available, makeup to the SFP can be established using the alternate means (hose connection to SFP system in the SFP pump room).

It is recognized that following an emergency core offload, that there would be few things of higher priority for that unit than restoring cooling / makeup to the SFP. However, given that fuel in the SFP would not become uncovered until 33 hours after the event, and the availability to provide makeup to the SFP without entering the SFP deck, actions to provide ventilation and makeup to the SFP may be postponed such that resources can be focused on the other unit and it's time critical actions.

These actions may also be precluded by environmental effects resulting from the ELAP and LUHS event (e.g., sustained high winds from a hurricane). In which case, these actions should be performed as soon as is safe and in accordance with the above, not-to-interfere strategy. Should this delay preclude access to the refuel floor, the alternate makeup strategy via the SFP system would remain available to maintain level in the SFP.

The SFP Cooling strategy will require makeup or spray via hoses from a portable pump that will take suction from the intake canal. Early positioning of equipment for the transition phase of the SFP cooling strategy consists of deploying separate hoses for hose makeup and hose spray. The hose can either be laid to discharge directly into the pool, or hooked up to a hose connection at the discharge of a SFP cooling pumps in the adjacent room.

> The spray makeup strategy also consists of early deployment of separate hoses for each SFP. Therefore, based on the need in the transition phase, personnel may choose makeup or spray and simply connect the necessary hose to the SFP FLEX pump(s). Should the refueling floor not be accessible, then the alternate tie-in location described in Phase 2 would be used.
>
> Using the design basis heat load and worst case fuel offload timing, the pool will start boiling at 2.7 hours after cooling is lost. A minimum of 99 gpm makeup will be required for the makeup strategy and at least 250 gpm of spray will be required for the spray strategy. The minimum flow rate for the SFP FLEX pump is 250 gpm to each unit's pool in the event of leaks to both pools. Borated water is not required to maintain sub-criticality.

On page 52 of the Integrated Plan for safety function Maintain Spent Fuel Pool Cooling during Phase 2, the licensee stated:

> The baseline capabilities required for SFP Cooling are makeup via hoses on the refuel floor, makeup via connection to SFP cooling piping or other alternate location, vent pathway for steam from the SFP, and spray capability via monitor nozzles from refueling floor using a portable pump. The vent pathway for steam is discussed above. The recommended strategy is opening the personnel doors and providing makeup via the portable SFP FLEX pump. As stated above, early deployment of hoses with makeup and spray connections will prevent personnel from having to access the SFP area in the event of extensive loss of pool level. Note that, with the exception of the plant having undergone an emergency core offload or a rupture of the pool itself, all actions for SFP cooling should be done on a not-to-interfere with other, higher priority FLEX strategies and actions.
>
> Makeup to the SFP without accessing the refueling floor will be accomplished by using the existing SFP cooling piping which discharges into the pool. A small section of piping just downstream of the SFP Cooling Water pump B or Emergency SFP Cooling Water pump will be modified to install an isolation valve and a hose connection. The pumps are located at the 18 foot elevation in the SFP Pump and Heat Exchanger room. Portable hoses from the FLEX storage facility will be connected from the SFP FLEX pump to the hose connections to provide the required makeup without accessing the refueling floor. Suction to the SFP FLEX pumps will be from the intake canal.
>
> In the unlikely event that additional ventilation to the SFP room is required; the L-shaped missile barrier door could be opened. Opening this door would require re-powering the small motor located at the base of the door. In addition to increasing ventilation in the room, opening this large missile barrier door would provide a path to spray into the pool without entering the refueling floor.
>
> Opening the SFP doors to provide ventilation early after the ELAP and LUHS event would not be possible during a hurricane event due to the high winds. However, a calculation that assumed an emergency core offload has just occurred determined that the fuel in the SFP would not become uncovered until 33 hours after the ELAP and LUHS event. Even for hurricane scenarios, there is sufficient time after the event before actions would be required to provide makeup to the SFP.

On page 71 of the Integrated Plan discussing Sequence of Events Timeline (Attachment 1), the licensee described that between 1.5 and 8 hours the SFP doorways are opened and hoses are staged, and that an alternate injection method is available if hoses can't be installed. Since the primary strategy is to stage hoses from the SFP through a propped open door before boiling (2.7 hours) makes the room uninhabitable, it is not clear why this activity is identified as 1.5 to 8 hours on the timeline. During the audit, the licensee stated that as indicated in the Integrated Plan, the PTN SFP strategy includes venting of the pool area to manage the heat and condensation in the building. To do so, the doors of the building are opened. The timeline for opening of the doors is targeted to start at T+1.5 hours. As indicated in the Integrated Plan, this could possibly be delayed depending on ongoing events such as a hurricane.

A delay in opening of the doors has the potential to lessen the habitability due to increased temperature and humidity within the room. However, the configuration of the SFP doors is such that, once the doors are opened, habitability conditions should rapidly improve. The upper levels of the SFP rooms have exterior walls with the ability to have air exchange with the environment. The SFP room, for each unit, has two doors, one on the East side and one on the West side, at approximate elevation 58 feet. In addition, each SFP room has an additional door, at approximate elevation 71 feet, on the East side. With all three doors open, the rooms are expected to readily ventilate as a result of natural effects such as cross ventilation and the buoyancy effects of warmer air. It is expected these effects will provide adequate habitability to accomplish Integrated Plan activities in the rooms.

In the event that access to the refuel floor is not available due to habitability concerns, makeup to the SFP can be established using the alternate means outside the SFP room (hose connection in the SFP pump room at the 18 foot elevation).

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 SFP cooling strategies, 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 or repowering hydrogen igniters for ice condenser containments.

On page 40 of the Integrated Plan for safety function Maintain Containment Pressure Control/Heat Removal, Phase 1, the licensee stated:

> The containment design pressure is 55 psig and the design temperature limit for the containment atmosphere is 283°F. Analysis has been completed and it has been determined that containment response following a postulated ELAP and LUHS event not exceed design parameters. As such, there are no coping strategies required for maintaining containment integrity during Phase 1 in Modes 1-4. The only action necessary is to monitor containment pressure and temperature to ensure that RCS leakage is minimal. These monitoring parameters will be available via normal plant instrumentation.

On page 41 of the Integrated Plan for safety function Maintain Containment Pressure Control/Heat Removal, Phase 1, the licensee stated:

> A confirmatory analysis is needed and will be performed for the containment temperature and pressure responses throughout all phases of the event. This is tracked as pending action 1 in Attachment 3.

On page 42 of the Integrated Plan regarding Maintain Containment Pressure Control/Heat Removal, Phase 2, the licensee stated:

> Typical containment analyses for pressurized water reactors (PWRs) with shutdown RCP seals indicate that containment temperature and pressure will not be challenged during Phase 2 FLEX timeline so long as decay heat removal is maintained. As such, the primary strategy for containment integrity in Phase 2 is to monitor containment temperature and pressure and maintain decay heat removal.
>
> In Modes 6 and 5 without steam generators available, temperature and pressure increases may challenge containment integrity. Therefore, the Phase 2 coping strategy will be to commence containment spray (CS) to reduce temperature and pressure to acceptable levels. The means of commencing containment spray would be by restoration of power to the CS pumps. The CS pumps are 200 horsepower, 480VAC pumps capable of supplying up to 1340 gpm against 50 psig in containment, approximately 458 feet developed head.
>
> The power requirements of the pump are within the capacity of the 600 kW FLEX DG proposed for Phase 2 (though stopping of other loads on the FLEX DG may be required prior to the starting of this pump). The pump suction can be aligned to either RWST if needed. Use of RWST water for containment spray may require replenishment from a non-nuclear source of water (e.g., well water, intake water) before the completion of Phase 2 if one of the units was in Mode 6 or in Mode 5 without SG available when the ELAP and LUHS event occurs.

The licensee provided information in the Integrated Plan on page 40 and 42 that references FPL065-CALC-010, "MAAP Containment Analysis for Turkey Point Units 3 and 4." During the audit, the licensee was requested to make the FPL065-CALC-010 document available for NRC staff review on the FPL ePortal and to the extent such topics are not covered in FPL065-CALC-010, further summarize the MAAP evaluation model used and justify its adequacy. Discuss the containment nodalization, heat transfer from primary and secondary system piping components, heat sinks and loss mechanisms, and the mass and energy boundary condition from the reactor coolant pump seal leakage. Identify how the mass and energy boundary condition for seal leakage was identified and provide a technical justification for its adequacy.

During the audit process, the licensee provided FPL065-CALC-010, "MAAP Containment Analysis for Turkey Point Units 3 and 4" on the E-Portal. The Turkey Point MAAP4 containment is modeled with 5 nodes: the reactor cavity, lower compartment, upper compartment, annular compartment, and refueling pool. Additionally, 10 flow junctions connect these nodes for mass and energy transfer.

In addition to the containment model, the Turkey Point MAAP4 model includes the effects of the concrete and steel heat sinks that exist within each node. MAAP4 models the concrete/steel walls/floors that separate individual nodes as "DISTRIBUTED" heat sinks and the miscellaneous equipment within the node as "LUMPED" heat sinks. There are 10 distributed heat sinks used to model the walls/floors that bound the nodes within the MAAP4 model for Turkey Point. There are three lumped heat sinks to model the internal structural equipment contained in a node.

The parameter "QC0" contained in the Turkey Point MAAP4 parameter file represents the convective heat losses under nominal conditions from the steam generators, pressurizer, and rest of the primary system to the containment. The original EPU MAAP RCS heat loss"QC0" value was conservatively assumed to be 1.85E7 BTU/hr which is two to three times larger than expected for a typical 3 loop PWR. Westinghouse later performed a heat loss calculation under EPU conditions and determined a new EPU RCS heat loss value of 6.810E+6 Btu/hr. For conservatism, FPL065-CALC-010 evaluates two cases for Modes 1-4. The first case used the original EPU convective heat load of 1.85E+7 BTU/hr. The second case used the Westinghouse calculated value of 6.810E+6 Btu/hr.

The mass/energy boundary condition of the RCP seals assumes safe shutdown RCP seals have been implemented, and assumes 1 gpm per RCP + 1 gpm of unidentified sources (a total of 4 gpm for the PTN primary system). The MAAP analysis conservatively modeled seal leakage by setting an initial high leak rate of 20 gpm and allowing MAAP4 to calculate a reduced leak rate as the RCS depressurizes. The resultant average leak rate over the first 120 hours after the ELAP using this method is 4 gpm. The elevation of the RCP leakage is at the top of the cold leg which is consistent with the physical location of the Turkey Point model 93 RCP seal package. The effluent is deposited into the lower compartment node for containment.

The MAAP containment analysis was used to determine when to start a containment spray pump for pressure control and was based on the original EPU higher containment convective heat load for conservatism.

During the audit, the licensee identified that they have revised this strategy and intend to vent the containment instead of using containment spray. A new analysis will be completed to determine when containment venting must be initiated. As such, the FLEX MAAP containment analysis will be revised and result included in the 6 month update report. This has been identified as Confirmatory Item 3.2.3.A. in Section 4.2.

On page 47 of the Integrated Plan regarding Maintain Containment Pressure Control/Heat Removal, Phase 3, the licensee stated:

The strategy for containment integrity is to repower emergency containment cooling fans and restore component cooling water flow to the ECC heat exchangers from the RRC diesel generators. Cooling water flow through the containment coolers will be provided by repowering the CCW pumps from the RRC 4160 V diesel generator. Heat will be removed from the CCW system by portable diesel powered pumps from the RRC connected to the ICW/CCW heat exchangers.

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 containment functions strategies, 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.

The PTN FSAR Rev. 16, identified in Section 9.11.2 that cooling water is supplied to the safety related auxiliary feedwater pump oil coolers from the second stage of the auxiliary feed pump and is discharged to the condensate storage tanks.

The licensee's Integrated Plan does not describe the cooling of the charging pump. During the audit, the licensee was requested to identify if the source of cooling water for the charging pump is only dc (i.e., inverter) dependent, and if the piping is seismically robust. The licensee responded that the PTN Integrated Plan implied that cooling water would not be required when operating the CP at full speed. The CPs can run at full speed without cooling but not for extended time periods. FPL is evaluating options for intermittent operation of a charging pump or providing cooling to the fluid drive heat exchanger. Additional dc or ac power to the CP oil pump is not required because there are mechanically coupled to the CP drive shaft. The permanent CP cooler currently has emergency hose connection and its associated piping will be evaluated and qualified to survive all external hazards if it is determined to be the desired option. FPL will provide the final method for charging pump operation in the next Integrated Plan six month update report due in February 2014. This has been identified as Confirmatory Item 3.2.4.1.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 equipment cooling – cooling water, 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.
>
> 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 59 of the Integrated Plan for Safety Support Functions discussion of electrical distribution, instrumentation, communications, and lighting, Phase 1, safety functions support, the licensee stated:

> Temperatures in the DC equipment rooms and control room (the only locations in the plant with a significant heat load and sensitive equipment required to support the FLEX strategy) have been analyzed and determined to remain within satisfactory ranges throughout Phase 1.

During the audit, the licensee identified UFSAR Section 9.9.1.2 indicates control room equipment is designed to operate in an environment of 120°F and 95% relative humidity. Normal Control Room temperature is maintained at approximately 75°F and 60% relative humidity. The Control Room Ventilation System will be re-powered by the 480VAC FLEX generator within 8 hours of ELAP initiation and will begin restoring the Control Room back to nominal operating conditions. FPL performed a loss of ventilation Calculation FPL065-CALC-003 for the control room that shows without opening of any doors, the maximum temperatures remains below 120°F for 12 hours which was the end of the simulation.

The reviewer noted that Calculation FPL065-CALC-003 identified that equipment in the inverter rooms is qualified to operate for several days at 135°F. These rooms are adjacent to the main control room (MCR) and doors can be opened to communicate between rooms. The inverter rooms also have doors that allow communication with the outdoors.

During the NRC audit, the licensee was requested to address the adequacy of the ventilation provided in the battery room to protect the batteries from the effects on extreme high and low temperatures. The licensee responded that the installed battery room ventilation systems maintain the room temperature within the necessary temperature range prior to the ELAP. During the ELAP, the thermal inertia of the battery room structure and battery is expected to maintain the room temperature within the range required for the batteries to function.

The installed battery room ventilation system will be re-powered by the 480VAC FLEX generator within 8 hours of ELAP initiation. Typical battery room temperature is 82°F. Battery room ambient temperature of 115°F is the operability limit for the batteries. The licensee stated that considering the reduced battery load due to dc Bus load shedding which decreases the room heat load, it is unlikely that the battery room temperature will increase 33°F in 8 hrs.

During the audit, the licensee was requested to address the need for hydrogen gas ventilation in the battery rooms. The licensee responded that the installed battery room ventilation will be re-powered by the portable 480VAC FLEX generator within 8 hours of ELAP initiation. At that time, the batteries will begin charging and the battery room HVAC system will be in operation. Hydrogen accumulation during recharging will be removed by the HVAC system. The exhaust path that will be used is part of the battery room HVAC system.

The licensee was requested to provide a detailed summary of the analysis and or technical evaluation performed to demonstrate the adequacy of the ventilation provided in the TDAFW pump room to support equipment operation for all Phase of the ELAP. During the audit process, the licensee specified that the TDAFW pumps are located in outside areas and do not require any forced ventilation to perform their safety function.

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 ventilation for equipment cooling, 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.

On page 33, of the Integrated Plan regarding safety function RCS inventory Control in Modes 1 through 5 with Steam Generators available, the licensee stated, in part, that:

> Alternate strategies involve the use of Boric Acid Storage Tank (BAST) or RWST inventories through installed Charging and Boric Acid Transfer pumps or onsite portable RCS FLEX pump.

The BASTs are identified as a source of borated water. During the audit, the licensee was requested to identify how the temperature will be maintained at the minimum required value for solubility. The licensee responded that the PTN BAST boron concentration is limited by Technical Specifications to 4.0 wt.% (6993 ppm) with a solubility temperature of 62°F. PTN is located in South Florida below the 35th parallel and per review of Section 8 of the NEI 12-06 guidance, the snow, ice, or extreme cold hazard conditions do not apply to PTN. Therefore, PTN does not use heat tracing or provide heat to the BAST area. It is unlikely that an extreme cold hazard condition will result in an ELAP and lower BAST room temperature below 62°F due to short durations of cold weather, internal thermal inertia of the Auxiliary Building, and all building fans being de-energized.

Based on the above, heat tracing is not needed for any systems due to the climate.

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.

Lighting

On page 58 of the Integrated Plan for safety function Safety Functions Support, Phase 1, the licensee stated, in part, that load shed will de-energize the dc backed MCR lighting, which will be supplemented by portable lanterns prior to the load shed.

The reference to portable lanterns in the MCR prior to de-energizing the dc backed MCR lighting is the only specific identification of the use of portable lighting. Page 95 of the Integrated Plan, Attachment 6, Credited Equipment states that portable lighting is required to be in the qualified storage structure(s). Portable lighting is not listed in Table 1 for portable equipment Phase 2 and Phase 3.

During the audit, the licensee was requested to provide the guideline for lighting to show conformance with the guidance in NEI 12-06, Section 3.2.2, consideration (8). The licensee responded that PWROG FSG-5, "Initial Assessment and Flex Equipment Staging," step #6 contains the general guidance for portable lighting. The PTN site specific FSG-5 will have specific information for lighting. The milestone listed in Attachment 3 of the Integrated Plan shows the site specific FSG procedures being complete in September 2014. Their completion will be reported in a six month update report.

Communications

On page 59 of the Integrated Plan in the section on safety functions support, Phase 1, the licensee stated:

> Communications will be through diverse equipment including sound powered phones, radios and the plant paging system. The plant paging system is powered from the Class 1E station battery and will not be load shed. Additional equipment which includes on-site communications is being addressed through the PTN Post-Fukushima communications initiative.

The NRC staff has reviewed the licensee communications assessment (ADAMS Accession Nos. ML12300A425 and ML13064A359) in response to the March 12, 2012 50.54(f) request for information letter for PTN and, as documented in the staff analysis (ADAMS Accession No. ML13149A382) 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. This has been identified as Confirmatory Item 3.2.4.4.A. in Section 4.2 below.

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 lighting and portable 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.

During the audit, the licensee was requested to address access to the protected area and internal locked areas of the plant considering loss of power to security systems. The licensee responded that during FLEX Phase 1 activities, locked areas, where remote equipment operation may be necessary (such as the Auxiliary Feedwater cage room) will be available to Operations staff through key access without electrical power being available. During FLEX Phase 2 activities, personnel access to the protected area can initially be accommodated by Security controlled key locked gate areas. Access of equipment to the Protected Area can similarly be accommodated by manual control by Security of equipment access gates.

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 protected and internal locked area access, if these requirements are implemented as described.

3.2.4.6 Personnel Habitability – Elevated Temperature

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

> *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.

Section 9.2 of NEI 12-06 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.

During the audit, the licensee identified that the TDAFW pumps are located in outside areas and do not require and forced ventilation to perform their safety function.

On page 59 of the Integrated Plan, the licensee stated:

> Temperatures in the DC equipment rooms and control room (the only locations in

the plant with a significant heat load and sensitive equipment required to support the FLEX strategy) have been analyzed and determined to remain within satisfactory ranges throughout Phase 1.

During the audit, the licensee stated:

> UFSAR Section 9.9.1.2 indicates control room equipment is designed to operate in an environment of 120°F and 95% relative humidity. Normal Control Room temperature is maintained at approximately 75°F and 60% relative humidity. The Control Room Ventilation System will be re-powered by the 480VAC FLEX generator within 8 hours of ELAP initiation and will begin restoring the Control Room back to nominal operating conditions. FPL performed a loss of ventilation Calculation FPL065-CALC-003 for the control room that shows without opening of any doors, the maximum temperatures remains below 120°F for 12 hours which was the end of the simulation. This calculation is provided in the ePortal. The analysis used normal heat loads and an outside temperature of 95°F which are conservative for the ELAP event. Additional cases were evaluated for opening doors and installing portable fans which show control room temperatures remain at or below 110°F for a 12 hour period. The fans blow into the MCR and air exists through the Inverter Rooms to outside the plant. Under ELAP conditions all non-vital control room electrical ac loads will be de-energized and 50% of the vital ac/dc loads will be de-energized due to load shedding within the first hour of the event. Consequently, during an ELAP event the control room will see at least a 50% reduction in the electrical heat loads assumed in the calculation. Therefore, portable fans are not expected to be required and only opening doors should be adequate to maintain the control room environment below 110°F for the 8 hour period without air conditioning. PTN control room operators will be dressed in conventional office clothing and would be performing less than light work since they would be monitoring indications. As indicated in NUMARC 87-00 at least 4 hour periods are tolerable in this environment. PWROG FSG-5, Initial Assessment and Flex Equipment Staging, will contain guidance on heat stress reduction techniques to extend stay times such as fluid replenishment, outside air directed ventilation and rotating outside breaks. In addition, the development of FSG procedures will address/consider accessibility of equipment, tooling, connection points, plant components and human performance aids applicable to FLEX 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 personnel habitability in elevated temperatures, if these requirements are implemented as 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 [net positive suction head] 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.

Heated torus water can be relied upon if sufficient NPSH can be established. 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.

On pages 13 and 14 of the Integrated Plan, the licensee stated that immediately following the event, reactor core cooling is accomplished by natural circulation of RCS through the SGs. The SGs are supplied by the AFW system taking suction from one of the CSTs.

On page 21 of the Integrated Plan, the license describes the use of new well pumps to fill the CST(s) to enable use of the AFW system as long as there is sufficient steam pressure to drive the AFW pump turbines. When the steam pressure becomes insufficient to drive the AFW pump turbines, the SGs are depressurized to allow for makeup with the portable diesel driven FLEX pumps which still take suction from the new wells.

On page 27 of the Integrated Plan, the licensee describes Phase 3 long term cooling provided by the RHR and CCW systems. The CCW heat exchangers will be cooled by canal water supplied by a pump provided by the RRC.

On page 33 of the Integrated Plan, the licensee describes RCS inventory control in Phase 2. The credited action is to cooldown and depressurize the RCS for injection of boron and coolant inventory from the accumulators. If additional borated water is necessary after depletion of the accumulators, the method of injecting water into the RCS would either be to use the water in the BASTs by repowering a charging pump and Boric Acid Transfer pump from the FLEX DG or to connect the RCS FLEX pump to allow pumping of RWST water. During the audit, the licensee deleted the use of the RCS FLEX pump and stated they will use the charging pump to allow pumping of RWST water.

During the NRC audit, the licensee was requested to discuss how separation of the CSTs provides assurance that one CST will be available during in an ELAP event involving high winds, hurricane, or missile hazards. The licensee responded that the current licensing basis credits redundancy and separation for the CST supply to the AFW pumps to address the case of one tank being lost due to a tornado missile impact. The systems are cross-connected and able to take suction from either tank. The tanks are at opposite ends of the power block separated by a distance of approximately 400 ft. Based on this separation and the surrounding structures which provide substantial shielding from wind driven missiles, the licensee asserted that it is reasonable to conclude that one of the tanks would survive a wind generated missile in the ELAP event consistent with the current licensing basis. The licensee stated that as a practical matter, in 1992 Hurricane Andrew passed directly over the site with sustained category 5 winds of 175 mph and gusts to 200 mph. Although severe damage occurred in the residential and commercial structures in the path of the storm from wind and wind generated missiles, the tanks remained structurally sound and fully operable.

The reviewer consulted the PTN UFSAR, Revision 24, Appendix 5E, Section 5E-2, "External Missiles," which states that the current licensing basis for PTN considers tornado missiles concurrent with a loss of offsite power but not concurrently with a maximum hypothetical accident. This Section of the UFSAR provides a listing of vital systems and components that are not fully enclosed by concrete structures along with a discussion of how they are protected from wind-driven missiles by redundancy and separation or analyzed to show that the failure of the non-vital portion would not prevent safe shutdown or cause an uncontrolled release in excess of the established guidelines. CSTs are item 6 on the list provided. The discussion of the CSTs in that Section includes the statement that:

> Redundancy and spacing of the Condensate Storage Tanks provide the required system capability in the event of damage to one component by a tornado missile. If one tank is lost due to missile impact with a coincidental loss of power, an adequate supply of water is available from the remaining tank to achieve hot standby for a period of time since the tanks are cross-tied. If water inventory decreases below an adequate volume in the remaining tank, non-safety related sources of make-up water to the tank are available.

During the audit, the licensee was requested to discuss how separation of the RWSTs provides assurance that one RWST will be available in an ELAP event involving high winds, hurricane, or missile hazards. The licensee responded that both RWSTs are classified as Class I structures per UFSAR Chapter 5, Appendix 5A and that per the UFSAR, Class I structures are designed to withstand high winds and to resist the effects of a tornado. The licensee asserted that the RWSTs are protected from wind driven missiles per the current plant design basis by separation and redundancy.

The RWSTs are included in the list of vital systems and components not fully enclosed by concrete structures in the PTN UFSAR, Revision 24, Appendix 5E, Section 5E-2 as item 9. The discussion of the RWSTs in that Section states:

9. Refueling Water Storage Tanks:

   The refueling water tanks (RWSTs) are carbon steel, epoxy lined tanks located in the yard east of the Auxiliary Building. A loss of either RWST due to a missile impact will not affect shutdown capability because:

a) The safe shutdown condition for Turkey Point is defined as Hot Standby with the reactor coolant system temperature greater than or equal to 540˚F. This condition does not require RWST inventory to achieve or maintain reactor subcriticality.

b) The RWST is required to provide borated water to the safety injection system, RHR and containment spray systems during maximum hypothetical accident (MHA) conditions. However, a MHA accident coincident with a missile impact is not a design basis for the plant.

The reviewer noted that the discussions of the RWSTs in the PTN UFSAR rely on an analysis to show that their failure would not prevent a safe shutdown or cause an uncontrolled release rather than being protected from wind-driven missiles by redundancy and separation. The need for further information on the protection of the RWSTs from wind-driven missiles is identified as Open Item 3.2.4.7.A in Section 4.1 below.

The licensee identified that NEI 12-06 Section 3.2.1.3 (3), states that 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 available. NEI 12-06 defines “Robust (designs)” as the design of an SSC that either meets the current plant design basis for the applicable external hazards or has been shown by analysis or test to meet or exceed the current design basis.

Based on the definition of “Robust (designs)” per NEI 12-06, there is reasonable assurance that one CST will be available in an ELAP event involving high winds, hurricanes, seismic or missile hazards.

On Page 22 of the Integrated Plan, under (pressurized water reactor) PWR Portable Equipment Phase 2, the licensee described that one CST is assumed to be available for ELAP events. The licensee plans to have a portable pump for SG injection, SG FLEX pump, "normally staged at a location near the CST" to provide makeup water as needed. The licensee was requested to confirm that the SG FLEX pump can be connected to either CST to maximize the means to establish makeup water to the SGs during an ELAP event in a hurricane scenario.

The licensee responded that the SG FLEX pump will be used to either refill the CST(s) if the AFW pumps are available or to directly feed the steam generators if they are not. In either case, they are deployed and available at T+ 9 hours after the event and credited to refill the CST(s) at T+12 hours. During the hurricane conditions, the pumps will be stored in the FLEX storage building which will provide protection from all wind hazards and storm surge. The pumps are deployed and tied in after the hurricane conditions have subsided.

The licensee’s approach described above, as currently understood, has raised a concern 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, or that an acceptable alternative was provided, such that there would be reasonable assurance that the requirements of Order EA-12-049 will be met with respect to guidance concerning the availability of the water sources due to credit being taken for availability of the RWST. This concern has been identified as Open Item 3.2.4.7.A above and in Section 4.1.

3.2.4.8 Electrical Power Sources/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 61 of the Integrated Plan, the licensee stated:

> The Phase 2 coping strategy following an ELAP and LU-S event is to stage and connect a 480 VAC diesel generator to power select loads. The loads which may be powered by the Phase 2 FLEX Diesel Generator include the battery chargers that supply the Class IE 125VDC Switchgear. Additional guidance will be added to 0-ONOP-103.3, Attachment 2 to have the portable generators and transformers installed and connected prior to loss of all DC power. When power from the FLEX DG is restored to the Class 1E Load Centers, all interlocks and protective features for the loads will be preserved, assuming that power remains available to associated components (e.g., relays, actuation logics) and that the BDBEE did not cause a fault in electrical distribution system protective circuits (e.g., faults to under-voltage relays and over-current relays). The diverse means will be to power the loads directly by connecting the FLEX Diesel Generator to the load's power cables via portable switchgear. Procedures for these scenarios will be provided.

On page 65 of the Integrated Plan, the licensee stated:

> Phase 3 strategies involve the use of large 4 kV diesel generators from the Regional Response Center. This strategy would restore power to most of the electrical distribution system, lighting, and communications loads which are not damaged from the ELAP and LUHS event via installed electrical distribution systems or through manually routed cables to the individual loads. Major loads which will be repowered with this DG are the CCW pumps, RHR pumps, and ECCs. The RRC DG will also have the capability of restoring power to other 480VAC loads that were repowered from the FLEX DG in Phase 2 if needed and any non-safety related loads (such as the RHR sump pumps) if required. When power from the RRC DG is restored to the switchgear, all interlocks and protective features (except for switchgear lockout related trips) for the loads should be preserved, assuming that power remains available to associated components (e.g., relays, actuation logics) and that the BDBEE did not cause a fault in electrical distribution system protective circuits (e.g., faults to under-voltage relays and over-current relays). The diverse means will be to power the loads directly by connecting the FLEX Diesel Generator to the load's power cables via portable switchgear. Procedures for these scenarios will be provided.

During the audit, the licensee was requested to provide a summary of the sizing calculation for the FLEX generators to show that they can supply the loads assumed in Phases 2 and 3. The licensee responded:

> The kW load value for the equipment being relied upon was taken from the EDG Load list drawings 5613-E-019 SH1 and SH2, 5614-E-019 SH 1 and SH2 which are located in the ePortal. These values were arithmetically summed to obtain a total kW load. The loading calculated above was used in a commercial diesel generator vendor software package to determine a bounding generator size. The commercial software used the kW load along with the starting kVA of the largest motor to determine the diesel generator size. The value obtained was used in the procurement specification for the 480VAC portable generators. The generator bidders then took the data and applied their specific sizing

> methodology in developing the proposal for the 480VAC generators. The proposed generators were sized slightly higher than the specification in order to ensure sufficient capability to power the required loads.
>
> The same philosophy was applied to the Phase 3 loads. The equipment was identified and the EDG Load List drawing was used to validate loading.

During the audit, the licensee was requested to describe how electrical isolation will be maintained such that (a) Class 1E equipment is protected from faults in portable/FLEX equipment and (b) multiple sources do not attempt to power electrical buses. The licensee responded:

> The portable 480VAC generator will be outfitted with protective devices for diesel generator and engine protection. The generator will have a 100% rated output circuit breaker. The 480VAC connection points will be to the Safety Related load centers 3A, 3B, 3C and 3D. These connections will be through a safety related circuit breaker with overcurrent and short circuit protection features sized for the loads. The circuit breaker will be coordinated with the downstream devices to ensure the downstream circuit breakers operate prior to the FLEX connection circuit breaker. These breakers will be administratively controlled in the racked out position during normal plant operation to prevent inadvertent closing of the breaker. If the breaker was to be mis-positioned, the results would be merely powering of the local generator terminal box.
>
> In Phase 3, the circuit breakers will be electrically interlocked with all incoming feeder breakers (Unit Aux Transformer, Start-Up Transformer, EDG) such that all three breakers must be opened before the FLEX circuit breaker can be closed. In addition, an interlock in the trip circuit will trip the FLEX circuit breaker if any of the three feeder breakers is closed.

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 electrical power sources/isolations 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 7 of the Integrated Plan, in the section of General Integrated Plan Elements regarding Portable Equipment Refueling during Phases 2 & 3, the licensee stated:

> Portable equipment will require refueling from the Turkey Point Unit 4 Emergency Diesel Generator (EDG) storage tanks in Phase 2 and from the RRC provided equipment in Phase 3.
>
> An analysis to determine the portable equipment refueling requirements is needed and will be developed as part of the equipment qualifications/specifications and the associated procedures. This is tracked as pending action 5 listed in Attachment 3.

On page 61 of the Integrated Plan, the licensee stated:

> Refueling for Phase 2 equipment will be from the Unit 4 Emergency Diesel Storage Tanks. These tanks are contained within Class I structures. A fuel truck will be located in the FLEX storage building and used for that purpose. Fuel consumption analysis is pending for all temporary equipment. This will be completed as part of the equipment order and develop of the procedures for their use. This is tracked as pending action 5 in Attachment 3.

On page 90 of the Integrated Plan, Enercon drawing SK-FPLTP080-C-001 Rev. 0, Sheet 1 of 1 identified 2 super duty trucks with 5^{th} wheel towing, 2 trailers with fuel tanks (200 gallon tanks), and 3 flatbed trailers for moving FLEX equipment. On page 98 of the Integrated Plan, in the section identifying credited equipment Phase 2, the licensee identified a fuel trailer with an installed fuel transfer pump. The list does not list 2 trailers with 200 gallon tanks as is shown on the Enercon drawing. The list also does not list the 2 super duty trucks. During the audit, the licensee was requested to address the inconsistency. The licensee responded that during design development, it was determined that the 2 trucks will be maintained in the FLEX storage building, but only 1 refueling trailer will be needed The sizing of the refueling trailer will ensure that all of the portable equipment can be refueled per the refueling plan which is under development. This information will be updated and submitted in the six month update due in February of 2014. This has been identified as Confirmatory Item 3.2.4.9.A. in Section 4.2.

The licensee does not identify if credit is taken for fuel oil stored in day tanks of portable equipment. During the audit process, the licensee was requested to address if the fuel oil in day tanks is credited, and if credited, how is fuel quality in the day tanks of the portable equipment stored for extended periods of time is maintained. The licensee responded that FLEX equipment will be stored with filled fuel tanks and that a Preventative Maintenance program will be developed to monitor and control the quality of the fuel in the tanks of the portable FLEX equipment and replace as necessary.

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 fueling 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 [air operated valves] AOVs and [motor operated valves] 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 6 of the Integrated Plan, the licensee stated:

T+1 (hour) -Operating Crew Completes Deep Load Shedding

The operating crew completes deep load shedding once the ELAP is declared and before 1 hour has elapsed after the event. By completing the deep load shedding in 1 hour, run time on the batteries of 15.9 hours will be available providing sufficient time to install portable diesel generators. Procedural guidance will be provided on the time critical nature of this activity and the loads to be shed.

T+8 (hours) -Portable Diesel Generators Available to Power Well Pumps

The portable diesel generators will be used to power wells pumps, which are credited by hour 9 and required to be making up to the CST at hour 12. The station batteries provide the power for the critical instrumentation since ac power is initially lost. The strategies provide for backup power using portable diesel generators prior to their depletion. The batteries are expected to provide power for 15.9 hours. Even so, restoration of power to the battery chargers and other equipment on the load centers is highly desirable early in the scenario. Because of the low margin of time to power the well pumps, and the benefits of repowering the battery chargers and the other equipment, the installation of the portable diesel generators is considered time critical.

On page 58 of the Integrated Plan, the licensee stated:

Essential instrumentation and control functions will be maintained by the 125VDC Class IE batteries that are designed to power the safety related instrumentation for a minimum of 2 hours. To extend this coping period, non-essential loads will be shed as early as possible (within 1 hour). This extended load shed will be proceduralized and involves the opening of 27 to 33 (depending on inverters in

> standby) breakers in 4 rooms (all located in the control building, each within 1 minute traveling time from the control room). This extended load shed will de-energize the DC backed Main Control Room (MCR) lighting, which will be supplemented by portable lanterns prior to the load shed. This extended load shedding will extend the battery powered monitoring function for one train of the following essential parameters until the FLEX DG is available to supply all required instrument loads:

On page 61 of the Integrated Plan for safety function Safety Function Support Phase 2, the licensee stated:

> The Phase 2 coping strategy following an ELAP and LUHS event is to stage and connect a 480 VAC diesel generator to power select loads. The loads which may be powered by the Phase 2 FLEX Diesel Generator include the battery chargers that supply the Class IE 125VDC Switchgear. Additional guidance will be added to 0-ONOP-103.3, Attachment 2 to have the portable generators and transformers installed and connected prior to loss of all DC power. When power from the FLEX DG is restored to the Class 1E Load Centers, all interlocks and protective features for the loads will be preserved, assuming that power remains available to associated components (e.g., relays, actuation logics) and that the BDBEE did not cause a fault in electrical distribution system protective circuits (e.g., faults to under-voltage relays and over-current relays). The diverse means will be to power the loads directly by connecting the FLEX Diesel Generator to the load's power cables via portable switchgear. Procedures for these scenarios will be provided.

During the audit, the licensee was requested to provide the basis for the minimum dc bus voltage that is required to ensure proper operation of all required electrical equipment. The licensee responded:

> Calculation FPL065-CALC-009 was prepared, “Turkey Point Battery Discharge Capacity During Extended Loss of AC Power” to evaluate the battery discharge capacity in order to ensure a minimum of 8 hours of operation. The acceptance criteria used are 105V for Batteries 3A, 4A and 4B, 105.6V for Battery 3B and 108.6V for the Spare Battery. The acceptance criteria was based on providing a minimum of 103V to the limiting components at Turkey Point, which are the station inverters. This minimum voltage was obtained from Section 6.3 of PTN calculation PTN BFJE-94-002 Revision 8.

During the audit, the licensee was requested to provide a detailed discussion on the loads that will be shed from the dc bus, including the location where the required action needs to be taken, and the required operator actions/time needed.

The licensee responded:

> Development of the FSG for load shedding will address plant impact from loss of power. Potential safety impacts are addressed as part of procedure development and will be included in the FSG. The FSG milestone provided in the OIP is September 2014. This information will be provided in a six month update.

Reviewer evaluation of procedure EOP-ECA-0.0, “Loss of All AC Power”, identified an action on page 31 that requires CO_2 purge of the main generator prior to de-energizing the dc-powered seal oil pump.

During the audit, the licensee was requested to confirm that load shed activities will not interfere with required valve positioning or operator action capability that may be credited in establishing ELAP response strategies. The licensee responded:

> The dc load shed activities will not interfere with the RCS makeup flowpath since it consists of manual valve manipulation and the control valves being utilized all fail open upon loss of power. The dc load shed activities can potentially interfere with the AFW flowpath because the AFW flow control valves fail close. However the operator would observe the loss of AFW flow and would implement 3/4-ONOP-075 for guidance to locally operate the AFW flow control valves.

During the audit, the licensee was requested to provide the dc load profile with the required loads for the mitigating strategies to maintain core cooling, containment, and spent fuel pool cooling. The licensee responded:

> Calculation FPL065-CALC-009 was prepared to determine the required dc loading and coping times necessary to support Phase 1 of an ELAP event. The station design basis calculation PTN-BFJE-94-002 was used as a starting point for the ELAP dc loading calculation. Both calculations are provided in the ePortal. The station calculation assumed minimal load shedding after the first 60 minutes to determine the batteries were capable of performing their function for the 2 hour station blackout event. As part of the Fukushima FLEX strategy, the calculation assumes the additional load shedding of the emergency lighting loads and the redundant inverter after the first 60 minutes that will be specified in the related FSG. The additional load shedding and resulting load profiles for the station batteries based on calculation FPL065-CALC-009 are provided in the PTN ePortal.

Reviewer evaluation of Calculation FPL065-CALC-009 identified that none of the batteries used in the FLEX strategies had a duty cycle of more than 8 hours.

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 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, the paragraph following Guideline (15) states in part:

> 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 guidance provided in INPO [Institute of Nuclear Power Operations] 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., Electrical Power Research Institute (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 11 of the Integrated Plan, General Integrated Plan Elements, regarding Identify how the programmatic controls will be met, the licensee stated:

> Existing plant maintenance programs and procedures will be used to identify and document maintenance and testing requirements. Preventative Maintenance work orders (PMs) will be established and testing procedures will be developed in accordance with the PM program. Testing and PM frequencies will be established based on type of equipment and considerations made within EPRI guidelines. The control and scheduling of the PMs will be administered under the existing site work control processes.

On page 97 of the Integrated Plan, Attachment 6, Credited Equipment, the licensee identified the portable equipment for Phase 2. The list provides reasonable assurance that the Integrated Plan conforms to the guidance in NEI 12-06, Section 3.2.2 for N+1 availability of equipment to support NEI 12-06 Table 3-2 baseline capabilities.

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. During the audit, the licensee informed the NRC of their plans to abide by this generic resolution. The NRC staff will evaluate the resulting program through the audit and inspection processes.

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 11 of the Integrated Plan, the licensee stated:

> Existing plant configuration control procedures will be modified to ensure that permanent and temporary changes to the plant design, physical plant layout, roads, buildings, and miscellaneous structures will not adversely impact the approved FLEX 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 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 Pages 11 and 12 of the Integrated Plan, General Integrated Plan Elements, regarding Describe training program, the licensee stated:

> The PTN training plan for the implementation of the FLEX strategies will follow the Systematic Approach to Training (SAT) to evaluate training requirements for station personnel for the changes to plant equipment, the FLEX portable equipment, and new or revised station procedures that result from implementation of the FLEX strategies. Training modules for Station and Emergency Response Organization (ERO) personnel that will be responsible for implementing the FLEX strategies will be developed to ensure personnel proficiency in the mitigation of beyond-design-basis external events. The training will be implemented and maintained per existing PTN training programs. The details, objectives, frequency, and success measures will follow the plant's SAT process.
>
> FLEX training will ensure that personnel assigned to direct the execution of mitigation strategies for BDBEEs will achieve the requisite familiarity with the associated tasks and mitigating strategy time constraints considering available job aids and instructions. Training will be completed prior to full implementation of the requirements of this order as presented in the milestone schedule, Attachment 3.

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 considerations 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).

The Integrated Plan states:

> Two Regional Response Centers (RRC) are being established to support utilities during beyond design basis events. Contracts are in place to develop the facilities, purchase equipment, support of the FLEX strategies, and maintenance of the equipment.
>
> Each RRC will hold five sets of equipment, four of which will be able to be fully deployed when requested, the fifth set will have equipment in a maintenance cycle. Equipment will be moved from an RRC to a local assembly area established by the Strategic Alliance for FLEX Emergency Response (SAFER) team and the utility.
>
> 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 "playbook", which is the site's plan and equipment needs for FLEX strategies, will be delivered to the site within 24 hours from the initial request. Large equipment needed for long term coping will be delivered within 72 hours from the initial

request. A preliminary list of equipment is presented in Attachment 6.

Review of the licensee's use of off-site resources, as described above, provides reasonable assurance that the proposed arrangement will conform to the guidance found in NEI 12-06, Section 12.2, with regard to the capability to obtain equipment and commodities to sustain and backup the site's coping strategies (Guideline 1). However, the Integrated Plan failed to provide any information as to how conformance with NEI 12-06, Section 12.2 Guidelines 2 through 10 will be met. 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 offsite resources, if these requirements are implemented as described.

4.1 OPEN ITEMS

Item Number	Description	Notes
3.2.1.8.A	During the audit process, the licensee informed the NRC staff of its intent to abide by the generic approach included in the Pressurized Water Reactor Owners Group 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. At the time the audit was conducted, the licensee had neither (1) committed to abide by the additional conditions specified in the NRC's endorsement letter, nor (2) identified an acceptable alternate approach for justifying the boric acid mixing assumptions in the analyses supporting its mitigating strategy..	Significant
3.2.1.9.A	The licensee provided justification for an alternate approach to meeting EA-12-049 that does not meet the guidance of NEI 12-06. NRC evaluation of the final design is required to determine the acceptability of the justification.	Significant
3.2.4.7.A	The licensee relies on redundancy and separation of the RWSTs to show that at least one will survive a tornado event with wind-driven missiles. The PTN current licensing basis does not document this for the RWSTs. Further information is necessary to permit reliance on the RWSTs as a water source.	Significant

4.2 Confirmatory Items

3.1.1.3.A	Confirm that the non-seismically robust internal flooding sources are not an issue when there is no ac.	Notes
3.1.1.4.A	Off-Site Resources – Confirm RRC local staging area, evaluation of access routes, method of transportation to the site, and drop off	

	area.	
3.2.1.A	Confirm re-calculation of the boration requirements for Phase 2 cool down to provide additional margin and flexibility for the boration activity and provide the results in the six month update.	
3.2.1.B	Confirm analysis using a previously reviewed NRC code for validation of RCS cool down and depressurization timeline once the seal design is completed.	
3.2.1.1.A	Reliance on the NOTRUMP code for the ELAP analysis of Westinghouse plants is limited to the flow conditions before reflux condensation initiates. This includes specifying an acceptable definition for reflux condensation cooling. Verification of these conditions for PTN needs to be verified.	
3.2.1.1.B	Confirm recalculation of the SG pressure to prevent injection of nitrogen from the accumulators using the guidance in the PWROG position paper.	
3.2.1.1.C	Confirm site-specific evaluation for controlling containment pressure using MAAP to determine when containment venting must be initiated.	
3.2.1.2.A	Address analysis used to determine the RCP seal leakage of one gpm/seal for the safe shutdown/low leakage seals, and adequacy of the analysis including computer code/methodology and assumptions used, and supporting testing data applicable to the ELAP conditions when the site specific evaluation is performed.	
3.2.1.5.A	Provide justification that the instrumentation to measure the listed parameters and the associated setpoints credited in the ELAP analysis for automatic actuations and indications required for the operator to take appropriate actions are reliable and accurate in the containment harsh conditions with high moisture levels, temperature and pressure during the ELAP event. The information should (1) include a discussion of the analysis that is used to determine the containment temperature, pressure, and moisture profiles during the ELAP event, and (2) address the adequacy of the computer codes/methodologies, and assumptions used in the analysis.	
3.2.1.6.A	A change in strategies will require revision to the SOE based on results of future MAAP analysis.	
3.2.1.9.B	Finalization of the licensee's final engineering designs and supporting analysis is required for portable equipment that directly performs a FLEX mitigation strategy.	
3.2.3.A	The FLEX MAAP containment analysis will be revised and result included in the 6 month update report.	
3.2.4.1.A	Determine the final method of operating the charging pumps (i.e., intermittent operation or providing cooling to the fluid drive heat exchanger.)	
3.2.4.4.A	Confirm that upgrades to the site's communications systems have been completed.	
3.2.4.9.A	Confirm completion of the refueling plan and sizing of the refueling trailer.	
3.4.A	Confirm information is provided on how conformance with NEI 12-06, Section 12.2 guidelines 2 through 10 will be met.	