Choice Letter FLEX Assumptions
Many actions are local, infrequently/never performed, and some have very limited training. In many cases, "ergonomics" rated as "poor" because the local actions may be physically demanding and in difficult SBO conditions (on emergency lighting at best and without any ventilation). PSF's that were determined to be performance drivers (for FLEX Electric) were stress for diagnosis and action, and complexity and experience/training for action. Stress "high" because the plant would be in a SBO condition. The action to align the FLEX electrical system was considered "highly" complex and assigned "low" experience/training. The procedure requires many in-plant actions under difficult conditions and the alignment has never been implemented.

Stress

SE Section 3.7.4, Accessibility and Lighting (page 43)

A lighting review by the licensee evaluated the lighting available to make required piping and electrical connections, perform instrumentation monitoring and the associated travel paths to the various areas. The licensee stated in the FIP that battery powered (Appendix "R") emergency lights, backed up by LED hard hat lamps and battery-operated LED lights, provide adequate lighting for all primary connection points in the BDBEE strategies. The Appendix "R" emergency lights are designed and periodically tested to ensure the battery pack will provide a minimum of 8 hours of lighting with no external ac power sources.

Once the FLEX generator has repowered portions of the vital 480 Vac system, standby lighting cabinets (SLC) in Division 1 or Division 2 will light large areas of the plant. The primary (Division 1) electrical strategy will energize an SLC that lights the control and diesel generator buildings, and the alternate (Division 2) electrical strategy will energize an SLC that lights the auxiliary and fuel buildings. The LED tripod lights are staged in the FLEX DG room to provide additional lighting during Phases 2 and 3.

SE Section 3.9, Habitability and Operations (page 47-48)

During the audit, the licensee stated that the FLEX generator room in the Diesel Generator Building will have its own heating, ventilation, and air conditioning (HVAC) to maintain acceptable temperatures. The licensee stated that the FLEX generator is air-cooled, and no supplemental cooling is required with the radiator operating properly. The licensee also stated that per EC 392335, "Fukushima FLEX Internal Generator 480 VAC Connections Required to Support NRC EA-12-049 FLEX Response," a supplemental fan was included in the construction of the FLEX generator room that will circulate air in the room and exhaust additional air from the room to maintain margin to the 122 °F maximum operating temperature for the FLEX diesel generator.

The licensee's evaluation showed that the equipment meets the required OBA conditions, but also have shown capabilities, either through testing or analysis, that exceed those conditions and can be expected to perform their required functions under post beyond design basis conditions for an extended period of time. Based on its review of the essential station equipment required to support the FLEX mitigation strategy, which are primarily located in the MCR, RCIC Room, Battery Rooms, NSPS Inverter Rooms, and Containment, the NRC staff finds that the

equipment should perform their required functions at the expected temperatures as a result of loss of ventilation during an ELAP event.

SE Section 3.9.2.1, Main Control Room (page 51)

Calculation 3C10-0390-001, "Rev to EC 334887 Extended Power Uprate - Deferred Calculations and Documents," Rev. 1 concluded that, when the mitigating actions of opening and closing specified doors in conjunction with starting an exhaust fan and opening cabinet panels, the Main Control Room temperature peaks at 119 °F, and quickly decreases and stabilizes at approximately 107 °F. The licensee stated that a toolbox approach, (e.g. rotation of personnel), would be employed if further actions were required to ensure that operators could carry out the overall mitigation strategy. The licensee's procedure, CPS FSG 4306.01P010, "FLEX Ventilation," Rev. 0, directs the operators to take the appropriate actions corresponding with the analysis assumptions.

Based on the evaluation above, the NRC staff concludes that the licensee has developed guidance that, if implemented appropriately, should maintain or restore equipment and personnel habitability conditions following a BDBEE consistent with NEI 12-06 guidance, as endorsed, by JLD-ISG-2012-01, and adequately addresses the requirements of the order.

Complexity

SE Section 3.7.3.2, Electrical Connection Points (page 42- 43)

The Clinton electrical strategy uses a FLEX generator that is permanently installed on elevation 762 feet of the diesel generator building. In its FIP, the licensee stated that a new seismically designed electrical riser consisting of conduit and electrical connection boxes has been constructed in the control building spanning between the 702 and 825-foot elevations. The FLEX generator energizes the electrical riser. Portable cables to make the interconnections are stored in close proximity to the 480 Vac substations that require power following a BDBEE. These substations have been fitted with seismically designed bus inserts. The cables are used to connect the electrical connection boxes on the riser to the bus inserts that will energize the substations. All electrical connection points are located in either the auxiliary building or the control building. Both buildings are seismic Category I structures providing protection of the connection points from all hazards. Except for the case where the FLEX DG is unavailable and the N+1 FLEX DG is deployed from the FSB; all electrical connections are made indoors. If the N+1 DG must be deployed, it is staged outside the diesel generator building. Portable electrical cables are used to connect the FLEX generator with the riser. The cables are routed through the robust auxiliary building and control building.

The licensee's electrical strategy includes a primary and alternate method to repower key equipment and instruments utilized in FLEX strategies. Operators in the MCR will decide which strategy to use for core cooling, containment integrity, and SFP cooling. The electrical connection points in the licensee's strategy are the seismically installed bus inserts in the 480 Vac substations. The electrical path from the FLEX diesel generator to the primary or alternate connection points consists of a combination of seismically robust conduit and connection boxes (riser), and cables stored on reels in seismically robust cabinets (except Control Building 825' elevation, which has reels but not cabinets). The location of the cable reels was chosen to

facilitate cable deployment between the riser and the substations that need to be energized. The licensee's electrical strategy requires the deployment of nine (9) 4/0 cables (three per phase), located on reels inside fixed storage cabinets between the FLEX DG in the Diesel Generator Building and electrical panel 1 FX01 E in the adjacent Control Building on the same elevation. There are three reel cabinets in the Diesel Generator Building that contain the cables that connect to the FLEX DG. These cables are routed through a rollup door that separates the two buildings. Three reel cabinets in the Control Building contain the cables that connect to 1 FX01E and to the cables routed from the FLEX diesel generator.

Experience and Training

SE Section 3.12, Procedures and Training (pages 56-57)

FLEX strategy support guidelines have been developed in accordance with BWROG guidelines. FLEX Support Guidelines (FSGs) will provide available, pre-planned FLEX strategies for accomplishing specific tasks in the Emergency Operating Procedures (EOPs). The licensee stated that FSGs will be used to supplement (not replace) the existing procedure structure that establishes command and control for the event.

Procedural interfaces have been incorporated into plant procedure Clinton 4306.01 "Extended Loss of AC Power I Loss of Ultimate Heat Sink" **to the extent necessary to include appropriate reference to FSGs and provide command and control for the ELAP**. Clear criteria for entry into FSGs will ensure that FLEX strategies are used only as directed for BDBEE conditions, and are not used inappropriately in lieu of existing procedures. When FLEX equipment is needed to accomplish FLEX strategies or supplement EOPs, the ELAP flowchart, EOP, Severe Accident Mitigation Guidelines, or Extreme Damage Mitigation Guidelines will direct the entry into and exit from the appropriate FSG procedure.

Clinton's Nuclear Training Program has been revised **to assure personnel proficiency in the mitigation of BDBEEs is adequate and maintained.** These programs and controls were developed and have been implemented in accordance with the Systematic Approach to Training (SAT) Process. Using the SAT process, Job and Task analyses were completed for the new tasks identified applicable to the FLEX mitigation strategies. The licensee stated that based on the analysis, training for Operations was designed, developed and implemented for Operations continuing training. "ANSI/ANS 3.5, Nuclear Power Plant Simulators for use in Operator Training" certification of simulator fidelity is considered to be sufficient for the initial stages of the BDBEE scenario training. Full scope simulator models have not been explicitly upgraded to accommodate FLEX training or drills.

Initial training has been provided and periodic training will be provided to site emergency response leaders on beyond-design-basis (BOB) emergency response strategies and implementing guidelines. Personnel assigned to direct the execution of mitigation strategies for BDBEEs have received the necessary training to ensure familiarity with the associated tasks, considering available job aids, instructions, and mitigating strategy time constraints. Where appropriate, integrated FLEX drills will be conducted periodically; with all time-sensitive actions evaluated over a period of not more than 8 years. The licensee asserted that it is not required to connect/operate temporary/permanently installed equipment during these drills. Therefore, the NRC staff finds that the licensee has adequately addressed the procedures and training

associated with FLEX because the procedures have been issued and a training program has been established and will be maintained in accordance with NEI 12-06, Section 11.6.

Ergonomics

SE Section 3.14.1, FLEX Electrical Distribution (page 58)

The Clinton electrical strategy includes the use of a new permanently installed FLEX diesel generator and FLEX electrical distribution (riser). This DG is seismically installed on elevation 762 feet in the diesel generator building. The location of the FLEX generator in the DG building and the location of the FLEX electrical. riser system in the control building protects them from each of the hazards delineated in NEI 1206. **The decision to install the generator in the DG building provides the operators with fewer challenges in implementing the electrical strategy**.

Installing the generator and riser allows resources to be applied to establishing the required electrical and mechanical lineups that would otherwise be used deploying the generator from a remote location. The licensee does have a backup (N+1) FLEX generator in the FSB, which can be moved next to the DG building and used to energize the FLEX electrical riser using portable cables. The licensee also has identified primary and alternate buses and equipment to be powered from the FLEX riser. Due to the robust installation of the FLEX generator and the FLEX electrical riser and their protection from all applicable hazards, the NRC staff approves this alternative as being an acceptable method of compliance with the order.

SE Section 3.10.1, RCS makeup (page 54)

The NRC staff considered the relative cleanliness of the primary water source and the analysis provided above, and the fact that sufficient instrumentation will be available to the operators to confirm an adequate RPV water level for the analyzed ELAP event, and concluded that the licensee has an acceptable strategy to provide makeup water to the RPV.

SE Section 3.11, Shutdown and Refueling (page 55)

The position paper provides guidance to licensees for reducing shutdown risk by incorporating FLEX equipment in the shutdown risk process and procedures. Considerations in the shutdown risk assessment process include maintaining necessary FLEX equipment readily available and **potentially pre-deploying or pre-staging equipment to support maintaining or restoring key safety functions in the event of a loss of shutdown cooling**. The NRC staff concludes that the position paper provides an acceptable approach for demonstrating that the licensees are capable of implementing mitigating strategies in shutdown and refueling modes of operation. During the audit process, the licensee referenced the Exelon Position Paper, EXC-WP-03, "FLEX Guidance for Shutdown/Refueling Modes," which includes use of a defense in depth approach to outages and will take risk appropriate steps in preparation for outages. The licensee stated that its approach is fully consistent with the NEI position paper on shutdown/refueling modes and the NRC endorsement letter of the NEI position paper. Based on the evaluation above, the NRC staff concludes that the licensee has developed guidance that if implemented appropriately should maintain or restore core cooling, SFP cooling, and containment following a BDBEE in shutdown and refueling modes consistent with NEI 12-06

guidance, as endorsed, by JLD-ISG-2012-01 and adequately addresses the requirements of the order.

SE Section 3.4.4.1.2, Plant Instrumentation (page 30)

In NEI 12-06, Table 3-1, specifies that containment pressure, suppression pool temperature, and suppression pool level are key containment parameters which should be monitored by repowering the appropriate instruments. Suppression pool level and containment pressure instrumentation is available prior to and after DC load shedding of the DC busses during an ELAP event for up to 6 hours. Availability after 6 hours is dependent on actions to restore ac power to the Division 1 battery charger (primary strategy) or the safety-related swing battery charger (alternate strategy). With regard to suppression pool temperature monitoring, the FIP states that temperature readings of the suppression pool may be manually obtained using existing site procedure 4200.01C003, "Monitoring CNMT Temperatures During a SBO." The licensee stated during the audit process that the indication is obtained by using a MCR termination cabinet and a Fluke 45 meter (or equivalent), or RTD resistance bridge, and correlating a resistance to a temperature reading. Based on this information, the licensee should have the ability to appropriately monitor the key containment parameters as delineated in NEI 12-06, Table 3-1.