



Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402

CNL-15-037

February 27, 2015

10 CFR 2.202  
10 CFR 50.4

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

Sequoyah Nuclear Plant, Units 1 and 2  
Facility Operating License Nos. DPR-77 and DPR-79  
NRC Docket Nos. 50-327 and 50-328

Subject: **Fourth Six-Month Status Report in Response to the March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049) for Sequoyah Nuclear Plant (TAC Nos. MF0864 and MF0865)**

- References:
1. Letter from TVA to NRC, "Tennessee Valley Authority (TVA) - Overall Integrated Plan in Response to the March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049) for Sequoyah Nuclear Plant," dated February 28, 2013 (ML13063A183)
  2. Letter from TVA to NRC, "First Six-Month Status Report in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049) for Sequoyah Nuclear Plant," dated August 28, 2013 (ML13247A286)
  3. Letter from NRC to TVA, "Sequoyah Nuclear Plant, Units 1 and 2 - Interim Staff Evaluation Relating to Overall Intergraded Plan in Response to Order EA-12-049 (Mitigation Strategies) (TAC Nos. MF0864 and MF0865)," dated February 19, 2014 (ML14002A109)

4. Letter from TVA to NRC, "Second Six-Month Status Report and Revised Overall Integrated Plan in Response to the March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order-EA-12-049) for Sequoyah Nuclear Plant," dated February 28, 2014 (ML14064A181)
5. Letter from TVA to NRC, "Third Six-Month Status Report in Response to the March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049) for Sequoyah Nuclear Plant (TAC Nos. MF0864 and MF0865)," dated August 28, 2014 (ML14247A644 )

On February 28, 2013, the Tennessee Valley Authority (TVA) submitted an Overall Integrated Plan (OIP) in response to the March 12, 2012, Commission Order modifying licenses with regards to requirements for mitigation strategies for beyond-design-basis external events, Order number EA-12-049, for the Sequoyah Nuclear Plant (SQN), Units 1 and 2 (Reference 1). On August 28, 2013, TVA provided the first six-month status report to the OIP (Reference 2).

The OIP submitted in Reference 1 employed a strategy using reactor coolant pump (RCP) low leakage seals. TVA revised its strategy to use the existing conventional RCP seals. This change in RCP seals required a revision to the OIP submitted by Reference 1. Based on a review of TVA's plan, including the first six-month update, and information obtained through the mitigation strategies audit process, the NRC concluded in its Interim Staff Evaluation that the plan, when properly implemented, will meet the requirements of Order EA-12-049 at SQN, Units 1 and 2 (Reference 3). The Interim Staff Evaluation included open item 3.2.1.6.A. This open item required revision to the Sequence of Events due to use of the conventional RCP seals for reanalysis by the NRC. On February 28, 2014, TVA provided the second six-month status report and revised OIP (Reference 4) which included the required revision to the Sequence of Events due to use of the conventional RCP seals.

On August 28, 2014, TVA provided the third six-month status report (Reference 5). Reference 5 noted changes to the storage locations for the current 3 MW FLEX Diesel Generators and the change in the site location for the FLEX Equipment Storage Building. In addition, Reference 5 noted that TVA was evaluating the potential to qualify the existing Condensate Storage Tanks (CSTs) as a primary water source in lieu of the Auxiliary Feedwater Supply Tank (AFWST) and any changes resulting from this reevaluation will be provided in the fourth six-month status update.

The purpose of this letter is to provide the fourth six-month status report pursuant to Section IV, Condition C.2, of Reference 1, that delineates progress made in implementing the requirements of Reference 1. This status report also provides results of reevaluating the existing CSTs as a primary water source. Specifically, the Enclosure of this letter provides fourth six-month status report. As discussed above, TVA has completed evaluation of the CSTs and the CSTs are being modified to provide missile protection and seismic qualification. The CSTs will be used as the primary water source in lieu of the AFWST.

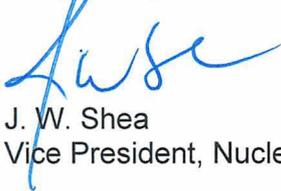
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In addition to the changes described previously, the Open Items table in the Enclosure has been updated. Open Item 14 has been re-opened as indicated in the Enclosure. Open Items 1, 2, 9, 10, 16 - 20 and 22 - 25 are closed. The milestone target completion dates have also been updated as shown in the Enclosure.

There are no new regulatory commitments in this letter. If you have any questions regarding this report, please contact Zachary Kitts at (423) 843-7018.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 27th day of February 2014.

Respectfully,



J. W. Shea  
Vice President, Nuclear Licensing

Enclosure:

Tennessee Valley Authority Sequoyah Nuclear Plant's Fourth Six-Month Status Report for the Implementation of Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigations Strategies for Beyond-Design-Basis External Events

cc (Enclosure):

NRR Director - NRC Headquarters  
NRO Director - NRC Headquarters  
NRR JLD Director - NRC Headquarters  
NRC Regional Administrator - Region II  
NRR Project Manager - Sequoyah Nuclear Plant  
NRC Senior Resident Inspector - Sequoyah Nuclear Plant

**ENCLOSURE**

**TENNESSEE VALLEY AUTHORITY SEQUOYAH NUCLEAR PLANT  
FOURTH SIX-MONTH STATUS REPORT FOR THE IMPLEMENTATION OF ORDER EA-12-049,  
ORDER MODIFYING LICENSES WITH REGARD TO REQUIREMENTS FOR MITIGATION  
STRATEGIES FOR BEYOND-DESIGN-BASIS EXTERNAL EVENTS**

## ENCLOSURE

### TENNESSEE VALLEY AUTHORITY SEQUOYAH NUCLEAR PLANT FOURTH SIX MONTH STATUS REPORT FOR THE IMPLEMENTATION OF ORDER EA-12-049, ORDER MODIFYING LICENSES WITH REGARD TO REQUIREMENTS FOR MITIGATION STRATEGIES FOR BEYOND-DESIGN-BASIS EXTERNAL EVENTS

#### Introduction

Tennessee Valley Authority (TVA) developed an Overall Integrated Plan (OIP) (Reference 1 in Reference section of this enclosure), for Sequoyah Nuclear Plant (SQN), Units 1 and 2, documenting the diverse and flexible strategies (FLEX), in response to Reference 2. TVA provided the first 6-month status report on August 28, 2013 (Reference 3), a revised OIP on February 28, 2014 (Reference 4), and the third 6-month status report on August 28, 2014 (Reference 5). This attachment provides an update of milestone accomplishments since submittal of the third 6-month status report (Reference 5), including any changes to the compliance method or schedule.

#### Milestone Accomplishments

The following milestones have been completed since submittal of the revised OIP (Reference 4) and submittal of the third 6-month status report, and are current as of February 6, 2015.

- Perform Staffing Analysis
- Procure On-Site Equipment
- Identify Off-Site Delivery Stations
- Create Site Specific FSIs
- Create Maintenance Procedures
- Develop Training Plan

#### Milestone Schedule

The following provides an update to Attachment 2 of the OIP. The activity status of each item is provided, as well as any change to the expected completion date has changed. The dates are planning dates subject to change as design and implementation details are developed.

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

Activity	Target Completion Date	Activity Status	Revised Target Completion Date
<b>Submit Overall Integrated Plan</b>	Feb 2013	Complete	
<b>Submit 6 Month Updates:</b>			
Update 1	Aug 2013	Complete	
Update 2	Feb 2014	Complete	
Update 3	Aug 2014	Complete	
Update 4	Feb 2015	Complete	
Update 5	Aug 2015	Not Started	
Update 6	Feb 2016	Not Started	
Update 7	Aug 2016	Not Started	
<b>FLEX Strategy Evaluation</b>	Jun 2013	Complete	
<b>Walk-throughs or Demonstration</b>	May 2015	Not Started	Jan 2016
<b>Perform Staffing Analysis</b>	Jan 2015	Complete	
<b>Modifications:</b>			
Modifications Evaluation	Oct 2013	Complete	
Unit 1 N-1 Walkdown	Oct 2013	Complete	
Unit 1 Design Engineering	Nov 2014	In-progress	Mar 2015
Unit 1 Implementation Outage	May 2015	Started	
Unit 2 N-1 Walkdown	Apr 2014	Complete	
Unit 2 Design Engineering	Nov 2014	In-progress	Mar 2015
Unit 2 Implementation Outage	Dec 2015	Not Started	
<b>Storage:</b>			
Storage Design Engineering	Oct 2014	In-progress	Mar 2015
Storage Implementation	May 2015	In-progress	
<b>FLEX Equipment:</b>			
Procure On-Site Equipment	Jan 2015	Complete	
Develop Strategies with NSRC	Dec 2013	Complete	
Identify Off-Site Delivery Stations	Mar 2014	Complete	
<b>Procedures:</b>			
PWROG issues FSG guidelines	Jun 2013	Complete	
Create Site Specific FSIs	Nov 2014	Complete	
Create Maintenance Procedures	Nov 2014	Complete	
<b>Training:</b>			
Develop Training Plan	Nov 2014	Complete	
Implement Training	May 2015	In-progress	
<b>Unit 1 FLEX Implementation</b>	May 2015	Started	
<b>Unit 2 FLEX Implementation</b>	Dec 2015	Started	
<b>Full Site FLEX Implementation</b>	Dec 2015	Not Started	
<b>Submit Completion Report</b>	Jan 2016	Not Started	

## FLEX Mitigation Strategy Update Summary

The following is a list of updates made to the information provided since the third 6-month status report (Reference 5). A copy of the latest version of the OIP incorporating these changes has been uploaded to the ePortal. Additional discussion and detail are provided in the OIP. With exception of the identified alternate for using pre-staged diesel generators and pumps described below, these changes meet the NEI 12-06 compliance method.

### General Integrated Plan Elements:

- The Seismic Augmented Approach provides additional requirements for plants to address seismic robustness of FLEX equipment. These requirements are captured in the SQN Design Criteria for the FLEX Response System. This ensures that FLEX credited equipment (both currently installed and new) retains function during and after a beyond design basis seismic event using seismic margins assessment criteria by calculating a High Confidence of Low Probability of Failure (HCLPF) seismic capacity and comparing that to the seismic demand of the Review Level Ground Motion (RLGM). For this margin assessment the RLGM is capped at 2X SSE from 1 to 10 Hz.
- In accordance with NEI 12-06, the liquefaction potential of FLEX deployment routes has been evaluated. This evaluation found that neither soil liquefaction or lateral spreading would prevent deployment of FLEX equipment after a beyond-design-basis seismic event. The evaluation was performed in accordance with ASCE 7-10.
- Sequoyah Nuclear Plant is using pre-staged 480v (225KVA) and 6900v (3 MW) FLEX Diesel Generators and pre-staged pumps that will be powered through the existing electrical distribution system as a part of the mitigation strategy integrated plan. This is identified as an alternative approach from the strategies identified in NEI 12-06, as endorsed by NRC in JLD-ISG-2012-01, due to reliance on permanently installed plant structures and systems (i.e., electrical distribution system) and components (pre-staged diesel generators and pumps) in lieu of reliance on complete deployment and alignment of portable generators and diesel driven pumps to accomplish an ELAP event mitigation. Sequoyah Nuclear Plant plans to comply with the guidance in JLD-ISG-2012-01 and NEI 12-06 in implementing FLEX strategies for the SQN site except for the alternatives to the guidance as stated above.
- Several updates made to the Sequence of Events discussion and to Attachment 1A, Sequence of Events Timeline for both Non-Flood and Flood scenarios, including: RCP seal leakage rates based on PWROG/Westinghouse calculations, SG pressure plateaus for RCS cooldown and depressurization, 480v FLEX DG refuel strategy, and recognition that hardened and seismically qualified CSTs will be the initial source of SG makeup.
- Sequoyah Nuclear Plant will pre-stage FLEX Flood Mode equipment based on a 25 year flood warning from TVA's River Operations forecasting group. Concurrent with full FLEX implementation at Sequoyah, River Operations procedure RvM-SOP-10.05.06, "Nuclear Notifications and Flood Warning Procedure," and AOP-N.03, "External Flooding," will be revised to provide the notification and direct the pre-staging of FLEX equipment.

- Sequoyah Nuclear Plant has updated the description for the National SAFER Response Center plan for phase 3 response as follows: Equipment will be moved from the NSRC to a SQN Staging Area, established by the Strategic Alliance for FLEX Emergency Response (SAFER)/NSRC team and TVA. Staging area B is on the Sequoyah Training Center upper parking lot. Staging area C is the Cleveland Regional Jetport located 52 driving miles from SQN. Staging area D is the Chattanooga Airport (Lovell Field) which is 28 driving miles from SQN. Communications will be established between SQN and the SAFER/NSRC team and required equipment moved to the site as needed. First arriving equipment, as established in the 'SAFER Response Plan for Sequoyah Nuclear', will be delivered to the site within 24 hours from the initial request. Once the equipment arrives onsite SQN will utilize it based on plant conditions and need. Details for activation, delivery and operational capability of the Phase 3 equipment can be found in the 'SAFER Response Plan for Sequoyah Nuclear'.

#### **Maintain Core Cooling & Heat Removal:**

- Identified hardened and seismically qualified CSTs as the primary source of SG makeup water.
- Provided discussion for FLEX mitigation strategy options available for SG makeup during Non-Flood and Flood Event scenarios.
- Added discussion for use of Mode 5 & 6 IP FLEX Pumps for Core Cooling with SGs not Available events.
- Updated the discussions in the Storage/Protection of Equipment subsections for: Seismic, Flooding, Severe Storms with High Winds, Snow, Ice and Extreme Cold and High Temperatures.

#### **Maintain RCS Inventory Control:**

- Identified revised RCP seal leakage rates based on PWROG/Westinghouse calculations.
- Identified revised SG pressure plateaus for RCS cooldown and depressurization.
- Provided discussion for FLEX mitigation strategy options available for RCS inventory makeup during Non-Flood and Flood Event scenarios.
- Updated the discussions in the Storage/Protection of Equipment subsections for: Seismic, Flooding, Severe Storms with High Winds, Snow, Ice and Extreme Cold and High Temperatures.

#### **Maintain Containment:**

- Sequoyah Nuclear Plant has performed a containment analysis based on the boundary conditions described in Section 2 of NEI 12-06. Based on the results of this analysis, required actions to ensure maintenance of containment integrity and required instrumentation function have been developed.

- In an ELAP event at SQN and adhering to SQN's Mitigation Strategy, Safety Injection Pump (SIP) operation is initiated at ~ T+5 hours to recover RCS inventory lost through RCP seal leakage and shrinkage due to a RCS cooldown and depressurization. The Ice Condenser doors open. Calculation LTR-ISENG-14-2 Revision 1, demonstrates that the containment pressure at T+72 hours is well below design pressure. The highest temperature to which the containment vessel is exposed to occurs in the upper containment compartment (140°F at 72 hours) and is also well below the design limit (220°F). The pressures and temperatures are not stabilized and continue to increase but the rate of increase is modest and conditions in the containment expected to remain benign until the ice bed is depleted. This is expected to occur approximately 6 days from the event initiation (T+~6 days).
- Provided discussion of long term containment cooling strategy options.
- Updated the discussions in the Storage/Protection of Equipment subsections for: Seismic, Flooding, Severe Storms with High Winds, Snow, Ice and Extreme Cold and High Temperatures.

#### **Maintain Spent Fuel Pool Cooling:**

- Two independent SFP level instruments have been added to facilitate remote monitoring of SFP level and SQN with the requirements of NRC Order EA 12-051 and NEI 12-02.

These SFP Level instruments are powered from the 120v AC Vital Power System. The primary power supply to Spent Fuel Level Continuous Monitoring Loop 1 (0-LI-78-43) is from 120v AC Vital Power Board 1-III with its individual power supply battery backup (0-BAT-78-43). The primary power supply to Spent Fuel Level Continuous Monitoring Loop 2 (0-LI-78-44) is from 120v AC Vital Power Board 2-IV with its individual battery backup power supply (0-BAT-78-44). The 120v AC Vital Power Boards are powered by 120v AC Vital Inverters fed by its 125v DC Vital Battery Board. (DCN D23195A).

- Sequoyah Nuclear Plant has performed a SFP analysis calculation CN-SEE-II-13-9, R0, demonstrating the following:

Considering no reduction of coolant inventory due to sloshing, the time to boil is 11.77 hours for a seismic event assuming the minimum critical damping and an initial bulk water temperature in the pool of 127°F. This time to boil is calculated using the normal credible decay heat load. For maximum credible heat load, the time to boil is 5.39 hours.

Considering no reduction in initial SFP water inventory, starting from nominal pool level, an initial bulk water temperature of 127°F and assuming the normal operating decay heat load results in a time when boil off decreases the water level to 10 feet above the SFP racks of approximately 58.83 hours for an SSE seismic event.

For the maximum credible heat load and an initial water temperature in the pool of 127°F, the time when boil off decreases the water level to 10 feet above the SFP racks is approximately 27.08 hours.

Initial SFP makeup should be from the Demineralized Water Head Tank until it is depleted. In order to keep the pool at a constant level of coolant (thus covering the top of the spent fuel), the deployed LP FLEX Pumps will pressurize the ERCW headers and provide makeup to the SFP.

- Updated the discussions in the Storage/Protection of Equipment subsections for: Seismic, Flooding, Severe Storms with High Winds, Snow, Ice and Extreme Cold and High Temperatures.

#### **Safety Functions Support:**

- The 6900v FLEX DGs are pre-staged in the Additional Diesel Generator Building (ADGB).
- Fuel for the 480v FLEX DGs will be provided by each 480v FLEX DG's day tank. Refueling operations will be required at an approximate 10 hour frequency for the duration of 480v FLEX DG operation. The sequence of refuel operations would be:
  - The 480v FLEX DGs refuel source (tanker trailer or fuel cube) should be filled from a selected EDG 7-day tank or diesel fuel storage tank, if it survived the initiating event and transported to the refuel staging area located on the South side of Unit 2 near the Auxiliary Building (AB).
  - Fuel transfer pump would be staged and refuel hose connections completed for ground level and AB roof refuel operations.
  - With ground level to Auxiliary Building (AB) roof and AB roof to ground level communications established, refuel the 480v FLEX DGs day tanks.

The Condensate Storage Tanks (CSTs) are currently being hardened by providing missile protection and seismic qualification and they will be used as the primary water source for SG makeup.

- This section addresses Habitability and Operations:

Operating Conditions - A loss of ventilation analyses was performed to quantify the maximum steady state temperatures expected in specific areas related to FLEX mitigation strategy implementation to ensure the environmental conditions remain acceptable for personnel habitability and within equipment qualification limits. (FLEX Implementation HVAC ELAP Analysis, Project No. 12938-017, SL-012415, Rev. 0, June 11, 2014, Letter No. SL-TVA-365).

Lighting - In an ELAP event initial lighting during Phase 1 of the response the MCR and Shutdown Board Room areas are provided by the plant designed 125v DC powered emergency lighting system, designated by the LD prefix. This system utilizes LED light bulbs. The Auxiliary Control Room (ACR), access and egress routes and areas that must be attended for safe shutdown operations are provided with 8 hour emergency battery lighting (EBL) units. The EBL units that support safe shutdown and emergency access and egress are routinely referred to as Appendix 'R' battery packs. Traveling to and from the various areas necessary to implement the FLEX mitigation strategies,

making required mechanical connections, operating electrical disconnects and breakers, monitoring instrumentation and component manipulations are similar to tasks previously walked down for B.5.b and Appendix 'R' Safe Shutdown operations.

Communications - Sequoyah Nuclear Plant, Units 1 & 2 communications systems and equipment are designed and installed to ensure reliability of onsite and offsite communications in the event of a design basis or BDBEE. SQN's ELAP mitigation capability benefits from a previously planned upgrade of SQN's radio communication system. DCN D23096 has converted the analog Nextel Radio System to a trunked VHF and UHF digital system with new multi-ban handheld radios. The new radio system hardware (cabinets, repeaters, hand held radios, etc.) are provided by the Harris Corporation.

SQN maintains a sound powered phone system. There are four plant sound powered phone sub-divisions: Backup Control Center System, Plant Operations System, Health Physics System and Diesel Building to Main Control Room System. The sound-powered telephone system is a communication system which utilizes telephone instruments in which the transmitters and receivers are passive transducers; external power is not required since operating power is obtained from the speech input only.

TVA purchased 17 IsatPhone PRO global handheld satellite phones for Sequoyah. The SatPhone Battery Life is Talk time: Up to 8 Hours; Standby Time: Up to 100 Hours. These phones are deployed in the MCR at the Shift Manager - Senior Reactor Operator's (SRO) desk, in the TSC, Central Alarm Station (CAS), Environmental Monitoring Vans, with individuals on-site, and in the Emergency Planning (EP) office area. In addition spare batteries are kept fully charged that are available at the TSC, CAS, and EP offices. This gives the individual phones 16 hours of talk time before recharging is needed. The phone in the vans is charged using the standard 12V adapter and will remain available throughout the duration of the event.

- Updated the discussions in the Storage/Protection of Equipment subsections for: Seismic, Flooding, Severe Storms with High Winds, Snow, Ice and Extreme Cold and High Temperatures.

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

Currently, TVA expects to comply with the order implementation date and no relief/relaxation is required at this time.

## Open Items from Overall Integrated Plan and NRC Evaluation

The following tables provide a summary of the open items documented in the OIP or the NRC Evaluation and the status of each item.

Open Item Number	Description	Status
1	The current Condensate Storage Tanks (CSTs) are a non-seismic tank that is not missile protected. The site is currently pursuing two options; the qualification and hardening of the existing CST or the construction of a new seismically qualified and missile protected CST. One of these options must be completed before the volume of the CST can be credited.	<p style="text-align: center;">Closed</p> <p>The Condensate Storage Tanks (CSTs) are being modified to provide missile protection and seismic qualification. DCNs 23191 &amp; 23376 in progress.</p>
2	Liquefaction of haul routes for FLEX will be analyzed.	<p style="text-align: center;">Closed</p> <p>Report of Geotechnical Exploration, Deployment Paths Analysis and Condensate Storage Tanks, TVA Sequoyah Nuclear Plant, AMEC Project 3050140254 and Sequoyah Nuclear Plant - Liquefaction Induced Settlement of FLEX Deployment Paths - White Paper.</p>
3	No detailed analysis has been provided regarding initial FLEX fuel supplies to determine a need time for access to 7 day tank supplies or resupply of the 7 day tanks. It is assumed that each FLEX component is stored with a minimum supply of 8 hours of fuel at constant operation. This assumption will need to be assessed once all FLEX equipment has been purchased and equipment specifications are known.	<p style="text-align: center;">Closed</p> <p>Fuel consumption spreadsheet completed to show that fuel supply of equipment will last seven days. (EDMS W50 140715 007)</p>
4	No need time has been identified for action to protect containment. This includes actions to mitigate pressurization of containment due to steaming when reactor coolant system (RCS) vent paths have been established or actions to mitigate temperature effects associated with equipment survivability. An evaluation will be provided to prove indefinite containment coping.	<p style="text-align: center;">Closed</p> <p>Westinghouse Letter, LTR-ISENG-14-2, Revision 0, Containment Pressures and Temperatures for Sequoyah Units 1 and 2 during an ELAP Calculated with MAAP 4.07, August 8, 2014.</p>

<b>Open Item Number</b>	<b>Description</b>	<b>Status</b>
5	The Phase 3 equipment staging area has not been determined.	<p style="text-align: center;">Closed</p> <p style="text-align: center;">Areas are identified and are included in the National SAFER Response Center (NSRC) playbook.</p>
6	A strategy for clearing and removing debris will be determined.	<p style="text-align: center;">Closed</p> <p style="text-align: center;">Debris removal equipment has been identified and storage locations determined</p>
7	A thorough analysis of the makeup flow rate requirements and other equipment characteristics will be finalized during the detailed design phase of FLEX.	<p style="text-align: center;">Started</p>
8	The need time for spent fuel pool (SFP) cooling actions (deployment of hose, venting, and alignment of makeup) was determined using worst case heat loads. This item will continue to be assessed and later action times may be acceptable. Note that the timing for this step during an outage is different, but resources will be available to complete the required actions.	<p style="text-align: center;">Closed</p> <p style="text-align: center;">Westinghouse Calculation Note, CN-SEE-II-13-9, Revision 0, Determination of the Time to Boil in the Sequoyah Units 1 &amp; 2 Spent Fuel Pool after an Earthquake, April 24, 2014, TVA-14-35</p>
9	Functional requirements for each of the Phase 3 strategies, equipment and components will be completed at a later time and will be provided in the six month updates to the February 28, 2013 submittal.	<p style="text-align: center;">Closed</p> <p style="text-align: center;">Functional requirements and equipment for Phase 3 strategies are identified and included in the National SAFER Response Center (NSRC) playbook</p>

Open Item Number	Description	Status
10	Containment temperature instrumentation is only available until flood waters enter the technical support center (TSC) inverter or station battery rooms. A method to monitor containment temperature, post flood, will be developed.	<p data-bbox="1192 274 1284 302">Closed</p> <p data-bbox="1065 342 1414 678">SQN procedure FSI-7, Loss of Vital Instrumentation or Control Power, provides the vehicle to attain/monitor containment temperature post flood. A pyrometer will be used to monitor containment wall temperature.</p> <p data-bbox="1057 719 1422 981">Westinghouse Letter, LTR-ISENG-14-2, Revision 0, Containment Pressures and Temperatures for SQN Units 1 and 2 during an ELAP Calculated with MAAP 4.07, August 8, 2014.</p>
11	The heating, ventilation and air conditioning (HVAC) analysis is preliminary, and has not been finalized.	<p data-bbox="1192 993 1284 1021">Closed</p> <p data-bbox="1068 1061 1414 1193">FLEX Implementation HVAC Analysis Impact Study, Project No. 12938-012, January 31, 2013.</p> <p data-bbox="1073 1232 1422 1664">Calculation ID: NUC-SQN-MEB-MDQ0009992013000085, Rev 001, SQN ELAP Transient Temperature Analysis, January 23, 2014 &amp; FLEX Implementation HVAC ELAP Analysis, Project No. 12938-017, SL-012415, Rev. 0, June 11, 2014, Letter No. SL-TVA-365.</p>

Open Item Number	Description	Status
12	Verify ability to deploy FLEX equipment to provide core cooling in Modes 5 and 6 with steam generators (SGs) unavailable.	<p style="text-align: center;">Closed</p> <p>Westinghouse Calculation Note, CN-SEE-II-13-37-Redacted, Revision 0, Sequoyah Unit 1 and Unit 2 Reactor Coolant System FLEX Evaluation with Standard Reactor Coolant Pump Seals, March 6, 2014. 0 - FSI - 5.05, ERCW Alignment for 5000GPM Portable Diesel Pump, Revision 0.</p>
13	An evaluation of the impact of FLEX response actions on design basis flood mode preparations will be performed. This evaluation will include the potential for extended preparation time for FLEX. Changes which affect the Integrated Plan will be included in the six month update.	<p style="text-align: center;">Open</p> <p>AOP-N.03, External Flooding is in process of revision to integrate FLEX strategies.</p>
14	Perform an alternate cooling source evaluation. The purpose of this analysis is to examine options to utilize alternate water sources to provide continuous sources of water to maintain key safety functions.	<p style="text-align: center;">Open</p> <p>Westinghouse Calculation Note, CN-SEE-II-13-6, Revision 3-A (draft) Sequoyah FLEX Alternate Cooling Evaluation Input Auxiliary Feedwater Usage is in review.</p>
15	Perform conceptual hydraulic performance analyses. The purpose of this analysis is to conservatively evaluate hydraulic performance of FLEX systems.	<p style="text-align: center;">Open</p> <p>Westinghouse Calculation Note, CN-FSE-14-48 , Revision 0-A (draft), Sequoyah Units 1 and 2 As-Built FLEX System Fathom Model is in review.</p>
16	Develop a mechanical conceptual design report. The purpose of this report is to summarize the mechanical conceptual design of the FLEX strategies and identify any required modifications.	<p style="text-align: center;">Closed</p> <p>DAR-FSE-13-3, Revision 0, FLEX Mechanical Conceptual Design Report for the Sequoyah Unit 1 and Unit 2 Nuclear Plant, October 2014.</p>

Open Item Number	Description	Status
17	Develop a electrical conceptual design report. The purpose of this report is to summarize the electrical conceptual design of the FLEX strategies and identify any required modifications.	Closed See SE Tracker Item 61-B Response Closeout Notes.
18	Perform an RCS makeup analysis. The purpose of this analysis is to define FLEX RCS inventory and shutdown margin for Sequoyah.	Closed Westinghouse Calculation Note, CN-SEE-II-13-37-Redacted, Revision 0, Sequoyah Unit 1 and Unit 2 Reactor Coolant System FLEX Evaluation with Standard Reactor Coolant Pump Seals, March 6, 2014.
19	Perform an SFP evaluation. The purpose of this analysis is to evaluate the impact of sloshing and time-to-boil in the SFP after an earthquake.	Closed Westinghouse Calculation Note, CN-SEE-II-13-9, Revision 0, Determination of the Time to Boil in the Sequoyah Units 1 & 2 Spent Fuel Pool after an Earthquake, April 24, 2014, TVA-14-35.
20	Perform a timing and deployment evaluation. The purpose of this analysis is to summarize the FLEX timeline for Sequoyah, identify time constraints and provide for the safety function needs.	Closed NEI 12-01 Phase 2 Extended Loss of AC Power (ELAP) ERO Staffing Analysis Report, Revision 0, January 21, 2015.
21	Develop a programmatic control report. The purpose of this report is to summarize the need to implement programmatic control of the FLEX program.	Open Program Document to complete December, 2015.

Open Item Number	Description	Status
22	Evaluate the existing extreme hazard analysis and planned Near-Term Task Force (NTTF) Tier 1 activities on FLEX strategies to summarize on-going industry activities and the potential to impact the developed FLEX strategies.	<p align="center">Closed</p> <p>NEI 12-06, Revision 0, Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," August 2012.</p> <p>NEI 12-02, Revision 1. 'Industry Guidance for Compliance with NRC Order EA-12-051, "To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, August, 2012.</p>
23	The time at which the Forebay volume depletes needs to be evaluated to determine the time at which replenishment is required. Based on Reference 10 there is 1,640,000 gallons available in the Forebay. Based on the alternate cooling source evaluation, approximately 640,000 gallons are required at 72 hours post ELAP. Therefore, it is expected the Forebay volume will supply suction to the TDAFWP for greater than 72 hours following the ELAP event and replenishment will be required during Phase 3.	<p align="center">Closed</p> <p>See SE Tracker Item 23-C Response Closeout Notes.</p>
24	Further analysis will be performed to determine the required timeline for implementing the 6.9 KV FLEX DGs as an alternate power source for the loads supplied by the 480v FLEX DGs.	<p align="center">Closed</p> <p>NEI 12-01 Phase 2 Extended Loss of AC Power (ELAP) ERO Staffing Analysis Report.</p>
25	Complete battery calculations to document Vital Battery life of 8 hours after loss of all AC. A battery calculation has been completed for WBN which is of similar design.	<p align="center">Closed</p> <p>SQN Calculations : SQN-CPS-057,058, 059, &amp; 060. Vital Control Power System Loading Channel I, II, III, IV and Continuous Loading Evaluation of Protective Devices in the 120VAC Vital Instrument Power Boards.</p>

Open Item Number	Description	Status
26	The CETs are only available until water enters the auxiliary instrument room. A method to monitor CET, post flood, will be evaluated and developed, if required.	<p data-bbox="1198 278 1292 304">Closed</p> <p data-bbox="1062 342 1425 1157">The CETs indications are only available until flood waters enter the Auxiliary Instrument Room (elevation 685). The validating indicator for CETs is the RCS Wide Range (WR) T-hot indicators. SQN procedure FSI-7, Loss of Vital Instrumentation or Control Power provides the vehicle to attain/monitor RCS WR T-hot indication. Flood protected instrumentation is available in the Auxiliary Control Room (ACR). Appendix B, Establishing Methods for Monitoring Parameters During Flood provides listing of RCS WR T-hot instruments that would be available in the ACR for Units 1 &amp; 2.</p>
27	Strategies to address extreme cold conditions on the refueling water storage tank (RWST) and/or boric acid tanks (BATs), including potential need to reenergize heaters have not been finalized.	<p data-bbox="1198 1168 1292 1193">Closed</p> <p data-bbox="1062 1232 1425 1332">See SE Tracker Item 27-C Responses Closeout Notes.</p>
28	Establish a contract with the SAFER team in accordance with the requirements of Section 12 of Reference 2.	<p data-bbox="1198 1342 1292 1368">Closed</p> <p data-bbox="1062 1406 1425 1498">Agreement with National SAFER Response Center (NSRC) is in place.</p>

**Potential NRC Evaluation Impacts**

There are no potential impacts to the NRC Evaluation identified at this time.

## References

The following references support the updates to the OIP described in this enclosure.

1. Letter from TVA to NRC, "Tennessee Valley Authority (TVA) - Overall Integrated Plan in Response to the March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049) for Sequoyah Nuclear Plant," dated February 28, 2013 (ML13063A183)
2. Letter from TVA to NRC, "First Six-Month Status Report in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049) for Sequoyah Nuclear Plant," dated August 28, 2013 (ML13247A286)
3. Letter from NRC to TVA, "Sequoyah Nuclear Plant, Units 1 and 2 - Interim Staff Evaluation Relating to Overall Intergraded Plan in Response to Order EA-12-049 (Mitigation Strategies) (TAC Nos. MF0864 and MF0865)," dated February 19, 2014 (ML14002A109)
4. Letter from TVA to NRC, "Second Six-Month Status Report and Revised Overall Integrated Plan in Response to the March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049) for Sequoyah Nuclear Plant," dated February 28, 2014 (ML14064A181)
5. Letter from TVA to NRC, "Third Six-Month Status Report in Response to the March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049) for Sequoyah Nuclear Plant (TAC Nos. MF0864 and MF0865)," dated August 28, 2014 (ML14247A644)