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
St. Lucie Nuclear Plant Units 1 & 2
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1.0 BACKGROUND

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

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

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

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

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

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

As described in Interim Staff Guidance (ISG), JLD-ISG-2012-01, "Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," the NRC staff considers that the development, implementation, and maintenance of guidance and strategies in conformance with the guidelines provided in NEI 12-06, Revision 0, subject to the clarifications in Attachment 1 of the ISG are an acceptable means of meeting the requirements of Order EA-12-049.

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

2.0 EVALUATION PROCESS

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

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

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

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

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

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

Additionally, for the purpose of this evaluation and the NRC staff's interim staff evaluation (ISE), licensee statements, commitments, and references to existing programs that are subject to routine NRC oversight (Updated Final Safety Analysis Report (UFSAR) program, procedure program, quality assurance program, modification configuration control program, etc.) will generally be accepted. For example, references to existing UFSAR information that supports the licensee's overall mitigating strategies plan, will be assumed to be correct, unless there is a specific reason to question its accuracy. Likewise, if a licensee stated 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 28, 2013 (ADAMS Accession No. ML13063A020) as supplemented by letter dated June 18, 2013, (ADAMS Accession No. ML13179A184) and as supplemented by the first six-month status report with letter dated August 28, 2013 (ADAMS Accession No. ML13242A274) Florida Power and Light (FP&L) (hereinafter referred to as the licensee) provided the Overall Integrated Plan for Compliance with Order EA-12-049 for St. Lucie Nuclear Plant (PSL) Units 1 & 2. The Integrated Plan describes the strategies and guidance under development for implementation by the licensee 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 staff notified all licensees and construction permit holders that the staff is conducting audits of their responses to Order EA-12-049. That letter described the process used by the NRC staff in its review, leading to the issuance of an interim staff evaluation and audit report. The purpose of the staff's audit is to determine the extent to which the licensees are proceeding on a path towards successful implementation of the actions needed to achieve full compliance with the Order.

3.1 EVALUATION OF EXTERNAL HAZARDS

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

3.1.1 Seismic Hazard

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 4 of the Integrated Plan, the licensee stated that the design criteria for PSL accounts for two design basis earthquake spectra, Operating Basis Earthquake (OBE) and Design Basis Earthquake (DBE). Structures, systems, and components (SSCs) important to safety are designed to withstand loads developed from these spectra. Provisions for this hazard will be included in the FLEX Integrated Plan.

The reviewer notes that the seismic screening portion of the Integrated Plan and Section 3.7 of the PSL Unit 1 UFSAR use the term DBE rather than Safe Shutdown Earthquake (SSE), which is the nomenclature used in NEI 12-06 and the remaining portions of the Integrated Plan and in Section 3.7 of the PSL Unit 2 UFSAR. Page 60 of the Integrated Plan makes reference to Section 3.7 of the PSL UFSAR for the hazard level of the SSE for the purposes of the seismic protection to be afforded portable equipment provided pursuant to EA-12-049, with the reference pointing to the UFSAR for Unit 1, Amendment 25, and the UFSAR for Unit 2, Amendment 20. Because the Unit 1 UFSAR defined DBE has a maximum ground acceleration of 0.1 g, which matches the maximum ground acceleration of 0.1 g in the Unit 2 UFSAR for the SSE, the reviewer considers all references to DBE and SSE within the Integrated Plan to be equivalent.

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 the Integrated Plan, the licensee stated that FLEX Equipment Storage Building (FESB) will be located on south side of the plant and east of the Independent Spent Fuel Storage Installation (ISFSI) area.

Additionally, the licensee specified that the FLEX equipment storage building (FESB) will be a single building capable of housing all FLEX equipment required to meet FLEX strategies. There will be sufficient equipment to address all functions for both units, plus one additional spare, i.e., an N+1 capability, where "N" is the number of units or 2N, where each piece of equipment is rated at 200% capacity and capable of supporting both units.

Also, FLEX equipment, including the tow vehicles and debris removal equipment, will be located inside of the FESB and secured for a Safe Shutdown Earthquake, as required. Additionally, the licensee stated on page 60 of the Integrated Plan that onsite portable FLEX equipment used during Phase 2 and 3 of the FLEX coping strategies will be stored and protected to meet the requirements of NEI 12-06, the FESB will be designed to meet PSL design basis for the SSE.

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 and storage for FLEX equipment considering seismic hazards, if these requirements are implemented as described.

3.1.1.2 Deployment of Portable Equipment - Seismic Hazard

NEI 12-06, Section 5.3.2 states:

> There are five considerations for the deployment of FLEX equipment following a seismic event.
>
> 1. If the equipment needs to be moved from a storage location to a different point for deployment, the route to be traveled should be reviewed for potential soil liquefaction that could impede movement following a severe seismic event.
> 2. At least one connection point 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 [mitigation] 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 the FLEX equipment should be provided that is also reasonably protected from the event.

On page 14 of the Integrated Plan, the licensee stated that on-site deployment routes for FLEX equipment from the FESB are shown in Figure 9 of the Integrated Plan. The licensee also stated that on-site FESB deployment routes will be analyzed for liquefaction.

On page 10, 11, 12, and 14 of the Integrated Plan, the licensee stated that time validation studies will be conducted to: a) justify the time constraints and resources for the deployment of a 480 VAC diesel generator to the station 480 VAC bus or directly to a designated piece of equipment; b) justify the time and resources required for the deployment of the Steam Generator (SG) FLEX pumps for SG makeup; c) justify time and resources required for deployment of Condensate Storage Tank (CST) FLEX pumps; and d) justify time and resources required for deploying SG FLEX Pump for RWT injection to the Reactor Coolant System (RCS).

On pages 29, 39, 54 and 66 of the Integrated Plan, the licensee stated that FLEX equipment shall be protected and meet the requirements provided in NEI 12-06, and that equipment stored in the FESB will be evaluated and protected from seismic events and a Safe Shutdown Earthquake. FLEX equipment, including the tow vehicles and debris removal equipment, will be located inside of the FESB and secured for a SSE, as required.

On page 27 of the Integrated Plan, the licensee stated that they will provide qualified and diverse connections to the CSTs to supply water to the suction of the SG FLEX pump. This modification ensures a source of water is available to feed the SGs via the SG FLEX pump in the event of failure or inadequate steam supply to the turbine driven auxiliary feedwater pump (TDAFWP). Additionally, the licensee will provide qualified and diverse connections to the CST for CST fill from designated sources. This modification provides a means to fill the CSTs on low inventory from any survivable water source via the CST FLEX pump.

On page 29 of the Integrated Plan, the licensee stated that the CST FLEX pump will take suction from the RWT or other available tank and discharge to the Unit 2 CST which can then supply the Unit 1 CST, and that protected connections will be installed on the outlet of the RWTs and both CSTs to allow for filling either CST tank directly.

On page 30 of the Integrated Plan, the licensee stated that all connections for the FLEX equipment will be designed to withstand and be protected from site applicable hazards.

On page 102 of the Integrated Plan, the licensee identified a pending action to prepare a FLEX Support Guideline (FSG) for accessibility considerations for personnel to enter areas to perform manual actions.

Consideration 3 does not apply to PSL as the site is located on the Atlantic Ocean without a downstream dam.

The licensee addressed consideration 2 of NEI 12-06 Section 5.3.2 regarding protection of the means to move the equipment. All connection points were noted as protected from seismic events, however Figure 9 in the Integrated Plan, which provided deployment routes from the FESB to plant locations, was not legible. It was not possible to determine the location of staged equipment (pumps and generators) or the buildings through which the hoses and equipment would be routed. This has been identified as Confirmatory Item 3.1.1.2.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 deployment 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 that:

> 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 beyond-design-basis seismic events. In order to address these considerations, each plant should compile a reference source, for the plant operators that provides approaches to obtaining necessary instrument readings to support the implementation of the coping strategy. 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 equipment for those plants that could be impacted by failure of a not seismically robust downstream dam.

On page 58 of the Integrated Plan the licensee identified a Pending Action Item regarding local instrument readings as follows:

> Evaluations are in progress to determine appropriate alternate locations for obtaining critical parameters (e.g., at containment penetrations).

On page 22 of the Integrated Plan, the licensee stated that PSL will use industry guidance from the Pressurized Water Reactor Owners Group (PWROG) to develop site specific procedures or guidelines to address criteria in NEI 12-06. The procedures and/or guidelines developed will support existing strategies within existing plant procedures.

On page 58 of the Integrated Plan, the licensee stated that evaluations are in progress to determine appropriate alternate locations for obtaining critical parameters, e.g., at containment penetrations.

In the Integrated Plan, the licensee did not discuss any procedural interface considerations regarding seismic hazards associated with; large internal flooding sources that are not seismically robust and do not require ac power, and the use of ac power to mitigate ground water in critical locations. During the audit process the licensee stated that internal flooding is principally a concern to equipment in the emergency core cooling system (ECCS) pump room at the lower levels of the Reactor Auxiliary Building (RAB) and the rooms receive drains from higher elevations. The ECCS pump rooms are protected by watertight doors and operator manual actions to isolate drains to the rooms. In the ELAP scenario, less internal flooding volume than that considered in design base cases will occur due to depressurization of non-seismic lines with loss of power. Access to the ECCS pump to support FLEX responses can be accomplished without electric power. Power is not required to mitigate groundwater.

Consideration 4 does not apply to PSL as the site is located on the Atlantic Ocean and there are no downstream dams.

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 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 14 of the Integrated Plan, the licensee stated that the nuclear industry will establish two Regional Response Centers (RRC) to support utilities during beyond design basis external events. 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 14 of the Integrated Plan, the licensee stated that the staging area for the RRC equipment has not been finalized and that the RRC staging area location will be finalized and deployment routes from the RRC staging area to the site will be developed. 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 use of off-site resources following seismic events, if these requirements are implemented as described.

3.1.2 Flooding Hazard

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 4 and 5 of the Integrated Plan, the licensee stated that external flooding design of St. Lucie safety related structures is discussed in UFSAR, Section 3.4, Water Level (Flood) Design. Flood protection criteria applied to plant structures, systems and components is listed in Table 3.2-1 of the UFSAR.

Per section 3.4.1 of the UFSAR, plant grade is at elevation +18', Unit 1 and +18.5', Unit 2 and minimum entrance level to all safety related buildings is +19.5 feet. Maximum elevation of roadways is +19.0 feet, thus any ponding of water that might result will be below the building entrances.

The plant is located on Hutchinson Island, a barrier island, situated between the Atlantic Ocean and the Indian River. The plant is situated above the highest possible water levels attainable except for wave run-up resulting from probable maximum hurricane (PMH) considerations. The maximum hurricane surge results in a still water elevation of 17.2 feet above mean low water (MLW) and wind induced waves to 18.0 feet above MLW. (Unit 2 UFSAR, Section 2.4.2.2.b)

Based upon the probable maximum flood (PMF) high water level due to the PMH, wave run-up level and plant island elevation noted above, flood protection stop logs at entrances (whose minimum elevation is at least +19.5 feet) to safety related buildings are not deemed necessary. Additional wave run-up protection is provided to entrances of the Fuel Handling Building (FHB) and RAB by the presence of adjacent buildings and structures. Since no permanent structures are located on the south side of Unit 2 RAB, additional wave run-up protection has been provided by installing stop logs in the entrance on the south wall and the southernmost entrance on the east wall of Unit 2 RAB. (Unit 2 UFSAR Section 3.4.1)

A flooding re-evaluation is being performed as required by 10 CFR 50.54(f) letter of March 12, 2012 and will be submitted to the NRC by March 12, 2015 for PSL. 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 development of 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/guidelines address the needed actions to relocate the equipment. Based on the timing of the limiting flood scenario(s), the FLEX equipment can be relocated to a position that is protected from the flood, either by barriers or by elevation, prior to the arrival of the potentially damaging flood levels. This should also consider the conditions on-site during the increasing flood levels and whether movement of the Flex equipment will be possible before potential inundation occurs, not just the ultimate flood height.

2. Storage areas that are potentially impacted by a rapid rise of water should be avoided.

On page 29 of the Integrated Plan, the licensee stated that FLEX equipment will be stored above flood waters. The lowest deployment paths from the FESB are above an elevation of 12 feet above MLW. The flood surge resulting in a PMF is anticipated to exceed an elevation of 12 ft. for 2 hrs. duration (UFSAR, Unit 2, Figure 2.4-12). Based on the coping milestone timelines in Attachment 1A of the Integrated Plan, access to Phase 2 FLEX equipment will not be required until flood waters have receded.

On pages 39, 54 and 66 of the Integrated Plan, the licensee stated that during a hurricane induced flooding event, access to areas in the plant, as well as access to the FESB, could be restricted due to flood waters and high winds. The strategy to maintain core cooling was developed such that access to Phase 2 FLEX equipment and access to environmentally harsh areas would not be required until the high winds had subsided and the flood waters receded.

On page 60 of the Integrated Plan, the licensee stated that onsite portable FLEX equipment used during Phase 2 and 3 of the FLEX coping strategies will be stored and protected in a single structure, the FESB, that meets the external hazards requirements of NEI 12-06. Proposed location and layout for the FESB are depicted in Figure 7 and Figure 8 in the Integrated Plan. To meet the requirements of NEI 12-06, the FESB will be designed to meet PSL design basis for the PMF (UFSAR Section 3.4). The building will be water tight to the level of PMF or the finished floor level will be above PMF level.

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 and storage for FLEX equipment considering flood hazards, 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 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.

On page 17 of the Integrated Plan, the licensee stated that for a BDBEE with significant warning, such as a hurricane, both units will be shutdown at the time of the event. The Severe Weather Preparations procedure instructs the operators to shutdown and cooldown the plant to Mode 3 or 5 (with steam generators available) at least two hours prior to the projected onset of hurricane force winds. The actual mode is dependent on the category of the projected hurricane and determinations by plant personnel. On-site resources are significantly increased in advance of the projected storm. The procedure also directs operators top off major water tanks, fuel oil tanks and increase plant staffing and supplies. Therefore, prior to the arrival of hurricane induced flooding and high winds, the plant is in a unique state and well prepared to cope with the event.

On page 12 of the Integrated Plan, the licensee stated that FLEX equipment will be stored above flood waters. The lowest deployment paths from the FESB are above an elevation of 12 feet above MLW. The flood surge resulting in a PMF is anticipated to exceed an elevation of 12 ft. for 2 hrs. duration (UFSAR, Unit 2, Figure 2.4-12). Based on the coping milestone timelines in Attachment 1A, access to Phase 2 FLEX equipment will not be required until flood waters have receded.

On page 27 of the Integrated Plan, the licensee stated two modifications for Unit 1 & 2. The first modification is to provide qualified and diverse connections to the CSTs to supply water to the suction of the SG FLEX pump. This modification ensures a source of water is available to feed the SGs via the SG FLEX pump in the event of failure or inadequate steam supply to the TDAFW pump. The second modification is to provide qualified and diverse connections to the CST for CST fill from designated sources. This modification provides a means to fill the CSTs on low inventory from any survivable water source via the CST FLEX pump.

On page 29 of the Integrated Plan, the licensee stated that the CST FLEX pump will take suction from the RWT or other available tank and discharge to the Unit 2 CST which can then supply the Unit 1 CST. Protected connections will be installed on the outlet of the RWTs and both CSTs to allow for filling either CST tank directly.

On page 30 of the Integrated Plan, the licensee stated that all connections for the FLEX equipment will be designed to withstand and be protected from site applicable hazards.

On page 29 of the Integrated Plan, the licensee stated that the UHS dam valves are capable of being opened to supply backup flow from Big Mud Creek (Intracoastal Waterway) to the intake canal. Suction of the offsite pumping system will be from the Intake and will discharge to new connections located at the intake structure. Two new connection points with isolation valves will be provided. It is anticipated that a manifold may be required to interface with multiple hoses from an RRC LUHS Pumping System.

The seawater source in a PMH event will contain floating and submerged debris which may adversely affect the use of the RRC LUHS Pumping System and Component Cooling Water (CCW) heat exchangers. Accordingly, for such an event, the suction of the RRC LUHS pumping system will be preferentially placed within the plant intake wells to provide straining by the intake traveling water screens. The traveling water screens are provided for the combined circulating water and intake cooling water system flow rates. While these screens are not seismically designed, they are ruggedly designed to accommodate large in-service hydraulic loads (a seismic event is not expected to create a debris issue). Due to their large surface area, the screens will be effective in straining the intake flow without the need to power the traveling screens. In addition to these screens, the CCW heat exchangers are equipped with full flow automatic debris filters. While the debris filters are capable of manual backwash operation, the filters will be provided with power from the 4.16 KVAC RRC FLEX generator so they may operate in their automatic mode.

On page 64 of the Integrated Plan, the licensee stated that the diesel fuel oil (DFO) trailer is a Transfueler 500 gallon diesel fuel oil tank. The tank is mounted on a trailer with a 12v battery operated pump capable of delivering up to 25 gpm. The trailer will be towed by a FLEX tow vehicle or equivalent. The DFO trailer tank will be filled by gravity feed from the Unit 2 Diesel Oil Storage Tanks. The Unit 2 Diesel Oil Storage Tanks are fully qualified for flooding.

The licensee did not specifically address NEI 12-06 Section 6.2.3.2, consideration 7 regarding the potential need for dewatering or extraction pumps, and consideration 8 regarding the potential need for temporary flood barriers. During the audit process, the licensee stated that dewatering or extraction pumps are not required as building entrances are above the plant PMF high water elevation. Per the UFSAR, high water level is at 17.2 ft. Plant grade is at 18.5 ft. and the minimum entrance to all buildings is 19.5 ft. The licensee stated that as an additional precaution stop logs are deployed on specific doors to address wave runup.

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 for FLEX equipment considering flood hazards, if these requirements are implemented as described.

3.1.2.3 Procedural Interfaces - Flooding Hazard

NEI 12-06, Section 6.2.3.3 states:

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

On page 22 of the Integrated Plan, the licensee stated that PSL will use industry guidance from the PWROG to develop site specific procedures or guidelines to address criteria in NEI 12-06. The procedures and/or guidelines developed will support existing strategies within existing plant procedures.

FPL did not discuss the potential need for guidance for deployment of temporary flood barriers and extraction pumps, per consideration 3 above. During extraction, pumps are not required as building entrances are above the plant PMF high water elevation, per the UFSAR, high water level is at 17.2 ft. Plant grade is at 18.5 ft. and the minimum entrance to all buildings is 19.5 ft. Also stop logs are deployed on specific doors to address wave runup per procedure

0005753, “Severe Weather Preparations.” Additionally, the licensee stated that; stop log deployment is initiated for wave run-up protection prior to projected arrival of a severe hurricane, that stop logs are stored in close proximity to the location of used and are periodically inspected for material condition, and no barriers are required to be installed for deployment of FLEX equipment or connection to FLEX connection points.

The licensee’s approach described above, as currently understood, is consistent with the guidance found in NEI 12-06, as endorsed by JLD-ISG-2012-01, and provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to procedural interfaces considering flood hazards, 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 14 of the Integrated Plan, the licensee stated that the staging area for the RRC equipment has not been finalized and that the RRC staging area location will be finalized and deployment routes from the RRC staging area to the site will be developed. 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 Wind Hazard

NEI 12-06, Section 7.2.1, provides the NRC-endorsed screening process for evaluation of severe storms with high wind hazard. This screening process considers the hazard due to hurricanes and tornadoes.

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 pages 5 and 6 of the Integrated Plan, the licensee stated that PSL is a coastal site and is subject to hurricane hazards. Hurricanes and tornado hazards will be addressed for the PSL site, as PSL is situated near the 240 mph hurricane contour shown in Figure 7-1 of NEI 12-06. High winds and Tornado loadings are discussed in the UFSAR, Chapter 3, Section 3.3, Wind and Tornado Loadings. Per the UFSAR, the design hurricane wind speed is 194 mph. Wind loads are applied to all seismic Class 1 structures based on this design wind speed. Section 3.3.2 of the UFSAR states the design tornado has a horizontal rotational wind speed of 300 mph and translational speed of 60 mph. The licensee stated that the design tornado wind speed applied to St. Lucie is extremely conservative since Florida tornados are much less severe, and that plant procedures require that for a Category 4 or 5 Hurricane, the units shall be shutdown to Mode 5, at least two (2) hours before the projected onset of sustained hurricane force winds within the Owner Controlled Area.

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

3.1.3.1 Protection of FLEX Equipment - High 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.

On pages 29, 39, 54 and 66 of the Integrated Plan, the licensee stated that the FESB will be designed to survive PSL design basis hurricanes, tornados and tornado missiles. Hurricanes will have advance notice and the units will be placed in a safe condition per plant procedures. Time critical FLEX equipment responses can be prestaged in robust structures, as required, before the onset of hurricane winds. Other BDBEE high wind events (tornado) are short lived and are not anticipated to present FLEX equipment access issues.

On page 60 of the Integrated Plan, the licensee stated that onsite portable FLEX equipment used during Phase 2 and 3 of the FLEX coping strategies will be stored and protected in a structure that meets the external hazards requirements of NEI 12-06. To meet the requirements of NEI 12-06, the FESB will be designed to meet PSL design basis for the high wind hazards due to hurricanes, tornados and tornado missiles, per UFSAR Section 3.3.

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 storage and protection of FLEX equipment for high wind hazards, if these requirements are implemented as described.

3.1.3.2 Deployment of FLEX Equipment - High Wind 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 page 17 of the Integrated Plan, the licensee stated that for a BDBEE with significant warning, such as a hurricane, both units will be shutdown at the time of the event. The Severe Weather Preparations procedure instructs the operators to shutdown and cooldown the plant to Mode 3 or 5 (with steam generators available) at least two hours prior to the projected onset of hurricane force winds. The actual mode is dependent on the category of the projected hurricane and determinations by plant personnel. On-site resources are significantly increased in advance of the projected storm. The procedure also directs operators top off major water tanks, fuel oil tanks and increase plant staffing and supplies. Therefore, prior to the arrival of hurricane induced flooding and high winds, the plant is in a unique state and well prepared to cope with the event.

On page 29 of the Integrated Plan, the licensee stated that the UHS dam valves are capable of being opened to supply backup flow from Big Mud Creek (Intracoastal Waterway) to the intake canal. The licensee also stated that Suction of the offsite pumping system will be from the Intake and will discharge to new connections located at the intake structure on ICW system piping lines. Two new connection points with isolation valves will be provided. It is anticipated that a manifold may be required to interface with multiple hoses from an RRC LUHS Pumping System.

The licensee also stated that the seawater source in an PMH event will contain floating and submerged debris which may adversely affect the use of the RRC LUHS Pumping System and CCW heat exchangers, and accordingly, for such an event, the suction of the RRC LUHS pumping system will be preferentially placed within the plant intake wells to provide straining by the intake traveling water screens. Additionally, the licensee stated that the traveling water screens are provided for the combined circulating water and intake cooling water system flow rates, and that while these screens are not seismically designed, they are ruggedly designed to accommodate large in-service hydraulic loads (a seismic event is not expected to create a debris issue). The licensee also stated that due to their large surface area, the screens will be effective in straining the intake flow without the need to power the traveling screens. In addition to these screens, the CCW heat exchangers are equipped with full flow automatic debris filters. While the debris filters are capable of manual backwash operation, the filters will be provided with power from the 4.16 KVAC RRC FLEX generator so they may operate in their automatic mode.

On pages 29, 39, 54 and 66 of the Integrated Plan, the licensee stated that FLEX equipment shall be protected and meet the requirements provided in NEI 12-06 and that equipment stored in the FLEX storage building will be evaluated and protected from seismic events and an SSE. Additionally, FLEX equipment, including the tow vehicles and debris removal equipment, will be located inside of the FESB and secured for an SSE, as required.

On page 30 of the Integrated Plan, the licensee stated that all connections for the FLEX equipment will be designed to withstand and be protected from site applicable hazards.

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

3.1.3.3 Procedural Interfaces - High Wind Hazard

NEI 12-06, Section 7.3.3, states:

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

On page 17 of the Integrated Plan, the licensee stated that for a BDBEE with significant warning, such as a hurricane, both units will be shutdown at the time of the event. The Severe Weather Preparations procedure instructs the operators to shutdown and cooldown the plant to Mode 3 or 5 (with steam generators available) at least two hours prior to the projected onset of hurricane force winds. The actual mode is dependent on the category of the projected hurricane and determinations by plant personnel.

On page 22 of the Integrated Plan, the licensee stated that PSL will use industry guidance from the PWROG to develop site specific procedures or guidelines to address criteria in NEI 12-06. The procedures and/or guidelines developed will support existing strategies within existing plant 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, and provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to procedural interfaces for high wind hazards, 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 14 of the Integrated Plan, the licensee stated that the staging area for the RRC equipment has not been finalized and that the RRC staging area location will be finalized and deployment routes from the RRC staging area to the site will be developed. 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 Hazard

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. All sites located north of the 35th Parallel should provide the capability to address extreme snowfall with snow removal equipment. Finally, all sites except for those within Level 1 and 2 of the maximum ice storm severity map contained in Figure 8-2 should address the impact of ice storms.

On page 6 of the Integrated Plan, the licensee stated that PSL is located in South Florida below the 35th parallel. Per Section 8 of NEI 12-06, snow, ice, or extreme cold hazards do not apply to PSL. Provisions for this hazard will not be included in the FLEX Integrated Plan.

PSL screens out for the hazards due to snow, ice, and extreme cold.

3.1.5 High Temperature Hazard

NEI 12-06, Section 9 states:

> All sites will address high temperatures. Virtually every state in the lower 48 contiguous United States has experienced temperatures in excess of 110˚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 6 of the Integrated Plan, the licensee stated that the climate at PSL is typical of that in southern Florida, being hot and humid in the summer and mild in the winter. At the PSL site on Hutchinson Island, the average maximum temperature ranges from 72 degrees F in February to 87 degrees F in August (UFSAR Unit 1, Table 2.3-10). UFSAR Tables 2.3-10, Unit 1 and 2.3-37, Unit 2, illustrate the monthly distribution of temperature and extremes recorded in the area. Long term temperature statistics for West Palm Beach (climate characteristics are very similar to Hutchinson Island) indicate a 101 degrees F maximum extreme and a 27 degrees F minimum extreme (UFSAR Unit 2, Table 2.3-37). It is not expected that FLEX equipment and deployment would be affected by high temperature; however, high temperature will be considered with respect to 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 screening for high temperature hazards, if these requirements are implemented as described.

3.1.5.1 Protection of FLEX Equipment - High Temperature Hazard

NEI 12-06, Section 9.3.1, states:

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

On pages 29, 39, 54 and 66 of the Integrated Plan, the licensee stated that the climate at PSL is typical of that in southern Florida, being hot and humid in the summer and mild in the winter. The PSL site (Hutchinson Island) average maximum temperature ranges from 72 degrees F in February to 87 degrees F in August. An extreme maximum of 101 degrees F was recorded in July 1942. (UFSAR Unit 2, Table 2.3-37) FLEX equipment (i.e., pumps, diesel generators, etc.) shall be capable of operating in hot weather in excess of the site extreme maximum of 101 degrees F which is below the threshold of 110 degrees F discussed in NEI 12-06. It is not expected that FLEX equipment and deployment would be affected by high temperatures. Nonetheless, 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 FESB will include natural ventilation to maintain temperatures within the manufacturer's recommendations.

On page 60 of the Integrated Plan, the licensee stated that onsite portable FLEX equipment used during Phase 2 and 3 of the FLEX coping strategies will be stored and protected in a structure that meets the external hazards requirements of NEI 12-06. To meet the requirements of NEI 12-06, the FESB will be designed to meet PSL design basis for the extreme high temperature of 101 degrees F (UFSAR Unit 2, Table 2.3-37) and will be considered with respect to maintaining equipment within manufacturer's design ratings.

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

3.1.5.2 Deployment of 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 pages 29, 39, 54 and 66 of the Integrated Plan, the licensee stated that the climate at PSL is typical of that in southern Florida, being hot and humid in the summer and mild in the winter. The PSL site (Hutchinson Island) average maximum temperature ranges from 72 degrees F in February to 87 degrees F in August. An extreme maximum of 101 degrees F was recorded in July 1942. (UFSAR Unit 2, Table 2.3-37) FLEX equipment (i.e., pumps, diesel generators, etc.) shall be capable of operating in hot weather in excess of the site extreme maximum of 101 degrees F which is below the threshold of 110 degrees F discussed in NEI 12-06. It is not expected that FLEX equipment and deployment would be affected by high temperatures. Nonetheless, 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 FESB will include natural 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 deployment of FLX equipment for high temperature 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 portable equipment.

On page 22 of the Integrated Plan the licensee stated that PSL will use industry guidance from the PWROG to develop site specific procedures or guidelines to address criteria in NEI 12-06. The procedures and/or guidelines developed will support existing strategies within existing plant procedures.

On pages 29, 39, 54 and 66 of the Integrated Plan, the licensee stated that FLEX equipment, e.g., pumps, diesel generators, shall be capable of operating in hot weather in excess of the site extreme maximum of 101 degrees F which is below the threshold of 110 degrees F discussed in NEI 12-06. It is not expected that FLEX equipment and deployment would be affected by high temperatures. Nonetheless, 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 FESB will include natural ventilation to maintain temperatures within the manufacturer's recommendations.

On page 102 of the Integrated Plan, the licensee identified a Pending action to prepare an FSG for accessibility considerations for personnel to enter areas to perform local manual actions.

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 high temperature hazards, 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 auxiliary feedwater (AFW)/emergency feedwater (EFW) system to provide steam generator (SG) makeup sufficient to maintain or restore SG level in order to continue to provide core cooling for the initial phase. This approach relies on depressurization of the SGs for makeup with a portable injection source in order to provide core cooling for the transition and final phases. This approach accomplishes 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. In mode 5 (cold shutdown) and mode 6 (refueling) with SGs not available, this approach relies on an on-site pump for RCS makeup and diverse makeup connections to the RCS for long-term RCS makeup with borated water and residual heat removal from the vented RCS.

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

Acceptance criteria for the analyses serving as the technical basis for establishing the time constraints for the baseline coping capabilities described in NEI 12-06, which provides 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 process, the licensee was requested to identify the installed non-safety related systems or equipment that are credited in establishing the mitigation strategies and discuss the intended mitigation functions, and justify that they are available and reliable to provide the desired functions on demand during the ELAP conditions. During the audit process, the licensee stated that PSL credits the non-safety related batching tanks in each unit as available for use in developing additional borated water for a Mode 5&6 strategy. The tanks and associated piping to the boric acid mix tanks (BAMT) are located in a qualified structure and have considerable design margin as the equipment is normally drained and out of service. The licensee should provide information related to seismic concerns for this non-safety equipment. This has been identified as Confirmatory Item 3.2.1.A in Section 4.2.

Additionally, PLS credits non safety related traveling water screens located in the qualified intake structure, to provide debris control for RRC pumps restoring UHS flow. These screens are built to withstand large hydraulic forces stemming from potential screen blockage in conjunction with much larger flows from the circulating water pumps and intake cooling water pumps. The licensee stated that due to their construction there is reasonable assurance that one or more of the four screens will be available to support Phase 3 strategies. The screens will be operated as stationary equipment which should accommodate much lower flows for an extended period of time. In the longer term 480 Vac diesel generators provided by the RC can be used to repower the equipment. PSL also credits a 12 inch missile-protected potable water supply line from off-site as the alternate strategy water source during tornado events. PSL will also depend on a number of backup non-safety related tanks discussed in Section 3.2.4.7 as water sources. Evaluations discussed in that section will be performed to validate that one or more of the tanks will be available.

Also during the audit process, the license was requested supply the following information regarding SG atmospheric depressurization valves (ADVs):

1) Specify the size of the ADV backup nitrogen supply source and required time for its use as a motive force to operate the ADV.
2) Discuss the analysis determining the size of the subject nitrogen supply
3) discuss the electrical power supply that is required for operators to throttle steam flow through the ADVs within the required time and show that the power is available and adequate for the intended use, and
4) Discuss the operator actions that are required to operate ADVs manually and show that the required actions can be completed within the required time.

During the audit process, the licensee stated that PSL Unit 1 ADVs are safety related air operated valves (AOVs) that fail closed on loss of instrument air. The FLEX FSG's will direct the operator to control SG pressure using the ADVs and to subsequently cooldown and depressurize the plant. The operator must align the backup nitrogen supply as follows:

1) The ADV backup nitrogen supply source will consist of two high pressure bottles. ADV operation is required for the duration of Phase 1 & 2 response, which is nominally 120 hours.
2) The backup nitrogen supply source is specified to last for the full mission time to reduce FLEX manpower requirements. A single bottle is expected to be sufficient for the entire period. The design accommodates bottle replacement if required.
3) ADV control circuits are non-safety related. No electrical power is required to operate Unit 1 AOVs while they are manually positioned with a hand loader.
4) Nitrogen backup system cylinders with a large cap over the cylinder outlet valve and quick disconnects, are permanently installed within the steam trestle in the vicinity of the ADVs. Quick disconnects are permanently installed between the valve positioner and actuator. A hand loader, fitting and hose to connect the cylinder outlet valve to the valve actuator are stored in a local FLEX cabinet. Operator actions will be as follows: Using the fittings in the FLEX cabinet to connect the hose from the handloader outlet and to the valve actuator. Use the handloader to introduce nitrogen into the operator, which will tend to open the AOV. This sequence will control the ADV based on SG level provided by sound powered phones or radios. Time validation for these actions will be performed and addressed in a future 6-month update.

The PSL Unit 2 ADVs are motor operated valves (MOVs) which will be manually adjusted by operators during Phase 1 and 2.

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

NEI 12-06, Section 1.3 states:

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

On page 76 of the Integrated Plan, the licensee stated that PSL will follow technical basis as described in WCAP-17601-P. If any deviations from WCAP-17601-P are identified, site specific analyses will be performed to provide the technical basis for any strategies, assumptions, acceptance criteria, time constraints or other deviations from WCAP-17601-P. In the August 2013 update, the licensee stated that they will provide additional technical basis for

WCAP-17601-P deviations in support of the mitigating strategies. These analyses will be provided during six month updates to the Integrated Plan.

During the audit process, the licensee provided a discussion regarding comparison of the WCAP analysis as it relates to PSL. The licensee provided a review that identified and evaluated important parameters and assumptions to demonstrate the WCAP analysis is appropriate for simulating the ELAP transient for PSL Units 1 and 2.

The licensee stated that WCAP Section 4.1.2.1, “Case Matrix”, Table 4.1.2.1-1 represents the WCAP Combustion Engineering case matrix. Additionally shutdown margin cases 25 and 30 represent PSL 1 and 2 at extended power uprate (EPU) conditions, solid plant case 31 represents PSL1 at EPU conditions (common assumptions are applicable to both units), and core uncovery cases 0 and 32 represent PSL1 and 2. Also regarding WCAP section 4.1.2.2 “CENTS Codes and Models”, the CENTS code is used in the ELAP analysis of CE designed plants.

The licensee stated that regarding WCAP Section 4.2.1, “Input Assumptions” that; Decay heat is per ANS 5.1-1979 +2 sigma or equivalent, emergency feedwater will be provided symmetrically to all steam generators, if possible accumulators will be isolated at an appropriate time, reactor vessel head voiding will be ignored, best estimate physics data will be used, there is an unlimited source of AFW available, and degradation of the TDAFW pump is not considered.

The licensee provided additional discussion in the audit process regarding applicable sections of WCAP-17601-P which addressed the following topics and provided a discussion of their applicability to PSL.

- Section 4.2.3 “Combustion Engineering Unique Assumptions”
- Section 4.2.3.2.1 “Safety Injection Tank Data”
- Section 4.2.3.2.2 “Physics Parameters Data”
- Section 4.2.3.2.3 “Operator Actions”
- Section 4.2.3.2.4 “RCS Heat Loss”
- Section 4.2.3.2.5 “Auxiliary Feedwater System”
- WCAP Section 4.4 “RCP Seal Leakage Assumptions” and the applicability of WCAP Section 4.4.2 “Combustion Engineering Designed NSSS”
- WCAP Section 5.2.3 “Combustion Engineering Designed NSSS - Reference Coping Times”
- WCAP Section 5.5 “Combustion Engineering Cooldown And Depressurization”
- WCAP Section 5.6 “SIT Injection For RCS Boration And Makeup Isolation/Venting To Prevent Gas Injection Into The RCS”
- WCAP Section 5.7 “RCS Response With Little Or No RCS Leakage”
- WCAP Section 5.8 “Re-Criticality With Lowered RCS Temperature”

The license was requested to: 1) clarify whether they intend to cooldown the plant using less than all SG’s, 2) provide a discussion of how the temperature consideration of an idle loop will be addressed, 3) discuss what precautions are to be taken by operators with respect to loop stagnation and cooldown with respect to preserving RCP seals, and 4) discuss what precautions will be taken to maintain appropriate sub-critical margins in the reactor during cooldown

During the audit process, the licensee stated that PSL will perform a symmetrical natural circulation cooldown using all RCS loops in the primary ELAP strategy. The safety-related TDAFW pump will be used to feed both SG's, and safety related ADV's will be used to steam both SG's. FLEX connections for use of the backup FLEX SG pump are located in a manner such that pump flow can be directed to both SGs.

Section 3.2 of WCAP-17601-P discusses the PWROG's recommendations that cover following subjects for consideration in developing FLEX mitigation strategies: (1) minimizing RCP seal leakage rates; (2) adequate shutdown margin; (3) time initiating cooldown and depressurization; (4) prevention of the RCS overfill; (5) blind feeding an SG with a portable pump; (6) nitrogen injection from SITs, and (7) asymmetric natural circulation cooldown (NCC). The licensee was requested to discuss their position on each of the recommendations discussed above for developing the FLEX mitigation strategies, and additionally to list the recommendations that are applicable to the plant, provide the rationale for the applicability, address how the applicable recommendations are considered in the ELAP coping analysis, and discuss the plan to implement the recommendations. Also, the licensee was requested to provide the rationale for each of the recommendations that are determined to be not applicable to the plant.

The licensee provided the following response to the seven questions noted above:

1) St Lucie currently credits controlled bleed-off (CBO) isolation in a 20 minute timeframe as provided for by an early step in the SBO procedure, EEOP-10, to support the 8 hour SBO coping time. To support FLESX strategies, PSL will enhance EOP's in a manner to credit CBO isolation in 10 minutes.
2) Review of physics parameters on a cycle by cycle basis will ensure adequate shutdown margin is provided.
3) PSL will perform a symmetric cooldown natural circulation cooldown and depressurization in the 2-6 hour timeframe at a nominal rate of 75 degrees/hour to a SG pressure of 120 psia.
4) PSL will FSG's will provide guidance for rapid cooldown in the 2-6 hour timeframe and will provide guidance for safety injection tank (SIT) isolation.
5) PSL will provide FLEX SG pump for each unit sized for 300 gpm at SG pressure of 300 psig which bounds PSL SG decay heat makeup requirements.
6) PSL will arrest cooldown at an RCS pressure determined to prevent SIT nitrogen injection. If cooldown needs to be stopped, cooldown will be resumed once SIT's are isolated or vented to prevent nitrogen injection.
7) The safety-related TDAFW pump provides makeup to both SGs and safety related ADV's steam both SG's. The backup FLEX pump is capable of feeding both SG's through either primary or secondary FLEX connections.

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

The licensee has decided to use the CENTS computer code for simulating the Extended Loss of ac Power (ELAP) event. Although the NRC staff does acknowledge that CENTS has been reviewed and approved for performing non-LOCA transient analysis, the NRC staff has not examined its technical adequacy for simulating the ELAP transient. A generic concern associated with the use of CENTS for ELAP analysis arose because NRC staff reviews for previous applications of the CENTS code had imposed a condition limiting the code's heat transfer modeling in natural circulation to the single-phase liquid flow regime. This condition was imposed due to the lack of benchmarking for the two-phase flow models that would be LOCA scenarios. Because the postulated ELAP scenario generally includes leakage from reactor coolant pump seals and other sources, two-phase natural circulation flows may be reached in the RCS prior to reestablishing primary makeup. Therefore, the NRC staff requested that the industry provide adequate basis for reliance on simulations with the CENTS code as justification for licensees' mitigation strategies.

To address the NRC staff's concern associated with the use of CENTS to simulate two-phase natural circulation flows that may occur during an ELAP for the licensee and other Combustion Engineering (CE) designed PWRs, the Pressurized Water Reactor Owners Group (PWROG) submitted a position paper dated September 24, 2013, entitled "Westinghouse Response to NRC Generic Request for Additional Information (RAI) on CENTS Code in Support of the Pressurized Water Reactor Owners Group (PWROG)" (ADAMS Accession No. ML13297A174, Non-Publicly Available). This position paper provided a comparison of several small-break LOCA simulations using the CENTS code to the CEFLASH-4AS code that was previously approved for analysis of design-basis small-break LOCAs. The analyses in the position paper show that the predictions of CENTS were similar or conservative relative to CEFLASH-4AS for key figures of merit for natural circulation conditions, including the predictions of loop flow rates and the timing of the transition to reflux boiling. The NRC staff further observed the fraction of the initial RCS mass remaining at the transition to reflux boiling predicted by the CENTS code for the ELAP simulations in WCAP-17601-P to be (1) in reasonable agreement with confirmatory analysis performed by the staff with the TRACE code and (2) within the range of results observed in scaled thermal-hydraulic tests that involved natural circulation (e.g., Semiscale Mod-2A, ROSA-IV large-scale test facility). After review of this position paper, the NRC staff endorsed a resolution through letter dated October 7, 2013 (ADAMS Accession No. ML13276A555, Non-Publically Available). This endorsement contained one limitation on the CENTS computer code's use for simulating the ELAP event. That limitation and its corresponding Confirmatory Item number for this TER are provided as follows:

(1) The use of CENTS in the ELAP analysis for CE plants is limited to the flow conditions prior to reflux boiling initiation. The licensee is requested to address its compliance with the above limitation on the use of CENTS in the ELAP analysis. This has been identified as Confirmatory Item 3.2.1.1.A in Section 4.2.

The requested information includes providing a justification for how the initiation of reflux boiling is defined. Specifically, the CENTS-calculated flow quality at the top of SG U-tube should be provided for conditions when two-phase natural circulation ends and reflux boiling initiates. Also, the licensee should discuss how the applicable ELAP analyses meet the above limitation on the use of CENTS.

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

3.2.1.2 RCP Seal Leakage Rates

NEI 12-06, Section 1.3 states:

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

During an ELAP event, cooling to the RCPs seal packages will be lost and water at high temperatures will degrade seal materials, leading to seal leakages from the RCS. Without ac power available to the emergency core cooling system, the RCS inventory loss from the seal leakages for an extended time period will result in core inadequate cooling conditions. The ELAP analysis credits operator actions to align the high pressure RCS makeup sources and replenish the RCS inventory for maintaining the core covered with water. The effect of the seal leakage rates on the results of the ELAP analysis is that the greater values of the seal leakage rates will result in a shorter required operator action time for the operator to align the high pressure RCS makeup water sources.

The Integrated Plan stated that St. Lucie would modify the seals for the reactor coolant pumps of both units to include Flowserve Abeyance seal stages. By letter dated June 18, 2013, (ADAMS Accession No. ML13179A184) the licensee revised the PSL FLEX strategy to maintain the current Flowserve N-9000 RCP seal configuration. The licensee stated that the existing St. Lucie seal configuration is consistent with the N-9000 RCP seal configuration evaluated in WCAP-17601-P, "Reactor Coolant System Response to the Extended Loss of AC Power Event for Combustion Engineering NSSS Designs." The licensee noted that both St. Lucie units have excess flow check valves in the RCP controlled bleed off (CBO) lines and, additionally, have fail closed isolation valves to isolate the CBO leakage pathway, and that station blackout emergency operating procedures have an early positive step to isolate the CBO leak path on loss of seal cooling. As part of the revised RCP seal approach, St. Lucie will initiate the reactor coolant system cooldown to a steam generator pressure of 120 psia in a 2-6 hour timeframe as opposed to the 10-14 hour timeframe originally indicated in the Integrated Plan. This action conforms to WCAP-17601-P and eliminates the deviation previously indicated within Attachment 1B, “NSSS Significant Reference Analysis Deviation Table” of the Integrated Plan.

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 Combustion Engineering (CE) designed plants (with the exception of Palo Verde Nuclear Generating Station). Those limitations and the corresponding Confirmatory Item number for this TER are provided as follows:

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 (15 gpm/seal) discussed in the PWROG position paper addressing the RCP seal leakage for CE plants (Reference 2). If the RCP seal leakage rate used in the plant-specific ELAP analysis is less than upper bound expectation for the seal leakage rate discussed in the position paper, justification should be provided.

- Analyses in Support of the FLEX RCS Inventory Control Strategy

During the audit, the licensee stated that Cases 0 and 32 listed in Table 4.1.2.1-1 of WCAP-17601 are applicable to St Lucie 1 and 2, respectively, in support of its FLEX RCS Inventory Control Strategy. Both cases assumed that the RCP seal leakage rate is 15 gpm per RCP. Since the assumed flow rate of 15 gpm per RCP represents the maximum leakage allowed by the control-bleed-off (CBO) flow limiting check valves, and is compliant with the above limitation related to the RCP seal leakage rate used in the ELAP analysis for applicable CE plants, the NRC staff determined that the assumed leakage rate is acceptable. Cases 0 and 32 also assumed that the RCP seal leakage commences at the pressure in the RCS at the time subcooling in the RCS cold-legs is less than 50 degrees F. The condition to assume initiation of the RCP seal leakage is based on the information in Section 4.4.2 of WCAP 17601, which states that “the probability of seal failure greatly increases when there is less than 50 degrees F subcooling in the Cold Legs.” However, the licensee did not discuss whether the seal failure will occur or not when subcooling of the coolant in the RCS cold-legs is greater than 50 degrees F. The licensee should specify the seal leakage flow assumed for the ELAP from time zero to condition when subcooling in the RCS cold-legs decreases to 50 degrees F, and provide justification for the assumed leakage rate. This has been identified as Confirmatory Item 3.2.1.2.A in Section 4.2.

- Analyses in Support of the FLEX Containment Strategies

During the audit the licensee stated that its FLEX containment strategies assumed a leakage of 1 gpm per RCP. RCP seal leakage was assumed to start at time zero rather than at some time at which 50 degrees F subcooling in the RCS cold-legs cannot be maintained.

During the audit the licensee stated that St Lucie RCPs are Byron Jackson model 35x35x43/DFSS with Flowserve N-9000 seals. The RCP and seal design features contain the excess flow check valves to limit the flow to 15 gpm per RCP. In the St Lucie design of the RCP configurations there are two CBO flow paths. The primary CBO path is to the volume control tanks via a containment penetration. The inboard solenoid isolation valve fails closed on loss of power(for Unit 2, air operated valve (AOV), fails closed on loss of instrument air (IA)) and outboard AOV fails closed on loss of IA). Both valves receive a containment isolation signal to close. An alternate CBO path to the quench tank via an AOV is normally closed and fails closed on loss of AI. Its CBO design includes the ability to terminate all CBO flow, reducing the seal leakage to essentially zero, remotely from the main control room.

St Lucie currently credits CBO isolation in a 20 minutes timeframe (), as provided by an early step in the station blackout (SBO) procedure, EOP-10, to support an 8 hours SBO coping time.

To support FLEX strategies, St Lucie will revise EOPs in a manner to credit CBO isolation in 10 minutes. For an earlier CBO isolation, the vapor seal stage temperature remains 50 degrees F lower than the lower seal stage (300 vs. 250 degrees F). The lower temperature supports the lower probability of vapor stage seal failure.

Based on the CBO isolation design features discussed above, and the licensees plan to revise EOPs to direct operators to perform CBO isolation in the main control room within 10 minutes following the ELAP, the NRC staff determined that the leakage rate of 1 gpm per RCP assumed in the analysis for supporting the FLEX containment strategies is acceptable for an ELAP period after the CBO isolation.

Additionally, licensee did not discuss whether the seal failure will occur or not during the ELAP before the CBO isolation. The licensee should specify the maximum temperature and pressure, and minimum subcooling of the coolant of the RCS cold-legs during the ELAP before the CBO isolation, and justify the assumption that the integrity of the RCP seals can be maintained, and the seal leakage rate is less than 1 gpm per RCP during an ELAP before the CBO is isolated. This has been identified as Confirmatory Item 3.2.1.2.B in Section 4.2.

In the response, the licensee indicated that CBO isolation is performed remotely from the main control room by closure of redundant safety related failed closed valves. Time validation study results will be provided by the licensee as a part of a 6-month update.

- Revised Analyses in Support of the FLEX RCS Inventory Control Strategy

As discussed in Section 3.2.1.6 of this report, the licensee intends on developing a revised analysis regarding RCP seal leakage that will affect time constraints noted in the generic SOE. The discussion of the assumed RCP seal leakage rates used in the licensee's revised analysis should be provided to the NRC staff for review. This has been identified as Confirmatory Item 3.2.1.2.C in Section 4.2.

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

The licensee did address the applicability of assumption 4 from WCAP Section 4.2.1, Input Assumptions - Common to All Plant Types, on page 4-13 of WCAP-17601, which states that "Decay heat is per ANS 5.1-1979 + 2 sigma, or equivalent." The licensee was requested to provide a discussion regarding the decay heat model used in the ELAP is needed which specifies the values of the following key parameters used to determine the decay heat: (1) initial power level, (2) fuel enrichment, (3) fuel burnup, (4) effective full power operating days per fuel cycle, (5) number of fuel cycles, if hybrid fuels are used in the core, and (6) fuel characteristics are based on the beginning of the cycle, middle of the cycle, or end of the cycle. The licensee was requested to address the adequacy of the values used, and if a different decay heat model is used, describe the specific model and address the acceptability of the model and the analytical results.

During the audit process, the licensee stated that the ANS 5.1-1979 + 2 sigma decay heat model is applicable to PSL and is currently used in the design basis analysis for both units and that the WCAP model is adequate for use in ELAP applications. The licensee provided the following specific values that apply to both units:

- Power level - 3020 MWth
- Fuel enrichment - less than or equal to 4.6 w/o planar average U-235 (typical range is 3.8 to 4.5 w/o U-235)
- Fuel burnup - less than or equal to 62,00 MWD/MTU (PSL1) and 60,000 MWD/MTU PSL2) (typical assembly maximum is less than or equal to 55,000 MWD/MTU)
- Effective full power days - approximately 500 to 530 average (18 month cycle)

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 76 of the Integrated Plan, the licensee stated that PSL will follow technical basis as described in WCAP-17601-P. If any deviations from WCAP-17601-P are identified, site specific analyses will be performed to provide the technical basis for any strategies, assumptions, acceptance criteria, time constraints or other deviations from WCAP-17601-P. These analyses will be provided during six month updates to the submittal.

FPL has not completed a plant specific analysis and notes that the technical basis for strategies, assumptions, acceptance criteria and time constraint are described in WCAP-17601-P. No specific RCS or core parameters were provided.

During the audit process, the licensee stated that the WCAP analysis is applicable to PSL. The licensee stated that they evaluated the important parameters/assumptions and determined the WCAP analysis is appropriate for PSL.

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 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

In the Integrated Plan, the licensee stated that the following instrumentation is credited for ELAP analysis and to support strategy implementation:

- RCS T_{hot}
- RCS WR T_{cold}
- AFW Pump Flow
- SG Pressure
- SG Level
- Unit 1/2 CST Level
- DC Bus Voltage

The licensee provided that the following additional instrument loops are available to assist monitoring plant parameters:

- RCS Wide Range Pressure
- Source Range Neutron Flux
- Containment Pressure
- SIT Levels
- Pressurizer Level
- Containment Temperature
- Reactor Water Levels
- Core Exit Thermocouples
- Neutron Monitoring

The licensee did not provide justification that the instrumentation listed and the associated indications are reliable and adequate to provide the desired functions on demand during the ELAP with the containment harsh conditions at high moisture, temperature and pressure levels.

During the audit process, the licensee stated that loss of all ac causes an initial increase in containment parameters to 2 psig/180 degrees F followed by a much more gradual rise to peak conditions of 4 psig/195 degrees F at 120 hours. Humidity is taken at 100%. Additionally the licensee stated that all instruments are environmentally qualified (EQ) for design basis accidents. Also due to licensing differences, PSL 1 and 2 have slightly different design basis EQ profiles. The licensee noted that for Rosemount pressure transmitters are generically rated for a temperature of 240 degrees F for 21 hours and 176 degrees for 30 days. The licensee stated that while not completely enveloped by the ELAP event there is reasonable assurance the transmitters will function for the event duration.

Section 3.3.3 of this TER provides a discussion of the results of the MAAP analysis that was conducted to determine the containment response with respect to design pressure of 44 psig and design temperature of 264 degrees F. From the above statements Rosemount containment pressure transmitters are apparently not rated (environmentally qualified) for the maximum containment temperature rating of 264 degrees F. The licensee should provide additional information regarding their conclusion that there is reasonable assurance that the Rosemount pressure transmitters will continue to function thru all phased of the ELAP. This has been identified a Confirmatory Item 3.2.1.5.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 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 8 thru 14 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. The licensee stated that this section presents a generic timeline for Modes 1-5 with steam generators available and a list of additional actions required when plant is in Mode 6 and 5 without steam generators.

The licensee provided a generic SOE time line as noted on pages 8-14 and in Attachment 1A of the Integrated Plan, but has not completed all of the final analysis as noted in the fifteen (15) time validation studies/pending actions. Required Action times were noted as a range of times rather than specific values. The licensee intends to develop a revised analysis regarding RCP seal leakage that will affect time constraints noted in the generic SOE. The results of the licensee’s revised analysis should be provided to the NRC staff for review. This has been identified as Confirmatory Item 3.2.1.6.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 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 reviewed the licensee’s Integrated Plan and determined that the Generic Concern related to shutdown and refueling requirements is applicable to the plant. This Generic Concern has been resolved generically through the 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 process, the licensee stated that PSL will abide by the NEI position paper (generic resolution) addressing mitigating strategies in shutdown and refueling modes. 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 cold shutdown or refueling strategies, if these requirements are implemented as described.

3.2.1.8 Core Sub-Criticality

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

> All plants provide means to provide borated RCS makeup.

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 this licensee.

The 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 is identified as Open Item 3.2.1.8.A in Section 4.1.

On page 8 of the Integrated Plan, the licensee stated that a deviation from NEI-12-06 Section 3.2.2(13) is being taken with respect to use of a charging pump for RCS makeup and boration. Section 3.2.2(13) addresses the transition from Phase 1 installed equipment to Phase 2 equipment and stipulates that portable pump capability is required for RCS makeup. Table D-1, allowing repowering of charging pumps only, is inconsistent with this requirement.

The licensee stated that per NEI response on FLEX Guidance Inquiry Form 2013-06, Table D-1 would allow a strategy of re-powering an installed charging pump as the Phase 2 strategy without requiring a portable pump, and that either strategy should be an acceptable strategy but if the strategy to re-power a charging pump is selected, then the Integrated Plan submittal should justify its acceptability and note that a deviation from Section 3.2.2(13) is being taken.

The licensee stated that the PSL RCS Inventory coping strategy relies on repowering one of three installed charging pumps in each unit. Each charging pump motor breaker will be capable of being powered on its input and load sides from a 480 VAC FLEX generator. The proposed use of portable generators to repower installed charging pumps is an alternative approach to NEI 12-06. This places greater reliance on the current state of knowledge of external hazards, which are being re-examined pursuant to NTTF Recommendation 2.1. New information from that effort may necessitate changes in the degree of protection afforded the pre-staged generators and associated equipment in order to maintain the guidance and strategies required by EA-12-049. Additional information is needed from the licensee to determine whether the proposed approach provides an equivalent level of flexibility for responding to an undefined event as would be provided through conformance with NEI 12-06, including provision of connection points for the use of portable pumping sources from off-site should the installed equipment be rendered unavailable by the initiating event. This is identified as Open Item 3.2.1.8.B in Section 4.1.

Additionally during the audit process, the licensee was requested to discuss various issues with boron mixing models and maintaining sub criticality during an ELAP. The licensee responded by stating that the PSL strategy review determined that SIT injection resulting from the 2-6 hour cooldown to 120 psia SG pressure provides sufficient boration to maintain 1% shutdown margin with all rods in and xenon free conditions for an RCS cold leg temperature of greater than 300 degrees F. Additional boration is required prior to further cooldown in Phase 3. The required boration will be provided in T+10 hours timeframe once the FLEX 480 V DG is operational. Boration at the time will provide ample time for mixing to occur within the RCS. The licensee stated that PSL will monitor further industry work concerning boron mixing models and will adjust the FLEX strategy as appropriate. This is has been identified as Confirmatory Item 3.2.1.8.C in Section 4.2.

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

3.2.1.9 Use of Portable Pumps

NEI 12-06, Section 3.2.2, Guideline (13), provides the following guidance:

> 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 RCS/SG makeup requires a transition and interaction with installed systems. For example, transitioning …. to a portable pump for SG makeup may require cooldown and depressurization of the SGs in advance of using the portable pump connections. Guidance should address both the proactive transition from installed equipment to portable and reactive transitions in the event installed equipment degrades or fails. Preparations for reactive use of portable equipment should not distract site resources from establishing the primary coping strategy. In some cases, in order to meet the time-sensitive required actions of the site-specific strategies, the FLEX equipment may need to be stored in its deployed position.
>
> The fuel necessary to operate the FLEX equipment needs to be assessed in the plant specific analysis to ensure sufficient quantities are available as well as to address delivery capabilities.

NEI 12-06 Section 11.2 states in part:

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

On page 24 of the Integrated Plan, the licensee stated that as a baseline capability for reactor core cooling for Phase 2 a portable diesel driven pump (SG FLEX pump) will be deployed for injection into the steam generators in the event that the TDAFW pump fails. Implementing this capability requires depressurizing the steam generators to allow for makeup with the SG FLEX pump. To allow for defense-in-depth actions in the event of an unforeseen failure of the TDAFW pump, the portable SG FLEX pump for the Phase 2 core cooling will be staged and made ready as resources are available following the BDBEE. The SG FLEX Pump will be staged at a location near the CST. The supply for the SG FLEX pump will be the CSTs. Modifications will provide connection points for connection of the SG FLEX pump to the CST.

The Integrated Plan stated that St. Lucie would modify the seals for the reactor coolant pumps of both units to include Flowserve Abeyance seal stages. By a letter dated June 18, 2013, (ADAMS Accession No. ML13179A184), the licensee revised the St. Lucie FLEX strategy to maintain the current Flowserve N-9000 RCP seal configuration. As part of the revised RCP seal approach, St. Lucie will initiate the reactor coolant system cooldown to a steam generator pressure of 120 psia in a 2-6 hour timeframe as opposed to the 10-14 hour timeframe originally indicated in the Integrated Plan. This action is compliant with WCAP-17601-P and eliminates the deviation previously indicated within Attachment 1B, NSSS Significant Reference Analysis Deviation Table of the Integrated Plan.

During the audit process, the licensee was requested to provide a discussion regarding the analyses that were used to determine the required flow rates and corresponding pressures of the SG FLEX portable pump which should include a discussion of the computer codes/ methods and assumptions used in the analyses, and that addresses the adequacy of the computer codes/methods and assumptions. If the decay heat model used is not the ANS 5.1-1979 + 2 sigma model, a discussion is needed for the model that addresses its adequacy for the intended use. Also, provide information to show that the required capacity of the SG FLEX portable pump is sufficient for use in maintaining core cooling and sub-criticality during phases 2 and 3 of ELAP.

The licensee responded that the required integrated flow rate for the first 24 hours to remove decay heat and sensible heat is calculated based on the formula in Section 5.2.2 of the WCAP-17601-P Rev. 1 using NOTRUMP code which were performed per ANS 5.1 1979 +2 sigma decay heat model. The licensee needs to provide the justification for using the NOTRUMP computer code to determine the required integrated flow rate to remove decay heat and sensible heat. This has been identified as Confirmatory Item 3.2.1.9.A in Section 4.2.

The licensee also stated the since there were no applicable values provided from the WCAP CENTS runs the required makeup flow beyond 24 hours was based on a PSL site specific calculation (WOG MUHP-2315). Makeup for the sensible heat due to cooldown was allocated over a 4hour period in the 10 to 14 hour time frame. To address the revision in FLEX strategies a calculation revision will reallocate the sensible makeup requirement to the 2-6 hour time frame. PSL decay heat load requires makeup flows ranging from 214.3 gpm to 117.8 gpm for the first 8 hours. A backup strategy uses a portable FLEX SG pump to provide 300 gpm and 300 psig SG pressure on guidance within WCAP-17601. The FLEX SG pump nominally produces 400 psig to accommodate elevation changes and hose loses with design margin. The FLEX SG pump flow rate is sufficient for maintaining core cooling. The results of the licensee's revised calculation discussed above should be provided for the NRC staff to review. This has been identified as Confirmatory Item 3.2.1.9.B in Section 4.2.

The licensee stated that time validation studies will be conducted to justify the time and resources required for the deployment of the SG FLEX pumps for steam generator makeup.

On page 32 of the Integrated Plan, the licensee stated that Phase 3 strategies for all modes of RCS cooling will be to establish Shutdown Cooling (SDC) which will require an RRC pumping system capable of cooling the SDC Heat Exchanger and a RRC 4.16 KVAC diesel generator to power CCW and Low Pressure Safety Injection (LPSI) pumps. Additionally in the 6-month update the licensee stated that the Integrated Plan indicated a pump would be provided from the RRC to replace the function of the Intake Cooling Water Pumps due to the LUHS event. The design point of the SAFER RRC pump is subject to final procurement but is expected to be 5000 gpm at 150 psi. The LUHS pump criteria mentioned in the Integrated Plan, 7162 gpm @ 90 psi, will be altered to align with SAFER provided equipment and demonstrated to be sufficient for the purpose of reinstating Phase 3 Shutdown Cooling. The revised LUHS pump criteria and the associated analysis supporting their adequacy for the purpose of reinstating Phase 3 Shutdown Cooling should be provided to the NRC staff for review. This has been identified as Confirmatory Item 3.2.1.9.C in Section 4.2

Section 3.2.4.7 Portable Equipment Fuel, below addresses the fuel necessary to operate the FLEX equipment needs. The discussion in this section provides reasonable assurance that sufficient quantities of fuel as well as delivery capabilities are available.

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 listed in this section, and Open Item 3.2.1.8.B, provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to use of portable pumps, if these requirements are implemented as described.

3.2.2 Spent Fuel Pool Cooling Strategies

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

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

NEI 12-06, Section 3.2.1.1 provides the acceptance criterion for the analyses serving as the technical basis for establishing the time constraints for the baseline coping capabilities described in NEI 12-06, which provide an acceptable approach to meeting the requirements of EA-12-049 for maintaining SFP cooling. This criterion is keeping the fuel in the SFP covered. On page 50 and 51 of the Integrated Plan the licensee stated that during the BDBEE, the following conditions are assumed for SFP cooling:

1. All SFP boundaries are intact, including the liner, gates, and transfer canals
2. Although sloshing may occur during a seismic event, the initial loss of SFP inventory does not preclude access to the refueling deck around the pool.
3. Unit 2 Seismic Category 1 SFP Cooling system is intact, including attached qualified piping. Unit 1 SFP cooling system is not seismic and, therefore, is not credited.
4. SFP heat load assumes maximum design basis full core offload heat load for the site.
5. Spent Fuel Pool cooling strategies are the same for Modes 1 through 6.

On page 9 of the Integrated Plan, the licensee stated that the FLEX SFP coping strategy is reliant upon onsite personnel actions include securing open all FHB doors, opening the large L-shaped door and staging hoses for portable makeup or spray from the SFP FLEX pump. Additionally, the L-shaped door can be opened without power being available and plant procedures address methods to accomplish this task. The open FHB doors will provide a ventilation pathway for steam from the SFP in addition to a pathway for laying hoses. Further evaluation has been completed and ensures the L-shaped door can be opened in the required time frame. During the audit process, the licensee was requested to provide a discussion of how this vent path for steam and condensate for the FHB would allow adequate venting, as no elevation drawings were included in the Integrated Plan.

During the audit process, the licensee stated that the L-shape door is 400 sq-ft. used to transfer spent fuel casks and it penetrates the wall and roof at elevation 96.8 ft. The floor elevation surrounding the SFP is at elevation 62 ft. At the south end of the SFP pool area (at the 62 ft. elevation) is a 6 ft. by 30 ft. doorway which allows for air circulation through the area and out of the I-shaped opening. Other doors in the FHB can be opened to provide access and additional ventilation.

The fuel transfer tube path between containment and the spent fuel pit, if open, will be closed to separate the two areas and prevent introduction of unborated seawater into the refueling cavity from the SFP. Closure of the fuel transfer tube path can be accomplished either by installation of the transfer tube blind flange located within containment or closure of V41-11, isolation valve.

All refuel floor hoses will be pre-staged in Phase 1 and will only require final connections at grade elevation in Phase 2 to provide flow paths for hose makeup or spray. These are makeup hoses to be placed on the refuel floor and spray hoses/portable monitor hoses to be staged on the refuel floor.

On page 52 and 53 of the Integrated Plan, the licensee stated that deployment of Phase 2 SFP Cooling equipment that will become hampered by habitability issues will be staged in Phase 1. These are makeup via hoses on the refuel floor, spray capability via hoses and portable monitor nozzles on the refuel floor and a vent pathway for steam from the SF. All hoses will be pre-staged in Phase 1 and will only require final connections at grade elevation in Phase 2 to provide flow paths for hose makeup or spray.

The licensee Also stated that for hose makeup, two alternate baseline capabilities exist. One makeup is provided via hoses on the refuel floor (Elevation 62 ft.) and the other makeup is provided via a hardened makeup connection with discharge at a point above the SFP.

- The makeup hose will be routed from grade elevation near the supply hose, into the FHBs via access through the roll-up door (at grade elevation), up through the stairwell located on the east side of each FHB, and over the side of the SFP.
- For the hardened makeup line, an existing 2 1/2" ICW line is located on the east outside wall of each FHB. This line is flanged for potential connection of a hose providing water from the ultimate heat sink. The 2 1/2" line will be modified to provide missile protection.

Additionally the licensee stated that for spray, a hose will be routed similarly to the above described makeup hose routing, and to ensure complete fuel coverage, one spray monitor will be placed in three of the four corners of the pool. The licensee stated that this setup guarantees full spray coverage of the pool and fuel, where the spray strategy results in overspray.

Based on the Phase 2 SFP conditions (e.g., whether pool is intact, actual water level), personnel will choose either a makeup or spray flow path and then connect the necessary hose to a 200% capacity SFP FLEX pump.

Using the worst case design basis heat load and worst case fuel offload timing, the Unit 1 SFP will take 3.3 hours to boil and 19.3 hours to reach the level that provides 15 ft. of water coverage above the irradiated fuel and require approximately 76 gpm of makeup water to mitigate boil-off.

For a Unit 2 worst case design basis heat load and worst case fuel offload timing, it will take 3.1 hours to boil and 17.1 hours to reach the level that provides 15' of water coverage above the irradiated fuel and require approximately 85 gpm of makeup water. Due to the SFP boil-off rates, the Unit 1 SFP fuel would be uncovered in 49.3 hours and the Unit 2 SFP fuel would be uncovered in 43.5 hours.

In most cases, the establishment of SFP cooling is not a time critical event. Based on the worst case design basis heat load and worst case fuel offload timing addressed above, makeup and spray hoses will need to be staged early in the event. This case will occur when additional refueling personnel are available and can readily focus on establishing SFP cooling as neither containment integrity nor core cooling actions are required.

Makeup flow rates are bounded by the overspray requirement of 250 gpm. Note that the B.5.b engineering evaluation considers a required flow rate of 200 gpm and does not consider overspray; use of 250 gpm per pool for overspray is bounding for FLEX purposes.

The minimum flow rate for the 200% SFP FLEX pump is 500 gpm at a discharge head high enough to overcome line losses and the 42.5 foot elevation change. Borated water is not required to maintain sub-criticality. The SFP FLEX pump will be staged to take suction from the intake canal in accordance with the current licensing basis. The seawater makeup strategy will include periods of overfeed to mitigate seawater concentration issues within the SFP.

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.

On page 43 of the Integrated Plan, the licensee stated that for scenarios with steam generators removing core heat, no specific coping strategy is required for maintaining containment integrity during Phase 1, 2 or 3. The only action necessary is to monitor containment pressure and temperature to verify that RCS leakage is minimal. Containment conditions are monitored during performance of Safety Function Status Checks of EOP-10. Containment pressure and temperature will be available via normal plant instrumentation.
Review of once-through-cooling scenarios for Modes 6 & 5 without steam generators indicates containment venting will be required during Phase 2 to prevent exceeding containment design conditions. This is addressed in section 3.2.1.7 of this TER.

The licensee also stated that the containment is normally isolated per plant technical specifications. Most containment isolation valves are normally closed or fail closed on loss of power. As the BDBEE results in a loss of power and no valve failures are assumed the containment is assumed to be completely isolated following the event.

Additionally, the licensee stated that steam generators will remove the majority of core decay heat from containment, containment pressure and temperature will slowly rise due to RCS leakage and direct heat transfer, and heat loss from containment is not significant without operation of containment sprays or the cooling fan system. A MAAP analysis was conducted to determine the containment response with respect to design pressure of 44 psig and design temperature of 264 degrees F.

The licensee provided strategies to maintain containment cooling and used MAAP analysis to determine maximum expected containment pressures and temperatures for the ELAP conditions. However the licensee has changed plans regarding installation of newer Flowserve N-9000 RCP seals which will affect the MAAP analysis assumptions e.g., potentially higher RCP seal leakage. The FPL referenced MAAP analysis document was not available for review. The licensee was requested to provide the supporting details and information regarding MAAP analysis used to establish the containment temperatures and pressures assumed in the containment functions analysis.

During the audit process, the licensee stated that the containment MAAP analysis assumes a 1 gpm/RCP seal leakage rate based on the expected performance of the N-9000 seal with early CBO isolation and RCS cooldown and depressurization within 6 hours. The licensee provided FPL064-CALC-003, "MAAP Containment Analysis" on the E-portal. The licensee stated that the PSL MAAP4 RCS model consists of a 2-loop primary system model, pressurizer and 2-region SG model out to the Main Steam Isolation Valves (MSIV). The containment is modeled with 7 nodes and 13 flow junctions that connect theses nodes for mass and energy transfer.

In addition to the containment model, the PSL MAAP4 model includes the effects of concrete and steel heat sinks that exist within each node. Additionally, the parameter QCO contained in the PSL MAAP4 parameter file discusses the convective heat losses under nominal conditions from the steam generators, pressurizer and the remainder of the primary system to the containment. The mass/energy boundary conditions for the RCP seals refer to the implementation of safe shutdown RCP seals and assumed a 1 gpm per RCP seal +1 gpm of unidentified leakage sources.

The licensee stated that a potential issue with high containment temperatures in ELAP conditions is steam generation within the cooling water circuit of a containment fan cooler (CFC). As addressed in NRC Generic Letter 96-06, steam generation is adverse as it can lead to water hammer events on reinitiating cooling water system flow. The licensee stated that for the assumed 1 gpm/seal leakage rate, the containment temperature of less than 200 degrees F will not lead to steam generation within the water circuit.

On page 46 of the Integrated Plan, the licensee stated that no specific coping strategy is required for maintaining containment integrity during Phase 2 or 3. Any unexpected rise in containment parameters can be addressed by methods discussed below. During the audit process, the licensee was requested to provide a discussion of the analysis used to determine the strategies and time requirements for actions beyond 7 days to reduce containment pressure and temperature. In response the licensee stated that MAAP analysis indicates that loss of all ac causes an initial increase in containment parameters to 2 psig/180 degrees F followed by a much more gradual rise to peak conditions of 4 psig/195 degrees F at 120 hours (end of the analysis). The licensee further stated that Phase 3 containment strategy of events with steam generators available will restore CCW flow and power to two CFC fans to cool containment. Additionally, the timing of these actions is not critical as containment parameters are increasing gradually and at 120 hours remain well below containment design criteria.

On page 48 of the Integrated Plan, the licensee stated that the Phase 3 strategies for all modes of Maintain Containment will be to establish SDC operation so that once-through-cooling, with its discharge to the containment atmosphere, can be terminated, and that this requires an offsite pumping system from the RRC capable of removing heat from the reactor core and a large 4.16 KVAC diesel generator. The RRC equipment will allow ICW, CCW and SDC systems to be placed in service for eventual transition to core off load for inspection.

No additional specific phase 3 strategy is required for maintaining containment integrity. Continue with Phase 2 strategy for maintaining a vented containment. With the initiation of SDC to remove core heat, the containment will depressurize without further action. Aggressive containment cooling (i.e., initiation of containment spray) will be avoided due to containment vacuum concerns. Further review of safeguard equipment initiation with respect to the containment vacuum analysis is required. CCW flow to the containment coolers can be re-established with existing plant equipment after the cooling water circuits have time to cool.

For the Mode 5 and 6 conditions, the licensee stated that for the mid-loop condition, insufficient makeup flow is provided for a containment pressure above 8.2 psig and for a closed containment, the MAAP analysis indicates that, from the onset of boiling, a closed containment will pressurize to 8.2 psig within 4 hours. However, FPL stated that venting containment through an 8 in. vent line at one hour maintains the pressure below 5 psig. The licensee did not specify the 8-in. vent path to be used to maintain containment pressure below 5 psig.

During the audit process, the licensee stated that the PSL containment venting strategy for this condition has evolved to provide a vent path through the 30-inch escape air lock to the FHB. The airlock can be opened without the use of ac power at direction from the Control Room.

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 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 licensee did not provide sufficient information regarding cooling functions provided by such systems as auxiliary building cooling water, service water, or component cooling water cooling when ac power is lost during the ELAP for Phase 1 and 2. For example, the potential need for cooling water for the TDAFW pump bearings was not discussed. Additional information was required of the licensee to determine the acceptability of FPL's plans to provide supplemental ventilation and cooling to the subject areas when normal cooling will not be available during the ELAP. Additionally, the licensee was requested to address whether a BDBEE would adversely affect the TDAFW pump recirculation line to the extent that it could become pinched or severed, hence adversely affection the steam traps resulting in a turbine trip.

During the audit process, the licensee stated that plant equipment used during Phase 1 and 2 do not require ventilation or auxiliary cooling. The TDAFW pump is located in an outdoor seismic/missile protected location (steam trestle) not requiring ventilation cooling. The TDAFW pump bearings, the charging and boric acid mix tank pumps do not rely on external cooling systems.

The licensee also indicated during the audit process that the TDAFW pump mini-recirculation lines for both units are safety-related and run underground or are contained within qualified structures hence there is reasonable assurance the lines will not be damaged. Additionally, on Unit 1 a steam trap is provided to maintain the steam lines to the TDAFWP turbine hot and remove condensed water. On Unit 2, this function is provided by throttled valves. For both units, the subject lines are routed with in the qualified steam trestle and discharge to the ground locally within the trestle. The licensee concluded that there is reasonable assurance that a TDAFW pump will not trip due to water slugs within the steam lines during an ELAP.

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 equipment cooling water systems, if these requirements are implemented as described.

3.2.4.2 Ventilation – Equipment Cooling

NEI 12-06, Section 3.2.2, Guideline (10) provides that:

> *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, 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 degrees 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, the licensee stated that the temperature in electrical equipment rooms (EER) 1A, 1B, and 1C following an ELAP condition was evaluated. The purpose of this evaluation was to determine if any recovery actions will be required to maintain operability of the equipment in the EER's. The results of this evaluation indicated that the maximum temperature in any one of the EER's is approximately 129 degrees F. Appendix F of NUMARC 87-00 states that most equipment outside of containment is expected to operate in temperatures not to exceed 150 degrees F for a duration of 4 hours. There is no generic industry guidance on equipment operability for the longer 72 hour ELAP scenario. A more detailed evaluation will be performed to justify operation up to a temperature of 129 degrees F for 72 hours or portable fans will be provided. This has been identified as Confirmatory Item 3.2.4.2.A in Section 4.2.

The licensee stated that other areas of the RAB do not require supplemental ventilation to support equipment function or habitability post-BDBEE as they will contain little energized or heated equipment. Air flow may be accomplished by opening of doors for cross-flow ventilation. 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 stated that the TDAFW pump is located in an outdoor environment within the qualified steam trestle. No ventilation fans are required for safety related design functions or post ELAP conditions.

The areas of the plant that would most likely be affected by loss of ventilation and cooling systems are the ones that will be necessary to be occupied Main Control Room (MCR) during the ELAP or will require ventilation for situations like hydrogen generation in the battery rooms.

Without ventilation the MCR would most likely heat up. If temperatures approach a steady-state condition of 110 degrees F, the environmental conditions within the MCR would remain at the uppermost habitability temperature limit defined in NUMARC 87-00 for efficient human performance. NEI 12-06, Section 3.2.1.8 states that the loss of HVAC can be addressed consistent with NUMARC 87-00, which provides the technical basis for this habitability standard as MIL-STD-1472C. MIL-STD-1472C concludes that 110 degrees F is tolerable for light work for a 4 hour period while dressed in conventional clothing with a relative humidity of approximately 30%. FPL did not supply sufficient information to conclude that the habitability limits of the MCR will be maintained in all Phases of an ELAP.

During the audit process, the licensee stated temperatures in vital areas will be monitored and compensatory actions (opening doors, installing temporary ventilation) will be taken as necessary to limit temperature rise. Some doors will be pre-emptively opened within 2 hours. Heatup evaluations provide reasonable evidence to support the expectation that sufficient time will be available to deploy and required temporary ventilation. Additionally the MCR temperature rise will be mitigated by opening doors. Portable fans will be staged nearby to provide ventilation. These actions coupled with electrical load shedding will maintain habitable conditions within the MCR. Preliminary calculations indicate a MCR temperature rise to 110 degrees F in 72 hours. The long time frame provides ample time to implement aggressive compensatory actions. PSL personnel receive heat stress training and heat stress which will be mitigated by personnel rotation, ice packs and adequate cool drinking water. The licensee stated that there is reasonable assurance that MCR habitability conditions will be maintained and MCR personnel will take actions to address unforeseen temperature extremes. Additionally, past ventilation outages provide experience that a sudden loss of MCR ventilation will not result in inhabitable conditions.

With no ventilation for the battery rooms, hydrogen gas building could become an issue. As the strategy for providing ventilation to the battery room has not been developed, additional discussion on the hydrogen gas exhaust path is needed, and a discussion of the accumulation of hydrogen with respect to national standards and codes which limit hydrogen concentration to less than 2% (IEEE Standard 484 as endorsed by Regulatory Guide 1.128, “Installation Design and Installation of Vented Lead-Acid Storage Batteries for Nuclear Power Plants”) and less than 1% (National Fire Code) when the batteries are being recharged during Phase 2 and 3.

The licensee was requested to provide a discussion of battery room ventilation to prevent hydrogen accumulation while recharging the batteries in phase 2 or 3, which should include a description of the exhaust path if it is different from the design basis. The licensee was also requested to provide information on the adequacy of the ventilation provided in the battery room to protect the batteries from the effects of elevated or lowered temperatures.

During the audit process, the licensee stated that the design basis battery room roof exhausters will be powered when the battery chargers are placed in operation powered by the same 480 Vac FLEX diesel generators to provide ventilation consistent with normal ventilation. The design basis of the exhausters is 810-1060 cfm. During normal operations the RAB HVAC system is designed to limit the maximum inside air temperature below 104 degrees F. An increase in temperature above normal conditions would not result in an increase in battery capacity. The licensee also stated that an increase in electrolyte temperature has been shown to not appreciably affect the magnitude of short circuit current delivered by the battery per IEEE-946. Elevated temperatures would only have a long term effect on battery life. Extreme cold conditions do not apply to PSL as discussed in Section 3.1.4.1 of this TER.

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 stated that the TDAFW pump is located in an outdoor environment within the qualified steam trestle. No ventilation fans are required for safety related design functions or post ELAP 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 Item, 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.

In the Integrated Plan, the licensee did not discuss the effects of loss of power to heat tracing or if heat tracing was required. During the audit process the licensee stated that the BAMT maximum boron concentration (3.5 weight %) has a solubility limit of 50 degrees F. PSL design basis conditions do not require heat tracing of safety related systems and heat tracing systems are not utilized for piping systems from the BAMT. BAMT and boric acid delivery systems to the RCS are located with the RAB. Due to the south Florida sub-tropical location, the RAB has no heating system. Cold weather cycles are rather short and RAB temperatures remain relatively stable due to thermal inertia and internal heat loads.

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

3.2.4.4 Accessibility – Lighting and Communications

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

> *Plant procedures/guidance should identify the portable lighting (e.g., flashlights or headlamps) and communications systems necessary for ingress and egress to plant areas required for deployment of FLEX strategies.*

> Areas requiring access for instrumentation monitoring or equipment operation may require portable lighting as necessary to perform essential functions.
>
> Normal communications may be lost or hampered during an ELAP. Consequently, in some cases, portable communication devices may be required to support interaction between personnel in the plant and those providing overall command and control.

On pages 59 and 60 of the Integrated Plan, the licensee stated that following load shedding, MCR lighting will be provided using portable battery operated lighting. The portable lighting will be stored in designated lockers adjacent to the MCR where it is protected from external hazards and close to the deployment location.

FPL noted that communication and lighting equipment would be provided in accordance with vendor and Electric Power Research Institute (EPRI) guidelines. No specific details were provided regarding this equipment, except lighting for the MCR as noted above. On page 80 of the Integrated Plan, FPL noted in Figure 3, PSL FLEX Electrical Connections (Phase 1-3 Strategy Table), that emergency lighting and plant communications would be powered from the 480 Vac FLEX portable generators. The SOE timeline on page 74, Action Item 5 notes that the 480 Vac generator will be deployed and connected between 6-8 hours into the event. No discussion was provided of the first 6-8 hours of the ELAP. The licensee was requested to provide a discussion of the availability of installed lighting and communications equipment and/or if additional portable lighting or communications equipment is needed prior to the connection of the 480 VAC portable generators.

The licensee responded that to facilitate safe access to plant areas during the ELAP, flashlights and headlamps are currently available for operators with duties outside the MCR as well as the Appendix R cabinets credited emergency portable lights located throughout the units. Lighting for the MCR noted above will be powered via 120V ac portable generators that are currently staged. Although not credited, Appendix R lighting (batteries last 8 hours) provides for emergency lighting in select areas of the plant where operators or maintenance personnel may need to be perform actions during ELAP conditions.

The NRC staff reviewed the licensee communications assessment (ML12307A116 and ML13057A033) in response to the March 12, 2012 50.54(f) request for information letter for PSL and, as documented in the staff analysis (ML13134A050) 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 for confirmation that upgrades to the site's communications systems have been completed.

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 providing adequate lighting and communications, if these requirements are implemented as described.

3.2.4.5 Protected and Internal Locked Area Access

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

> *Plant procedures/guidance should consider the effects of ac power loss on area access, as well as the need to gain entry to the Protected Area and internal locked areas where remote equipment operation is necessary.*
>
> At some plants, the security system may be adversely affected by the loss of the preferred or Class 1E power supplies in an ELAP. In such cases, manual actions stated in ELAP response procedures/guidance may require additional actions to obtain access.

FPL did not provide any other discussion of security issues as a result of the ELAP. During the audit process the licensee was requested to a discussion regarding this access issue. The licensee responded during FLEX activities access to locked areas where remote equipment operation may be necessary will be available to operations staff through security officer key access without electrical power. FLEX equipment and personnel access to that protected area can be accomplished by security officers' gate access without electrical power. During time validation studies, PSL will confirm the adequacy of the access provisions and address any additional guidance or procedure upgrades 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 access to protected and locked areas of the plant, 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 degrees F. Many states have experienced temperatures in excess of 120 degrees F.

The licensee stated that preliminary analysis indicates the loss of MCR ventilation requires supplemental ventilation to mitigate room heat-up. A cross-flow ventilation path will be established by opening the MCR, and Unit 1 Technical Support Center east and west doors. A more detailed evaluation of the supplemental MCR ventilation will be performed to address sizing and deployment response times. This has been identified as Confirmatory Item 3.2.4.6.A in section 4.2.

The licensee stated that other areas of the RAB do not require supplemental ventilation to support equipment function or habitability post-BDBEE as they will contain little energized or heated equipment. Air flow may be accomplished by opening of doors for cross-flow ventilation. 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 stated that the TDAFW pump is located in an outdoor environment within the qualified steam trestle. No ventilation fans are required for safety related design functions or post ELAP 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 Item, provides reasonable assurance that the requirements of Order EA-12-049 will be met with respect to habitability in high temperature environments, 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 NPSH can be demonstrated and, for example, that the water does not gravity drain back to the UHS. Alternate water delivery systems can be considered available on a case-by-case basis. In general, all CSTs should be used first if available. If the normal source of makeup water (e.g., CST) fails or becomes exhausted as a result of the

hazard, then robust demineralized, raw, or borated water tanks may be used as appropriate.

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

On page 12 of the Integrated Plan, the licensee stated that the larger Unit 2 CST will be cross-connected with the Unit 1 CST to extend the time period before the CST FLEX pump must be deployed to augment the CST volumes with water from the RWTs or other available sources. Without cross-connecting, the Unit 1 CST volume will be depleted in approximately 16 hours and the Unit 2 CST in approximately 43 hours. Requirements for cross-tie completion are based on a nominal 4 hours prior to Unit 1 CST depletion. Time validation studies will be conducted to justify time and resources required for cross-connecting CSTs.

Additionally, the licensee stated that deployment of the CST pump during Phase 1 of the RCS cooling is a contingency measure taken to ensure adequate water supplies for core cooling. The CST FLEX pump will be used in Phase 2 to refill the CSTs and/or the RWT depending on the Mode requirements prior to depletion of the CSTs. Refill capability at 17 hours is well in advance of the depletion of the combined Unit 1 & 2 CST volumes at approximately 29 hours. The CST FLEX pump will take suction from the RWT or other available tank and discharge to the Unit 2 CST which can then supply the Unit 1 CST. Protected connections will be installed on the outlet of the RWTs and both CSTs to allow for filling either CST tank directly. Time validation studies will be conducted to justify time and resources required for deployment of CST FLEX pumps.

On page 18 of the Integrated Plan the licensee specified that feedwater supply for each TDAFW pump is from a Seismic Category 1, Condensate Storage Tank (CST). The Unit 1 CST is a nominal 250,000 gallon tank. The Unit 2 CST is a nominal 400,000 gallon tank. The tanks are discussed in greater detail at the end of this section. Individually, the CSTs provide sufficient inventory to meet Phase 1 requirements (Unit 1, 16 hours; Unit 2, 43 hours).

The qualified inventory of the two CSTs (581,600 gallons) will be shared between the units to provide makeup flow to the steam generators for approximately 29 hours. Crediting the CSTs for this amount of volume requires analysis and modifications. The following provides the basis for the volumes contained between the tank anti-vortex plate located 4” above the tank floor and a credited operating level.

- Unit 1 CST tank level is normally maintained just below the high-level alarm setpoint. Qualification of non-seismic condenser makeup nozzles in the upper region of the tank provides a nominal volume of 220,450 gallons based on a tank water elevation of 24 ft.-5 in.
- The Unit 2 CST tank level is normally maintained just below the high-level alarm setpoint. Qualification of the non-seismic nozzles provides a nominal volume of 361,150 gallons.
- Seismic qualification of the missile-protected CST cross-tie line allows the contents of the larger Unit 2 CST to be shared with Unit 1 providing a shared volume of 581,600 gallons.

- The Unit 2 CST is seismically-qualified and missile-protected.
- The Unit 1 CST is seismically-qualified. An engineering evaluation will be performed to qualify the Unit 1 CST for BDBEE high wind hazards. Any required plant modifications will be implemented as appropriate with information provided in the six month update.

The qualified inventory of at least one RWT will be shared as required between the units. The basis for crediting the RWT(s) is as follows:

- The RWT for each unit contains a minimum 477,360 gallons of borated water per Technical Specifications.
- Both RWTs are seismically qualified; but are not currently qualified for design basis tornados. The RWTs are not currently cross-connected.
- An engineering evaluation will be performed to qualify the RWT(s) for BDBEE high wind hazards. Any required plant modifications will be implemented as appropriate with information provided in the six month update.
- The evaluation may include other water sources such as the CWSTs, TWST, and PWSTs.
- If required by the above evaluation, the RWTs will be cross-connected with a missile protected line to allow either RWT to be aligned for gravity flow to the SDC piping of either unit.

The results of evaluations to be completed to qualify the Unit 1 CST and both Unit 1&2 RWT for missile hazards were to be provided in a 6-month update. The August 2013 update did not include any update on the evaluations. The licensee was requested to provide milestones for when high wind evaluations will completed for the noted water sources. During the audit process, the licensee stated that the evaluation results of protected water sources will be provided as part of the second 6-month update in February 2014. The evaluation will demonstrate that the Unit 1 CST will be available following tornado wind/missile event. As an alternate strategy a modification will be implemented to missile protect the Fort Pierce utilities potable water connection which will be used as the primary Phase 2 water source following a tornado wind/missile event. As a secondary source of water, an evaluation will justify additional non-qualified water tanks sources being available during Phase 2 due to separation, intervening buildings and redundancy. This has been identified as Confirmatory Item 3.2.4.7.A in Section 4.2.

The licensee provided additional information in the audit response that provides a description of the structural steel and grating security barrier that was installed of the top of the Unit 1 CST. This barrier provides additional assurance that the Unit 1 CST will be available during a tornado event. Additionally, the Unit 1 and 2 CST can be cross-connected using an existing 8-inch line that runs underground except for portions in the protected CST enclosure. The cross tie allows for flow in either direction.

For a high wind event, the volume of one RWT is assumed available. The full volumes of the CSTs and one RWT is assumed available based on the modifications to address Unit 1 CST non-seismic interface piping and the CST/RWT analyses discussed in Phase 1. The combined inventory of these three tanks is 1,058,960 gallons (477,360 gallons borated, 581,600 gallons unborated).

If both units are in operating modes with steam generators available, the inventory in the surviving RWT, that is not be required for eventual RCS makeup, will be added to the cross-connected CSTs (approximately an additional 440,000 gallons). This extends the total SG feed inventory to 1,021,600 gallons (510,800 gallons per Unit) or to approximately 76 hours.

RRC equipment in support of the Phase 3 strategy to initiate SDC will arrive at the RRC staging area after 72 hours. The timeframe to deploy this offsite equipment and enter SDC is envisioned to require 36-48 hours resulting in a total Phase 2 coping time of approximately 120 hours. Therefore, in a wind-based event, an additional volume of water is required before the long term strategy for SDC initiation is available. Additionally, a boration capability will be required.

As qualified water sources are depleted, makeup water will be pumped to the CST/RWT from the potential sources listed in the table below with the CST FLEX Pump. Based on the number and dispersed location of these tanks, it is highly likely that large volumes of on-site water will be available following a BDBE wind-based event. Each of these site tanks will be modified to allow FLEX pumps to take suction from them. As a last resort, seawater will be used for SG and RCS cooling.

Rank	Volume (gal)	Source	Seismic	Missile Protected	Water Quality
1	199,000	Treated Water Storage Tank	N	N	Demin
2	150,000 (U1) 150,000 (U1)	Primary Water Tank	N	N	Demin
3	120,000	Monitor Storage Tank 12C	N	N	Borated or Demin
4	351,000 1A 351,000 1B	City Water Storage Tanks	N	N	Potable
5	Unlimited	Ft. Pierce Utilities Supply Line	N	N	Potable
6	10,000 gal/truck	Tanker Trucks from Off-site	N	N	Potable or Demin
7	~3,000,000	Retention Ponds	N	N/A	Brackish
8	Unlimited	Intake Canal	Y	Y	Seawater

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 makeup water sources, if these requirements are implemented as described.

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 59 of the Integrated Plan the licensee stated that ELAP recovery initially requires shedding of non-essential dc loads in Phase 1 to extend station battery life so that essential instrumentation will be available to monitor event progression. Subsequent deployment of a 480VAC FLEX diesel generator in Phase 2 repowers battery chargers and other selected loads. In Phase 3, a 4.16 KVAC FLEX diesel generator will be deployed after delivery from offsite. The tie-in points for FLEX generators, depicted in Figure 1 and Figure 2, are discussed in subsequent sections of the Integrated Plan. An overview of the Electrical Strategy is provided in a tabular format in Figure 3 of the Integrated Plan.

On page 102 of the Integrated Plan, the licensee identified three Pending Actions to develop procedures for; deployment and operation of 480 VAC diesel generators, power restoration with ESF signals present due to de-energized instrument inverters, and repowering selected station loads to support long term safety functions.

Although the licensee plans on developing procedures related to the use of portable generators, FPL did not provide any information regarding how portable generators would be electrically isolated from plant equipment. The licensee was requested to describe the electrical isolation strategy. During the audit process, the licensee stated that appropriate coordinated current interrupting devices (i.e., safety related double isolation circuit breakers and or fuses) will be used to provide fault protection and electrical separation between Class 1E electrical equipment and the portable FLEX equipment. Additionally procedural controls such as inhibiting EDG start circuits and breakers rack-outs will be employed to prevent simultaneous connection of both FLEX DG's and safety related EDG's to the same ac distribution system or component. In Phase 3 the circuit breakers will be electronically interlocked with all incoming feeder breakers (A/B-2 EDG) such that both 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 two 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/isolation and interactions, if these requirements are implemented as described.

3.2.4.9 Portable Equipment Fuel

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

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

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

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

On page 27 of the Integrated Plan, the licensee stated that PSL will use industry guidance from the PWROG to develop site specific procedures or guidelines to address criteria in NEI 12-06. The procedures and/or guidelines developed will support existing command and control strategies within existing plant procedures. A procedure will be developed for refueling diesel power FLEX equipment.

On page 64 of the Integrated Plan, the licensee stated that the DFO trailer is a Transfueler 500 gallon diesel fuel oil tank. The tank is mounted on a trailer with a 12v battery operated pump capable of delivering up to 25 gpm. The trailer will be towed by a FLEX tow vehicle or equivalent. The DFO trailer tank will be filled by gravity feed from the Unit 2 Diesel Oil Storage Tanks. The Unit 2 Diesel Oil Storage Tanks are fully qualified for seismic, wind, missiles and flooding. Each tank contains greater than 42,500 gallons of fuel oil. Gravity feed is accomplished by either draining through the 3" fill connection or the two 2" tank drains. The Transfueler DFO tank will be stored in the FESB. Guidance will be developed to provide operating instructions, fuel burnup rates and fueling strategies for all portable diesel driven FLEX equipment. On page 101 of the Integrated Plan, the licensee provided a Pending Action to perform a time validation study for refueling FLEX equipment.

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 portable equipment fuel, if these requirements are implemented as described.

3.2.4.10 Load Reduction to Conserve DC Power

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

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

On pages 9 and 10 of the Integrated Plan, the licensee stated that the essential instrumentation and control functions will be maintained by 125 VDC Class 1E batteries, which are designed to power the safety related dc loads (including instrumentation) for a minimum of four hours without any requirements for load shedding. However, in order to extend the capacity of the batteries further, the non-essential loads will be shed early (between 1/2 and one hour) into the event. Extended load shedding is capable of increasing the duration of the battery powered instrumentation monitoring function on Unit 1 to approximately 12 hours and

11 hours for 1A and 1B station batteries respectively; and on Unit 2 to approximately 10 hours and 9 hours for 2A and 2B station batteries respectively. An 8-hour battery discharge capacity will be assumed to conservatively bound these calculated maximum battery discharge durations, which credit extended load shedding.

The licensee also stated that during based on the limited design capacity of the Class 1E batteries, substantial load shedding must be initiated early at approximately thirty minutes into the event in order to successfully extend the battery discharge time from 4 hours to at least 8 hours. The Inverters C & D, which feed the MC & MD instrument buses will be shed in the first 30 minutes, with steps taken to preclude any potential spurious equipment operation, which may result from their de-energization. Smaller loads identified as not required for safe shutdown will be load shed after 1 hour.

The licensee also stated that at 4-6 hours into the event, a 480 VAC FLEX Diesel Generator will be deployed, staged and connected to repower a station 480 VAC bus within eight hours to ensure power is available to the battery chargers prior to depletion of the station batteries. In order to ensure that the batteries remain available until the 480 VAC FLEX Diesel Generator is operational extended manual load shedding will be used. The licensee also stated that time validation studies will be conducted to justify the time constraints and resources for the deployment of a 480 VAC diesel generator to the station 480 VAC bus or directly to a designated piece of equipment.

The licensee was requested to provide further evaluation of the 480 VAC Diesel Generator loads to ensure that it is appropriately sized for the FLEX equipment. In the August 6-month update the licensee stated that the evaluation was complete and that a 350 kW DG/unit is required. The calculated loading including starting kVA requirements were used in a commercial diesel generator vendor software package to determine a bounding generator size. The results (PSL Unit 2 worst case) are provided in a file titled “PSL FLEX 480 Vac Diesel – Generator Sizing Report” The generator vendors used this data and applied to their specific sizing methodology in developing their proposal for the 480 Vac portable generators. The resulting proposed portable generator was sized higher than the specification value in order to assure sufficient capability. The same process was used for the Phase 3 loads 4160 Vac diesel.

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. During the audit process, the licensee provided the load profile for the 2B battery which has the most limiting duty cycle. Battery loads were shed in five separate steps and were completed in 9 hours. At this time battery chargers will be repowered by the FLEX 480 V diesel generators. The licensee stated that during the audit process the dc coping strategy is being revised to increase battery margin. Current strategy is to perform load shedding on both safety related batteries with both batteries remaining in service at reduced load. To improve margin the revised strategy will be to initially secure one battery, load shed and operate on the other battery and return the secured battery to service before the first battery is depleted. The licensee stated that this should essentially double the available coping time. Further information will be provided in the February 2014 update. This has been identified as Confirmatory Item 3.2.4.10.A in Section 4.2.

The licensee was requested to provide a detailed discussion on the loads that will be shed from the dc bus, the equipment location, or location where the required action needs to be taken, and the required operator actions needed to be performed and the time to complete each action. Additionally, the licensee was requested to explain which functions are lost as a result of shedding each load and to discuss any impact on defense in depth and redundancy.

During the audit process, the licensee stated that under current load shedding strategy (a table of loads was provided) only the loads associated with battery 2A and 2B receive power. The most significant loads, Inverters C and D, are shed at 30 minutes which the remainder of the loads are shed after one hour from the start of the event. The total of the loads shed were deducted from the total battery current steps calculated in the current calculation of record. Only loads related to the higher tier switchgear and busses (480V, 4.16kV and 6.9 kV) and other loads not critical to plant shutdown are shed. Any atmospheric dump valves and other necessary components remain on for the duration of the event. With the selected loads of one train energized, necessary instrumentation equipment needs to monitor the plant and mitigate the event will be available. Additionally, the licensee stated that the location of the equipment where the required actions need to be taken is the 43 ft. elevation of the RAB in the electrical equipment rooms. The required operator actions needed to be performed are to open the breakers, associated with the loads listed in the provided table, which will be identified in the FSG. The estimated time to complete these actions is 30 minutes which will be confirmed via a time validation exercise. The results will be provided in a 6-month update.

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 stated in response that the basis for the minimum dc bus voltage is 112 V dc. This value was calculated doing the “Electrical Transient and Analyzer Program” (ETAP) load for analysis that considered the minimum voltage requirement of each credited component and the voltage drop to each component.

The licensee noted two calculations, references 8 and 9 (Calc FPL064-CALC-004, Rev 0, Unit 1 Battery Load Shedding Strategy and, Calc FPL064-CALC-005, Rev 0, Unit 2 Battery Load Shedding Strategy) of the Integrated Plan that were completed that provide the basis for this load shedding strategy. Ref’s 8 and 9 were not available for review. Further evaluation of the manual shedding strategy is required to address potential spurious actions stemming from de-energizing multiple instrument buses. The licensee was requested to discuss which components change state, when loads are shed and any actions needed to mitigate the resultant hazards, for example H2 release from the main generator. During the audit process, the licensee stated that the dc loads that were selected for shedding will not change state causing a safety hazard or plant transient. The main generator seal oil pump is powered from non-safety batteries and is not shed as part of the ELAP strategies. If the non-safety equipment is operable past the event, the generator will be vented per existing SBO 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, 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 load reduction to conserve dc power, if these requirements are implemented as described.

3.3 PROGRAMATIC CONTROLS

3.3.1 Equipment Maintenance and Testing

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

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

NEI 12-06, Section 11.5 states:

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

2. Portable equipment that directly performs a FLEX mitigation strategy for the core, containment, or SFP should be subject to maintenance and testing guidance provided in INPO AP 913, Equipment Reliability Process, to verify proper function. The maintenance program should ensure that the FLEX equipment reliability is being achieved. Standard industry templates (e.g., EPRI) and associated bases will be developed to define specific maintenance and testing including the following:

    a. Periodic testing and frequency should be determined based on equipment type and expected use. Testing should be done to verify design requirements and/or basis. The basis should be documented and deviations from vendor recommendations and applicable standards should be justified.

    b. Preventive maintenance should be determined based on equipment type and expected use. The basis should be documented and deviations from vendor recommendations and applicable standards should be justified.

    c. Existing work control processes may be used to control maintenance and testing. (e.g., PM Program, Surveillance Program, Vendor Contracts, and work orders).

3. The unavailability of equipment and applicable connections that directly performs a FLEX mitigation strategy for core, containment, and SFP should be managed such that risk to mitigating strategy capability is minimized.

a. The unavailability of installed plant equipment is controlled by existing plant processes such as the Technical Specifications. When installed plant equipment which supports FLEX strategies becomes unavailable, then the FLEX strategy affected by this unavailability does not need to be maintained during the unavailability.

b. Portable equipment may be unavailable for 90 days provided that the site FLEX capability (N) is available.

c. Connections to permanent equipment required for FLEX strategies can be unavailable for 90 days provided alternate capabilities remain functional.

d. Portable equipment that is expected to be unavailable for more than 90 days or expected to be unavailable during forecast site specific external events (e.g., hurricane) should be supplemented with alternate suitable equipment.

e. The short duration of equipment unavailability, discussed above, does not constitute a loss of reasonable protection from a diverse storage location protection strategy perspective.

f. If portable equipment becomes unavailable such that the site FLEX capability (N) is not maintained, initiate actions within 24 hours to restore the site FLEX capability (N) and implement compensatory measures (e.g., use of alternate suitable equipment or supplemental personnel) within 72 hours.

On page 15 of the Integrated Plan, the licensee stated that existing plant maintenance programs will be used to identify and document maintenance and testing requirements. Preventative Maintenance (PM) work orders 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. PSL will assess the addition of program description into the UFSAR, and Technical Requirements Manual.

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

This Generic Concern involves clarification of how licensees would maintain FLEX equipment such that it would be readily available for use. The technical report provided sufficient basis to resolve this concern by describing a database that licensees could use to develop preventative maintenance programs for FLEX equipment. The database describes maintenance tasks and maintenance intervals that have been evaluated as sufficient to provide for the readiness of the FLEX equipment. The NRC staff has determined that the technical report provides an acceptable approach for developing a program for maintaining FLEX equipment in a ready-to-use status. The 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 FLEX equipment 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 15 of the Integrated Plan, the licensee stated that PSL will implement a FLEX program stipulating the required administrative controls to be implemented. FLEX equipment will be procured as commercial equipment unless credited for other functions; then the quality attributes of the other functions apply. 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.

The licensee did not address considerations 1 and 3 of NEI 12-06 regarding; maintaining a historical record of previous strategies and the basis for changes, or address providing a documented engineering basis that ensures that any change in FLEX strategy continues to ensure the key safety functions (core and SFP cooling, containment integrity) are met. This has been identified as Confirmatory Item 3.3.2.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 configuration control, if these requirements are implemented as described.

3.3.3 Training

NEI 12-06, Section 11.6, 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 leaders7 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 15 and 16 of the Integrated Plan, the licensee stated that a Systematic Approach to Training (SAT) will be used to evaluate training requirements for station personnel based upon changes to plant equipment, implementation of FLEX portable equipment, and new or revised procedures that result from implementation of the FLEX strategies. Training modules for personnel that will be responsible for implementing the FLEX strategies, and Emergency Response Organization (ERO) personnel 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 PSL 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, considering available job aids, instructions, and mitigating strategy time constraints.

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

3.4 OFFSITE RESOURCES

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

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

The licensee's plans for the use of off-site resources conform to the minimum capabilities specified 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 (item 1 above). The licensee identified two Pending Actions, No's 3 and 5 regarding plans for developing RRC strategies. 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 use of off-site resources, if these requirements are implemented as described.

4.0 OPEN AND CONFIRMATORY ITEMS

4.1 OPEN ITEMS

Item Number	Description	Notes
3.2.1.8.A	At the time the audit was conducted, the licensee had neither (1) committed to abide by the generic approach endorsed by the NRC staff for boron mixing, including the additional conditions specified in the NRC's endorsement letter, nor had	

	the licensee (2) identified an acceptable alternate approach for justifying the boric acid mixing assumptions in the analyses supporting its mitigating strategy.	
3.2.1.8.B	The licensee stated that the PSL RCS Inventory coping strategy relies on repowering one of three installed charging pumps in each unit. Each charging pump motor breaker will be capable of being powered on its input and load sides from a 480 VAC FLEX generator. The use of portable generators to repower installed charging pumps is proposed an alternative to NEI 12-06. The NRC staff notes that this places greater reliance on the current state of knowledge of external hazards, which are being re-examined pursuant to NTTF Recommendation 2.1. New information from that effort may necessitate changes in the degree of protection afforded the pre-staged generators and associated equipment in order to maintain the guidance and strategies required by EA-12-049. Additional information is needed from the licensee to determine whether the proposed approach provides an equivalent level of flexibility for responding to an undefined event as would be provided through conformance with NEI 12-06, including provision of connection points for the use of portable pumping sources from off-site should the installed equipment be rendered unavailable by the initiating event.	

4.2 <u>CONFIRMATORY ITEMS</u>

Item Number	Description	Notes
3.1.1.2.A	FPL addressed consideration 2 of NEI 12-06 Section 5.3.2 regarding protection of the means to move the equipment. All connection points were noted as protected from seismic events, however Figure 9 which provided deployment routes from the FESB to plant locations was not legible. It was not possible to determine the location of staged equipment (pumps and generators) or the buildings through which the hoses and equipment would be routed.	
3.1.1.4.A	The licensee stated that the staging area for the RRC equipment has not been finalized and that the RRC staging area location will be finalized and deployment routes from the RRC staging area to the site will be developed.	
3.2.1.A	The licensee stated that PSL credits the non-safety related batching tanks in each unit as available for use in developing additional borated water for a Mode 5&6 strategy. The tanks and associated piping to the BAMT are located in a qualified structure and have considerable design margin as the equipment is normally drained and out of service. The licensee should provide information related to seismic concerns for this non-safety equipment.	
3.2.1.1.A	The NRC staff endorsed the PWROG's position that the use of CENTS in the ELAP analysis for CE plants is limited to the flow conditions prior to reflux boiling initiation. The licensee is	

	requested to address its compliance with the limitation on the use of CENTS for the ELAP analyses. Specifically, the CENTS-calculated flow quality at the top of SG U-tube should be provided for conditions when two-phase natural circulation ends and reflux boiling initiates. Also, the licensee should discuss how the applicable ELAP analyses meet the above limitation on the use of CENTS.	
3.2.1.2.A	The licensee should specify the seal leakage flow assumed for the ELAP from the time zero to conditions when subcooling in the RCS cold-legs decreases to 50 degrees F, and provide justification for the assumed leakage rate.	
3.2.1.2.B	The licensee did not discuss whether or not the seal failure will occur during the ELAP before the CBO isolation. The licensee is requested to specify the maximum temperature and pressure, and minimum subcooling of the coolant of the RCS cold-legs during the ELAP before the CBO isolation, and justify the assumption that the integrity of the RCP seals can be maintained, and the seal leakage rate is less than 1 gpm per RCP during an ELAP before the CBO is isolated.	
3.2.1.2.C	The licensee intends to develop a revised analysis regarding RCP seal leakage that will affect time constraints noted in the generic SOE. The discussion of the assumed RCP seal leakage rates used in the licensee's revised analysis should be provided to the NRC staff for review.	
3.2.1.5.A	The licensee should provide additional information regarding their conclusion that there is reasonable assurance that the Rosemount pressure transmitters will continue to function thru all phased of the ELAP.	
3.2.1.6.A	The licensee provided a generic SOE time line as noted on pages 8-14 and in Attachment 1A of the Integrated Plan, but has not completed all of the final analysis as noted in the fifteen (15) time validation studies/pending actions. Required Action times were noted as a range of times rather than specific values. The licensee intends to develop a revised analysis regarding RCP seal leakage that will affect time constraints noted in the generic SOE. The results of the licensee's revised analysis should be provided to the NRC staff for review.	
3.2.1.8.C	Additional boration is required prior to further cooldown in Phase 3. The required boration will be provided in T+10 hours timeframe once the FLEX 480 V DG is operational. Boration at the time will provide ample time for mixing to occur within the RCS. The licensee stated that PSL will monitor further industry work concerning boron mixing models and will adjust the FLEX strategy as appropriate.	

3.2.1.9.A	The licensee needs to provide the justification for using the NOTRUMP computer code to determine the required integrated flow rate to remove decay heat and sensible heat.	
3.2.1.9.B	To address the revision in FLEX strategies a calculation revision will reallocate the sensible makeup requirement to the 2-6 hour time frame. PSL decay heat load requires makeup flows ranging from 214.3 gpm to 117.8 gpm for the first 8 hours. A backup strategy uses a portable FLEX SG pump to provide 300 gpm and 300 psig SG pressure on guidance within WCAP-17601. The FLEX SG pump nominally produces 400 psig to accommodate elevation changes and hose loses with design margin. The FLEX SG pump flow rate is sufficient for maintaining core cooling. The results of the revised calculation noted above should be provided for review.	
3.2.1.9.C	The design point of the SAFER RRC pump is subject to final procurement but is expected to be 5000 gpm at 150 psi. The LUHS Pump criteria mentioned in the Integrated Plan, 7162 gpm @ 90 psi will be altered to align with SAFER provided equipment and demonstrated to be sufficient for the purpose of reinstating Phase 3 Shutdown Cooling. The revised LUHS pump criteria and the associated analysis supporting their adequacy for the purpose of reinstating Phase 3 Shutdown Cooling should be provided for review.	
3.2.4.2.A	The results of the evaluation of the EER indicated that the maximum temperature in any one of the EER's is approximately 129 degrees F. Appendix F of NUMARC 87-00 states that most equipment outside of containment is expected to operate in temperatures not to exceed 150 degrees F for a duration of 4 hours. There is no generic industry guidance on equipment operability for the longer 72 hour ELAP scenario. A more detailed evaluation will be performed to justify operation up to a temperature of 129 degrees F for 72 hours or portable fans will be provided.	
3.2.4.4.A	It was 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. Confirmation that upgrades to the site's communications systems have been completed will be accomplished.	
3.2.4.6.A	A cross-flow ventilation path will be established by opening the MCR, and Unit 1 Technical Support Center east and west doors. A more detailed evaluation of the supplemental MCR ventilation will be performed to address sizing and deployment response times.	
3.2.4.7.A	As a secondary source of water an evaluation will justify	

	additional non-qualified water tanks sources being available during Phase 2 due to separation, intervening buildings and redundancy.	
3.2.4.8.A	The licensee stated that appropriate coordinated current interrupting devices (i.e., safety related double isolation circuit breakers and or fuses) will be used to provide fault protection and electrical separation between Class 1E electrical equipment and the portable FLEX equipment. Additionally procedural controls such as inhibiting EDG start circuits and breakers rack-outs will be employed to prevent simultaneous connection of both FLEX DG's and safety related EDG's to the same ac distribution system or component. In Phase 3 the circuit breakers will be electronically interlocked with all incoming feeder breakers (A/B-2 EDG) such that both 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 two feeder breakers is closed.	
3.2.4.10.A	Current strategy is to perform load shedding on both safety related batteries with both batteries remaining in service at reduced load. To improve margin the revised strategy will be to initially secure on battery, load shed and operate on the other battery and return the secured battery to service before the first battery is depleted. The licensee stated that this should essentially double the available coping time. Further information will be provided in the February 2014 update.	
3.2.4.10.B	For phase 2, and 3 generators sizing, the licensee stated that the current EDG loading calculation of record was used to determine the KW loads of equipment being relied upon. The calculated loading including starting kVA requirements were then used in a commercial diesel-generator vendor software package to determine a bounding generator size. The value obtained along with starting requirement of the largest motor, was used in the procurement specification of the 480 VAC portable generators. The resulting proposed portable generators were sized higher than the specification value in order to ensure sufficient capability to start and power the required loads.	
3.3.2.A	The licensee did not address considerations 1 and 3 of NEI 12-06 regarding; maintaining a historical record of previous strategies and the basis for changes, or address providing a documented engineering basis that ensures that any change in FLEX strategy continues to ensure the key safety functions are met.	
3.4.A	The licensee's plans for the use of off-site resources conform to the minimum capabilities stated 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 (item 1 above). The licensee identified two Pending Actions, No's 3 and 5 regarding plans for developing	

	RRC strategies.	