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

CNL-16-026

February 11, 2016

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
Renewed Facility Operating License Nos. DPR-77 and DPR-79
NRC Docket Nos. 50-327 and 50-328

Subject: **Completion of Required Action for Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049) March 12, 2012, for Sequoyah Nuclear Plant (TAC Nos. MF0864 and MF0865)**

References:

1. NRC Order Number EA-12-049, "Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," dated March 12, 2012 (ML12054A735)

2. NRC Interim Staff Guidance 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," Revision 0, dated August 29, 2012 (ML12229A174)

3. NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," Revision 0, August 2012 (ML12242A378)

4. Letter from TVA to NRC, "Tennessee Valley Authority - Initial 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 EA-12-049)," dated October 29, 2012 (ML12307A104)

5. 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)

Enclosure 3 Attachment 3 is to be withheld from public disclosure under 10 CFR 2.390.
When separated from this submittal, this letter is decontrolled.

6. 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)

7. 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 (ML14064A295)

8. Letter from NRC to TVA, "Sequoyah Nuclear Plant, Units 1 and 2 - Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Order EA-12-049 (Mitigation Strategies) (TAC Nos. MF0864 and MF0865)," dated February 19, 2014 (ML14002A109)

9. 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)

10. Letter from TVA to NRC, "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)," dated February 27, 2015 (ML15064A167)

11. Letter from TVA to NRC, "Fifth 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, 2015 (ML15240A376)

12. Letter from NRC to TVA, "Sequoyah Nuclear Plant, Units 1 and 2 - Report for the Onsite Audit Regarding Implementation of Mitigating Strategies and Reliable Spent Fuel Instrumentation Related to Orders EA-12-049 and EA-12-051 (TAC Nos. MF0864, MF0865, MF0794, and MF0795)," dated March 3, 2015 (ML15033A430)

13. Letter from TVA to NRC, "Request for Schedule Relaxation from NRC Order EA-12-049, 'Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Event'," dated April 2, 2015 (ML15096A256)

14. Letter from NRC to TVA, "Sequoyah Nuclear Plant, Unit 1 - Relaxation of the Schedule Requirements of Order EA-12-049, 'Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events' (TAC No. MF0864)," dated April 29, 2015 (ML15104A703)

On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued Order EA-12-049 that directed Tennessee Valley Authority (TVA) to implement mitigation strategies for beyond-design-basis external events (Reference 1). Specific requirements were outlined in Attachment 2 of Reference 1.

The purpose of this letter is to report full compliance with the order to the NRC as required by Section IV, Condition C.3 of Reference 1, for Sequoyah Nuclear Plant (SQN), Units 1 and 2. Enclosure 1 to this letter provides a summary of compliance to each of the requirements described in Attachment 2 of Reference 1.

Reference 1 also required submission of an initial status report 60 days following issuance of the final interim staff guidance (Reference 2) and an overall integrated plan pursuant to Section IV, Condition C. Reference 2 endorses industry guidance document Nuclear Energy Institute (NEI) 12-06, Revision 0 (Reference 3) with clarifications and exceptions identified in Reference 2.

Reference 4 provided the TVA initial status report regarding mitigation strategies. On February 28, 2013, 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 EA-12-049, for the SQN, Units 1 and 2 (Reference 5). On August 28, 2013, TVA provided the first six-month status report to the OIP (Reference 6).

The OIP submitted in Reference 5 employed a strategy using reactor coolant pump (RCP) low leakage seals. TVA revised its strategy to use the existing conventional RCP seals. This strategy change required a revision to the OIP, which was resubmitted in Reference 7. These changes were presented and discussed with the NRC through the mitigation strategies audit process.

Based on a review of TVA's plan, including the six-month updates, and information obtained through the mitigation strategies audit process, the NRC concluded in its Interim Staff Evaluation (ISE) that the plan, when properly implemented, will meet the requirements of Order EA-12-049 at SQN, Units 1 and 2 (Reference 8). In addition, the ISE contained a summary of the open and confirmatory items requiring disposition.

References 9, 10 and 11 provided the third, fourth and fifth six-month status reports to the OIP pursuant to Section IV, Condition C of the NRC Order.

The NRC conducted an onsite audit from December 1 through 5, 2014. NRC issued an Audit Report on March 3, 2015, summarizing the activities and all open audit items under review by NRC (Reference 12).

Section IV, Condition A.2, of Reference 1 requires completion of full implementation no later than two refueling cycles after submittal of the OIP, as required in Condition C.1.a, or December 31, 2016, whichever comes first. On April 2, 2015, TVA requested an extension for SQN Unit 1 FLEX implementation (Reference 13) to allow deferral of implementation until Unit 2 implementation was required. This request was granted by the NRC on April 29, 2015 (Reference 14). The SQN Unit 2 second refueling outage since submittal of Reference 5 concluded on December 13, 2015, with Unit 2 entering Mode 2. As granted by Reference 14, full implementation of the NRC Order was achieved for SQN Unit 1 simultaneously with the end of the Unit 2 refueling outage.

Enclosure 2 provides a response to the open and confirmatory items identified in the NRC ISE (Reference 8) and those open and pending items listed in the NRC audit report (Reference 12).

Enclosure 3 provides the SQN, Units 1 and 2, FLEX Final Integrated Plan.

The information provided in Enclosure 3, Attachment 3 is considered to contain information concerning physical protection not otherwise designated as Safeguards Information and is designated "Security Sensitive Information" as defined in 10 CFR 2.390(d)(1). Accordingly, TVA requests that the information provided in Enclosure 3, Attachment 3 to this letter be withheld from public disclosure.

There are no new regulatory commitments in this letter. If you have any questions regarding this matter, please contact Michael McBrearty at (423) 843-7088.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 11th day of February 2016.

Respectfully,

J. W. Shea
Vice President, Nuclear Licensing

Enclosures

cc: See Page 5

**Enclosure 3 Attachment 3 is to be withheld from public disclosure under 10 CFR 2.390.
When separated from this submittal, this letter is decontrolled.**

Enclosures:

1. Tennessee Valley Authority, Sequoyah Nuclear Plant, Units 1 and 2, Mitigation Strategies (FLEX) Compliance 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)
2. Tennessee Valley Authority, Sequoyah Nuclear Plant, Units 1 and 2, Mitigation Strategies (FLEX) Technical Basis for Audit and Interim Staff Evaluation Open Items
3. SQN Final Integrated Plan

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 3 Attachment 3 is to be withheld from public disclosure under 10 CFR 2.390.
When separated from this submittal, this letter is decontrolled.

ENCLOSURE 1

Tennessee Valley Authority, Sequoyah Nuclear Plant, Units 1 and 2, Mitigation Strategies (FLEX) Compliance 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)

Introduction

Tennessee Valley Authority (TVA), Sequoyah Nuclear Plant (SQN), developed an initial Overall Integrated Plan (OIP) (Reference 1 in Reference section of this Enclosure), documenting the diverse and flexible strategies (FLEX), in response to Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," Reference 2. The information provided herein documents full compliance for TVA, SQN, Units 1 and 2, with Reference 2.

The information provided in Attachment 1 of Enclosure 1 documents the compliance of SQN, Units 1 and 2, pursuant to Section IV, Condition C.3 of Reference 2, as of December 13, 2015. Compliance with specific elements of Order EA-12-049 is documented in Attachment 1 of this Enclosure. The Milestone Schedule - Items Complete is provided in Attachment 2 of this Enclosure.

Open Item Resolution

Issues from the NRC Interim Staff Evaluation (ISE) (Reference 14) and Audit Report (Reference 15) have been addressed by TVA. The issues that were identified as open and pending in References 14 and 15 include:

Item	Reference
ISE Open Item (OI) 3.2.1.6.A	14
ISE OI 3.2.1.8.A	14, 15
ISE OI 3.2.3.A	14, 15
ISE OI 3.2.4.8.A	14
ISE Confirmatory Item (CI) 3.1.1.2.A/B	14
ISE CI 3.1.2.2A	14
ISE CI 3.1.3.2.A	14
ISE CI 3.1.4.1.A	14
ISE CI 3.1.5.1.A	14
ISE CI 3.2.1.1.A	14
ISE CI 3.2.1.2.A/B	14
ISE CI 3.2.1.3.A	14
ISE CI 3.2.1.8.B	14
ISE CI 3.2.4.1.A	14
ISE CI 3.2.4.2.A/B/C	14
ISE CI 3.2.4.3.A	14

Item	Reference
ISE CI 3.2.4.4.A	14
ISE CI 3.2.4.5.A	14
ISE CI 3.2.4.6.A	14
ISE CI 3.2.4.8.B	14
ISE CI 3.2.4.10.A	14
ISE CI 3.4.A	14, 15
OIP OI #7	15
OIP OI #10	15
OIP OI #13	15
OIP OI #14	15
OIP OI #15	15
OIP OI #18	15
OIP OI #20	15
OIP OI #21	15
OIP OI #24	15
SE #3	15
SE #4	15
SE #5	15

TVA's responses to the Interim Staff Evaluation (ISE) Open and Confirmatory Items, Licensee Identified Open Items and Audit Questions/Audit Report Open Items are summarized in Enclosure 2. Enclosure 3 provides the SQN Final Integrated Plan.

Order EA-12-049 Compliance Elements Summary

The elements identified below for Sequoyah Nuclear Plant (SQN), Units 1 and 2, are documented in the Overall Integrated Plan (Reference 1), the 6-Month Status Reports (References 3, 4, 5, 6 and 7), and additional docketed correspondence (References 8 through 13) that demonstrate compliance with Order EA-12-049.

Strategies - Complete

SQN, Units 1 and 2, strategies are in compliance with Order EA-12-049. Strategy related Open Items, Confirmatory Items, or Audit Questions/Audit Report Open Items have been addressed and are considered complete pending NRC closure. TVA is providing responses to strategy related Open Items, Confirmatory Items, and Audit Questions/Audit Report Open Items as documented in Enclosure 2. The closure of responses to some issues are pending NRC review.

Modifications - Complete

The modifications described in the Final Integrated Plan (FIP) required to support the FLEX strategies for SQN, Units 1 and 2, are either closed, or the equipment has been turned over to Operations with the FLEX Design Change Notices (DCNs) and Engineering Design Change Requests (EDCRs) in the closeout process in accordance with the station design control process.

Equipment – Procured and Maintenance & Testing - Complete

The equipment required to implement the FLEX strategies for SQN, Units 1 and 2, has been procured in accordance with NEI 12-06, Sections 11.1 and 11.2. The required FLEX equipment has been received at SQN. Equipment has been initially tested/performance verified as identified in NEI 12-06, Section 11.5, and is available for use.

Maintenance and testing is being conducted through the use of the SQN Preventive Maintenance (PM) Program such that equipment reliability is achieved. FLEX PM instructions have been approved and issued in accordance with the site PM control process. Site PMs are scheduled for implementation in the appropriate work weeks based on their frequency as scheduled in the SQN PM Program.

Protected Storage - Complete

The storage facilities required to implement the FLEX strategies for SQN, Units 1 and 2, have been completed and provides protection from the applicable site hazards. The equipment required to implement the FLEX strategies for SQN, Units 1 and 2, is stored in its protected configuration.

Procedures - Complete

FLEX Support Instructions (FSIs) for SQN, Units 1 and 2, are common procedures and have been developed and integrated with existing procedures. The FSIs and affected existing procedures have been verified and are available for use in accordance with the site procedure control program.

Training - Complete

Training for SQN, Units 1 and 2, has been completed in accordance with an accepted training process as recommended in NEI 12-06, Section 11.6.

Staffing - Complete

The staffing study for SQN has been completed in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 50.54(f), as provided in "Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," dated March 12, 2012 (Reference 16), as documented in TVA's letter to the NRC dated January 30, 2015 (Reference11).

National SAFER Response Centers - Complete

TVA contracted with Pooled Equipment Inventory Company (PEICo) and has joined the Strategic Alliance for FLEX Emergency Response (SAFER) Team Equipment Committee for off--site facility coordination. It has been confirmed that PEICo is ready to support SQN with Phase 3 equipment stored in the National SAFER Response Centers in accordance with the site-specific SAFER Response Plan.

Validation - Complete

SQN has completed validation in accordance with industry guidance to assure required tasks, manual actions and decisions for FLEX strategies are feasible and may be executed within the constraints identified in the FIP for Order EA-12-049.

FLEX Program Document - Complete

The TVA SQN FLEX Program document has been developed in accordance with the requirements of NEI 12-06. The TVA Fleet (Reference 17) and SQN (Reference 18) documents have been issued.

References

References for Enclosure 1 and associated Attachments

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. NRC Order Number EA-12-049, "Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," dated March 12, 2012 (ML12054A735)

3. Letter from TVA to NRC, "First 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," dated August 28, 2013 (ML13247A286)

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)

6. Letter from TVA to NRC, “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),” dated February 27, 2015 (ML15064A167)

7. Letter from TVA to NRC, “Fifth 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, 2015 (ML15240A376)

8. Letter from TVA to NRC, “Tennessee Valley Authority (TVA) - Answer to Order EA-12-049 with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events for TVA's Bellefonte Nuclear Plant, Browns Ferry Nuclear Plant, Sequoyah Nuclear Plant, and Watts Bar Nuclear Plant,” dated March 30, 2012.

9. Letter from TVA to NRC, “Tennessee Valley Authority (TVA) - 60-Day Response to NRC Letter, Request for Information Pursuant to Title 10 of the *Code of Federal Regulations* 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident; dated March 12, 2012,” dated May 11, 2012.

10. Letter from TVA to NRC, “Tennessee Valley Authority - Initial 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),” dated October 29, 2012.

11. Letter from TVA to NRC, “Tennessee Valley Authority (TVA) - Response to March 12, 2012, Request for Information Pursuant to Title 10 of the *Code of Federal Regulations* 50.54(f) Regarding Recommendations of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident, Enclosure 5, Recommendation 9.3, Emergency Preparedness - Staffing, Requested Information Items 1, 2, and 6 - Phase 2 Staffing Assessment,” dated January 30, 2015.

12. Letter from TVA to NRC, “Request for Schedule Relaxation from NRC Order EA-12-049, ‘Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Event’,” dated April 2, 2015.

13. Letter from NRC to TVA, “Sequoyah Nuclear Plant, Unit 1 - Relaxation of the Schedule Requirements of Order EA-12-049, ‘Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events’ (TAC No. MF0864),” dated April 29, 2015

14. Letter from NRC to TVA, “Sequoyah Nuclear Plant, Units 1 and 2 -Interim Staff Evaluation Relating To Overall Integrated Plan In Response to Order EA-12-049 (Mitigation Strategies) (TAC Nos. MF0864 and MF0865),” dated February 19, 2014

15. Letter from NRC to TVA, “Sequoyah Nuclear Plant, Units 1 and 2 - Report For The Onsite Audit Regarding Implementation of Mitigating Strategies and Reliable Spent Fuel Instrumentation Related To Orders EA-12-049 and EA-12-051 (TAC Nos. MF0864, MF0865, MF0794, and MF0795),” dated March 3, 2015.

16. Letter from NRC to TVA, "Request for Information Pursuant to Title 10 of the *Code of Federal Regulations* 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," Recommendation 9.3, dated March 12, 2012 (ML2073A348).

17. TVA, Nuclear Power Group Standard Programs and Processes, NPG-SPP-09.22.2, “Diverse and Flexible Coping Strategies (FLEX) Program Document”

18. TVA, Technical Instruction, 0-TI-DXX-000-922.3, “Diverse and Flexible Coping Strategies(FLEX) Program Basis”

Activity	Completion Date
Submit Overall Integrated Implementation Plan	**Feb 2013**
6 Month Status Updates	
Update 1	Aug 2013
Update 2	Feb 2014
Update 3	Aug 2014
Update 4	Feb 2015
Update 5	Aug 2015
FLEX Strategy Evaluation	**Jun 2013**
Walk-throughs or Demonstrations	**Dec 2015**
Perform Staffing Analysis	**Jan 2015**
Modifications	
Modifications Evaluation	Oct 2013
Unit 1 N-1 Walkdown	Oct 2013
Unit 1 Design Engineering	Mar 2015
Unit 1 Implementation Outage	May 2015
Unit 2 N-1 Walkdown	Apr 2014
Unit 2 Design Engineering	Dec 2015
Unit 2 Implementation Outage	Dec 2015
Storage	
Storage Design Engineering	Mar 2015
Storage Implementation	Dec 2015
FLEX Equipment	
Procure On-site Equipment	Jan 2015
Develop Strategies with NSRC	Dec 2013
Identify Off-site Delivery Stations	Mar 2014
Procedures	
PWROG issues FSG guidelines	Jun 2013
Create Site Specific FSIs	Nov 2014
Create Maintenance Procedures	Nov 2014
Training	
Develop Training Plan	Nov 2014
Implement Training	May 2015
Unit 1 FLEX Implementation	**Dec 2015**
Unit 2 FLEX Implementation	**Dec 2015**
Full Site FLEX Implementation	**Dec 2015**
Submit Completion Report	**Feb 2016**

ENCLOSURE 2

Tennessee Valley Authority, Sequoyah Nuclear Plant, Units 1 and 2,
Mitigation Strategies (FLEX) Technical Basis for Audit and Interim Staff Evaluation Open Items

TVA affirms that SQN is in full compliance with Order EA-12-049 as demonstrated by the docketed correspondences concerning these orders. Briefly, SQN FLEX Interim Staff Evaluation (ISE) Open and Confirmatory Items (CIs) are complete pending NRC closure; SQN FLEX Overall Integrated Plan (OIP) Open Items (OIs) are complete pending NRC Closure; SQN FLEX Audit Questions are complete pending NRC closure; and SQN FLEX NRC Audit Report Open Items are complete pending NRC closure. The following tables provide responses to all SQN open items.

Table 1 - Items in NRC Interim Staff Evaluation (ISE) dated February 19, 2014

ISE Item Number	Description	Licensee Response
OI 3.2.1.6.A	Sequence of Events (SOE) - Complete the reanalysis to support the revised timelines, both for the flood and the non-flood conditions, in light of the new strategy of not crediting low leakage seals, and for using the existing pre-staged 3 MW [mega watt] DGs [diesel generators] to power the safety injection pumps to restore RCS [reactor coolant system] inventory. Other aspects of the SOE timeline to be verified are the boration strategy and the SFP [spent fuel pool] cooling strategy.	The Final Integrated Plan (FIP) under Enclosure 3 of this letter provides the revised Sequence of Events (SOE) timelines for flood and non-flood conditions.
OI 3.2.1.8.A	Core Sub Criticality - Complete the reanalysis to support the revised core boration coping strategy of providing boration early in the ELAP [extended loss of alternating current (ac) power] event including the deployment considerations and the rate of boration as it affects sizing the high pressure (HP) FLEX pump is to be completed.	Response provided in Table 2, below - see ISE OI 3.2.1.8.A

ISE Item Number	Description	Licensee Response
OI 3.2.3.A	Containment Functions - Containment evaluations for Phases 1, 2 and 3 have not been done. Complete the results of the evaluations needed to confirm that containment functions are maintained during the course of the ELAP event. Open Item #4 in the 8/28/14 6-month update states that Westinghouse Calculation LTR- ISENG-14-2, Rev 0, has been completed which demonstrates that containment functions will be maintained throughout all Phases of the ELAP. This calculation should be added to the ePortal for staff review.	Response provided in Table 2, below see ISE OI 3.2.3.A
OI 3.2.4.8.A	Electric Power Sources - On page E-57 of the Integrated Plan, the licensee stated plans to pre-stage and protect two 225 kVA [kilovolt-amperes] 480 volt [V] FLEX diesel generators on the roof of the Auxiliary Building and two 3 MW 6.9 kV FLEX diesel generators in the protected Flexible Equipment Storage Building (FESB). The use of pre-staged generators appears to be an alternative to NEI 12-06. The licensee has not provided sufficient information to demonstrate that the approach meets the NEI 12-06 provisions for pre-staged portable equipment. 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.	During the NRC Audit conducted December 1 through 4, 2014, at SQN, NRC conducted walk-downs of the two 225 kVA 480 V FLEX DGs on the roof of the Auxiliary Building and two 3 MW 6.9kV FLEX DGs in the protected Flexible Equipment Storage Building (FESB) and reviewed electrical calculations, draft FLEX Support Instructions (FSIs), and the justification for pre-staged electrical power sources. This information is provided in ePortal Item 16 (Reference 1). Applicable Supporting Documents - ePortal Item 16 Reference: 1. SQN FLEX OIP Alternate Justification 11-24-14

ISE Item Number	Description	Licensee Response
CI 3.1.1.2.A	Deployment of FLEX Equipment - Confirm the routes from offsite staging areas “C” and “D” are not subject to liquefaction.	During the NRC Audit conducted December 1 through 4, 2014 at SQN, information regarding liquefaction was provided under Reference 1, wherein it is documented that transport routes from Staging Areas “C” and “D” to SQN may not be available. Transportation to the site will be by heavy lift helicopter or truck, as described in the SAFER Plan, depending on the condition and availability of transportation routes (Reference 2). Applicable Supporting Documents - ePortal Item 21 (Reference 1) and 26 (Reference 2) References: 1. Report of State Route Study Emergency Equipment Mobilization Routes TVA Sequoyah Nuclear Plant 2. SAFER Response Plan for Sequoyah Nuclear Plant Revision 1, January 21, 2015
CI 3.1.1.2.B	Deployment of FLEX Equipment - Confirm that loss of ac power will not prevent moving or deploying portable equipment.	During the NRC Audit conducted December 1 through 4, 2014, at SQN, NRC conducted walk-downs of the FESB and the Additional Diesel Generator Building (ADGB). The FESB and ADGB have structural members with rigging points to allow pulling the door open with pre-staged chain falls/come-a-long in the event of loss of power. Applicable Supporting Documents - ePortal Item 27 References: 1. 0-360-PIP-15-010 SQN ADGB Door Operation 2. 0-360-PIP-15-002 SQN FESB South Door Operation 3. 0-360-PIP-15-001 SQN FESB North Door Operation

ISE Item Number	Description	Licensee Response
CI 3.1.2.2.A	Deployment Flood Hazard - Confirm the ability to use the HP electric, submersible FLEX pump for coping during the flood mode considering the following FLEX equipment deployment considerations: a) its stored location, b) method of deployment, c) staged location, and d) method of connecting and powering up the HP pump.	During the NRC Audit conducted December 1 through 4, 2014 at SQN, NRC conducted walk-downs of the Intermediate Pressure (IP) and High Pressure (HP) pumps. Information regarding stored location, deployment, staging and power supply are provided in ePortal Item 9. HP FLEX pumps are prestaged on elevation (el 669) of the Auxiliary Building (AB) in the Unit 1 and Unit 2 Positive Displacement (PD) Charging Pump rooms. The N+1 pump is in the Unit 2 PD Charging Pump room. IP FLEX pumps: Two diesel driven pumps are stored in the FESB. For a non-flood event, pumps are deployed adjacent to the Condensate Storage Tanks (CSTs) to take suction from the CST or any existing tank. Two motor driven submersible pumps are prestaged on el 714 of the AB in the Unit 1 and Unit 2 Ventilation Rooms, and take suction from the Essential Raw Cooling Water (ERCW) System. Both can be used in a flood and non-flood event. Two motor driven submersible pumps are prestaged on el 669 of the AB in the Unit 1 and Unit 2 PD Charging Pump rooms, and take suction from the ERCW system. Both can be used in a flood and non-flood event. These pumps are also used in Modes 5 and 6 to supply RCS and take suction from the Refueling Water Storage Tank (RWST). The FIP under Enclosure 3 of this letter provides similar electrical power supply and staging information. Applicable Supporting Documents - ePortal Item 9 and 040 References: 1. SQN Flood Warning Calculation 2. SQN Figures A3-22 through 24 in ePortal Item 040

ISE Item Number	Description	Licensee Response
CI 3.1.3.2.A	Deployment High Winds - Confirm that the licensee's preparations for the hurricane hazard address the impact on the ultimate heat sink (UHS).	Abnormal Operating Procedure, AOP-N.02, "Tornado Watch/Warning" provides the actions necessary to mitigate the effects of a tornado. The AOP is implemented based on a tornado watch or warning, and actions are performed to protect the ultimate heat sink. This document was provided during the NRC Audit conducted December 1 through 4, 2014, at SQN under ePortal Item 9 Applicable Supporting Documents - ePortal Item 9 References: 1. AOP-N.02 Tornado Watch/Warning
CI 3.1.4.1.A	Protection of 225 kVA DGs - Extreme cold temperature hazard. Confirm the licensee has addressed the need for heating of the enclosure housing the FLEX DGs on the roof of the auxiliary building.	During the NRC Audit conducted December 1 through 4, 2014, at SQN, NRC conducted walk-downs of the two 225 kVA 480 V FLEX diesel generators on the roof of the Auxiliary Building and reviewed documents provided in ePortal Item 16. TVA determined that heating the enclosures of the 225 kVA DGs is not required for operation of the DGs. Applicable Supporting Documents - ePortal Item 16 References: 1. Confirmatory Item 3.1.4.1.A 2. Design Criteria (DC)-V-48.0, FLEX Response System 3. DC Environment outside Temp (DC-V- 21.0, Environmental Design) 4. 480V and 6900V DG Shop Orders 5. Evaluation of Jacket Water Heater for Extreme Cold 6. DG Coolant Cold Temp. Rating

ISE Item Number	Description	Licensee Response
CI 3.1.5.1.A	Protection of 225 kVA DGs - High temperature hazard. Confirm the licensee has addressed the need for ventilation/cooling the enclosure housing the FLEX DGs on the roof of the auxiliary building.	During the NRC Audit conducted December 1 through 4, 2014, at SQN, NRC conducted walk-downs of the two 225 kVA 480 V FLEX DGs on the roof of the AB and reviewed documents provided in ePortal Item 16. TVA determined an additional venting/cooling system for the enclosures of the 225 kVA DGs is not required for operation of the DGs. Applicable Supporting Documents - ePortal Item 16 References: 1. Confirmatory Item 3.1.5.1.A 2. DC-V-48.0 FLEX Response System 3. 480V DG Protection from Heat - Sizing and Specification - 105°F 4. 480V DG Protection from Heat - Sizing and Specification - 108°F 5. DC Environment outside Temp (DC-V- 21.0, Environmental Design) 6. Calculation MDQ0003602013000088, Maximum Temperature for 225kVA DG Enclosures 7. 480V and 6900V DG Shop Orders

ISE Item Number	Description	Licensee Response
CI 3.2.1.1.A	ELAP Analysis - Confirm the licensee's reliance on the NOTRUMP code for the ELAP analysis of Westinghouse plants is limited to the flow conditions prior to reflux condensation initiation. This includes specifying an acceptable definition for reflux condensation cooling.	During the NRC Audit conducted December 1 through 4, 2014, at SQN, a response was provided to NRC under ePortal Item 17; however, an analysis was still in progress to determine RCS makeup flow rates. The ELAP analysis using the NOTRUMP code was limited to flow conditions before reflux condensation initiates (Reference 1). Based on SQN's strategies to provide RCS makeup around 5 hours post ELAP, the estimated margin of time to reflux condensation cooling is approximately 9.5 hours. This information has been provided in ePortal Item 030. Applicable Supporting Documents - ePortal Item 17 and 030 References: 1. Westinghouse CN-SEE-II-13-37 Rev 1 (Redacted), Sequoyah Unit 1 and Unit 2 Reactor Coolant System FLEX Evaluation with Standard Reactor Coolant Pump Seals dated April 10, 2015. 2. PWROG-14027, Revision 3, "No. 1 Seal Flow Rate for Westinghouse Reactor Coolant Pumps Following Loss of All AC Power Task 3: Evaluation of Revised Seal Flow Rate on Time to Enter Reflux Cooling and Time at which the Core Uncovers," April 2015
CI 3.2.1.2.A	RCP Seals - Complete the analysis for RCP seal leakage rates and confirm its use in the ELAP analysis and the justification for the value used in the Sequoyah RCS make-up calculation.	Response provided in Table 2, below - See responses to SE #3, SE #4, and SE #5.
CI 3.2.1.2.B	RCP Seals - Confirm integrity of O-rings if the cold leg temperature exceeds 550 degrees F during the ELAP event. The applicable analysis and relevant seal leakage testing data used to justify that the integrity of the associated O-rings will be maintained at the temperature conditions experienced during the ELAP event needs to be evaluated in the context of the Sequoyah updated strategy.	TVA, SQN has confirmed that the maintenance instructions specify the use of high temperature O-rings (7228-C). SQN began installation of these O-ring after November 1991. SQN has identified two reactor coolant pumps (RCP), RCP 1-4 and RCP 2-3, where the scheduled O-ring replacement has not occurred. Scheduled maintenance for RCP 1-4 is set to occur in Fall 2016, and for RCP 2-3 in Spring 2017.

ISE Item Number	Description	Licensee Response
		These RCPs have at least one O-ring made of 7228-B compound. TVA believes this to be acceptable and provided justification under ePortal Item 9, and as described hereafter. The qualification of the 7228-A compound seal was completed in WCAP-10541 R2 S1 "High Temperature Extrusion Qualification Testing of Seals Eastern 7228A O-ring Compound." This qualification was completed at the test conditions mentioned below. The 7228-B compound was qualified in the same manner as the 7228-A compound. The 7228-B O-rings were tested to 1800 psid. From PWROG-14015-P, Table 6, Category 1 plants have a maximum pressure at the pump outlet of 951 psia at a cold leg pressure of 2250 psia. This pressure difference would be 1299 psid. Based on Sequoyah expected conditions at the seal during ELAP and the test pressure used for 7228-B O-rings, we consider our ELAP conditions as bounded by the qualification test parameters (0.018" gap/550°F/1800 psid). Also the ELAP strategy begins RCS cooldown within one hour reducing both temperature and pressure witnessed by the O-ring. Applicable Supporting Documents - ePortal Item 9 and 041 References: 1. Response to 13-A regarding Maintenance instructions 2. Response to NRC Item 13-A regarding O-rings 3. WCAP-10541 Rev 2, Westinghouse Owners Group Report, Reactor Coolant Pump Seal Performance Following a Loss of All AC Power, November 1986 4. LTR-RES-13-153, Documentation of 7228C O-rings at ELAP Conditions, October 31, 2013 5. PWROG-14015-P, Rev 0, No. 1 Seal Flow Rate for Westinghouse Reactor Coolant Pumps Following Loss of All AC Power, Task 2: Determine Seal Flow Rates, June 2014 6. SQN-DC-V-4.1.1, Rev 15, Sequoyah Nuclear Plant - Main Steam System

ISE Item Number	Description	Licensee Response
		7. Westinghouse CN-SEE-II-13-37 Rev 1 (Redacted), Sequoyah Unit 1 and Unit 2 Reactor Coolant System FLEX Evaluation with Standard Reactor Coolant Pump Seals, dated April 10, 2015.
CI 3.2.1.3.A	Decay Heat - Confirm the applicability of assumption 4 on page 4-13 of WCAP-17601-P, which states that "Decay heat is per ANS 5.1-1979 + 2 sigma, or equivalent." If the ANS 5.1-1979 + 2 sigma model is used in the ELAP analysis, values of the following key parameters used to determine the decay heat should be specified and the adequacy of the values used: (1) initial power level, (2) fuel enrichment, (3) fuel burnup, (4) effective full power operating days [EFPD] 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 [BOC], middle of the cycle {MOC], or end of the cycle [EOC].	During the NRC Audit conducted December 1 through 4, 2014, at SQN, a response was provided to NRC under ePortal Item 17. LTR-LIS-14-219 provides the values that Westinghouse used in WCAP-17601 for items 2-6. The power level is given in WCAP-17601 as 3723 MWt. 1. Initial power level – 3723 MWt – bounds SQN (3455 MWt) 2. Fuel Enrichment – 5% - bounds SQN 3. Fuel Burnup – bounds initial conditions given in 3.2.1.2(1) of NEI 12-06 4. EFPD/cycle – 540 EFPD (18 months) – bounds SQN 5. Number of fuel cycles – 3 6. Fuel characteristics based on BOC, MOC, or EOC - bounds initial conditions as given in 3.2.1.2(1) of NEI 12-06

ISE Item Number	Description	Licensee Response
CI 3.2.1.8.B	Core Sub Criticality - Confirm the analytical model addresses the boron mixing model under natural circulation conditions potentially involving two-phase flow, is in accordance with the Pressurized-Water Reactor Owners Group position paper, dated August 15, 2013 (ADAMS Accession No. ML13235A135 (non- public for proprietary reasons)) to include the three additional considerations provided in the NRC endorsement letter dated January 8, 2014 (ADAMS Accession No. ML13276A183).	During the NRC Audit conducted December 1 through 4, 2014, at SQN, a response was provided to NRC under ePortal Item 10. Boration coping strategy requirements have been considered since the NRC Audit. See response to ISE OI 3.2.1.8.A for discussion of RCS makeup and boration requirements. Reference 1 (ePortal Item 029) addresses clarification item No. 1 of the NRC endorsement letter dated January 8, 2014. FSI-8, "Alternate RCS Boration," provides operator actions to initiate alternate RCS boration to maintain subcritical conditions during an Extended Loss of AC Power (ELAP) event using one SI Pump or FLEX High Pressure Pump (HPP) (Reference 2). After injection of borated water, one hour of mixing in the RCS is required before boration is complete in consideration to clarification item No. 3 of the NRC endorsement letter dated January 8, 2014. The ELAP strategy is developed to preclude reflux cooling in consideration to clarification item No.2a of the NRC endorsement letter dated January 8, 2014. However, FSI-8 provides instruction to recovery from reflux cooling in the event of occurrence and one hour mixing is required before credit is taken for boration (ePortal Item 042). Applicable Supporting Documents - ePortal Item 10, 029, and 042 References: 1. Westinghouse CN-SEE-II-13-37 Rev 1 (Redacted), Sequoyah Unit 1 and Unit 2 Reactor Coolant System FLEX Evaluation with Standard Reactor Coolant Pump Seals dated April 10, 2015. 2. FSI-8, "Alternate RCS Boration"

ISE Item Number	Description	Licensee Response
CI 3.2.4.1.A	Equipment Cooling - Confirm that the SFP cooling system pumps, component cooling system pumps, motor driven AFW [auxiliary feedwater] pumps and the air compressors are sufficiently cooled to function for their expected duration during the ELAP event.	During the NRC Audit conducted December 1 through 4, 2014, at SQN, a response was provided to NRC under ePortal Items 5 and 17. The SFP cooling system pump, component cooling system pumps, motor driven AFW pumps, and the air compressors, may be used for the ELAP strategy; however, this equipment is not relied on to meet the requirements of NEI 12-06 R0. Never-the-less, Reference 1, provided in ePortal Item 21, determines the transient temperature responses for the equipment areas based on an ELAP conditions. Reference 2, reviewed in draft form during the audit (ePortal Item 5), contains direction to survey area temperatures during an ELAP event. An approved copy of Reference 2 is provided in ePortal Item 042. Reference 3, provided in ePortal Item 042, evaluates the cooling needs for placing spent fuel pool cooling system in service for long-term cooling. Reference 4, provided in ePortal Item 042, evaluates the cooling needs for using the motor driven AFW pumps as an alternative to the primary sources (i.e., turbine driven AFW pump and Intermediate Pressure (IP) FLEX pumps). Applicable Supporting Documents - ePortal Item 5, 17, 21, and 042 References: 1. SL-TVA-365 Sequoyah Nuclear Plant FLEX Implementation HVAC ELAP Analysis SL-012415 Revision 0 2. FSI-5.01, “Initial Assessment and FLEX Equipment Deployment” 3. FSI-11, “Alternate SFP Makeup and Cooling” 4. FSI-3, “Alternate Low Pressure Feedwater”

ISE Item Number	Description	Licensee Response
CI 3.2.4.2.A	Ventilation - Confirm that the equipment in the safety injection pump room, MDAFW [motor driven AFW] pump room and CC [component cooling] pump room are capable of operating in the post ELAP environmental temperatures for their required duration once analyses to determine the temperature rise are complete.	During the NRC Audit conducted December 1 through 4, 2014, at SQN, a response was provided to NRC under ePortal Item 17. The component cooling system pumps, and motor driven AFW pumps, may be used for the ELAP strategy; however, this equipment is not relied on to meet the requirements of NEI 12-06 R0. The safety injection (SI) Pump room transient temperature has been analyzed and determined that additional cooling is not required. See response provided in Table 2, below, for OIP OI #18.

ISE Item Number	Description	Licensee Response
CI 3.2.4.2.B	Ventilation - Confirm the impact of elevated temperatures and any accompanying mitigation methodologies due to a loss of ventilation and/or cooling on electrical equipment being credited as part of the ELAP strategies (e.g., electrical equipment such as in the turbine driven auxiliary feedwater pump room) are acceptable.	During the NRC Audit conducted December 1 through 4, 2014, at SQN, a response was provided to NRC under ePortal Item 10. TVA has evaluated the impact to room temperatures during an ELAP period. References 1 and 2, determine the transient temperature responses for the equipment areas based on an ELAP. These documents were provided in ePortal Item 21. Reference 3, supports References 1 and 2 by establishing a cutoff value (i.e., upper boundary) for the parameter of ambient temperature that is reasonable and conservative for excluding electrical equipment from the scope of the environmental qualification program required by 10CFR50.49. In this evaluation, a temperature limit was determined that represents an upper limit for concluding that a plant area has a mild environment with respect to temperature even if a plant design basis accident (DBA) were to occur. (ePortal Item 21) Applicable Supporting Documents - ePortal Item 10 and 21 References: 1. SL-TVA-365 Sequoyah Nuclear Plant FLEX Implementation HVAC ELAP Analysis SL-012415 Revision 0 2. SL-TVA-255 Loss of HVAC during ELAP Study 3. GENSTP3-001, R000, “Upper Boundary Temperature for Mild Environments Related to Environmental Qualification of Electrical Equipment”

ISE Item Number	Description	Licensee Response
CI 3.2.4.2.C	Ventilation - Confirm that the hydrogen concentration in the battery room remains less than combustibility limits in the context of the licensee's strategies for the ELAP event.	During the NRC Audit conducted December 1 through 4, 2014, at SQN, information was provided to NRC under ePortal Item 10 and a walk-down was conducted of the battery rooms. Hydrogen generation is a concern when the batteries are charging. Steps are taken within Reference 3, to promote natural circulation through blocking the battery room doors open, monitoring hydrogen concentration and restoring room exhaust fans when the 6.9kV FLEX DG is supplying power (ePortal Item 042). Applicable Supporting Documents - ePortal Item 10 and 042 References: 1. B87140924001, EDQ0009992014000102, "FLEX Analysis for 125V DC Batteries" 2. B87931021001, SQN-CPS-063, "Hydrogen Generation, Vital Batteries" 3. FSI-4, DC Bus Management and 480V FLEX D/G Alignment/Loading

ISE Item Number	Description	Licensee Response
CI 3.2.4.3.A	Heat Tracing - Confirm that the licensee has addressed the possibility of boric acid precipitation after loss of heat tracing during extreme cold conditions. The evaluation should consider the time boration is initiated and throughout the time of boration.	During the NRC Audit conducted December 1 through 4, 2014, at SQN information was provided to NRC under ePortal Item 17. SQN has reviewed the need for heat tracing and determined that no heat tracing is required to implement strategies associated with Order EA-12-049. Boric Acid Tank (BAT) heat tracing will be lost at initiation of the ELAP; however, room temperature for the BAT will not decrease significantly and use of boric acid from the BAT will occur at approximately 5 hours. By this time, BAT temperatures will be high enough to ensure availability. RWST instrumentation is outside and may freeze after loss of heat tracing; however, personnel awareness of inventory in the RWST and strategies to utilize inventory in RWST for RCS makeup do not rely on use of instrumentation because the total makeup to RCS is less than RWST inventory. Reference 1, (ePortal Item 042) includes instruction to evaluate freezing conditions, restoration of tank heater, and installation of temporary heat tracing or draining water from equipment. Applicable Supporting Documents - ePortal Item 17 and 042 Reference: 1. FSI-5.01, “Initial Assessment and Flex Equipment Deployment”

ISE Item Number	Description	Licensee Response
CI 3.2.4.4.A	Communication - Confirm that upgrades to the site's communications systems have been completed in accordance with TVAs Communications Assessment and as evaluated by the NRC staff (ADAMS Accession No. ML13116A125).	During the NRC Audit conducted December 1 through 4, 2014, at SQN, information (References 1 - 3) was provided to NRC under ePortal Item 10. Upgrades to the site's communications systems have been completed in accordance with TVA's Communications Assessment (Reference 1) and documented in Design Change Notice D23096. The FIP under Enclosure 3 of this letter provides the SQN communication capabilities. Applicable Supporting Documents - ePortal Item 10 References: 1. TVA letter to NRC, "Tennessee Valley Authority (TVA) - Communication Assessment Related to NRC Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendation 9.3 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," dated October 31, 2012 2. NRC letter to TVA, "Sequoyah Nuclear Plant, Units 1 and 2 -Staff Assessment In Response To Recommendation 9.3 of the Near-Term Task Force Related To The Fukushima Dai-ichi Nuclear Power Plant Accident (TAC Nos. MF0032 And MF0033)," dated April 30, 2013 3. TVA letter to NRC, " Change to Communication Assessment Implementation Dates as Submitted in Tennessee Valley Authority's (TVA's) Response to NRC Letter, Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendation 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," dated October 15, 2014

ISE Item Number	Description	Licensee Response
CI 3.2.4.5.A	Accessibility - Confirm the ability to access protected and internal locked areas.	During the NRC Audit conducted December 1 through 4, 2014, at SQN, NRC discussed the security response, for access of protected and internal locked areas, to an ELAP event. Various FLEX Maintenance Instructions and FLEX Support Instructions notify Security of the actions needed to address ELAP conditions.
CI 3.2.4.6.A	Personnel Habitability - Confirm there are no habitability/accessibility concerns for the areas where local operator actions are performed to include completion of the habitability/accessibility study and any accompanying mitigation actions.	During the NRC Audit conducted December 1 through 4, 2014, at SQN, a response was provided to NRC under ePortal Item 10. References 1 and 2 of the response, determine the transient temperature responses for the equipment areas in which operator actions are performed. These documents were provided in ePortal Item 21. Applicable Supporting Documents - ePortal Item 10 and 21 References: 1. SL-TVA-365 Sequoyah Nuclear Plant FLEX Implementation HVAC ELAP Analysis SL-012415 Revision 0 2. SL-TVA-SQN-3014, MDQ0009992013000085 R1, “SQN ELAP Transient Temperature Analysis”

ISE Item Number	Description	Licensee Response
CI 3.2.4.8.B	Electrical Power Sources - The sizing basis for the 225 kVA DG and their ability to start the planned individual loads identified in the FLEX strategies. Confirm that the analysis for sizing of the DG shows that it encompasses coordination for protective equipment, cable ampacity, and voltage drop.	During the NRC Audit conducted December 1 through 4, 2014, at SQN, information was provided in ePortal Item 10 regarding the sizing of 225 kVA DG, distribution runs, protective equipment, power demands, and manufacturer specifications. Similar information was provided for the 3MW 6900V DGs. Reference 1 and 2 determines that the 225 kVA and 3MW 6900V DGs have the necessary capacity for the intended loads, and the distribution system is adequate to carry the loads to the necessary protective equipment. Applicable Supporting Documents - ePortal Item 10 References: 1. EDQ0009993013000086 - Technical Justification for Extended Station Blackout Diesel Generators 2. EDN0003602014000120 - 6900V 3MW FLEX Diesel Generator A and B Electrical Cable system Analysis 3. Spreadsheet of power demands for the 3MW DGs 4. Manufacturer Specifications Sheets for the 225kVA and 6900V DGs

ISE Item Number	Description	Licensee Response
CI 3.2.4.10.A	Load Reduction - Confirm that the licensee has addressed the actions necessary to complete the load shed, including the equipment location (or location where the required action needs to be taken), the time to complete each action, and identify which functions are lost as a result of shedding each load.	During the NRC Audit conducted December 1 through 4, 2014, at SQN, information was provided in ePortal Item 10. Reference 1, provided in ePortal Item 10, justifies the ability of the 125V DC Vital batteries and chargers to meet the load requirements during the initial 8 hours of a beyond Design Basis External Event (BDBEE). Reference 2 initiates a load shed following the loss of all AC power, by directing the performance of Reference 3. These documents are provided in ePortal Item 043. Applicable Supporting Documents - ePortal Item 10 and 043 References: 1. EDQ0009992014000102 - Flex Analysis for 125v DC Vital Batteries 2. ECA-0.0, “Loss of All AC Power” 3. EA-250-1, “Load Shed of Vital Loads After Station Blackout”
CI 3.4.A	Off-Site Resources - Confirm the licensee's arrangements for off-site resources addresses the guidance of Guidelines 2 through 10 in NEI 12-06, Section 12.2.	Response provided in Table 2, below - see ISE CI 3.4.A

Table 2 - Items in NRC Audit Report dated March 3, 2015

NRC Audit Report Item Number	Description	Licensee Response
ISE OI 3.2.1.8.A	Core Sub Criticality - Complete the reanalysis to support the revised core boration coping strategy of providing boration early in the [extended loss of alternating current (ac) Power] ELAP event including the deployment considerations and the rate of boration as it affects sizing the high pressure (HP) FLEX pump is to be completed. The licensee provided a calculation showing the boration needed to remain subcritical at 24 hours. The licensee is updating the calculation to ensure that boration is not needed before 24 hours to remain subcritical. Will review when available.	A review of Reference 1 was performed by NRC during the NRC Audit conducted December 1 through 4, 2014. A response was provided to NRC under ePortal Item 9. TVA has revised the Reference 1 calculation and provided a updated response to NRC under ePortal Item 29 (Reference 2). The revised calculation included: • revised safety injection (SI) flow rate, • revised reactor coolant gas vent system (RCGVS) flow rate • revised timing of events, • revised time dependence of boration requirements, • revised RCP seal leakage rates, and • revised one and two phase flow levels based on NOTRUMP analysis. Reference 2 documents the boration capability profile for a cooldown to 350°F following an ELAP event consistent with the diverse and flexible coping strategies (FLEX) at Sequoyah, Units 1 and 2. This analysis is applicable for the current Cycle 20 at Sequoyah, Units 1 and 2. TVA requested Westinghouse develop a future cycle reload check method to assess and confirm the continued applicability of Reference 2 with respect to future cycle fuel requirements. Reference 3, provided in ePortal Item 044, is applicable to FLEX program future reload cycles at Sequoyah Unit 1 and Unit 2. During subsequent cycle reload checks, future cycle fuel requirements shall be confirmed to be bounded by the boration capability defined in FLEX strategies. Plant design changes or changes in the FLEX strategies that impact the boration capability shall be evaluated and the methodology and results confirmed to remain applicable.

NRC Audit Report Item Number	Description	Licensee Response
		The Reference 3 analysis provides a template to calculate the FLEX boration capability as a function of time post ELAP for comparison to future fuel cycle requirements to be provided by TVA's Fuels Engineering to ensure adequate margin. Applicable Supporting Documents - ePortal Item 9, 29, and 044 References: 1. Westinghouse CN-SEE-II-13-37 Rev 0 (Redacted), Sequoyah Unit 1 and Unit 2 Reactor Coolant System FLEX Evaluation with Standard Reactor Coolant Pump Seals dated March 4, 2014 2. Westinghouse CN-SEE-II-13-37 Rev 1 (Redacted), Sequoyah Unit 1 and Unit 2 Reactor Coolant System FLEX Evaluation with Standard Reactor Coolant Pump Seals dated April 10, 2015 3. LTR-SEE-15-55, Rev 0 - Evaluation of Transient Boration Capability Versus Fuel Sub-Criticality Requirements for Tennessee Valley Authority (TVA) Sequoyah Units 1 and 2 to Support FLEX Strategies and Future Reloads, dated November 6, 2015.

NRC Audit Report Item Number	Description	Licensee Response
ISE OI 3.2.3.A	Containment Functions - Containment evaluations for Phases 1, 2 and 3 have not been done. Complete the results of the evaluations needed to confirm that containment functions are maintained during the course of the ELAP event. Open Item #4 in the 8/28/14 6-month update states that Westinghouse Calculation LTR-ISENG-14-2, Rev 0, has been completed which demonstrates that containment functions will be maintained throughout all Phases of the ELAP. This calculation should be added to the ePortal for staff review.	Containment analyses have been performed using the MAAP code. The 5 analyzed ELAP scenarios were carried out for 72 hours or until core uncovery and included: • Benchmark against WCAP-17601 which uses NOTRUMP code • FLEX case with RCS depressurization with no RCS makeup • FLEX case with RCS depressurization with FLEX strategy credited • Containment response without ice condenser door opening • Containment response with limited air return fan In FLEX strategy credited cases, the containment design internal pressure of 25.5 psia or the containment design temperature limit of 220°F are not exceeded. Applicable Supporting Documents - ePortal Item 09, 26 and 045 Reference: 1. LTR-ISENG-14-2 Rev 1, "Containment Pressures and Temperatures for Sequoyah Units 1 and 2 during an ELAP Calculated with MAAP 4.07," dated November 11, 2014.

NRC Audit Report Item Number	Description	Licensee Response
ISE CI 3.4.A	Off-Site Resources - Confirm the licensee's arrangements for off-site resources addresses the guidance of Guidelines 2 through 10 in NEI 12-06, Section 12.2. Reviewed draft SAFER playbook. The required equipment is identified. The NRC staff requests to review this document once it is finalized	A review of Reference 1 was performed by NRC during the NRC Audit conducted December 1 through 4, 2014. The SAFER Response Plan for SQN was initially approved on December 17, 2014, with revisions thereafter (Reference 2 provided in ePortal Item 26). Applicable Supporting Documents - ePortal Item 26 References: 1. SAFER Response Plan for Sequoyah Nuclear Plant, Draft, November 7, 2014 2. SAFER Response Plan for Sequoyah Nuclear Plant Revision 1, January 21, 2015

NRC Audit Report Item Number	Description	Licensee Response
OIP OI #7	A thorough analysis of the makeup flow rate requirements and other equipment characteristics will be finalized during the detailed design phase of FLEX. The licensee indicated that the evaluation for SFP cooling actions will be completed by February 2015. The staff will review the evaluation when it's made available in the office to close this item.	A review of the draft Reference 1 was performed by NRC during the NRC Audit conducted December 1 through 4, 2014 (ePortal Item 13). The latest revision of the calculation was provided to NRC under ePortal Item 29. This analysis determined the reactor coolant system (RCS) makeup flow rates that satisfy the RCS inventory control and boration requirements. TVA has identified required makeup flow rates for equipment used in the FLEX strategy. Reference 2, provided in ePortal Item 033, uses an Applied Flow Technology Fathom model of the Sequoyah FLEX strategies. The purpose of this calculation is to create an as-built hydraulic model for the Sequoyah Unit 1 and Unit 2 FLEX system, using the final strategies contained in the Sequoyah FIP, as well as the purchased valve datasheets and pump curves for each FLEX valve and pump. The flow rates to the RCS, steam generators, and spent fuel pool have been considered for the FLEX system and determined to be acceptable for the purchased equipment. The SFP cooling pumps and its support equipment will survive an ELAP event. The FLEX strategies will power the SFP pump motors from the FLEX 3 MW 6900V DG's. Applicable Supporting Documents - ePortal Item 13, 029, and 033 References: 1. Westinghouse CN-SEE-II-13-37 Rev 1 (Redacted), Sequoyah Unit 1 and Unit 2 Reactor Coolant System FLEX Evaluation with Standard Reactor Coolant Pump Seals dated April 10, 2015 2. Westinghouse Calculation Note, CN-FSE-14-48, Revision 0, Sequoyah Units 1 and 2 As-Built FLEX System Fathom Model, April 15, 2015.

NRC Audit Report Item Number	Description	Licensee Response
OIP OI #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. Open Item #10 in the 8/28/14 6-month update states that this issue is "Started", but not yet closed. Once the licensee completes the development of their plan, it should be submitted to the staff for review.	TVA, SQN has developed procedure FSI-7, "Loss of Vital Instrumentation or Control Power," to provide the vehicle to attain/monitor containment temperature after flood waters have inundated the technical support center (TSC) inverter or station battery rooms (Reference 1 provided in ePortal Item 042). A pyrometer will be used to monitor containment wall temperature. In response to ISE OI 3.2.3.A, see above, TVA has determined that the containment vessel design temperature limit of 220°F is not exceeded (Reference 2 provided in ePortal Item 026). Applicable Supporting Documents - ePortal Item 13, 26, and 042 References: 1. FSI-7, Loss of Vital Instrumentation or Control Power 2. LTR-ISENG-14-2 Rev 1, "Containment Pressures and Temperatures for Sequoyah Units 1 and 2 during an ELAP Calculated with MAAP 4.07," dated November 11, 2014.

NRC Audit Report Item Number	Description	Licensee Response
OIP OI #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 Inteqrated Plan will be included in the six month update. The licensee indicated that the evaluation for flood preparations will be completed by February 2015. The staff will review the flood evaluation when it's made available in the office to close this item.	TVA's SQN 4th and 5th 6-month update letters dated February 27, 2015, and August 28, 2015 respectively provided a status for flood mode preparation at SQN. TVA's River Systems Operation (RSO) will notify the SQN control room if Watts Bar Hydro instantaneous flow rate reaches 170,000 cfs, which approximates the 25 year flood frequency based upon observed historical flow data (Reference 1). This notification results in implementation of actions necessary to mitigate an external flooding event starting from an early warning of potential flood-producing conditions OR a flood with projected river levels requiring Stage 1 or 2 flood preparations (up to Probable Maximum Flood conditions) (Reference 2). References provided in ePortal Item 046. Reference 3 provides additional details of equipment deployment based on References 1 and 2. Applicable Supporting Documents - ePortal Item 037 for Ref. 3 and 046 References: 1. RvM-SOP-10.05.06, Nuclear Notifications and Flood Warning Procedure 2. AOP-N.03, External Flooding 3. Movement of Equipment and Refueling During a Flood Scenario
OIP OI #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. The staff reviewed the evaluation provided and requests additional information regarding additional analyses of existing sludge levels.	A review of Reference 1 was performed by NRC during the NRC Audit conducted December 1 through 4, 2014. TVA provided additional information regarding Units 1 and 2 steam generator deposit accumulation under ePortal Item 026. TVA had two additional analyses developed for alternate cooling source (ACS), References 2 and 3. Each of these were provided to NRC in ePortal Item 032. Reference 2 provides the AFW volumetric flow rate required during cooldown. The purpose of this calculation is to document the SQN Unit 1 and Unit 2 auxiliary feedwater

NRC Audit Report Item Number	Description	Licensee Response
		(AFW) usage input methodology for the ACS evaluation for use in responding to a postulated beyond design basis (BDB) event concurrent with an extended loss of all AC power (ELAP). Reference 2 has been revised to include the effect of Westinghouse Bulletin TB-15-1 and included in ePortal Item 032. Reference 3 provides calculations to determine the impurity concentrations and masses resulting from the addition of the ACSs to the steam generators and subsequent corrosion and precipitation ranking. Applicable Supporting Documents - ePortal Item 13, 026, and 032 References: 1. DAR-SEE-II-13-6 Rev 0, "Evaluation of Alternate Coolant Sources for Responding to a Postulated Extended Loss of All AC Power at the Sequoyah Nuclear Power Plant" 2. Westinghouse Calculation Note, CN-SEE-II-13-6, Revision 3. Sequoyah FLEX Alternate Cooling Evaluation Input Auxiliary Feedwater Usage, April 15, 2015 3. Westinghouse Calculation Note, CN-CDME-13-2, Revision 0, "Supporting Chemistry Calculations for Alternate Cooling Source Usage during Extended Loss of All A.C. Power at Sequoyah Nuclear Units 1 and 2," March 11, 2014
OIP OI #15	Perform conceptual hydraulic performance analyses. The purpose of this analysis is to conservatively evaluate hydraulic performance of FLEX systems. The licensee indicated that Westinghouse is completing the hydraulic analysis and will be available by February 2015. The staff will review the hydraulic analysis when it's made available in the office to close this item.	See response to OIP OI#7

NRC Audit Report Item Number	Description	Licensee Response
OIP OI #18	Perform an RCS makeup analysis. The purpose of this analysis is to define FLEX RCS inventory and shutdown margin for Sequoyah. The NRC staff requests that the licensee demonstrate that the required SI pump injection time, considering RCS shrinkage and RCP seal leakage, will not result in pump room heatup beyond the operating capability of the pumps.	See response to ISE OI 3.2.1.8.A for discussion of RCS makeup and boration requirements. TVA has evaluated the impact to room temperatures during an ELAP period. Specifically, SQN has evaluated the safety injection pump rooms and determined the rooms' transient temperature response reaches 140°F for a limited time and is acceptable (Reference 1 and 2 provided in ePortal Item 21). The SQN FIP and implementing procedures (Reference 3 provided in ePortal Item 042) provide instruction to block open pump room doors to facilitate natural ventilation. Applicable Supporting Documents - ePortal Item 10, 13, 21, and 042 References: 1. SL-TVA-365 Sequoyah Nuclear Plant FLEX Implementation HVAC ELAP Analysis SL-012415 Revision 0 2. SL-TVA-255 Loss of HVAC during ELAP Study 3. FSI-1, Long Term RCS Inventory Control 4. Response in files 18-A and 18-C

NRC Audit Report Item Number	Description	Licensee Response
OIP OI #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. The purpose of this analysis is to summarize the FLEX timeline for Sequoyah, identify time constraints and provide for the safety function needs. The draft OIP states this evaluation has been started. The NRC staff requests to review this evaluation once it is finalized.	TVA has conducted an assessment in accordance with NEI 12-01, “Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities.” The report presents the results of an assessment of the capability of the SQN on-shift staff and augmented Emergency Response Organization (ERO) to respond to a beyond design basis external event (BDBEE). The report was submitted to NRC and provided in ePortal Item 26. Applicable Supporting Documents - ePortal Item 26 TVA letter to NRC, “Tennessee Valley Authority (TVA) - Response to March 12, 2012, Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident, Enclosure 5, Recommendation 9.3, Emergency Preparedness - Staffing, Requested Information Items 1, 2, and 6 - Phase 2 Staffing Assessment” dated January 30, 2015
OIP OI #21	Develop a programmatic control report. The purpose of this report is to summarize the need to implement programmatic control of the FLEX program. The purpose of this report is to summarize the need to implement programmatic control of the FLEX program. The NRC staff requests to review this document once it is finalized.	TVA informed NRC in the 5th 6-Month update letter that this item had a targeted completion date of December 2015. TVA has completed the programmatic control reports and provided copies in ePortal Item 047 Applicable Supporting Documents - ePortal Item 047 References: 1. TVA SQN Technical Instruction, 0-TI-DXX-000-922.3 Diverse and Flexible Coping Strategies (FLEX) Program Basis, 2. 0-TI-DXX-000-922.4 Diverse and Flexible Coping Strategies (FLEX) Program

NRC Audit Report Item Number	Description	Licensee Response
OIP OI #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. During site audit on 12/4/14, the licensee staff stated that the SQN Staffing study table top confirmed starting of the 6.9kV FLEX DGs within 5 hrs as defined in the Sequence Of Events (SOE) document. Provide a copy of SOE document on ePortal.	TVA has concluded the staffing assessment in accordance with NEI 12-01, "Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities." The report was submitted to NRC and provided in ePortal Item 26. The FIP under Enclosure 3 of this letter provides the revised Sequence of Events (SOE) timelines for flood and non-flood conditions. Applicable Supporting Documents - ePortal Item 26 TVA letter to NRC, "Tennessee Valley Authority (TVA) - Response to March 12, 2012, Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident, Enclosure 5, Recommendation 9.3, Emergency Preparedness - Staffing, Requested Information Items 1, 2, and 6 - Phase 2 Staffing Assessment," dated January 30, 2015.

NRC Audit Report Item Number	Description	Licensee Response
SE #3	(Westinghouse Standard RCP Seals: NSAL-14-1) On February 10, 2014, Westinghouse issued Nuclear Safety Advisory Letter (NSAL)-14-1, which informed licensees of plants with standard Westinghouse RCP seals that 21 gpm may not be a conservative leakage rate for ELAP analysis. This value had been previously used in the ELAP analysis referenced by many Westinghouse PWRs, including the generic reference analysis in WCAP-17601-P. No additional input from the licensee is needed at this time. Further review of the information provided is required by the NRC staff.	A review of documentation regarding the impact of NSAL-14-1 on the SQN ELAP analysis was performed by NRC during the NRC Audit conducted December 1 through 4, 2014. Information was provided in ePortal Item 8. Subsequent the NRC Audit, TVA provided a revised response to the NRC under ePortal item 26 (Reference 1). This information confirmed the RCP seal leakage for Units 1 and 2 is less than 21 gallons per minute (gpm). The revised response had not confirmed the SQN #1 seal leakoff piping between a manual valve and the flow element remained intact for ELAP conditions. The piping element has been confirmed to remain intact (Reference 3 provided in ePortal Item 048). Additional information is found in response to SE #5. Response to ISE OI 3.2.1.8.A, above, provides the revised analysis for RCS makeup wherein the revised RCP leakage rates are used (Reference 2). Applicable Supporting Documents - ePortal Item 8, 26, 29 and 048 References: 1. “3-E Revised” - Sequoyah Response 2. Westinghouse CN-SEE-II-13-37 Rev 1 (Redacted), Sequoyah Unit 1 and Unit 2 Reactor Coolant System FLEX Evaluation with Standard Reactor Coolant Pump Seals dated April 10, 2015 3. TVA NPG SQN Calculation CDQ0000622015000245, RCP Seal No. 1 Leak-off Piping and Component Evaluation for Extended Loss of AC Power (ELAP) and Station Blackout (SBO), Revision 2, December 4, 2015.

NRC Audit Report Item Number	Description	Licensee Response
SE #4	Please provide adequate justification for the seal leakage rates calculated according to the Westinghouse seal leakage model that was revised following the issuance of NSAL-14-1. The justification should include a discussion of the following factors: a. benchmarking of the seal leakage model against relevant data from tests or operating events, b. discussion of the impact on the seal leakage rate due to fluid temperatures greater than 550°F resulting in increased deflection at the seal interface, c. clarification whether the second-stage reactor coolant pump seal would remain closed under ELAP conditions predicted by the revised seal leakage model and a technical basis to support the determination, and, d. justification that the interpolation scheme used to compute the integrated leakage from the reactor coolant pump seals from a limited number of computer simulations (e.g., three) is realistic or conservative. Pressurized-Water Reactor Owners Group (PWROG) is still developing and validating that leakage rates in PWROG-series reports are valid. More generic effort may be necessary to support issue resolution.	SQN is crediting the work performed by Pressurized Water Reactor Owners Group (PWROG) for response to RCP seal leakage rates used for SQN FLEX strategy. TVA had provided an initial response to NRC under ePortal Item 8 and a final response under ePortal Item 035. The response addresses model benchmarking, seal leakage rate at high temperature, second-stage RCP seal closure for a limited time period, and the conservatism of the calculation to the benchmark data. Applicable Supporting Documents - ePortal Item 8 and 035 References: 1. PWROG Report, PWROG-14015-P, Revision 2, “No. 1 Seal Flow Rate for Westinghouse Reactor Coolant Pumps Following Loss of All AC Power Task 2: Determine Seal Flow Rates,” April 2015. 2. WCAP-10541, Revision 2, “Reactor Coolant Pump Seal Performance Following a Loss of All AC Power,” November 1986 3. “SQN Plant -Specific Evaluation of Significant PWROG Generic NSSS Parameters” 4. PWROG-14027-P, Revision 3, “No. 1 Seal Flow Rate for Westinghouse Reactor Coolant Pumps Following Loss of All AC Power Task 3: Evaluation of Revised Seal Flow Rate on Time to Enter Reflux Cooling and Time at which the Core Uncovers,” April 2015 5. “SQN SE Tracker Item 4-E”

NRC Audit Report Item Number	Description	Licensee Response
SE #5	The NRC staff understands that Westinghouse has recently recalculated seal leakoff line pressures under loss of seal cooling events based on a revised seal leakage model and additional design-specific information for certain plants. a. Please clarify whether the piping and all components (e.g., flow elements, flanges, valves, etc.) in your seal leakoff line are capable of withstanding the pressure predicted during an ELAP event according to the revised seal leakage model. b. Please clarify whether operator actions are credited with isolating low-pressure portions of the seal leakoff line, and if so, please explain how these actions will be executed under ELAP conditions. c. If overpressurization of piping or components could occur under ELAP conditions, please discuss any planned modifications to the seal leakoff piping and component design and the associated completion timeline. d. Alternately, please identify the seal leakoff piping or components that would be susceptible to overpressurization under ELAP conditions, clarify their locations, and provide justification that the seal leakage rate would remain in an acceptable range if the affected piping or components were to rupture. Staff has remaining questions regarding adequacy of PWROG method for computing maximum pressures in PWROG-series reports. The licensee is requested to provide justification that the seal leak off line can withstand the pressures that are predicted by the PWROG work to be seen in the event.	TVA had provided an initial response to NRC under ePortal Item 8. The final response is provided here: a. Yes, Reference 1 determines that necessary piping and components will withstand the pressure predicted during an ELAP event. b. No Operator actions are required. c. The analysis of Reference 1 determined that select components required replacement to ensure the RCP seal leakage rate remained within the ELAP strategy. These components were replaced during the Unit 1 Cycle 20 refueling outage (RFO) of May 2015 and Unit 2 Cycle 20 RFO of December 2015 (Reference 2). d. Reference 1 and 2 determine that necessary piping and components will withstand the pressure predicted during an ELAP event. Additional information has been provided under ePortal Item 028 and 048 Applicable Supporting Documents - ePortal Item 8, 028 and 048 References: 1. TVA NPG SQN Calculation CDQ0000622015000245, RCP Seal No. 1 Leak-off Piping and Component Evaluation for Extended Loss of AC Power (ELAP) and Station Blackout (SBO), Revision 0, May 10, 2015. 2. TVA NPG SQN Calculation CDQ0000622015000245, RCP Seal No. 1 Leak-off Piping and Component Evaluation for Extended Loss of AC Power (ELAP) and Station Blackout (SBO), Revision 2, December 3, 2015.

ENCLOSURE 3

Final Integrated Plan

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT

UNITS 1 AND 2

FLEX

FINAL INTEGRATED PLAN

December 16, 2015

Prepared by: _[signature]_ / 12/16/2015
Lenard Bush — Date

Reviewed by: _[signature]_ / 12/16/2015
Phil Hitchcock — Date

Approved by: _[signature]_ / 12/16/2015
Brian Flynn — Date

General Integrated Plan Elements Sequoyah Units 1 and 2	
Determine Applicable Extreme External Hazard **Ref: NEI 12-06 Section 4.0 -9.0** **JLD-ISG-2012-01 Section 1.0**	

The Sequoyah site has been evaluated and the following applicable hazards have been identified:

- Seismic events
- External flooding
- Severe storms with high winds
- Snow, ice, and extreme cold
- Extreme heat

The Sequoyah site has been reviewed against Nuclear Energy Institute (NEI) guidance document NEI 12-06 (Reference 2) and determined that the hazards Flexible and Diverse Coping Mitigation Strategies (FLEX) equipment should be protected from include seismic; external flooding; severe storms with high winds; snow, ice and extreme cold; and extreme high temperatures. Sequoyah has determined the functional threats from each of these hazards and identified FLEX equipment that may be affected. The FLEX storage locations provide the protection required from these hazards. Sequoyah has developed procedures and processes to further address plant strategies for responding to these various hazards.

Seismic:

Per NEI 12-06 (Reference 2), seismic hazards must be considered for all nuclear sites. As a result, the credited FLEX equipment has been assessed based on the current Sequoyah seismic licensing basis to ensure that the equipment remains accessible and available after a beyond-design-basis external event (BDBEE) and that the FLEX equipment does not become a target or source of a seismic interaction from other systems, structures or components. From Reference 4, Section 2.5.2.4, safe shutdown earthquake (SSE) requirements of 0.18 g horizontal and 0.12 g vertical maximum ground accelerations. For an operating basis earthquake (OBE), the maximum horizontal and vertical ground accelerations are 0.09g and 0.06 g, respectively. The FLEX strategies developed for Sequoyah include documentation ensuring that FESB, Additional Diesel Generator Building (ADGB), and Auxiliary Building Storage locations meet the FLEX seismic criteria.

The Augmented Approach (Reference 13) 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 (Reference 2), the liquefaction potential of FLEX deployment routes has been evaluated (Reference 28). 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.

External Flooding:

The types of events evaluated to determine the worst potential flood included (1) probable maximum storm on the total watershed and critical sub-water sheds including seasonal variations and potential consequent dam failures and (2) dam failures in a postulated SSE or OBE with guide specified concurrent flood conditions.

Those safety-related facilities, systems, and equipment located in the containment structure are protected from flooding (Reference 4, Section 2.4.2.2). Only the Reactor Building, Emergency Diesel Generator Building (EDGB), Additional Diesel Generator Building (ADGB), and Essential Raw Cooling Water Intake Station will remain dry during the flood (Reference 4, Section 2.4A.2.1). Plant cooling requirements, with the exception of the fire protection system which must supply water to the steam generators in a design basis flood mode operations scenario, will be met by the ERCW system (Reference 4, Section 2.4A.2.1). All equipment required to maintain the plant safely during the flood is either designed to operate submerged, is located above the maximum flood level, or is otherwise protected (Reference 4, Section 2.4A.2.1).

Specific analysis of Tennessee River flood levels resulting from ocean front surges and tsunamis is not required because of the inland location of the plant (Reference 4, Section 2.4.2.2). Snow melt and ice jam considerations are also unnecessary because of the temperate zone location of the plant (Reference 4, Section 2.4.2.2). Flood waves from landslides into upstream reservoirs required no specific analysis, in part because of the absence of major elevation relief in nearby upstream reservoirs and because the prevailing thin soils offer small slide volume potential compared to the available detention space in reservoirs (Reference 4, Section 2.4.2.2). Seiches pose no flood threats because of the size and configuration of the lake and the elevation difference between normal lake level and plant grade (Reference 4, Section 2.4.5).

Per Reference 4, Section 2.4.2.2, the maximum plant site flood level from any cause is Elevation 719.6 ft. This information has been superseded by Reference 5. The maximum plant site flood level from any cause is elevation 722.0 ft. (still reservoir). This elevation would result from the probable maximum storm. Coincident wind wave activity results in wind waves of up to 4.2 ft. (crest to trough). Run up on the 4:1 slopes approaching the Diesel Generator Building reaches elevation 723.2 ft. Wind wave run up on critical vertical external, unprotected walls including the Essential Raw Cooling Water (ERCW) Intake Pumping Station, Auxiliary, Control and Shield Buildings is 726.2 ft. (Reference 5).

In summary, all equipment required to maintain the plant safety during all flooding events including the design basis flood (DBF) is either designed to operate submerged, is located above the maximum flood level, or is otherwise protected. Accordingly, FLEX mitigation strategies have been developed for external flooding hazards. In addition, Sequoyah has concluded agreements with Strategic Alliance for FLEX Emergency Response (SAFER) and the National SAFER Response Center (NSRC) for delivery of offsite FLEX equipment during Phase 3 which considers regional impacts from flooding.

High Wind:

Figures 7-1 and 7-2 from Reference 2 were used for this assessment.

Sequoyah is susceptible to hurricanes as the plant site is within the contour lines shown in Figure 7-1 of Reference 2.

It was determined the Sequoyah site has the potential to experience damaging winds caused by a tornado exceeding 130 mph. Figure 7-2 of Reference 2 indicates a maximum wind speed of 200 mph for Region 1 plants, including Sequoyah. Therefore, high-wind hazards are applicable to the Sequoyah site.

In summary, based on available local data and Figures 7-1 and 7-2 of Reference 2, Sequoyah is susceptible to severe storms with high winds so the hazard is screened in.

Snow, Ice, and Extreme Cold

Per the FLEX guidance all sites should consider the temperature ranges and weather conditions for their site in storing and deploying their FLEX equipment. That is, the equipment procured should be suitable for use in the anticipated range of conditions for the site, consistent with normal design practices.

Applicability of snow and extreme cold:

The Sequoyah site is located approximately 7.5 miles northeast of Chattanooga in Hamilton County, Tennessee, on a peninsula on the western shore of Chickamauga Lake at Tennessee River mile 484.4 (Reference 4, Section 1.1). The site is approximately 14 miles west-northwest of Cleveland, Tennessee and approximately 31 miles south-southwest of Watts Bar Nuclear Plant (Reference 4, Section 2.1.1). The approximate site location is given below (Reference 4, Table 2.1.1-1):

LATITUDE (degrees/minutes): 35°14' N
LONGITUDE (degrees/minutes): 85°5' W

From Reference 4, Table 2.3.2-16, the mean temperatures in Chattanooga, Tennessee have been in the low 40s˚F in the winter. The extreme minima temperature recorded was -10°F in the winter (Reference 4, Table 2.3.2-16).

Reference 2 states plants above the 35th parallel should provide the capability to address the hindrances caused by extreme snow and cold. The Sequoyah site is above the 35th parallel; therefore, the FLEX strategies considered the potential hindrances caused by extreme snowfall with snow removal equipment, as well as the challenges that extreme cold temperature may present.

Applicability of ice storms:

The Sequoyah site is not a Level 1 or 2 region as defined by Figure 8-2 of Reference 2; therefore, the FLEX strategies must consider the hindrances caused by ice storms.

In summary, based on the available local data and Figures 8-1 and 8-2 of Reference 2, the Sequoyah site does experience significant amounts of snow, ice, and extreme cold temperatures; therefore, the hazard was reviewed.

<u>Extreme Heat:</u>

Per Reference 2, all sites must 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. Sites that should address high temperatures should consider the impacts of these conditions on the FLEX equipment and its deployment. From Reference 4, Table 2.3.2-16, mean temperatures in Chattanooga, Tennessee can reach the upper 80s˚F in the summer. Extreme maxima temperature recorded was 106°F in the summer (Reference 4, Table 2.3.2-16).

Therefore, for selection of FLEX equipment the Sequoyah site considered the site maximum expected temperatures in their specification, storage, and deployment requirements, including ensuring adequate ventilation or supplementary cooling, if required.

Key Site assumptions to implement NEI 12-06 strategies. **Ref: NEI 12-06 Section 3.2.1**	*Provide key assumptions associated with implementation of FLEX Strategies:* Assumptions are consistent with those detailed in NEI 12-06, Section 3.2.1. Analysis has been performed consistent with the recommendations contained within the Executive Summary of the Pressurized Water Reactor Owners Group (PWROG) Core Cooling Position Paper (Reference 6) and assumptions from that document are incorporated in the plant specific analytical bases.

NEI 12-06 Assumptions

The initial plant conditions are assumed to be the following:

- 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.
- At the time of the postulated event, the reactor and supporting systems are within normal operating ranges for pressure, temperature, and water level for the appropriate plant condition. All plant equipment is either normally operating or available from the standby state as described in the plant design and licensing basis.

The following initial conditions are to be applied:

- No specific initiating event is used. The initial condition is assumed to be a loss of offsite power (LOOP) at a plant site resulting from an external event that affects the off-site power system either throughout the grid or at the plant with no prospect for recovery of off-site power for an extended period. The LOOP is assumed to affect all units at a plant site.
- All installed sources of emergency on-site ac power and station blackout (SBO) Alternate ac power sources are assumed to be not available and not imminently recoverable.
- Cooling and makeup water inventories contained in systems or structures with designs that are robust with respect to seismic events, floods, and high winds, and associated missiles are available.
- Normal access to the ultimate heat sink (UHS) is lost, but the water inventory in the UHS remains available and robust piping connecting the UHS to plant systems remains intact. The motive force for UHS flow, i.e., pumps, is assumed to be lost with no prospect for recovery.
- 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.
- Permanent plant equipment that is contained in structures with designs that are robust with respect to seismic events, floods, and high winds, and associated missiles, are available.
- Other equipment, such as portable ac power sources, portable back up dc power supplies, spare batteries, and equipment for 50.54(hh)(2), may be used provided it is reasonably protected from the applicable external hazards per Sections 5 through 9 and Section 11.3 of NEI 12-06 and has predetermined hookup strategies with appropriate procedures/guidance and the equipment is stored in a relative close vicinity of the site.
- Installed electrical distribution system, including inverters and battery chargers, remain available provided they are protected consistent with current station design.
- No additional events or failures are assumed to occur immediately prior to or during the event,

including security events.

- Reliance on the fire protection system ring header as a water source is acceptable only if the header meets the criteria to be considered robust with respect to seismic events, floods, and high winds, and associated missiles.

The following additional boundary conditions are applied for the reactor transient:

- Following the loss of all ac power, the reactor automatically trips and all rods are inserted.
- The main steam system valves (such as main steam isolation valves, turbine stops, atmospheric dumps, etc.), necessary to maintain decay heat removal functions operate as designed.
- Safety/Relief Valves (S/RVs) or Power Operated Relief Valves (PORVs) initially operate in a normal manner if conditions in the reactor coolant system (RCS) so require. Normal valve reseating is also assumed.
- No independent failures, other than those causing the extended loss of all alternating current (ac) power (ELAP) / loss of the ultimate heat sink (LUHS) event, are assumed to occur in the course of the transient.

Sources of expected pressurized water reactor (PWR) reactor coolant inventory loss include:

- Normal system leakage
- Losses from letdown unless automatically isolated or until isolation is procedurally directed
- Losses due to reactor coolant pump (RCP) seal leakage (rate is dependent on the RCP seal design)

The initial spent fuel pool (SFP) conditions are:

- All boundaries of the SFP are intact, including the liner, gates, transfer canals, etc.
- 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.
- SFP cooling system is intact, including attached piping.
- SFP heat load assumes the maximum design basis heat load for the site.

Containment Isolation Valves:

- It is assumed that the containment isolation actions delineated in current SBO coping capabilities is sufficient.

Assumptions Specific to Sequoyah Site

A1. Sequoyah Unit 1 is a mirror image of Unit 2, with only minor differences existing between plants. For this reason, any sections or sketches which are only shown for a single unit would be directly analogous to the other unit.

A2. The design hardened connections added for the purpose of FLEX are protected against external events.

A3. Flood re-evaluations pursuant to the Title 10 of the Code of Federal Regulations (10 CFR) 50.54(f) letter of March 12, 2012 has been completed and Near Term Task Force (NTTF) - Recommendation 2.1 Mitigating Strategies Flood Hazard Evaluation Report was submitted for Sequoyah Nuclear Plant. There were no unexpected or negative impacts to the FLEX mitigation strategies described in this Final Integrated Plan. (Reference 102).

A4. Seismic re-evaluation pursuant to the Title 10 of the Code of Federal Regulations (10 CFR) 50.54(f) letter of March 12, 2012 are not complete therefore not assumed in this submittal. As the re-

evaluation is completed, appropriate issues will be entered into the corrective action program. A5. To support time sensitive FLEX actions, adequate staffing levels will be available. Required staffing levels were evaluated consistent with guidance contained in NEI 12-06 for each of the site specific FLEX strategies. Available staffing levels were determined consistent with NEI 12-01, as described below: a. Post event time: 6 hours – No site access. This duration reflects the time necessary to clear roadway obstructions, use different travel routes, mobilize alternate transportation capabilities (e.g., private resource providers or public sector support), etc. b. Post event time: 6 to 24 hours – Limited site access. Individuals may access the site by walking, personal vehicle or via alternate transportation capabilities (e.g., private resource providers or public sector support). c. Post event time: 24+ hours – Improved site access. Site access is restored to a near-normal status and/or augmented transportation resources are available to deliver equipment, supplies and large numbers of personnel. Staffing levels have been assessed. (References 67 and 72). A6. Sequoyah designed and constructed one new storage location to protect portable FLEX equipment against all five external hazards except external flooding. This location is referred to in this document as the FLEX Equipment Storage Building (FESB). FLEX equipment stored or pre-staged in another location for a particular function, is noted in the section for that function. A7. Considerations for exceptions to the site security plan or other license/site specific requirements are included in the FLEX support guidelines. A8. Instrumentation on FLEX equipment will be used to confirm continual performance. A9. This plan defines strategies capable of mitigating a simultaneous loss of all alternating current (ac) power and loss of normal access to the ultimate heat sink resulting from a beyond-design-basis event by providing adequate capability to maintain or restore core cooling, containment, and SFP cooling capabilities at all units on a site. Though specific strategies are being developed, due to the inability to anticipate all possible scenarios, the strategies are also diverse and flexible to encompass a wide range of possible conditions. These pre-planned strategies developed to protect the public health and safety have been incorporated into the site emergency operating procedures in accordance with established EOP change processes, and their impact to the design basis capabilities of the unit evaluated under 10 CFR 50.59. The plant Technical Specifications contain the limiting conditions for normal unit operations to ensure that design safety features are available to respond to a design basis accident and direct the required actions to be taken when the limiting conditions are not met. The result of the beyond-design-basis event may place the plant in a condition where it cannot comply with certain Technical Specifications and/or with its Security Plan, and as such, may warrant invocation of 10 CFR 50.54(x) and/or 10 CFR 73.55(p). (Reference 12). A10.TVA Nuclear Power Group (NPG) will ensure that future cycle specific reactor core designs are bounded by the FLEX strategy boration requirements. (Reference 75).	
Extent to which the guidance, JLD-ISG-2012-01 and NEI 12-06, are being followed. Identify any deviations to JLD-ISG-2012-01 and NEI 12-06. **Ref: JLD-ISG-2012-01** **Ref: NEI 12-06 Section 13.1**	Sequoyah Nuclear Plant is using pre-staged 6900v (2.75 MWe) and 480v (225KVA) FLEX Diesel Generators and pre-staged High Pressure (HP) and Intermediate Pressure (IP) FLEX Pumps that are 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 plans to comply with the guidance in JLD-ISG-2012-01 (Reference 3) and NEI 12-06 (Reference 2) in implementing FLEX strategies for the Sequoyah site except for the alternatives to the guidance as stated above.	

Provide a sequence of events and identify any time constraint required for success including the technical basis for the time constraint. **Ref: NEI 12-06 Section 3.2.1.7** **JLD-ISG-2012-01 Section 2.1**	Describe in this section the sequence of events and technical basis for the time constraint or time sensitive activity identified in Attachment 1A. See Attachment 1A.

The sequence of events and any associated times constraints are identified below for Sequoyah Reactor Core Cooling and Heat Removal (steam generators available) strategies for FLEX Phases 1 through Phase 3. See attached sequence of events timeline (Attachment 1A) and the technical basis support information in Attachment 1B for a summary of this information.

Discussion of action items identified in Attachment 1A table: (Non-Flood Event)

1. Complete SBO Load Shed within 45 minutes (0.75 hours) following the start of the event.
2. Declare ELAP – ELAP entry conditions can be verified by control room staff and it is validated that emergency diesel generators are not available. This step is time sensitive and needs to occur within 1 hour following the start of the event to provide operators with guidance to perform ELAP actions.
3. Align and place in service the 480v FLEX Diesel Generators (225 KVA Diesel Generators). This ensures 125v DC Vital Battery Board power (control) and through the Vital Inverters 120v AC Vital Instrument Power (instrument indication).
4. Complete Extended Load Shed within 90 minutes (1.5 hours) following the start of the event.
5. Damage Assessment - The damage assessment will evaluate and document the condition of plant systems, structures and components (SSCs) after an ELAP event. The assessment will be consistent with the guidelines contained in supplement 5 of Reference 7.
6. Debris Removal (Access) - The earliest need for debris removal access paths is to support alignment of the Low Pressure FLEX Pumps to the Essential Raw Cooling Water (ERCW) headers at the Intake Pumping Station (IPS). This process will be initiated in order to support FLEX equipment deployment depending on the resources available.
7. Stage and align the Low Pressure (LP) FLEX pumps (Dominator and Triton) - to take suction from the intake channel with discharge routed to the ERCW FLEX connections at the Intake Pumping Station (IPS).
8. Initiate RCS depressurization and cooldown due to increased RCP seal leakage based on loss of seal cooling. At RCS full temperature and pressure the calculated RCP leak rate is 16 gpm and is 17.5 gpm at a RCS pressure and temperature of 1485 psig and 572°F. A RCS cooldown rate of 75-100°F per hour should be sustained until stabilized at ~ 225 psig Steam Generator (SG) Pressure. Cooldown and depressurization should be stabilized at ~225 psig SG pressure within 4 hours. With SG pressure stabilized at ~ 225 psig (~ 397°F) the RCS would be at ~ 397°F and ~295 psig. The RCP seal leak rate should be ~ 5.7 gpm per RCP. The Safety Injection System (SIS) Cold Leg Accumulators (CLAs) will provide a passive injection of 2500-2700 ppm concentration of borated water into the RCS during the initial RCS depressurization. The CLAs must be isolated prior to initiating further depressurization to prevent nitrogen injection into the RCS. (References 55, 60, 62 & 78)
9. Complete 6900v FLEX Diesel Generators (2.75 MWe), 6.9KV Shutdown Boards and emergency feeder breakers and 480v Shutdown Board alignment. This is to ensure switching at the EDG building and shutdown board rooms are complete, potential board loading is reduced and interlocks are cleared to allow the emergency feeder breaker to be used to safely power the 6.9KV Shutdown Boards from the

6.9KV FLEX DG.

10. Energize the 6.9KV Shutdown Boards with the 6.9KV FLEX DGs. Place a Safety Injection Pump (SIP) in service to recover and maintain RCS Pressurizer level with suction from the RWST which maintains a boron concentration of between 2500 and 2700 ppm. The SIP lube oil heat exchanger is cooled by the ERCW system. (Reference 37).

Note: Note that the second and final depressurization and cooldown holdpoints and times may be delayed as deemed appropriate by Operations provided the plant achieves a cold leg temperature of 350°F within 24 hours to support RCP seal requirements.

11. Once RCS inventory has been restored by SIP operation, calculated boration and required mixing completed and CLAs isolated to ensure against nitrogen injection into the RCS, a second SG depressurization and cooldown to 160 psig (370°F) per ECA-0.0 is accomplished.

    A further depressurization and cooldown within T+24 hours is required to achieve a RCS cold leg temperature of 350°F (120 psig and 350°F SG pressure and temperature) in order to maintain RCP number 2 seal integrity. (References 55, 60, 62 & 78)

12. Place the following equipment in service, if desired: Verify 6.9KV FLEX DG loading between starts. Auxiliary Air Compressors, Motor Driven Auxiliary Feedwater Pumps (MDAFWP), Component Cooling System Pumps (CCSPs) and/or Spent Fuel Pool (SFP) Cooling Pump.

Note: The realignment of ERCW headers are parallel responsibilities for assigned AUOs and ROs. The majority of the realignment will be accomplished by closure of motor operated valves (MOVs) once the Reactor MOV Boards are repowered by the 6.9KV FLEX DGs.

13. Initiate alignment of ERCW headers to ensure cooling water supplied by the LP FLEX pumps are efficiently directed to support FLEX strategies.

14. Stage and align the High Pressure (HP) FLEX pumps (AB elevation 669). The primary suction alignment is from the RWST which maintains a boron concentration of 2500-2700 ppm. An alternate or secondary suction alignment is from the Boric Acid Tank (BAT) which maintains a boron concentration of 6120 - 6990 ppm.

15. Stage and align the Diesel Driven Intermediate Pressure (IP) FLEX Pumps as backup to the TDAFWP for SG makeup. Suction is aligned from the CST FLEX connections and discharge can be routed to FLEX connections upstream of the TDAFWP Level Control Valves (LCVs) (primary) or MDAFWP LCVs (alternate).

16. Deploy hoses and spray nozzles to the SFP area as a contingency. Hoses can be routed to supply makeup from FLEX connections on the refuel floor or from the elevation below the refuel floor. This ensures makeup capability prior to the most limiting SFP time when boil off occurs (Reference 65).

Note: Diesel fuel transfer to the 480v FLEX DGs' 8,000 gallon fuel tank must be initiated to support 480v FLEX DGs' day tank makeup within 10 hours.

Note: 480v FLEX DG refueling connections (mechanical and electrical) are required to be complete and day tank refueling process in operation within 10 hours of initial 480v FLEX DG operation.

Note: The 6.9KV FLEX DGs also provide an alternative power source capability for the loads supplied by the onsite 480v FLEX DGs.

17. Initiate refueling preparation within 7-8 hours for diesel fueled FLEX equipment that require manual refueling operations.

    - Ensure the 500 gallon tanks on the FLEX trucks are filled to support diesel powered FLEX equipment refueling operations. Portable diesel powered FLEX equipment's onboard fuel supply will require replenishment within 7-8 hours from start of operation.

- Initiate fuel transfer to the 480v FLEX DGs 8,000 gallon fuel tank and complete 480v FLEX DGs day tank refueling connections (mechanical and electrical). Verify connections complete, fuel transfer pumps operation and makeup to the 480v FLEX DGs' day tanks.
- Complete 6900v FLEX DGs day tank refueling connections. Verify connections complete, fuel transfer pumps operation and makeup to the 6900v FLEX DGs' day tanks

Note: If a tornado or high wind driven missile penetrated the CSTs at the top of their protective barrier the CSTs will provide approximately 7.5 hours of makeup water for the SGs. This would expedite the need for evaluating and directing SG makeup water options.

18. The CSTs, if intact from the initiating event will be depleted in approximately 14.0 hours, makeup water options will need to be evaluated and directed. (Reference 25). Potential sources of clean water makeup are the Demineralized Water Storage Tank (DWST), and the U1 and U2 Primary Water Storage Tanks (PWST). If the CST is depleted, the operating auxiliary feedwater pumps' suction will be realigned to the ERCW headers to extend core cooling. The LP FLEX pumps have been aligned to the ERCW headers to provide a raw water input prior to the CST depleting. The last option would be the use of available static raw water in the ERCW headers (without LP FLEX pumps supply) which would provide approximately 18.5 hours for Unit 1 and Unit 2 SG makeup before loss. (Reference 29).
19. Initiate portable lighting for MCR, Shutdown Board Room and FLEX equipment locations, as required. This is not a time constraint. The MCR and Shutdown Board Rooms are provided with battery backup lighting. Portable lighting for FLEX equipment staging locations could be required. Portable lighting will be available for internal and external service, if required.
20. Complete ERCW header alignments to ensure ERCW pressures and flows for long term FLEX needs within 12 hours of the event.

Note: Doors to rooms where systems and/or components are in service or in operation should be blocked open to facilitate natural ventilation (i.e., 125v DC Vital Battery rooms, TDAFWP rooms, SIP rooms, etc.).

21. The Vital Battery Room and Shutdown Board Room heating, ventilation, and air conditioning (HVAC) study determined that ventilation is not required until 24 hours into the ELAP event; at which point it can be monitored periodically, if needed. (Reference 47).
22. The Main Control Room HVAC study determined that ventilation is not required until 24 hours into ELAP event; at which point it can be monitored periodically if needed. (Reference 47).
23. The TDAFWP room HVAC study determined that ventilation is not required until 24 hours into ELAP event; at which point it can be monitored periodically if needed. (Reference 47).
24. Venting of the SFP area will need to be evaluated within 24 hours based on the SFP time when boil off occurs. (Reference 65).
25. A time of 72 hours is assumed for staging and alignment of the mobile water purification units. The water purification units will provide clean water to refill the CSTs and provide for other potential needs such as clean water makeup to the SFP. However, cooling water makeup capability via the ERCW headers is available to be provided indefinitely, if required. (Reference 56).
26. Evaluate, identify and address (within 72 hours) long term needs including:
    - Site diesel fuel service.

<u>Discussion of action items identified in Attachment 1A table: (Flood Event)</u>

Note: An ELAP could occur at anytime during flood preparation or a flood event therefore FLEX equipment and strategies must be staged and ready for implementation, if required.

Note: During a Design Basis Flood Mode response, prior to flood waters exceeding plant grade, the EDGs are placed in service supplying plant safety related loads designed for flood mode operations and plant offsite power supplies are removed from service. Plant generation would have been removed from service prior to Flood Mode Stage II entry. Design Basis Flood Mode Operations are controlled by AOP-N.03, External Flooding.

Note: To assure that FLEX response actions do not impact on design basis flood mode preparations, Sequoyah 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 have been revised to provide the notification and direct the pre-staging of FLEX equipment. (Reference 22).

Note: The scenario described below assumes an ELAP event occurs post initial flood warning received from TVA's River System Operations and prior to a Stage 1 warning notification. This provides a 27 hour period before flood waters reach grade elevation. This flood preparation time period allows for initial use of the same FLEX mitigation strategy as a non-flood event. The initial steps 1-17 provide for stabilizing the plant and staging FLEX equipment for flood mitigation strategy.

1. Complete SBO Load Shed within 45 minutes (0.75 hours) following start of the event.
2. Declare ELAP – ELAP entry conditions can be verified by control room staff and it is validated that emergency diesel generators are not available. This step is time sensitive and needs to occur within 1 hour following the start of the event to provide operators with guidance to perform ELAP actions.
3. Align and place in service the 480v FLEX Diesel Generators (225 KVA Diesel Generators). This ensures 125v DC Vital Battery Board power (control) and through the Vital Inverters 120v AC Vital Instrument Power (instrument indication).
4. Complete Extended Load Shed for any Vital Battery within 90 minutes (1.5 hours) following the start of the event.
5. Damage Assessment - The damage assessment will evaluate and document the condition of plant SSCs after an ELAP event. The assessment will be consistent with the guidelines contained in supplement 5 of Reference 7.
6. Debris Removal (Access) - The earliest need for debris removal access paths is to support alignment of the Low Pressure FLEX Pumps to the ERCW headers at the IPS. This process will be initiated in order to support FLEX equipment deployment depending on the resources available.
7. Stage and align the LP FLEX pumps (Dominator and Triton) staged and aligned to take suction from the intake channel with discharge routed to the ERCW FLEX connections at the CCW Pumping Station.
8. Initiate RCS depressurization and cooldown due to increased RCP seal leakage based on loss of seal cooling. At RCS full temperature and pressure the calculated RCP leak rate is 16 gpm and is 17.5 gpm at a RCS pressure and temperature of 1485 psig and 572°F. A RCS cooldown rate of 75-100°F per hour should be sustained until stabilized at ~ 225 psig Steam Generator (SG) Pressure. Cooldown and depressurization should be stabilized at ~225 psig SG pressure within 4 hours. With SG pressure stabilized at ~ 225 psig (~ 397°F) the RCS would be at ~ 397°F and ~295 psig. The RCP seal leak rate should be ~ 5.7 gpm per RCP. The Safety Injection System (SIS) Cold Leg Accumulators (CLAs) will provide a passive injection of 2500-2700 ppm concentration of borated water into the RCS during the initial RCS depressurization. The CLAs must be isolated prior to initiating further depressurization to

prevent nitrogen injection into the RCS. (References 55, 60, 62 & 78)

9. Complete 6900v FLEX Diesel Generators (2.75 MWe), 6.9KV Shutdown Boards and emergency feeder breakers and 480v Shutdown Board alignment. This is to ensure switching at the EDG building and shutdown board rooms are complete, potential board loading is reduced and interlocks are cleared to allow the emergency feeder breaker to be used to safely power the 6.9KV Shutdown Boards from the 6.9KV FLEX DG.

10. Energize the 6.9KV Shutdown Boards with the 6.9KV FLEX DGs. Place a Safety Injection Pump (SIP) in service to recover and maintain RCS Pressurizer level with suction from the RWST which maintains a boron concentration of between 2500 and 2700 ppm. The SIP lube oil heat exchanger is cooled by the ERCW system. (Reference 37).

Note: Note that the second and final depressurization and cooldown holdpoints and times may be delayed as deemed appropriate by Operations provided the plant achieves a cold leg temperature of 350°F within 24 hours to support RCP seal requirements.

11. Once RCS inventory has been restored by SIP operation, calculated boration and required mixing completed (SDM verified) and CLAs isolated to ensure against nitrogen injection into the RCS a second SG depressurization and cooldown to 160 psig (370°F) per ECA-0.0 is accomplished.

    A further depressurization and cooldown within T+24 hours is required to achieve a RCS cold leg temperature of 350°F (120 psig and 350°F SG pressure and temperature) in order to maintain RCP number 2 seal integrity. (References 55, 60, 62 & 78)

Note: While the TDAFWP is not anticipated to fail, a secondary source of steam generator makeup can be provided by the MDAFWPs, if required, as soon as the 6.9KV FLEX DGs are in service.

12. Place the following equipment in service, if desired: Auxiliary Air Compressors, MDAFWPs, CCS Pumps, and/or SFP Cooling Pump.

Note: The above Design Basis components will be removed from service and transition to the FLEX strategies completed prior to flood waters reaching plant grade.

Note: The realignment of ERCW headers are parallel responsibilities for assigned AUOs and ROs. The majority of the realignment will be accomplished by closure of MOVs once the Reactor MOV Boards are repowered by the 6.9KV FLEX DGs.

13. Initiate alignment of ERCW headers to ensure cooling water supplied by the LP FLEX pumps are efficiently directed to support FLEX strategies.

14. Stage and align the second set of LP FLEX pumps to take suction from CCW cold water return channel with discharge routed to the ERCW FLEX connections at the AERCW pumping station. Hoses will remain isolated and pumps out of service until required.

Note: If a High Pressure (HP) FLEX Pump suction were initially aligned from the Boric Acid Storage Tanks (BATs) it must be realigned from the RWST prior to flood waters reaching plant grade.

15. Stage and align the High Pressure (HP) FLEX Pumps (AB elevation 669). The primary suction alignment is from the RWST which maintains a boron concentration of 2500-2700 ppm. An alternate or secondary suction alignment is from the Boric Acid Storage Tanks (BATs) which maintain a boron concentration of 6120 - 6990 ppm.

16. Stage and align the IP FLEX Pumps (AB elevation 714) with suction hoses routed from the AB elevation 714 ERCW FLEX connections and discharge hoses routed to FLEX connections upstream of the TDAFWP LCVs (primary) (WMSVV elevation 706) or MDAFWP LCVs (alternate) (AB elevation 714).

17. Deploy hoses and spray nozzles as a contingency for SFP makeup. Hoses can be routed to supply

makeup from an AB elevation 734 ERCW - CCS Spool Piece FLEX connection (next to the CCS Surge Tanks) to the SFP area or from an AB elevation 714 FLEX connection to the demineralized water makeup header FLEX connection on AB elevation 714. This ensures makeup capability prior to time when boil off initiates. (Reference 65).

Note: Diesel fuel transfer to the 480v FLEX DGs' 8,000 gallon fuel tank must be initiated to support 480v FLEX DGs' day tank makeup within 10 hours and sustained to ensure fuel level established to support fuel makeup operations during the period when flood waters exceed plant grade.

Note: 480v FLEX DG refueling connections (mechanical and electrical) are required to be complete and day tank refueling process in operation within 10 hours of initial 480v FLEX DG operation.

Note: The 6.9KV FLEX DGs also provide an alternative power source capability for the loads supplied by the onsite 480v FLEX DGs.

18. Initiate refueling preparation within 7-8 hours of initiation of operation for diesel fueled FLEX equipment that require manual refueling operations.
    - Ensure the 500 gallon tanks on the FLEX trucks and 500 gallon tank trailers are filled to support diesel powered FLEX equipment refueling operations. Portable diesel powered FLEX equipment's onboard fuel supply will require replenishment within 7-8 hours from start of operation.
    - Initiate fuel transfer to the 480v FLEX DG 8,000 gallon fuel tank and complete 480v FLEX DGs day tank refueling connections (mechanical and electrical). Verify connections complete, fuel transfer pumps operation and makeup to the 480v FLEX DGs' day tanks.
    - Complete 6900v FLEX DGs day tank refueling connections. Verify connections complete, fuel transfer pumps operation and makeup to the 6900v FLEX DGs' day tanks

Note: If a tornado or high wind driven missile penetrated the CSTs at the top of their protective barrier the CSTs will provide approximately 7.5 hours of makeup water for the SGs. This would expedite the need for evaluating and directing SG makeup water options.

19. The CSTs, if intact from the initiating event will be depleted in approximately 14.0 hours, makeup options will need to be evaluated and directed. (Reference 25). Potential sources of clean water makeup are the Demineralized Water Storage Tank (DWST), and the U1 and U2 Primary Water Storage Tanks (PWST). If the CST is depleted the operating auxiliary feedwater pumps' suction will be realigned to the ERCW headers to extend core cooling. The LP FLEX pumps have been aligned to the ERCW headers to provide a raw water input prior to the CST depleting. The last option would be the use of available static raw water in the ERCW headers (without LP FLEX pumps supply) which would provide approximately 18.5 hours for Unit 1 and Unit 2 SG makeup before loss. (Reference 29).
20. Initiate portable lighting for MCR, Shutdown Board Room and FLEX equipment locations, as required. This is not a time constraint. The MCR and Shutdown Board Rooms are provided with battery backup lighting. Portable lighting for FLEX equipment staging locations could be required. Portable lighting will be available for internal and external service, if required.
21. Complete ERCW header alignments to ensure ERCW pressures and flows for long term FLEX needs within 12 hours of the event.

Note: Doors to rooms where systems and/or components are in service or in operation should be blocked open to facilitate natural ventilation (i.e., Vital Battery rooms, TDAFWP rooms, Safety Injection Pump rooms).

22. The Vital Battery Room and Shutdown Board Room heating, ventilation, and air conditioning (HVAC) study determined that ventilation is not required until 24 hours into the ELAP event; at which point it can be monitored periodically, if needed. (Reference 47).
23. The Main Control Room HVAC study determined that ventilation is not required until 24 hours into ELAP event; at which point it can be monitored periodically if needed. (Reference 47).
24. The TDAFWP room HVAC study determined that ventilation is not required until 24 hours into ELAP event; at which point it can be monitored periodically if needed. (Reference 47).
25. Venting of the SFP area will need to be evaluated within 24 hours based on the SFP time when boil off occurs. (Reference 65).
26. Once flood waters recede below plant grade the mobile water purification units should be staged and aligned. The water purification units will provide clean water to refill the CSTs and provide for other potential needs such as clean water makeup to the SFP. However, cooling water via the ERCW headers is available to be provided indefinitely.
27. Evaluate, identify and address (within 72 hours) long term needs including:
    - Site diesel fuel service.

Identify how strategies will be deployed in all modes **Ref: NEI 12-06 section 13.1.6**	*Describe how the strategies will be deployed in all modes.*

Deployment of FLEX equipment is described for each FLEX function in the subsequent sections below and covers all operating modes. The broad-spectrum deployment strategies do not change for the different operating modes. The deployment strategies from the storage areas to the staging areas are identical and include debris removal, equipment transport, fuel transport, and power sources and requirements. RCS makeup connections are provided for the higher flow rates required during core cooling with SGs unavailable. Each of these strategies and the associated connection points are described in detail in the subsequent sections. The electrical coping strategies are the same for all modes. Figure A3-36 shows a visual representation of the deployment strategy.

Provide a milestone schedule. This schedule should include:
 	
• **Modifications timeline**
  ○ **Phase 1 Modifications**
  ○ **Phase 2 Modifications**
  ○ **Phase 3 Modifications**
• **Procedure guidance development complete**
  ○ **Strategies**
  ○ **Maintenance**
• **Storage plan (reasonable protection)**
• **Staffing analysis completion**
• **FLEX equipment acquisition timeline**
• **Training completion for the strategies**
• **National SAFER Response Centers (NSRCs) operational**
 	
Ref: NEI 12-06 Section 13.1	

The dates specifically required by the order are obligated or committed dates. Other dates are planned dates subject to change. Updates have been provided in the periodic (six month) status reports.

See attached milestone schedule Attachment 2.

Identify how the programmatic controls will be met. **Ref: NEI 12-06 Section 11** **JLD-ISG-2012-01 Section 6.0**	

Equipment associated with these strategies has been procured as commercial equipment with design, storage, maintenance, testing, and configuration control in accordance with NEI 12-06 Revision 0 Section 11.

The unavailability of equipment and applicable connections that directly perform a FLEX mitigation strategy is managed using plant equipment control guidelines developed in accordance with NEI 12-06 Revision 0 Section 11.5.

FLEX Mitigation Strategy required equipment and applicable electrical and mechanical connections and SFP Level Instrumentation unavailability, tracking, return to availability and contingency planning, if required are addressed in the following TVA NPG procedures:

- OPDP - 8, Operability Determination Process and Limiting Conditions for Operation Tracking. (Reference 23).
- NPG - SPP - 07.3, Work Activity Risk Management Process. (Reference 19).

Programs and controls established to assure personnel proficiency in the mitigation of beyond-design-basis events and maintaining FLEX and SFP level instrumentation are developed and maintained in accordance with NEI 12-06 Revision 0 Section 11.6 and NEI 12-02 Revision 1 Section 4.1.

The FLEX strategies, SFP level instrumentation and their basis are maintained in an overall program document. Existing plant configuration control procedures have been 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 nor SFP level instrumentation in accordance with NEI 12-06 Revision 0 Section 11.8 and NEI 12-02 Revision 1. Section 4. (References 20, 96 & 97).

<u>Procedure Guidance</u>

The PWROG has generated FLEX Support Guidelines (FSGs) in order to assist utilities with the development of site-specific procedures to cope with an ELAP in a manner compliant with the requirements of Reference 2, NEI 12-06. Sequoyah is a participant in the PWROG project PA-PSC-0965 and has implemented FLEX Support Instructions (FSIs) in a timeline to support the implementation of FLEX for Unit 1 and Unit 2 licensed operation.

The proposed implementation strategy aligns with the procedure hierarchy described in NEI 12-06 in that actions that maneuver the plant are contained within the typical controlling procedure, and the FLEX Support Instructions (FSIs) are implemented as necessary to maintain the key safety functions of Core Cooling, Spent Fuel Cooling and Containment in parallel with the controlling procedure actions. The overall approach is symptom–based, meaning that the controlling procedure actions and FSIs are implemented based upon actual plant conditions. (References 6 & 7).

<u>Sequoyah will continue participation in PA-PSC-0965 and will update plant procedures to maintain consistency with the PWROG program.</u>

<u>The following Operations procedures support SQN's FLEX mitigation strategy implementation:</u>

- ECA-0.0, Loss of All AC Power
- EA-250-1, Load Shed of Vital Loads After Station Blackout
- AOP-N.03, External Flooding, Parts 1, 2 & 3
- AOP-P.10, Loss of All AC Power While on RHR Cooling - In development in coordination with Westinghouse and Watts Bar Nuclear Plant. This procedure in conjunction with FSI-14, Shutdown RCS Makeup will

provide enhanced response capability in a Mode 5 or 6 ELAP event.

The following FSIs have been developed to support SQN's FLEX mitigation strategies:

- FSI-1, Long Term RCS Inventory Control
- FSI-2, Alternate AFW Suction Source
- FSI-3, Alternate Low Pressure Feedwater
- FSI-4, DC Bus Management and 480v FLEX DG Alignment
- FSI-5.01, Initial Assessment and FLEX Equipment Deployment
- FSI-5.02, 6900v FLEX D/G Startup and Alignment
- FSI-5.03, 6.9KV & 480v Shutdown Board Initial FLEX Alignment
- FSI-5.04, 6900v FLEX DG Plant Equipment Loading
- FSI-5.05, FLEX ERCW Alignment
- FSI-6, Alternate CST Makeup
- FSI-7, Loss of Vital Instrumentation or Control Power
- FSI-8, Alternate RCS Boration
- FSI-9, Low Decay Heat Temperature Control
- FSI-10, Cold Leg Accumulator Isolation
- FSI-11, Alternate SFP Makeup and Cooling
- FSI-12, Alternate Containment Cooling
- FSI-13, Transition from FLEX Support Instructions
- FSI-14, Shutdown RCS Makeup - In development with coordination from Westinghouse and Watts Bar Nuclear Plant.

The following Operations System Operating Instructions (SOs) have been developed to support SQN's FLEX mitigation strategies:

- 0-SO-360-3, - 6900V FLEX Diesel Generators, includes Attachment 1, 0-360-3.01 - 6900V FLEX DG System Power Checklist & Attachment 2, 0-360-3.02 - 6900V FLEX DG System Valve Checklist.
- 0-SO-360-225, - 480V FLEX Diesel Generator, includes Attachment 1 - 0-360-225.01, 225KVA DG A, 480v AC Power Checklist, Attachment 2 - 0-360-225.02, 225KVA DG B, 480v AC Power Checklist, Attachment 3 - 0-360-225.03, FLEX Electrical Submersible Pump Power Checklist & Attachment 4 - 0-360-225.04, 225KVA DG Fuel Oil Valve Checklist.

Sequoyah has developed Maintenance Instructions (MIs), Periodic Instructions (PIs) and Fire Protection Unit (FPU) procedure to support FLEX mitigation strategies. The following is a list of FLEX MI-FMIs & PIs:

- 0-MI-FMI-360-001.0 - FLEX - Align Submersible High Pressure FLEX Pump From RWST to RCS
- 0-MI-FMI-360-002.0 - FLEX - Align Submersible High Pressure FLEX Pump From Boric Acid Tanks to RCS
- 0-MI-FMI-360-003.0 - FLEX - Align Submersible Spare High Pressure FLEX Pump From RWST to RCS
- 0-MI-FMI-360-004.0 - FLEX - Align Submersible Spare High Pressure FLEX Pump From Boric Acid Tanks to RCS
- 0-MI-FMI-360-005.0 - FLEX - Align FLEX High Pressure Pump From Boric Acid Tanks Wye Connection to RCS
- 0-MI-FMI-360-017.0 - FLEX - Spent Fuel Pool Makeup from Elevation 734 ERCW
- 0-MI-FMI-360-018.0 - FLEX - Spent Fuel Pool Makeup from Elevation 714 ERCW
- 0-MI-FMI-360-020.0 - FLEX - Water Transfer Pump Makeup to Condensate Storage Tanks
- 0-MI-FMI-360-021.0 - FLEX - Staging of Small Diesel Equipment
- 0-MI-FMI-360-022.0 - FLEX - Staging of Diesel Driven Intermediate Pressure FLEX Pumps (IPPs at CSTs)
- 0-MI-FMI-360-022.1 - FLEX - Staging Low Pressure Diesel Driven Triton Pump (Floating Booster Pump) and 5000 GPM Dominator Pump (FLEX ERCW Pump)
- 0-MI-FMI-360-022.2 - FLEX - Transporting and Staging of Water Transfer Pumps
- 0-MI-FMI-360-023.0 - FLEX - Portable Diesel Equipment Refueling
- 0-MI-FMI-360-024.0 - FLEX - 480V FLEX DG Refueling Strategy
- 0-MI-FMI-360-025.0 - FLEX - Align Diesel Driven IPP from CST to SG Makeup

- 0-MI-FMI-360-026.0 - FLEX - Align Elevation 714 Intermediate Pressure Pumps from ERCW to SG Makeup
- 0-MI-FMI-360-027.0 - FLEX - Align Elevation 669 Intermediate Pressure Pumps from ERCW to SG Makeup
- 0-MI-FMI-360-029.0 - FLEX - Hose Deployment for Essential Raw Cooling Water System
- 0-MI-FMI-360-030.0 - FLEX - 6900V FLEX DG Fuel Line Connection
- 0-MI-FMI-360-031.0 - FLEX - Align Submersible Intermediate Pressure FLEX Pump From RWST to RCS
- 0-MI-FMI-360-032.0 - FLEX Align Submersible Intermediate Pressure FLEX Pump From Boric Acid Tanks Wye Connection to RCS
- 0-PI-MIN-360-001.0 - FLEX - Inventory of FLEX Equipment
- 0-PI-FPU-360-020.0 - Operation of the FLEX ERCW Pumps (Tritons and Dominators).
- 0-PI-SFT-360-001.0 - FLEX Pumps Operating Instructions for Maintenance Activities.

Maintenance and Testing

The FLEX mitigation equipment has been initially tested (or other reasonable means used) to verify performance conforms to the limiting FLEX requirements. Additionally, Sequoyah has implemented the maintenance and testing template issued by the Electric Power Research Institute (EPRI), where applicable. The template was developed to meet the FLEX guidelines established in NEI 12-06, Revision 0, Section 11.5.

The SFP level instrumentation has been initially calibrated and tested to verify performance conforms to the requirements of NEI 12-02, Revision1, Section 4.3 and SQN's SFP design. Additionally, SQN has developed maintenance and testing procedures to satisfy the requirements or NEI 12-02, Revision 1, Section 4.2. (References 98 & 99)

Staffing

The FLEX strategies documented in the event sequence analysis assume:

- On-site staff are at administrative minimum shift staffing levels,
- No independent, concurrent events, and
- All personnel on-site are available to support site response.

Sequoyah has addressed staffing considerations in accordance with NEI 12.06, Revision 0, Section 11.7. (References 2, 72 & 67).

Configuration Control

Per NEI 12-06 and the Interim Staff Guidance (ISG), the FLEX strategies must be maintained to ensure future plant changes do not adversely impact the FLEX strategies.

Therefore, Sequoyah will maintain the FLEX strategies and basis in an overall program document and has modified existing TVA NPG configuration control procedure to ensure changes to the plant design, physical plant layout, roads, buildings, and miscellaneous structures do not adversely impact the approved FLEX strategies.

- 0-TI-DXX-000-922.3, Diverse and Flexible Coping Strategies (FLEX) Program Basis.
- 0-TI-DXX-000-922.4, Monitoring of the Diverse and Flexible Coping Strategies (FLEX) Program.
- NPG SPP-09.3.1, Guidelines for Preparation of Design Inputs and Change Impact Screen.

(References 20, 96 & 97).

Describe training plan	Training plans have been developed for plant groups such as the emergency response organization (ERO), Fire, Security, Emergency Preparedness (EP), Operations, Engineering, and Maintenance. The training plan development was accomplished in accordance with Sequoyah procedures using the Systematic Approach to Training, and has been implemented to ensure that the required Sequoyah staff is trained prior to implementation of FLEX.

Describe the Strategic Alliance for FLEX Emergency Response (SAFER)/National SAFER Response Center (NSRC) plan	The nuclear industry has established two National SAFER Response Centers (NSRCs) to support utilities during beyond design basis events. Each NSRC will hold five sets of equipment, four of which will be able to be fully deployed when requested. The fifth set will have equipment that is in a maintenance cycle. 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 Sequoyah 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'. (Reference 17). TVA has established an agreement with the SAFER/NSRC team in accordance with the requirements of Section 12 of Reference 2.

Maintain Core Cooling & Heat Removal
Determine Baseline coping capability with installed coping[1] modifications not including FLEX modifications, utilizing methods described in Table 3-2 of NEI 12-06: • **AFW** • **Depressurize SG for Makeup** • **Sustained Source of Water** **Reference: JLD-ISG-2012-01 Sections 2 and 3**
PWR Installed Equipment Phase 1
Core Cooling with SGs Available The coping strategy is to remove heat from the RCS by providing cooling water to the four SGs. The plant is assumed to be operating at full power at the start of the event. An ELAP occurs to start the scenario. The TDAFWP will start as designed and provide cooling through the SGs. Initial alignment of the TDAFWP suction is to the CSTs. If the CSTs survive the initiating event they provide 14.0 hours of cooling water per unit (240,000 gallons per CST). If a missile or missiles generated by the initiating event penetrated at the top of the CSTs' protection barrier they could provide ~ 7.5 hours of cooling water to each unit. When water from the CSTs is no longer available valves must be opened to provide water from ERCW system. (Reference 76). Suction flow to the TDAFWP can be provided by standing water in the ERCW headers for approximately 18.5 hours as a last option as summarized in Reference 29. Core Cooling with SGs Not Available Note: For the following, it is assumed that the driver or basis for being in Mode 5 is a routine periodic refueling outage or plant shutdown and not a major maintenance or modification activity in progress, such as replacement of a pressurizer Safety Valve (SV) or Power Operated Relief Valve (PORV), SG Main Steam Isolation Valve (MSIV), SG SV or PORV. Actions that can be taken during Mode 5 are limited by the reason the unit is in Mode 5, the outage scope and unit status at the time of ELAP. Reactor core cooling and heat removal with SGs not available is provided during Phase 1 by heating up and boiling of the RCS coolant inventory. The lowest allowed level in the RCS, when SGs are not available to provide core cooling, is not more than one foot below the vessel flange which occurs during the removal of the reactor vessel head. RCS inventory makeup to the affected unit would be by gravity feed from the RWST. The ability of the RWST to provide a gravity feed to the RCS is limited by the RWST fluid height, line losses through the gravity feed path, and pressure within the RCS. The ability to maintained RCS pressure sufficiently low to facilitate gravity feed from the RWST is ensured by providing the availability of an adequate RCS vent path prior to entering conditions when SG cooling would not be available. This is addressed as a part of shutdown risk management. SQN is developing procedure AOP-P.10, Loss of All AC Power While On RHR Cooling and FSI-14, Shutdown RCS Makeup which will provide enhanced response capability in a Mode 5 or 6 ELAP event. AOP-P.10 will provide instructions for maintaining core cooling and protecting the reactor core, containment and the spent fuel pool in the event of a complete loss of Residual Heat Removal (RHR) system cooling. FSI-14, Shutdown RCS Makeup will provide instructions for establishing RCS makeup during an ELAP that occurs when a unit is in Modes 5 or 6 or when in Mode 4 on RHR cooling. In a Phase 1 scenario RCS makeup would be by gravity feed from the RWST. AOP-P.10 will have steps that provide kick-outs to FSI-14 where appropriate. FSI-14 will provide actions limited to establishing possible RCS makeup flow paths based on the affected unit's condition. In a Phase 1 situation FSI-14 Section 3.6 will provide instructions for locally opening CLA isolation valves for CLA makeup to

the RCS, if required and containment conditions allow. (References 100 & 101)

TVA's NPG and SQN has proceduralized administrative controls that take advantage of FLEX equipment and procedural capability during a unit outage by ensuring FLEX equipment remains available during the outage. Contingency plans should include the use of FLEX equipment to maintain Defense in Depth Margin. (Reference 18).

SQN will follow the guidance contained within the Nuclear Energy Institute (NEI) position paper dated September 18, 2013, entitled "Position Paper: Shutdown/Refueling Modes" (Agency wide Documents Access and Management Systems (ADAMS) Accession No. ML13273A514) which NRC has endorsed (ADAMS Accession No. ML13267A382). (Reference 12).

Details:	
Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* SBO Emergency Operating Procedure (EOP) ECA-0.0 (Reference 26) currently addresses implementation of this strategy. The strategies in ECA-0.0 are supported by the appropriate FSIs for FLEX Mitigation Strategy implementation.
Identify Modifications	*List modifications and describe how they support coping time.* 1. 8 Hour Battery Coping. (DCNs D23391 & D23096) - Increases battery coping capability. 2. The backup instrument air control stations for the SG Atmospheric Relief

	Valves (ARVs) and Auxiliary Feedwater (AFW) Level Control Valves (LCVs) have been moved to elevation 734 above the probable maximum flood (PMF) elevation of 722 for flood mode response. (DCN 23192). 3. The CSTs have been hardened and seismically qualified. (DCNs 23191 & 23376).
Key Reactor Parameters	1. SG Wide Range Level or Narrow Range Level with AFW Flow indication 2. SG Pressure 3. CST Levels RCS instrumentation that is assumed to also be available for this function: 1. Core Exit Thermocouple (CET) Temperature** 2. RCS Hot Leg (HL) Temperature (T_{hot}) if CETs not available 3. RCS Cold Leg (CL) Temperature (T_{cold})* 4. RCS Wide Range Pressure 5. Pressurizer Level 6. Reactor Vessel Level Indicating System (RVLIS) (backup to Pressurizer level) – available for up to 27 hours for limiting flood scenario, at which point pressurizer level is available again. 7. Neutron Flux Sequoyah relies on existing installed 125v DC Vital Batteries to power key instrumentation and emergency lighting. A battery coping calculation determined that the battery coping time is 8 hours. (Reference 30). *This instrumentation is only available until flood water enters the auxiliary instrument room. The potential validating indicator for T_{cold} is SG pressure when natural circulation is occurring. This substitution is allowed by guidance provided in OG-12-515, Transmittal of Final Generic PWROG FLEX Support Guidelines and Interfaces (Controlling Procedure Interface and Recommended Instruments) from PA-PSC-0965. (Reference 7). **This instrumentation is only available until flood water enters the auxiliary instrument room. The potential validating indicator for CETs is RCS Hot Leg temperatures. This substitution is allowed by guidance provided in OG-12-515, Transmittal of Final Generic PWROG FLEX Support Guidelines and Interfaces (Controlling Procedure Interface and Recommended Instruments) from PA-PSC-0965. (Reference 7). Sequoyah has developed FSI-7, Loss of Vital Instrumentation or Control Power to facilitate reading instrumentation locally, where applicable, using portable instrumentation as required by Section 5.3.3 of NEI 12-06. (Reference 33).
Note: 1. Core cooling strategies are provided for conditions where SGs are available or where SGs are not available but a sufficient RCS vent has been established to support core cooling. This assumption is per the guidance of NEI 12-06 FAQ 2012-19. Other configurations are not considered as these occur at short durations that are exempted per NEI-12-06 Table D.	

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Provide a general description of the coping strategies using on-site portable equipment including station modifications that are proposed to maintain core cooling. Identify methods and strategy (ies) utilized to achieve this coping time.

Core Cooling with SGs Available

Transition to Phase 2 is required before the Turbine Driven Auxiliary Feedwater Pumps suction sources are depleted. The CSTs, if not missile penetrated in the initiating event contain approximately 14 hours of inventory for each units' operation. (Reference 25) If a missile penetrated the CSTs at the top of the protective barrier approximately 7.5 hours of inventory for each unit would be available. When clean water sources are depleted, suction flow to the TDAFWPs can be provided by an unlimited supply of water from the LP FLEX Pumps staged at the IPS. These LP FLEX Pumps take suction from the intake channel and discharge to 4 ERCW FLEX connections at the Intake Pumping Station (IPS). They will be used to pressurize the ERCW headers which can then be used for direct supply to the TDAFWP suction, if required.

Surviving, non-seismic, clean water tanks can also be used to provide makeup to the CSTs using deployed diesel driven transfer pumps, hoses and installed FLEX connections.

As a last option, suction flow to the TDAFWPs can be provided by standing/static raw water in the ERCW headers which would supply approximately 18.5 additional hours of cooling water makeup to the Unit 1 and Unit 2 SGs. (Reference 29).

OPTIONS AVAILABLE - NON-FLOOD EVENT:

The Prime Source for Steam Generator (SG) Makeup at Sequoyah Nuclear Plant (SQN) are the Turbine Driven Auxiliary Feedwater Pumps (TDAFWPs) (one per unit) taking suction from demineralized water supplied Condensate Storage Tanks (CSTs). ERCW system supplying raw water is the ultimate source (safety related), if required.

NOTE: Due to the potential for de-rating of the 6.9KV FLEX DGs at high outside ambient temperatures 6.9KV FLEX DG loading margin should be verified prior to exercising the Motor Driven Auxiliary Feedwater Pumps (MDAFWPs) option to replace the TDAFWP. (Reference 80 & 105).

Option 1. Once the 6.9KV FLEX DGs are available, and loading capability is assured the MDAFWPs (Train A & B) could be placed in service to relieve a TDAFWP, if required. The suction source would be the same as the TDAFWPs.

Regardless of outside ambient temperature the following options are available to supply makeup water to the SGs:

Option 2. The portable Diesel Driven Intermediate Pressure (IP) FLEX pumps are deployed from the FLEX Equipment Storage Building (FESB) and staged next to the CSTs. Pump suctions would be by hose from the CSTs FLEX connections. The discharge is routed by hose to the TDAFWP discharge header FLEX connection in the West Main Steam Valve Vaults (WMSVVs) elevation 706. Optional discharge is to the MDAFWPs discharge header FLEX connections on AB elevation 714. (150gpm at 350psig).

Option 3. Once the 6.9KV FLEX DGs are available, the 480v motor driven IP FLEX Pumps pre-staged on AB elevation 714 could be placed in service, if required. The suction source is raw water by hose from the ERCW FLEX connections located on AB elevation 714. The discharge is routed by hose to the TDAFWP discharge header FLEX connection in the West (WMSVV) elevation 706. Optional discharge is to the MDAFWPs discharge header FLEX connections on AB elevation 714. (150gpm at 350psig). Power supply and control are from the 480v C & A Vent Boards. See Attachment 3, Figures A3-39, A3-40, & A3-41 for primary and optional power supplies to the 480v motor driven IP FLEX Pumps.

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Option 4. Once the 6.9KV FLEX DGs are available, the 480v motor driven Mode 5 & 6 IP FLEX Pumps pre-staged on AB elevation 669 could be aligned and placed in service as a backup to a failed or unavailable elevation 714 IP FLEX Pump. The suction source is raw water by hose from an ERCW FLEX connection on AB elevation 714. The discharge is routed by hose to the TDAFWP discharge header FLEX connection on elevation 706 in the West (WMSVV). Optional discharge is to the MDAFWPs discharge header FLEX connections on AB elevation 714. (150gpm at 350psig). Power supply and control are from the 480v C & A Vent Boards. See Attachment 3, Figures A3-39, A3-40 & A3-41 for primary and optional power supplies to the 480v motor driven IP FLEX Pumps.

Option 5. Once the SGs are depressurized to less than 150 psig (~ 105 to 115 psig) per procedure, the Diesel Driven Low Pressure (LP) FLEX Pumps (Triton and Dominators) are capable of supplying raw water to the SGs. For the LP FLEX Pumps staged at the IPS, suction will be supplied from the Triton's floating booster pumps in the intake channel providing positive suction to the LP FLEX Pump (Dominator). The LP FLEX pump's (Dominator) discharge will be routed by hoses to the ERCW FLEX connections at the IPS. FLEX hoses would be connected to ERCW FLEX connections on AB elevation 714 and routed to supply raw water to the Unit 1 and/or 2 TDAFWPs discharge header FLEX connections located on elevation 706 in the Unit 1 and Unit 2 West MSVVs. Optional discharge is to the MDAFWPs discharge header FLEX connections located on AB elevation 714. The LP FLEX pumps are rated at 5000gpm at 150psig.

Further RCS and SG depressurization would be per procedure ensuring appropriate shutdown margin (SDM) throughout the evolution and Cold Leg Accumulators (CLAs) isolation prior to reducing Reactor Coolant System (RCS) pressure below 225 psig.

OPTIONS AVAILABLE - FLOOD EVENT:

An ELAP could occur at any time, therefore Sequoyah will pre-stage FLEX Flood Mode equipment based on a 25 year flood warning from TVA's Division of Water Management, River Systems Operations (RSO) Branch. TVA's River Systems Operation's procedure RvM-SOP-10.05.06, "Nuclear Notifications and Flood Warning Procedure," and SQN Operation's AOP-N.03, "External Flooding" has been revised to provide the notification and direct the pre-staging of FLEX equipment. This early notification allows for FLEX equipment to be staged without impacting resources that would be required for design basis flood mode operation preparations. (Reference 22).

Scenario 1 - ELAP Occurs Simultaneous With or Early During Stage 1 Flood Warning Preparation:

When TVA's RSO branch determines that a major flood producing storm (area average rainfall of six inches above Chattanooga) is developing they activate their River Operations Emergency Operations Center (REOC) and establish a 3 hour communication between REOC and SQN. When SQN receives this higher level notification they activate the plant Operations Control Center (OCC) and begin planning for design basis flood actions to ensure that required staffing is obtained in advance of a potential Stage 1 Flood Warning. Once a Stage 1 Flood Warning is received from TVA's REOC, the site has a minimum of 27 hours prior to flood water reaching plant grade (elevation 706). During this 27 hour period, if not prior to, based on management decision and anticipatory communication from RSO, the units would be removed from service, cooled down and depressurized, borated to the required shutdown margin and aligned for flood mode operations. The prime source of SG makeup during this 27 hour period would be the TDAFWPs taking suction from the CSTs. If clean water became unavailable the suction source would be transferred to raw water supplied to the ERCW headers by the ERCWPs or if an ELAP has already occurred the deployed Diesel Driven LP FLEX Pumps.

Options available for ensuring makeup to the SGs during this 27 hour period between a Stage 1 Flood Warning and flood waters exceeding plant grade would be the same as discussed for the non-flood event.

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Prior to flood waters exceeding plant grade, SG makeup would be transitioned to an option that would not be impacted by flood waters onsite or inside the AB.

Once flood waters exceed plant grade the AB, Control Building and Turbine Building will flood as designed and for a Probable Maximum Flood (PMF) to elevation 722.0. This would result in the Safety Injection Pumps and TDAFW Pumps being ~ 53 feet under water (~37 feet if flood waters are at plant grade elevation) and the MDAFW Pumps being ~ 32 feet underwater at the PMF level inside the AB.

The options available if the AB was flooded are:

Option 1. The 480v motor driven IP FLEX Pumps (submersible operation capable) are pre-staged on AB elevation 714. The pump suctions source is raw water routed by hose from the ERCW FLEX connections located on AB elevation 714. The pumps discharge is routed by hose to the TDAFWPs discharge header FLEX connection on elevation 706 in the West MSVV. Optional discharge is to the MDAFWPs discharge header FLEX connections on AB elevation 714. Power supply and control are from the 480v C & A Vent Boards. See Attachment 3, Figures A3-39, A3-40, & A3-41 for primary and optional power supplies to the 480v motor driven IP FLEX Pumps. (150gpm at 350psig).

Option 2. Once the SGs are depressurized to less than 150 psig (~105 to 115 psig) per procedure, the Diesel Driven Low Pressure (LP) FLEX Pumps (Triton and Dominators) are capable of supplying raw water to the SGs. Raw water is supplied from a LP FLEX Pumps (Triton and Dominator) staged at the AERCW Pumping Station and taking suction from the cold water return channel with discharge hoses routed to ERCW FLEX connections located at the AERCW Pumping Station. A FLEX hose would be connected to an ERCW FLEX connection on AB elevation 714 and routed to the TDAFWPs discharge header FLEX connection located on elevation 706 in the West MSVVs. Optional discharge is to the MDAFWPs discharge header FLEX connections on AB elevation 714. (5000gpm at 150psig).

Scenario 2 - ELAP occurs after the units have been shut down, cooled down and depressurized and borated to a Cold Shutdown-Xenon Free Shutdown Margin condition and aligned for design basis flood mode operation (Stage 1 and Stage 2 flood preparations complete per AOP-N.03, External Flooding).

Flood waters at or above plant grade:

Note: When an ELAP occurred, SG makeup using raw water supplied by the Flood Mode Pumps per design response would be lost.

Note: If flood level is forecast to exceed elevation 706 a decision to recover Flood Mode Pump operation or implement options 1 or 2 below must be made. In a PMF flood level event (elevation 722) access to the AB elevation 714 FLEX connections and valves is lost.

Hoses would have been previously routed with final alignment requiring only valve operation prior to flood waters exceeding plant grade.

The options available for this condition are:

Option 1. The 480v motor driven IP FLEX Pumps (submersible operation capable) are pre-staged on AB elevation 714. The pumps suction source is raw water routed by hose from the ERCW FLEX connections located on AB elevation 714. The pumps discharge is routed by hose to the TDAFWP discharge header FLEX connections on elevation 706 in each unit's West MSVV. Optional discharge is a realignment isolating the failed HPFP system feed and aligning makeup supply from the IP FLEX pump to the MDAFWP discharge header FLEX connections on AB elevation 714. (150gpm at 350psig).

Power supply and control are from the 480v C & A Vent Boards. See Attachment 3, Figures A3-39, A3-40, & A3-41 for primary and optional power supplies to the 480v motor driven IP FLEX Pumps.

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Option 2. Once the SGs are depressurized to less than 150 psig (~ 105 to 115 psig) per procedure, the Diesel Driven Low Pressure (LP) FLEX Pumps (Triton and Dominators) are capable of supplying raw water via the ERCW FLEX connections to the SGs. Raw water is supplied by LP FLEX Pumps (Triton and Dominator) the Triton taking suction from the cooling tower return cold water channel and Dominator pump discharge routed by hoses to the AERCW Pumping Station ERCW FLEX connections. A FLEX hose would be connected to an ERCW FLEX connection on AB elevation 714 and routed to the TDAFWP discharge header FLEX connection located on elevation 706 in the West MSVV. Optional discharge is a realignment aligning makeup supply to the MDAFWP discharge header FLEX connections on AB elevation 714.

Given the plant structures, system and component (SSC) knowledge and emergency response equipment available onsite, near site or from TVA, INPO or NSRC resources, site Operations, Maintenance and Engineering staff will develop additional options and capabilities for providing a makeup source to the SGs.

The Diesel Driven IP FLEX Pumps are stored in and will be deployed from the FESB. The 480v motor driven IP FLEX Pumps are pre-staged on AB elevation 714 inside the AB Supply Fan Rooms, the 480v motor driven Mode 5 & 6 IP FLEX Pumps are pre-staged on AB elevation 669 inside the positive displacement (PD) pump rooms.

Power supply and control for the IP FLEX Pumps are from the 480v C & A Vent Boards. See Attachment 3, Figures A3-39, A3-40, & A3-41 for primary and optional power supplies to the 480v motor driven IP FLEX Pumps.

The deployment paths, staging locations and power supply information for the core cooling and heat removal IP FLEX pumps and associated equipment are provided in Attachment 3.

For non-flood conditions, Sequoyah will gradually transition to a long term core cooling strategy. This will include the use of the LP FLEX pumps on-site to provide a source of cooling water flow to the component cooling system (CCS) heat exchangers. The 6.9 KV FLEX DGs could be used to repower components such as the Auxiliary Air Compressors, MDAFWPs, CCSPs, SFPCPs, select ventilation equipment and other components as need and load capability allows.

Note: The 6.9KV FLEX DGs also provide an alternative power source capability for the loads supplied by the onsite 480v FLEX DGs.

<u>Core Cooling with SGs Not Available</u>

During Cold Shutdown or Refueling Modes, there are many variables that could impact the ability to provide makeup to the RCS and cool the core. With SGs unavailable core cooling is maintained through heat removal from the RCS via coolant boil off with gravity feed from the RWST and boil off through an RCS vent path.

SQN has procedure AOP-P.10, Loss of All AC Power While On RHR Cooling in development in coordination with Westinghouse and Watts Bar Nuclear Plant. This procedure will provide instructions for maintaining core cooling and protecting the reactor core, containment and the spent fuel pool in the event of a complete loss of Residual Heat Removal (RHR) system cooling. AOP-P.10 will provide recovery path instructions for the following plant conditions:

- In Mid-loop/Reduced Inventory
- Reactor Vessel Head Removed
- RCS Intact
- RCS Capable of Being Made Intact
- RCS NOT Intact (Vessel Head On)

FSI-14, Shutdown RCS Makeup is also in development which will provide instructions for establishing RCS makeup during an ELAP that occurs when a unit is in Modes 5 or 6 or when in Mode 4 on RHR cooling. AOP-

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P.10 will provide kick-outs to FSI-14 where appropriate. FSI-14 will provide actions limited to establishing possible RCS makeup flow paths based on the affected unit's condition. FSI-14 will provide the following applicable sections: • Establish RCS Makeup with SG Cooling Available • Establish Safety Injection Pump Makeup to Fill Reactor Cavity • Establish Mode 5 & 6 IP FLEX Pump Makeup to Reactor Cavity • Establish Pumped Injection for RCS Feed and Bleed • Inject Cold Leg Accumulator (References 100 & 101) The Mode 5 & 6 IP FLEX pump located on AB elevation 669 provides the ability to inject borated makeup water into the RCS via the Safety Injection System FLEX connections. (150gpm at 350psig). Power supply and control are from the 480v C & A Vent Boards. See Attachment 3, Figures A3-39, A3-40 & A3-41 for primary and optional power supplies. The connections utilized for RCS Inventory Control/Long-Term Subcriticality will be utilized for the reactor core cooling and heat removal with steam generators not available strategies (Modes 5 and 6). These connections are described in the RCS inventory control section. In addition, a flushing flow of 121 gpm at atmospheric conditions is required at 34.5 hours in order to preclude the RCS fluid from the incipient boric acid precipitation point. (Reference 55). TVA's NPG and SQN have proceduralized administrative controls to take advantage of FLEX equipment and procedural capability during a unit outage by ensuring FLEX equipment remains available during the outage. Contingency plans should include the use of FLEX equipment to maintain Defense in Depth Margin. (Reference 18). SQN follows the guidance contained within the Nuclear Energy Institute (NEI) position paper dated September 18, 2013, entitled "Position Paper: Shutdown/Refueling Modes" (Agency Wide Documents Access and Management Systems (ADAMS) Accession No. ML13273A514) which NRC has endorsed (ADAMS Accession No. ML13267A382). (Reference 12).

Details:	
Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation with a description of the procedure / strategy / guideline.* Procedures and guidance to support deployment and implementation, including interfaces to EOPs, special event procedures, Abnormal Operating Procedures (AOPs), and System Operating Procedures (SOs), have been developed in accordance with NEI 12-06, Revision 0, Section 11.4. Further, the PWROG has developed generic guidance and Sequoyah's strategy aligns with the generic guidance and considers the nuclear steam supply system (NSSS) specific guidance.
Identify modifications	*List modifications necessary for Phase 2* 1. The backup instrument air control stations for the SG Atmospheric Relief Valves (ARVs) and Auxiliary Feedwater (AFW) Level Control Valves (LCVs) have been moved to elevation 734 above the probable maximum flood (PMF) elevation of 722 for flood condition response. (DCN 23192). 2. FLEX connections are provided on the ERCW headers in the Auxiliary Building (elevation 714) for supplying water to the elevation 714 480v

Maintain Core Cooling & Heat Removal	
PWR Portable and Pre-staged Equipment Phase 2	
	motor driven IP FLEX Pumps. (DCN D23193). 3. The primary FLEX connection point for SG cooling is upstream of the SG LCVs on the TDAFWP discharge line. (DCN D23193). 4. The secondary FLEX connection points for SG cooling are upstream of the SG LCVs in both the train A and train B MDAFWP discharge piping. Connection to both trains is required for the secondary FLEX connections to ensure feed to all four SGs. (DCN D23193). 5. The CSTs have been hardened and seismically qualified. (DCNs 23191 & 23376). 6. CSTs FLEX connections are provided for clean water makeup or supply. (DCN D23193). 7. FLEX connections are provided on the ERCW headers at the IPS for the LP FLEX Pumps to pressurize the ERCW headers during non-flood and flood ELAP scenarios. (DCN D23193). 8. FLEX connections are provided on the ERCW headers at the AERCW pumping station for the LP FLEX Pumps to pressurize the ERCW headers during flood conditions. (DCN D23193). 9. FLEX connections are provided on the Primary Water Storage Tanks (PWSTs) and the Demineralized Water Storage Tank (DWST) to facilitate transfer of water to the CSTs. (DCN D23193). 10. Pre-staged submersible 480v AC HP & IP FLEX Pumps (Non-Flood, Flood & Mode 5 & 6) and power sources are provided. (DCN D23193). 11. FLEX connections are provided on the SIPs discharge headers for RCS makeup and boration by the HP FLEX Pumps or the Mode 5 & 6 IP FLEX Pumps. (DCN D23193). 12. RWST FLEX connections are provided to supply a suction source for HP FLEX Pumps or the Mode 5 & 6 IP FLEX Pumps. (DCN D23193). 13. BAT FLEX connection is provided to supply an alternate suction source for HP FLEX Pumps or the Mode 5 & 6 IP FLEX Pumps. (DCN D23193A). 14. FLEX Equipment Storage Building (FESB). (DCN D23358). 15. 480v FLEX DGs (225KVA DGS). (DCN D22929). 16. 6900v FLEX DGs (2.75 MWe DGs). (DCN 23197). 17. 8 Hour Battery Coping. (DCN D23096 & D23391). 18. Upgraded site communication capability with the Harris Radio System. (DCN 23096). - Note: Not a direct FLEX related modification. 19. Installed storage boxes/lockers/enclosures in the AB and ADGB for hoses, fittings, tools required for FLEX implementation. Installed concrete pads and reinforced roads where required for FLEX equipment deployment. (DCN D23193).

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Key Reactor Parameters	*List instrumentation credited or recovered for this coping evaluation.* 1. SG Wide Range Level or Narrow Range Level with AFW Flow indication 2. SG Pressure 3. CST Level RCS instrumentation that is assumed to also be available for this function: 1. CET Temperature** 2. RCS HL Temperature (T_{hot}) if CETs not available 3. RCS CL Temperature (T_{cold})* 4. RCS Wide Range Pressure 5. Pressurizer Level 6. RVLIS (backup to Pressurizer level) – available for up to 27 hours for limiting flood scenario, at which point pressurizer level is available again. 7. Neutron Flux Sequoyah relies on existing installed 125v DC Vital Batteries to power key instrumentation and emergency lighting. A battery coping calculation determined that the battery coping time is 8 hours. (Reference 30). *This instrumentation is only available until flood water enters the auxiliary instrument room. The potential validating indicator for T_{cold} is SG pressure when natural circulation is occurring. This substitution is allowed by guidance provided in OG-12-515, Transmittal of Final Generic PWROG FLEX Support Guidelines and Interfaces (Controlling Procedure Interface and Recommended Instruments) from PA-PSC-0965. (Reference 7). **This instrumentation is only available until flood water enters the auxiliary instrument room. The potential validating indicator for CETs is RCS Hot Leg temperatures. This substitution is allowed by guidance provided in OG-12-515, Transmittal of Final Generic PWROG FLEX Support Guidelines and Interfaces (Controlling Procedure Interface and Recommended Instruments) from PA-PSC-0965. (Reference 7). Sequoyah has developed FSI-7, Loss of Vital Instrumentation or Control Power to facilitate reading instrumentation locally, where applicable, using portable instrumentation as required by Section 5.3.3 of NEI 12-06. (Reference 33).
Storage / Protection of Equipment **Describe storage / protection plan or schedule to determine storage requirements.**	
Seismic	The 6.9KV FLEX DGs are be pre-staged in the Additional Diesel Generator Building (ADGB). The ADGB is a formidable building constructed to Class 1 rigor. The FLEX 6.9KV distribution systems have been analyzed to survive 2X SSE High Confidence of Low Probability Failure (HCLPF). The distribution system from the ADGB to the Emergency Diesel Generator Building (EDGB) is housed in robust structures and is missile protected and from the kirk-key switches located in the EDGB through the 6.9KV and 480v safety class electrical distribution system is appropriately protected or located within a Class I structure.

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	The 480v FLEX DGs are pre-staged on the roof of the Auxiliary Building. A protection structure has been built around the DGs, which is designed to the same Seismic Category I requirements as the Auxiliary Building. Seismic input for the design corresponds to the appropriate seismic accelerations at the roof of the Auxiliary Building. This design provides a seismic protection of 2X SSE HCLPF. Equipment required to implement this FLEX strategy is stored/staged/pre-staged in the FESB, ADGB, EDGB and/or AB which are designed for seismic loading in excess of the minimum requirements of the American Society of Civil Engineers (ASCE) 7-10.
Flooding	The 6.9KV FLEX DGs are pre-staged inside the ADGB which is located above the PMF elevation. The ADGB is a formidable structure designed and built to withstand 2X SSE HCLPF and 360 MPH winds. The distribution system from the ADGB to the EDGB is protected and from the kirk-key switches located in the EDGB through the 6.9KV and 480v safety class electrical distribution system is designed to withstand PMF waters, is appropriately protected or located within a Class I structure. The EDGB is located above the PMF flood elevation. The 480v FLEX DGs are pre-staged on the roof of the AB, which is sited in a suitable location that is above the PMF and as such is not susceptible to flooding from any source. Equipment required to implement this FLEX strategy is maintained in the ADGB, EDGB and/or AB in suitable locations functionally above the Probable Maximum Flood (PMF) level or are capable of submersible operation. Portable equipment stored in the FESB will be relocated to above PMF level prior to flood waters reaching plant grade.
Severe Storms with High Winds	The 6.9KV FLEX DGs are pre-staged inside the ADGB. The ADGB is a formidable structure designed and built to withstand 2X SSE HCLPF and 360 MPH winds. The distribution system from the ADGB to the EDGB is protected and from the kirk-key switches located in the EDGB through the 6.9KV and 480v safety class electrical distribution system is appropriately protected or located within a Class I structure. The 480v FLEX DGs are pre-staged on the roof of the AB. A protection structure has been built around the DGs, which is sited in a suitable location that is protected from NRC Region 1 tornado, missiles, and velocities as defined in Nuclear Regulatory Commission (NRC) Regulatory Guide 1.76 Revision 1. Equipment required to implement this FLEX strategy is maintained in the FESB, ADGB, EDGB and/or AB which are designed to meet or exceed the licensing basis high wind hazard for Sequoyah.
Snow, Ice, and Extreme Cold	The 6.9KV FLEX DGs are pre-staged inside the ADGB. The ADGB is a formidable structure designed and built to withstand 2X SSE HCLPF and 360 MPH winds. The ADGB is provided with a heat and ventilation system to

Maintain Core Cooling & Heat Removal	
PWR Portable and Pre-staged Equipment Phase 2	
	maintain an acceptable internal environment up to the point of ELAP. The 480v FLEX DGs are pre-staged on the roof of the AB. A protection structure has been built around the DGs, and has been evaluated for snow, ice and extreme cold temperature effects and heating has been provided as required to assure no adverse effects on the FLEX equipment. The FESB has been designed to address snow, ice and extreme cold temperature effects and heating is provided as required to assure no adverse effects on the FLEX equipment stored there. Equipment stored or staged in the FESB, ADGB, EDGB or AB are protected from these extremes.
High Temperatures	The 6.9KV FLEX DGs are pre-staged inside the ADGB. The ADGB is a formidable structure designed and built to withstand 2X SSE HCLPF and 360 MPH winds. The ADGB is provided with a heating and ventilation system to maintain an acceptable environment up to the point of ELAP. The 6.9KV FLEX DGs are potentially load limited (de-rated) when the outside ambient temperature is greater than or could exceed 93°F. Operations FLEX procedures provide precautions to be observed during high outside ambient temperature 6.9KV FLEX DG operations. This potential de-rating does not impact Sequoyah's ability to successfully implement mitigation strategies. (Reference 80 & 105). The 480v FLEX DGs are pre-staged on the roof of the AB. A protection structure has been built around the DGs, and has been evaluated for high temperature effects and ventilation is provided as required to assure no adverse effects. The FESB has been designed to address high temperature effects and HVAC is provided as required to assure no adverse effects on the FLEX equipment stored there. Equipment stored or staged in the FESB, ADGB, EDGB and/or AB are protected from high temperature extremes.

Deployment Conceptual Design

The figures provided in Attachment 3 show the deployment paths from each of the storage locations to the staging locations.

Strategy	**Modifications**	**Protection of connections**
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
<u>SGs Available</u> The primary connection for the IP FLEX pumps is located in the West Main Steam Valve Vault (MSVV) upstream of the LCVs on the TDAFWP discharge piping. For this alignment during non-flood conditions, suction to the IP	<u>Primary FLEX connection modifications:</u> • A FLEX connection has been added to the TDAFWP discharge line. • An isolation valve has been added to the main line upstream of connection. • An isolation valve has been	FLEX equipment connection points are designed to meet or exceed Sequoyah design basis SSE protection requirements. The primary connection is located inside the West MSVV. The West MSVV is a safety related structure and is protected from all external hazards except flooding. For flood

Maintain Core Cooling & Heat Removal		
PWR Portable and Pre-staged Equipment Phase 2		
FLEX pumps will be taken from the CSTs FLEX connections or ERCW headers. During flood conditions suction will be taken from the ERCW headers. Discharge of the IP FLEX pumps will be to the connection points shown in Attachment 3, Figure A3-1. The proposed hose routing for the primary connections and the associated equipment staging area can be found in Attachment 3, Figures A3-3 through A3-6. ERCW connections can be found in Attachment 3, Figure A3-23. Power supply and control are from the 480v C & A Vent Boards. See Attachment 3, Figures A3-39, A3-40, & A3-41 for primary and optional power supplies to the 480v motor driven IP FLEX Pumps.	added to the new branch. • Storz cap/adapter has been added to new branch. <u>CSTs modifications:</u> (DCN D23193). FLEX connections are provided with Storz connections. (DCNs 23191 & 23376) The CSTs are hardened and seismically qualified. <u>ERCW modifications</u>: (DCN D23193). For non-flood conditions, one set of LP FLEX Pumps will be staged near the IPS. The existing ERCW piping at the IPS has been modified to add isolation valves with Storz hose connections to allow the ERCW headers to be pressurized. For flood conditions, a second set of LP FLEX Pumps will be staged next to AERCW pumping station. The existing ERCW piping at the AERCW pumping station has been modified to add isolation valves with Storz hose connections to allow the ERCW headers to be pressurized. To supply water to the suction of the 480v motor driven AB elevation 714 IP FLEX Pumps or if required the AB elevation 669 Mode 5 & 6 IP FLEX Pumps, existing ERCW header ports in the AB on elevation 714 will be utilized. The ports have been modified to add Storz hose connections. <u>Other tank modifications:</u> An isolation valve and Storz hose connections have been added to the PWSTs and DWST for water	conditions, procedures ensure that hoses are connected before flood levels reach the connection. FLEX connections to the ERCW headers are seismically qualified and missile protected. CSTs connections are robust and missile protected. For connections required during flood conditions, procedures ensure that hoses are connected before flood levels reach the connection. Connections to clean water makeup source tanks are not protected since the connections are to non-protected tanks and would only be available if the tank survives the event. These FLEX connections are used to provide additional capability above the minimum FLEX requirements. (DCN D23193).

Maintain Core Cooling & Heat Removal		
PWR Portable and Pre-staged Equipment Phase 2		
	transfer pump capability to supply clean water makeup to the CSTs.	
<u>SGs Available</u> The secondary FLEX connection is located in the AB on elevation 714 upstream of the LCVs on the MDAFWP discharge piping. For this alignment, suction is taken from the CSTs FLEX connections or ERCW and discharged through the IP FLEX Pumps to the FLEX connection points shown in Attachment 3, Figure A3-2. The proposed hose routing for the secondary connection and the associated equipment staging area can be found in Attachment 3, Figures A3-3 and A3-4. ERCW FLEX connections can be found in Attachment 3, Figure A3-23. Power supply and control are from the 480v C & A Vent Boards. See Attachment 3, Figures A3-39, A3-40, & A3-41 for primary and optional power supplies to the 480v motor driven IP FLEX Pumps.	<u>Secondary FLEX connection modifications:</u> • Hard piping bas been installed between the HPFP Train A and Train B flood mode supply piping and the MDAFWP Train A and Train B piping which replaced the existing removable flood mode spool pieces. • A tee was added to this piping • Isolation valves were added to either side of the new tee. • Isolation valves were added on the new branches. • Storz caps/adapters were added to the new branches. <u>CSTs, ERCW, and other tank modifications:</u> Same as primary.	FLEX equipment connection points are designed to meet or exceed Sequoyah design basis SSE protection requirements. The secondary FLEX connection is located inside the Auxiliary Building. The Auxiliary Building is a safety related structure and is protected from all external hazards except flooding. For flood conditions, procedures will ensure that hoses are connected before flood levels reach the connection. FLEX connections to the ERCW are seismically qualified and missile protected. CST connections are robust and missile protected. For connections required during flood conditions, procedures ensure that hoses are connected before flood levels reach the connection. Connections to clean water makeup source tanks are not protected since the connections are to non-protected tanks and would only be available if the tank survives the event. These FLEX connections are used to provide additional capability above the minimum FLEX requirements. (DCN D23193).
<u>SGs Not Available</u> When SGs are not available, suction will be taken from the RWST FLEX connections (AB elevation 669) through the Mode 5 & 6 IP FLEX Pumps staged on AB elevation 669 with pump discharge routed to the primary FLEX connections on the Train B Safety Injection Pumps discharge headers. Train A Safety Injection Pump discharge Header FLEX connections provide an optional	<u>Primary FLEX Connection Modification</u> • Installed weldolet. • Added two isolation valves • Added a hose adapter. <u>RWSTs modifications:</u> • Installed pipe taps on RWSTs supply lines to the Refueling Water Purification Pumps on AB elevation 669. • Added isolation valves on these connection locations. • Added Storz adapters with	FLEX equipment connection points are designed to meet or exceed Sequoyah design basis SSE protection requirements. The primary connection at the SIP Train B and BAT connection are located inside the AB. The AB is a safety related structure and is protected from all external hazards except flooding. For flood conditions, procedures ensure that suction is transferred to the RWST FLEX connections before flood levels

Maintain Core Cooling & Heat Removal		
PWR Portable and Pre-staged Equipment Phase 2		
discharge path. Attachment 3, Figure A3-19 and A3-20. Power supplies to the Mode 5 & 6 IP FLEX Pumps are from the 480v C & A Vent Boards. Power supply routing and options can be found in Attachment 3, Figures A3-39, A3-40 & A3-41.	caps at each location. BAT Modification • Installed a tee on discharge line of BAT A. • Added an isolation valve on the branch. • Added a Storz adapter with cap on the branch.	exceed plant grade. The RWST connection is located inside the AB on elevation 669. For connections required during flood conditions, procedures will ensure that hoses are connected and alignment completed before flood levels exceed plant grade.
SGs Not Available When SGs are not available, suction will be taken from the RWST FLEX connections (AB elevation 669) through the Modes 5 & 6 IP FLEX Pumps staged on AB elevation 669 with pump discharge routed to the primary FLEX connections on the Train B Safety Injection Pumps discharge headers. Train A Safety Injection Pumps discharge header FLEX connections provide an optional discharge path. Attachment 3, Figure A3-19 and A3-20. Power supply to the Mode 5 & 6 IP FLEX Pumps are from the 480v C & A Vent Boards. Power supply routing and options can be found in Attachment 3, Figures A3-39, A3-40 & A3-41.	The secondary FLEX connection modification for steam generators not available is identical to the primary, except the Modes 5 & 6 IP FLEX Pumps staged on AB elevation 669 discharge being routed to the FLEX connections on the Train B Safety Injection Pumps discharge headers. BAT and RWST Modification Same as primary.	FLEX equipment and connection points are designed to meet or exceed Sequoyah design basis SSE protection requirements. The secondary FLEX connection and BAT FLEX connection are located inside the AB. The AB is a safety related structure and is protected from all external hazards except flooding. For flood conditions, procedures will ensure that suction is transferred to the RWST FLEX connections before flood levels exceed plant grade. The RWST FLEX connections are located inside the AB on elevation 669. For connections required during flood conditions, procedures will ensure that hoses are connected and alignment completed before flood levels exceed plant grade.

Notes:

1. System modifications are described in the “Modifications” section above and are illustrated in Attachment 3.
2. Figures A3-1 through A3-6 in Attachment 3 provide the deployment routes from the staging locations for each IP FLEX pump to the pump suction source and to the primary and secondary connection points on the AFW system.
3. Figures A3-39 through A3-41 provide FLEX power distribution information for 480v Motor Driven FLEX Pumps.

Maintain Core Cooling & Heat Removal
PWR Portable and Pre-staged Equipment Phase 2
4. Core cooling strategies are provided for conditions where SGs are available or where SGs are not available but a sufficient RCS vent has been established to support core cooling. This assumption is per the guidance of NEI 12-06 FAQ 2012-19. Other configurations are not considered as these occur at short durations that are exempted per NEI-12-06 Table D.

Maintain Core Cooling & Heat Removal	
PWR Portable and Pre-staged Equipment Phase 3	
Provide a general description of the coping strategies using phase 3 equipment including modifications that are proposed to maintain core cooling. Identify methods and strategy(ies) utilized to achieve this coping time. Core Cooling with SGs Available For Phase 3, Sequoyah will continue the Phase 2 coping strategies with additional assistance provided from offsite equipment/resources. The Strategic Alliance for FLEX Emergency Response (SAFER) was selected by the Nuclear Strategic Issues Advisory Committee (NSIAC) to provide offsite National SAFER Response Centers (NSRCs) for the nuclear industry in the United States. The NSRC provides additional capability and redundancy of equipment and resources until power, water, and coolant injection components or systems are restored or commissioned. There are 2 NSRC sites. One located in Memphis, TN and another in Phoenix, AZ. Once the call is made to the NSRC, they will provide ground and/or air transportation of the equipment to SQN staging areas B, C, or D within 24 hours. 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 which is 28 driving miles from SQN. Once the equipment is onsite, SQN will utilize it based on plant conditions and if needed to replace or augment operating FLEX Phase 2 Mitigation Strategies and/or equipment. Additional details for NSRC activation and the equipment that will be provided and delivered can be found in the SQN SAFER playbook, "SAFER Response Plan for Sequoyah Nuclear Plant". (Reference 17). Core Cooling with SGs Not Available Reactor core cooling with SGs not available is adequately maintained via the Phase 2 strategy.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	Procedures and guidance to support deployment and implementation, including interfaces to Emergency Operating Procedures (EOPs), special event procedures, Abnormal Operating Procedures (AOPs), and System Operating Procedures, have been developed in accordance with NEI 12-06, Revision 0, Section 11.4. Further, the PWROG has developed generic guidance and Sequoyah's strategy aligns with the generic guidance and considered the NSSS specific guidance. Finally, Sequoyah included in procedure notification of the NSRC to arrange for delivery and deployment of off-site equipment and sufficient supplies of commodities. TVA NPG has included in CECC EPIP - 3, Operations Duty Specialist Procedure For Alert, Site Area Emergency or General Emergency notification of the NSRC to arrange for delivery and deployment of off-site equipment and sufficient supplies of commodities. (Reference 21).
Identify modifications	Each of the Phase 3 strategies will utilize common connections where required as described for the Phase 2 connections to prevent any compatibility issues with the offsite equipment.
Key Reactor Parameters	*List instrumentation credited or recovered for this coping evaluation.* 1. SG Wide Range Level or Narrow Range Level with AFW Flow indication 2. SG Pressure 3. CSTs Level RCS instrumentation that is assumed to also be available for this function:

Maintain Core Cooling & Heat Removal		
PWR Portable and Pre-staged Equipment Phase 3		
	1. CET Temperature** 2. RCS HL Temperature (T_{hot}) if CETs not available 3. RCS CL Temperature (T_{cold})* 4. RCS Wide Range Pressure 5. Pressurizer Level 6. RVLIS (backup to Pressurizer level) – available for up to 27 hours for limiting flood scenario, at which point pressurizer level is available again. 7. Neutron Flux Sequoyah relies on existing installed 125v DC Vital Batteries to power key instrumentation and emergency lighting. A battery coping calculation determined that the battery coping time is 8 hours. (Reference 30). *This instrumentation is only available until flood water enters the auxiliary instrument room. The potential validating indicator for Tcold is SG pressure when natural circulation is occurring. This substitution is allowed by guidance provided in Reference 7. ** This instrumentation is only available until flood water enters the auxiliary instrument room. The potential validating indicator for CETs is RCS HL. This substitution is allowed by guidance provided in Reference 7. Sequoyah has developed FSI-7, Loss of Vital Instrumentation or Control Power to facilitate reading instrumentation locally, where applicable, using portable instrumentation as required by Section 5.3.3 of NEI 12-06. (Reference 33).	
Deployment Conceptual Design		
Strategy	**Modifications**	**Protection of connections**
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
A mobile water purification system will enable water from the Tennessee River or other raw water source to be purified. This unit would process the water source and discharge improved quality water to the CSTs and/or other locations as required.	Each of the Phase 3 strategies will utilize common connections or adapters as described for the Phase 2 connections to prevent any compatibility issues with the offsite equipment.	FLEX equipment and connection points are designed to meet or exceed Sequoyah design basis SSE protection requirements. The mobile water purification system will be supplied raw water from the Tennessee River or other raw water source. The discharge connections will be identical to the ones used for water transfer noted in Phase 2. The protection of those connection points is described in the section for Phase 2.

Maintain Core Cooling & Heat Removal
PWR Portable and Pre-staged Equipment Phase 3
Notes: 1. Core cooling strategies are provided for conditions where Steam Generators are available or where Steam Generators are not available but a sufficient RCS vent has been established to support core cooling. This assumption is per the guidance of NEI 12-06 FAQ 2012-19. Other configurations are not considered as these occur at short durations that are exempted per NEI-12-06 Table D.

Maintain RCS Inventory Control	
PWR Installed Equipment Phase 1:	
Determine Baseline coping capability with installed coping[2] modifications not including FLEX modifications, utilizing methods described in Table 3-2 of NEI 12-06: • **RCS makeup required (standard design RCP seals)** • **All Plants Provide Means to Provide Borated RCS Makeup**	
Provide a general description of the coping strategies using installed equipment including modifications that are proposed to maintain RCS inventory control. This section discusses RCS inventory control and subcriticality issues for conditions where steam generators are available. RCS inventory control and subcriticality issues for conditions where steam generators are not available are addressed in the reactor core cooling and heat removal section of this report. Following the declaration of an ELAP, a plant depressurization and cooldown will be initiated at approximately 1 hour of ELAP event. Natural circulation is maintained by ensuring adequate RCS inventory. Sequoyah Unit 1 and Unit 2 have standard Westinghouse RCP seals and given an ELAP event at rated RCS pressure a potential RCP seal leakage rate of 16.0 gpm exists. At a cold leg pressure of 1485 psig a potential leakage rate of 17.5 gpm per RCP is possible. With the units depressurized and cooled down to a SG pressure of 225 psig RCP seal leakage should be reduced to approximately 5.7 gpm per RCP. (References 60 & 62). Utilizing WCAP-17601 methodology (Reference 50), Reference 10 summarizes the limiting plant specific scenarios for RCS inventory control, shutdown margin, and Mode 5 & Mode 6 boric acid precipitation control with respect to the guidelines set forth in NEI 12-06. (Reference 2). RCS inventory is a significant concern for the ELAP scenario due to the RCP seal design. Timely RCS cooldown and depressurization at 75 to 100°F per hour will bring the units to ~ 225 psig SG pressure (saturation temperature for 240 psia ≈ 397°F). Holding SG pressure to greater than 225 PSIG ensures no nitrogen injection into the RCS from CLAs. RCS makeup is required to compensate for the RCP seal leakage and from shrinkage due to cooldown. For Phase 1 RCS makeup is provided from the Safety Injection System Cold Leg Accumulators. RCP seal leakage will be reduced due to the reduction in RCS pressure.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation* Loss of all AC Power ECA-0.0 addresses all procedural guidance required for maintaining RCS inventory during Phase 1. Procedures and guidance to support implementation of a boration strategy, including interfaces to EOPs, special event procedures, AOPs and SOs, have been developed in accordance with NEI 12-06, Revision 0, Section 11.4. Further, the PWROG has developed generic guidance and Sequoyah's strategy aligns with the generic guidance and considers the NSSS specific guidance.
Identify Modifications	*List modifications* 1. 8 Hour Battery Coping. (DCN D23096 & D23391). 2. The backup instrument air control stations for the SG Atmospheric Relief Valves (ARVs) and Auxiliary Feedwater (AFW) Level Control Valves (LCVs) have been moved to elevation 734 above the probable maximum flood

[2] Coping modifications consist of modifications installed to increase initial coping time, i.e., generators to preserve vital instruments or increase operating time on battery powered equipment.

Maintain RCS Inventory Control	
PWR Installed Equipment Phase 1:	
	(PMF) elevation of 722 for flood mode response. (DCN 23192). 3. FLEX connections are provided for the CSTs. (DCN D23193A). 4. CSTs have been hardened and seismically qualified. (DCNs 23191 & 23376).
Key Reactor Parameters	*List instrumentation credited for this coping evaluation.* 1. CET Temperature** 2. RCS HL Temperature (T_{hot}) if CETs not available 3. RCS CL Temperature (T_{cold})* 4. RCS Wide Range Pressure 5. Pressurizer Level 6. RVLIS (backup to pressurizer level) – available for up to 27 hours for limiting flood scenario, at which point pressurizer level is available again. 7. Neutron Flux Sequoyah relies on existing installed 125v DC Vital Batteries to power key instrumentation and emergency lighting. A battery coping calculation determined that the battery coping time is 8 hours. (Reference 30). *This instrumentation is only available until flood water enters the auxiliary instrument room. The potential validating indicator for Tcold is SG pressure when natural circulation is occurring. This substitution is allowed by guidance provided in Reference 7. **This instrumentation is only available until flood water enters the auxiliary instrument room. The potential validating indicator for CETs is RCS HL. This substitution is allowed by guidance provided in Reference 7. Sequoyah has developed FSI-7, Loss of Vital Instrumentation or Control Power to facilitate reading instrumentation locally, where applicable, using portable instrumentation as required by Section 5.3.3 of NEI 12-06. (Reference 33).
Notes: None	

Maintain RCS Inventory Control
PWR Portable and Pre-staged Equipment Phase 2:

Provide a general description of the coping strategies using installed equipment including modifications that are proposed to maintain RCS inventory control. Identify methods (borated high pressure RCS makeup) and strategy (ies) utilized to achieve this coping time.

This section discusses RCS inventory control and subcriticality issues for conditions where SGs are available. RCS inventory control and subcriticality issues for conditions where SGs are not available are addressed in the Reactor Core Cooling and Heat Removal section of this report.

Following the declaration of an ELAP, a plant cooldown and depressurization will be initiated at approximately 1 hour of ELAP event. Natural circulation is maintained by ensuring adequate RCS inventory.

Sequoyah Unit 1 and Unit 2 have standard Westinghouse RCP seals and given an ELAP event at rated RCS pressure a potential RCP seal leakage rate of 16.0 gpm exists. At a cold leg pressure of 1485 psig a potential leakage rate of 17.5 gpm per RCP is possible. (References 60 & 62).

Utilizing WCAP-17601 methodology (Reference 50) and Westinghouse Calculation Note, CN-SEE-II-13-27, (Reference 55) summarizes the limiting plant-specific scenarios for RCS inventory control, shutdown margin, and Mode 5 & Mode 6 boric acid precipitation control with respect to the guidelines set forth in NEI 12-06. (Reference 2).

OPTIONS AVAILABLE - NON-FLOOD EVENT:

Following SQNs Mitigation Strategy, within one hour of the initiating event the units will begin cooldown and depressurization of the RCS to mitigate a potential 16.0 gpm per reactor coolant pump (RCP) leakage from the standard RCP seals at rated RCS pressure. At a cold leg pressure of 1485 psig a potential leakage rate of 17.5 gpm per RCP is possible. (References 60 & 62). Timely RCS cooldown and depressurization at 75 to 100°F per hour to ~ 225 psig (~240 psia) would have the RCS at ~ 397°F and ~ 295 psig within 4 hours. The RCP seal leak rate at this pressure would be ~ 5.7 gpm per RCP. The first source of RCS makeup is from the Safety Injection System Cold Leg Accumulators (CLAs). As RCS pressure is reduced below the CLA tank pressure this passive safety system will start injecting borated water of 2400-2700 ppm boron concentration into the RCS. This will help compensate for the inventory loss from the RCP seal leakage and RCS shrinkage due to the cooldown. SG pressure will be held above 225 psig to minimize the possibility of injecting nitrogen from the CLAs into the RCS. RCS cooldown and depressurization should be stabilized at ~ 225 psig SG pressure within 4 hours of the initiating event. The 6.9KV FLEX Diesel Generators (DGs) will have repowered the 6.9KV Shutdown Boards at approximately 5 hours with raw water available in the ERCW system to support the operation of the Safety Injection Pumps (SIPs). Operation of a SIP in its normal alignment will take suction from the RWST containing ~ 370,000 gallons of demineralized water with a 2500-2700 ppm boron concentration and inject into all 4 RCS cold legs. The SIP operation will provide boration and restore RCS inventory and maintain pressurizer level until the HP FLEX Pump assumes this task. Approximately 8.5 hours after the initiating event the pre-staged 480v motor driven High Pressure (HP) FLEX pumps will be available for service. These pumps would be aligned with a suction hose from RWST FLEX connections located on Auxiliary Building elevation 669 and a discharge hose routed to B Train SIP discharge header FLEX connection on AB elevation 669. An optional suction source is available from a FLEX connection on the Boric Acid Tanks (BAT) (6120 - 6990 ppm boron concentration) located on AB elevation 690. Once RCS pressure is reduced, RCP seal leak rate is concurrently reduced and RCS inventory is recovered, the HP FLEX Pump is capable of maintaining RCS inventory. (40gpm at 600psig). The HP FLEX Pumps are fed from and operated from the 480v C & A Vent Boards 1A2-A and 2B2-B. Power supply routing and options can be found in Attachment 3, Figures A3-37, A3-38, A3-40, A3-42, & A3-43. The spare HP FLEX Pump can also be powered via disconnect switch operation from 480v FLEX DG ‘A’.

Option 1. A pre-staged HP FLEX Pump is provided for each unit and are located on AB elevation 669. The HP FLEX Pump’s suction can be aligned from that unit’s AB elevation 669 RWST FLEX connection or from the BATs

Maintain RCS Inventory Control
PWR Portable and Pre-staged Equipment Phase 2:

FLEX connection located on AB elevation 690. Discharge would be routed to either the B Train SIP discharge header FLEX connection (Primary) or A Train SIP discharge header (alternate). (40gpm at 600psig). Power supply routing and options can be found in Attachment 3, Figures A3-37, A3-38, A3-40, A3-42, & A3-43.

Option 2. A spare pre-staged HP FLEX Pump is located on AB elevation 669 that can be aligned to replace either unit's pre-staged HP FLEX Pump, if required. This spare HP FLEX Pump can be powered from either its normal feed C & A Vent Board 2B2-B or via disconnect switch operation from 480v FLEX DG A. (40gpm at 600psig). Power supply routing and options can be found in Attachment 3, Figures A3-37, A3-38, A3-40, A3-42, & A3-43.

Option 3. The Mode 5 & 6 IP FLEX Pumps pre-staged in the PD pump rooms on AB elevation 669 can be aligned to provide RCS makeup. This option would require a reduction in RCS pressure to ensure adequate injection from the Mode 5 & 6 IP FLEX Pumps. A suction hose would be routed from the RWST FLEX connection located on AB elevation 669 or from the BATs FLEX connection located on elevation 690 and the discharge hose routed to either the Train B or Train A SIP discharge header FLEX connection located on AB elevation 669. Power supply routing and options can be found in Attachment 3, Figures A3-37, A3-38, A3-40, A3-42, & A3-43. (150gpm at 350psig).

OPTIONS AVAILABLE - FLOOD EVENT:

An ELAP could occur at any time, therefore Sequoyah will pre-stage FLEX Flood Mode equipment based on a 25 year flood warning from TVA's Division of Water Management, River Systems Operations (RSO) Branch. TVA's River Systems Operation's procedure RvM-SOP-10.05.06, "Nuclear Notifications and Flood Warning Procedure" Revision 2, 5/1/2015 and SQN Operation's AOP-N.03, "External Flooding" Revision 55, dated 12/15/2015, provides the notification and SQN will direct the pre-staging of FLEX equipment. This early notification allows for FLEX equipment to be staged without impacting resources that would be required for design basis flood mode Stage 1 and Stage 2 Flood Warning preparations. (Reference 22).

Scenario 1 - ELAP occurs simultaneous with or early during the Stage 1 Flood Warning preparation time frame:

When TVA's RSO branch determines that a major flood producing storm (area average rainfall of six inches above Chattanooga) is developing they activate their River Operations Emergency Operations Center (REOC) and establish a 3 hour communication between REOC and SQN. When SQN receives this higher level notification they activate the plant Operations Control Center (OCC) and begin planning for design basis flood actions to ensure that required staffing is obtained in advance of a potential Stage 1 Flood Warning. Once a Stage 1 Flood Warning is received from TVA's REOC the site has a minimum of 27 hours prior to flood water reaching plant grade (elevation 706). During this 27 hour period, if the units were in either of Modes 1 through 4 they would be shutdown, cooled down and depressurized, borated to the required shutdown margin and aligned for flood mode operations.

Assuming the units were in Mode 1 when the ELAP occurred, the initial source of RCS inventory makeup would be the injection of borated water from the CLAs as the units are depressurized. Once the 6.9KV FLEX DGs repowered the 6.9KV Shutdown Boards and the 480v Shutdown Power distribution system the Safety Injection Pumps will recover RCS inventory taking suction from the RWST. The pre-staged 480v motor driven HP FLEX Pumps (submersible operation capable) would be aligned with suction from the RWST via FLEX connections located on AB elevation 669 and discharge to a FLEX connection located on B Train or A Train SIP discharge header and operated to maintain RCS inventory as required. (40gpm at 600psig).

If the suction supply to a HP FLEX Pump was aligned from the AB elevation 690 BAT FLEX connection it would be transferred to the RWST FLEX connection on AB elevation 669 prior to flood waters reaching grade elevation.

Maintain RCS Inventory Control	
PWR Portable and Pre-staged Equipment Phase 2:	

Once flood waters exceed plant grade the AB, Control Building and Turbine Building will flood as designed and for a Probable Maximum Flood (PMF), flood water will reach elevation 722.

Prior to flood waters exceeding plant grade power to the SIPs would be secured at the 6.9KV Shutdown Boards to ensure electrical separation from equipment not designed for AB design basis flood water levels.

The option available if the AB flooded is:

Note: The suction and discharge hoses to the HP FLEX Pumps would be required to be connected and valves aligned for operation prior to flood waters exceeding plant grade.

Note: If the spare pre-staged HP FLEX Pump or a Mode 5 & 6 IP FLEX Pump was required to replace one of the unit HP FLEX Pumps, this decision and required hose routing and valve alignments must be completed prior to flood waters exceeding plant grade.

Note: A Mode 5 & 6 IP FLEX Pump, if required, can be aligned from and to either unit as needed.

Option 1. The 480v motor driven HP FLEX Pumps (submersible operation capable) pre-staged on AB elevation 669 would be aligned. The HP FLEX Pumps suction source is borated water from the RWST FLEX connections located on AB elevation 669 with the discharge hoses routed to SIP discharge header FLEX connections. (40gpm at 600psig). The ultimate power source for the 480v motor driven HP FLEX Pumps is a 6.9KV FLEX DG through the 480v Shutdown Power distribution network to the 480v C & A Vent Boards. Power supply routing and options can be found in Attachment 3, Figures A3-37, A3-38, A3-40, A3-42, & A3-43.

Option 2. If required, a Mode 5 & 6 IP FLEX Pump (submersible operation capable) pre-staged in the PD pump rooms on AB elevation 669 can be aligned to provide RCS makeup. This option would require a reduction in RCS pressure to ensure adequate injection from the Mode 5 & 6 IP FLEX Pump. A suction hose would be routed from the RWST FLEX connection located on AB elevation 669 and a discharge hose routed to either the Train B or Train A SIP discharge header FLEX connection located on AB elevation 669. Power supply routing and options can be found in Attachment 3, Figures A3-37, A3-38, A3-40, A3-42, & A3-43. (150gpm at 350psig).

Scenario 2 - ELAP Occurs after the units have been shut down, cooled down and depressurized and borated to a Cold Shutdown-Xenon Free Shutdown Margin condition and aligned for design basis flood mode operation (Stage 1 and Stage 2 flood preparations complete per AOP-N.03, External Flooding). Flood waters at or above plant grade:

The option available for this condition is:

Note: If the spare pre-staged HP FLEX Pump or a Mode 5 & 6 IP FLEX Pump was required to replace one of the unit's HP FLEX Pumps that decision and necessary hose and valve alignments must be completed prior to flood waters exceeding plant grade. Hoses would be previously routed and connected with alignment completed requiring only operation of the designated FLEX Pumps.

The FLEX Pump and alignment options that would be available for this condition are described in Scenario 1 above.

Given the plant structures, system and component (SSC) knowledge and emergency response equipment available onsite or from TVA, INPO or NSRC resources, site Operations, Maintenance and Engineering staff will develop additional options and capabilities for providing a makeup source to the RCS.

Details:	
Provide a brief description of Procedures / Strategies / Guidelines	Procedures and guidance to support deployment and implementation, including interfaces to EOPs, special event procedures, AOPs, and SOs, have been developed in accordance with NEI 12-06, Revision 0, Section 11.4. Further, the PWROG has developed generic guidance, and Sequoyah's

Maintain RCS Inventory Control	
PWR Portable and Pre-staged Equipment Phase 2:	
	strategy aligns with the generic guidance and considers NSSS specific guidance.
Identify modifications	*List modifications necessary for Phase 2* 1. The backup instrument air control stations for the SG Atmospheric Relief Valves (ARVs) and Auxiliary Feedwater (AFW) Level Control Valves (LCVs) have been moved to elevation734 above the probable maximum flood (PMF) elevation of 722 for flood mode response. (DCN 23192). 2. FLEX connections have been provided on the ERCW headers in the Auxiliary Building elevation 714 for providing suction supply to the Intermediate Pressure (IP) FLEX pumps. (DCN 23193). 3. The primary FLEX connection point for SG cooling is upstream of the SG LCVs on the TDAFWP discharge line. (DCN 23193). 4. The secondary FLEX connection points for SG cooling are upstream of the SG LCVs in both the train A and train B MDAFWP discharge piping. A connection to both trains is needed for the secondary connection to ensure feed to all four SGs. (DCN 23193). 5. FLEX connections for clean water transfer to or from the CSTs are provided. (DCN D23191). 6. The CSTs have been hardened and seismically qualified. (DCNs 23191 & 23376). 7. FLEX connections are provided at the ERCW headers in the Intake Pumping Station (IPS) for the Low Pressure FLEX Pumps to pressurize the ERCW headers during non-flood and flood conditions. (DCN 23193). 8. FLEX connections are provided at the ERCW headers at the AERCW pumping station for the Low Pressure FLEX Pumps to pressurize the ERCW headers during flood conditions. (DCN 23193). 9. FLEX connections have been provided on the Primary Water Storage Tanks (PWSTs) and Demineralized Water Storage Tank to facilitate of transfer water to the CSTs. (DCN D23193). 10. Pre-staged submersible 480v AC HP and IP FLEX Pumps (non-flood, flood and Mode 5 & 6 IP) and power sources. (DCN 23193) 11. FLEX connections at the Safety Injection Pumps' discharge headers facilitate HP FLEX Pump or Mode 5 & 6 IP FLEX Pumps' RCS makeup capability. (DCN 23193). 12. RWST FLEX connections provide HP FLEX Pump or Mode 5 & 6 IP FLEX Pump suction source. (DCN 23193). 13. BAT FLEX connection provided for secondary HP FLEX Pump suction supply capability. (DCN 23193). 14. FLEX Equipment Storage Building (FESB). (DCN D23358). 15. 480v FLEX DGs (225kva DGs). (DCN D22929).

Maintain RCS Inventory Control	
PWR Portable and Pre-staged Equipment Phase 2:	
	16. 6900v FLEX DGs (2.75 MWe DGs). (DCN 23197). 17. 8 hour battery coping. (DCN D23096 & D23391). 18. Upgraded site communication capability with the Harris Radio System. (DCN 23096). - Note: Not a direct FLEX related modification. 19. Installed storage boxes/lockers/enclosures in the AB and ADGB for hoses, fittings, tools required for implementation. Installed concrete pads and reinforced roads where required for FLEX equipment deployment. (DCN D23193).
Key Reactor Parameters	*List instrumentation credited or recovered for this coping evaluation.* 1. CET Temperature** 2. RCS HL Temperature (T_{hot}) if CETs not available 3. RCS CL Temperature (T_{cold})* 4. RCS wide range pressure 5. Pressurizer Level 6. RVLIS (backup to Pressurizer level) – available for up to 27 hours for limiting flood scenario, at which point pressurizer level is available again. 7. Neutron Flux Sequoyah relies on existing installed 125v DC Vital Batteries to power key instrumentation and emergency lighting. A battery coping calculation determined that the battery coping time is 8 hours. (Reference 30). *This instrumentation is only available until flood water enters the auxiliary instrument room. The potential validating indicator for Tcold is SG pressure when natural circulation is occurring. This substitution is allowed by guidance provided in Reference 7. **This instrumentation is only available until flood water enters the auxiliary instrument room. The potential validating indicator for CETs is RCS HL. This substitution is allowed by guidance provided in Reference 7. Sequoyah has developed FSI-7, Loss of Vital Instrumentation or Control Power to facilitate reading instrumentation locally, where applicable, using portable instrumentation as required by Section 5.3.3 of NEI 12-06. (Reference 33).
Storage / Protection of Equipment: **Describe storage / protection plan or schedule to determine storage requirements**	
Seismic	The 6.9KV FLEX DGs are pre-staged inside the ADGB. The ADGB is a formidable structure designed and built to withstand 2X SSE HCLPF and 360 MPH winds. The distribution system from the ADGB to the EDGB is protected and from the kirk-key switches located in the EDGB through the 6.9KV and 480v safety class electrical distribution system is appropriately protected or located within a Class I structure. The 480v FLEX DGs are pre-staged on the roof of the AB. A protection structure has been built around the DGs, which is designed to the same Seismic Category I requirements as the AB. Seismic input for the design corresponds to the appropriate seismic accelerations at the roof of the AB.

Maintain RCS Inventory Control	
PWR Portable and Pre-staged Equipment Phase 2:	
	This design provides a seismic protection of 2X SSE HCLPF. Equipment required to implement this FLEX strategy is stored/staged/pre-staged in the FESB, ADGB, EDGB and/or AB which are designed for seismic loading in excess of the minimum requirements of the American Society of Civil Engineers (ASCE) 7-10.
Flooding	The 6.9KV FLEX DGs are pre-staged inside the ADGB which is located above the PMF elevation. The ADGB is a formidable structure designed and built to withstand 2X SSE HCLPF and 360 MPH winds. The distribution system from the ADGB to the EDGB is protected and from the kirk-key switches located in the EDGB through the 6.9KV and 480v safety class electrical distribution system is designed to withstand PMF waters, is appropriately protected or located within a Class I structure. The EDGB is located above the PMF flood elevation. The 480v FLEX DGs are pre-staged on the roof of the AB, which is sited in a suitable location that is above the PMF and as such is not susceptible to flooding from any source. Equipment required to implement this FLEX strategy is maintained in the FESB, ADGB, EDGB and/or AB in suitable locations functionally above the Probable Maximum Flood (PMF) level or are capable of submersible operation. Portable equipment stored in the FESB will be relocated to above PMF level prior to flood waters reaching plant grade.
Severe Storms with High Winds	The 6.9KV FLEX DGs are pre-staged inside the ADGB. The ADGB is a formidable structure designed and built to withstand 2X SSE HCLPF and 360 MPH winds. The distribution system from the ADGB to the EDGB is protected and from the kirk-key switches located in the EDGB through the 6.9KV and 480v safety class electrical distribution system is appropriately protected or located within a Class I structure. The 480v FLEX DGs are pre-staged on the roof of the AB. A protection structure has been built around the DGs, which is sited in a suitable location that is protected from NRC Region 1 tornado, missiles, and velocities as defined in Nuclear Regulatory Commission (NRC) Regulatory Guide 1.76 Revision 1. Equipment required to implement this FLEX strategy is maintained in the FESB, ADGB, EDGB and/or AB which are designed to meet or exceed the licensing basis high wind hazard for Sequoyah Nuclear Plant.
Snow, Ice, and Extreme Cold	The 6.9KV FLEX DGs are pre-staged inside the ADGB. The ADGB is a formidable structure designed and built to withstand 2X SSE HCLPF and 360 MPH winds. The ADGB is provided with a heat and ventilation system to maintain an acceptable internal environment up to the point of ELAP. The 480v FLEX DGs are pre-staged on the roof of the AB. A protection structure has been built around the DGs, and has been evaluated for snow, ice and extreme cold temperature effects and heating has been provided as required to assure no adverse effects on the FLEX equipment. The FESB has been designed to address snow, ice and extreme cold

Maintain RCS Inventory Control	
PWR Portable and Pre-staged Equipment Phase 2:	
	temperature effects and heating is provided as required to assure no adverse effects on the FLEX equipment stored there. Equipment stored or staged in the EDGB, ADGB or AB are protected from these extremes.
High Temperatures	The 6.9KV FLEX DGs are pre-staged inside the ADGB. The ADGB is a formidable structure designed and built to withstand 2X SSE HCLPF and 360 MPH winds. The ADGB is provided with a heating and ventilation system to maintain an acceptable environment up to the point of ELAP. The 6.9KV FLEX DGs are potentially load limited (de-rated) when the outside ambient temperature is greater than or could exceed 93°F. Operations FLEX procedures provide precautions to be observed during high outside ambient temperature 6.9KV FLEX DG operations. This potential de-rating does not impact Sequoyah's ability to successfully implement mitigation strategies. (Reference 80 & 105). The 480v FLEX DGs are pre-staged on the roof of the AB. A protection structure has been built around the DGs, and has been evaluated for high temperature effects and ventilation is provided as required to assure no adverse effects. The FESB has been designed to address high temperature effects and HVAC is provided as required to assure no adverse effects on the FLEX equipment stored there. Equipment stored or staged in the EDGB, ADGB or AB are protected from high temperature extremes.

Deployment Conceptual Modification (Attachment 3 contains Conceptual Sketches)		
Strategy	**Modifications**	**Protection of connections**
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
The primary RCS FLEX connection is located on the Train B SIP discharge header, in the SIP room at elevation 669. For this alignment, suction will be taken from the RWST or BATs and discharged through the HP FLEX pumps to the existing FLEX connection points shown in Attachment 3, Figures A3-7 and A3-8. The proposed hose routing for the primary FLEX connection and the associated equipment can be found in Attachment 3, Figures A3-9, A3-10, A3-13 and A3-14. The power supply and control	Primary FLEX Connection Modification located on the Train B SIP Discharge header. • Installed weldolet • Added two isolation valves • Added a hose adapter RWST Modifications: • Installed pipe taps on RWST supply lines to the Refueling Water Purification Pumps on AB elevation 669. • Added isolation valves on these connection locations. • Added a Storz adapter with cap on branch.	FLEX equipment and connection points are designed to meet or exceed Sequoyah design basis SSE protection requirements. The primary connection and BAT connection are located inside the Auxiliary Building. The Auxiliary Building is a safety related structure and is protected from all external hazards except flooding. The RWST connections are seismically qualified and missile protected.

Maintain RCS Inventory Control		
PWR Portable and Pre-staged Equipment Phase 2:		
for the 480v motor driven HP FLEX Pumps are the 480v C & A Vent Boards. Power supply routing and options can be found in Attachment 3, Figures A3-37, A3-38, A3-40, A3-42, & A3-43. During Mode 5 and 6 with SGs unavailable, suction will be taken from the RWST and discharged through the Mode 5 & 6 IP FLEX pumps (pre-staged in AB elevation 669 PD Pump rooms) to either the Train B or Train A SIP discharge header FLEX connection. The associated equipment can be found in Attachment 3, Figures A3-19 through A3-22.	<u>BAT Modification:</u> • Installed tee on discharge line of BATs. • Added an isolation valve on the branch. • Added a Storz adapter with cap on branch.	
The secondary RCS FLEX connection is on the SIP Train A discharge line, in the SIP room at elevation 669. For this alignment, suction will be taken from the RWST or BATs and discharged through the HP FLEX pumps to the FLEX connection points shown in Attachment 3, Figures A3-7 and A3-8. The proposed hose routing for the secondary RCS FLEX connection and the associated equipment can be found in Attachment 3, Figure A3-11, A3-12, A3-15, and A3-16. During Modes 5 and 6 with SGs unavailable, suction to Mode 5 & 6 IP FLEX Pump will be taken from the RWST and discharge will be routed to a FLEX connection located on the Train B or Train A SIP discharge header. (Location - AB elevation 669) Figures A3-19 through A3-22.	The secondary FLEX connection modification is identical to the primary, except for being located on the Train A SIP discharge header. <u>RWST and BAT Modifications:</u> Same as primary.	FLEX equipment and connection points are designed to meet or exceed Sequoyah design basis SSE protection requirements. The secondary SIP discharge header FLEX connection and BAT FLEX connection are located inside the Auxiliary Building. The Auxiliary Building is a safety related structure and is protected from all external hazards except flooding. The RWST connections are seismically qualified and missile protected.

Maintain RCS Inventory Control		
PWR Portable and Pre-staged Equipment Phase 2:		
Power supply for the 480v motor driven Mode 5 & 6 IP FLEX Pumps is from the 480v C & A Vent Boards. Power supply routing and options can be found in Attachment 3, Figures A3-39, A3-40 & A3-41.		
Notes:		

1. System modifications are described in the "Modifications" section above and are illustrated in Attachment 3.
2. Figures A3-9 through A3-18 in Attachment 3 provides the deployment routes from the staging locations for each HP FLEX Pump to the pump suction piping and to the primary and secondary connection points on the RCS connected systems.
3. Attachment 3, Figures A3-37 through A3-43 provide FLEX power distribution information for 480v motor driven FLEX Pumps.

Maintain RCS Inventory Control	
PWR Portable and Pre-staged Equipment Phase 3:	
Provide a general description of the coping strategies using phase 3 equipment including modifications that are proposed to maintain RCS Inventory Control. Identify methods (Low Leak RCP Seals and/or borated high pressure RCS makeup) and strategy(ies) utilized to achieve this coping time. This section discusses RCS inventory control and subcriticality issues for conditions where SGs are available. RCS inventory control and subcriticality issues for conditions where SGs are not available are addressed in the reactor core cooling and heat removal section of this report. Reactor level and sub-criticality is adequately maintained via the Phase 2 strategy. The Strategic Alliance for FLEX Emergency Response (SAFER) was selected by the Nuclear Strategic Issues Advisory Committee (NSIAC) to provide offsite National SAFER Response Centers (NSRCs) for the nuclear industry in the United States. The NSRC provides additional capability and redundancy of equipment and resources until power, water, and coolant injection components or systems are restored or commissioned. There are 2 NSRC sites. One located in Memphis, TN and another in Phoenix, AZ. Once the call is made to the NSRC, they will provide ground and/or air transportation of the equipment to SQN staging areas B, C, or D within 24 hours. 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. Once the equipment is onsite, SQN will utilize it based on plant conditions and if needed to replace or augment operating FLEX Phase 2 Mitigation Strategies or equipment. Additional details for NSRC activation and the equipment that will be provided and delivered can be found in the SQN SAFER playbook, "SAFER Response Plan for Sequoyah Nuclear". (Reference 17). Mobile water purification units are provided by SAFER/NSRC. The water purification units will provide demineralized water makeup to the CSTs and/or other uses. In a flood event the mobile water purification units would be staged and aligned once flood waters have receded below plant grade.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	Procedures and guidance to support deployment and implementation, including interfaces to EOPs, special event procedures, AOPs, and SOs, have been developed in accordance with NEI 12-06, Revision 0, Section 11.4. Further, the PWROG has developed generic guidance, and Sequoyah's strategy aligns with the generic guidance and considered the NSSS specific guidance. TVA NPG has included in CECC EPIP - 3, Operations Duty Specialist Procedure For Alert, Site Area Emergency or General Emergency notification of the NSRC to arrange for delivery and deployment of off-site equipment and sufficient supplies of commodities. (Reference 21).
Identify modifications	Each of the Phase 3 strategies will utilize common connections as described for the Phase 2 connections to prevent any compatibility issues with the offsite equipment.
Key Reactor Parameters	*List instrumentation credited or recovered for this coping evaluation.* 1. CET Temperature** 2. RCS HL Temperature (T_{hot}) if CETs not available 3. RCS CL Temperature (T_{cold})* 4. RCS wide range pressure 5. Pressurizer Level 6. RVLIS (backup to Pressurizer level) – available for up to 27 hours for limiting

Maintain RCS Inventory Control	
PWR Portable and Pre-staged Equipment Phase 3:	
	flood scenario, at which point pressurizer level is available again. 7. Neutron Flux Sequoyah relies on existing installed 125v DC Vital Batteries to power key instrumentation and emergency lighting. A battery coping calculation determined that the battery coping time is 8 hours. (Reference 30). *This instrumentation is only available until flood water enters the auxiliary instrument room. The potential validating indicator for Tcold is SG pressure when natural circulation is occurring. This substitution is allowed by guidance provided in Reference 7. **This instrumentation is only available until flood water enters the auxiliary instrument room. The potential validating indicator for CETs is RCS HL. This substitution is allowed by guidance provided in Reference 7. Sequoyah has developed FSI-7, Loss of Vital Instrumentation or Control Power to facilitate reading instrumentation locally, where applicable, using portable instrumentation as required by Section 5.3.3 of NEI 12-06. (Reference 33).

Deployment Conceptual Modification (Attachment 3 contains Conceptual Sketches)		
Strategy	**Modifications**	**Protection of connections**
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
Mobile water purification units are provided by SAFER/NSRC. The water purification units will provide demineralized quality water makeup to the CSTs or other uses. In a flood event the mobile water purification units would be staged and aligned once flood waters receded below plant grade.	Each of the Phase 3 strategies will utilize common connections as described for the Phase 2 connections to prevent any compatibility issues with the offsite equipment.	FLEX equipment connection points are designed to meet or exceed Sequoyah design basis SSE protection requirements. The discharge connections are identical to the ones used for Phase 2. The protection of those connection points is described in the section for Phase 2 for RCS Inventory Control.
Notes: None		

<table>
<tr><th colspan="2">Maintain Containment</th></tr>
<tr><td colspan="2">Determine Baseline coping capability with installed coping[3] modifications not including FLEX modifications, utilizing methods described in Table 3-2 of NEI 12-06:
• Containment Spray
• Hydrogen igniters</td></tr>
<tr><td colspan="2" align="center">PWR Installed Equipment Phase 1:</td></tr>
<tr><td colspan="2">Provide a general description of the coping strategies using installed equipment including modifications that are proposed to maintain containment.
Sequoyah has performed a containment evaluation based on the boundary conditions described in Section 2 of NEI 12-06. Based on the results of this evaluation, required actions to ensure maintenance of containment integrity and required instrumentation function have been developed. (Reference 44).
There are no phase 1 actions required at this time that need to be addressed.</td></tr>
<tr><td colspan="2" align="center">Details:</td></tr>
<tr><td>Provide a brief description of Procedures / Strategies / Guidelines</td><td>Procedures and guidance to support implementation of this strategy, including interfaces to EOPs, special event procedures, AOPs and SOs have been developed in accordance with NEI 12-06, Revision 0, Section 11.4. Further, the PWROG has developed generic guidance, and Sequoyah's strategy aligns with the generic guidance and considers the NSSS specific guidance.</td></tr>
<tr><td>Identify modifications</td><td>1. 8 Hour Battery Coping. (DCN D23096 & D23391).</td></tr>
<tr><td>Key Containment Parameters</td><td>List instrumentation credited for this coping evaluation.
1. Containment Pressure*
2. Containment Temperature**
* Sequoyah relies on existing installed 125v DC Vital Batteries to power key instrumentation and emergency lighting. A battery coping calculation determined that the battery coping time is 8 hours. (Reference 30).
**This instrumentation is only available until flood water enters the technical support center (TSC) inverter or station battery rooms.
Sequoyah has developed FSI-7, Loss of Vital Instrumentation or Control Power to facilitate reading instrumentation locally, where applicable, using portable instrumentation as required by Section 5.3.3 of NEI 12-06. (Reference 33).</td></tr>
<tr><td colspan="2">Notes: None</td></tr>
</table>

[3] Coping modifications consist of modifications installed to increase initial coping time, i.e., generators to preserve vital instruments or increase operating time on battery powered equipment.

Maintain Containment	
PWR Portable and Pre-staged Equipment Phase 2:	
Provide a general description of the coping strategies using on-site portable equipment including modifications that are proposed to maintain containment. Identify methods (containment spray/hydrogen igniters) and strategy(ies) utilized to achieve this coping time. Sequoyah has performed a containment analysis based on the boundary conditions described in Section 2 of NEI 12-06. (Reference 44). Based on the results of this analysis, required actions to ensure maintenance of containment integrity and required instrumentation function have been developed. (Reference 44). In an ELAP event at SQN and adhering to SQN's Mitigation Strategy a 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. During this time frame the Ice Condenser doors will open. Calculation LTR-ISENG-14-2 Revision 1, November 11, 2014 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). (References 44 & 34). The 6.9KV FLEX DGs provide the ability to support the operation of Containment Air Return Fans to enhance flow through the Ice Condenser (heat exchange), if required. Long term containment temperature control could be provided by the operation of Lower Compartment Coolers (LCCs) powered by the 6.9KV FLEX DGs. Cooling water would be provided to the LCCs by deployed Diesel Driven LP FLEX Pumps feeding the ERCW system headers and alignment of the ERCW system to maximize efficient usage of available cooling water resources. Long term additional equipment and resources supplied through the NSRC and/or others would provide additional raw water capability prior to the need. Additionally, Control Rod Drive Mechanism Coolers (CRDMCs) and Upper Compartment Cooler (UCCs) would be available for select operation, if required. (References 44 & 34). Additionally, the 6.9KV FLEX DGs can power the hydrogen igniters through the 480v shutdown power distribution system, if required. The 480v FLEX DGs discussed in the Safety Functions Support section can also be aligned to provide power to the hydrogen igniter supply transformers, if required.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	Procedures and guidance to support deployment and implementation, including interfaces to EOPs, special event procedures, AOPs, and SOs have been developed in accordance with NEI 12-06, Revision 0, Section 11.4. Further, the PWROG has developed generic guidance, and Sequoyah's strategy aligns with the generic guidance and considers the NSSS specific guidance.
Identify modifications	1. FLEX Equipment Storage Building (FESB). DCN D23358). 2. FLEX connections have been provided on the ERCW headers at the IPS for the LP FLEX Pumps to pressurize the ERCW headers during non-flood and flood conditions. (DCN D23193). 3. FLEX connections have been provided on the ERCW headers at the AERCW Pumping Station for the LP FLEX Pumps to pressurize the ERCW headers during flood conditions. (DCN D23193). 4. 480v FLEX DGs (225kva DGs). (DCN D22929).

Maintain Containment	
	5. 6900v FLEX DGs (2.75 MWe DGs). (DCN D23197). 6. Upgraded site communication capability with the Harris Radio System. (DCN 23096). - Note: Not a direct FLEX related modification. 7. Installed storage boxes/lockers/enclosures in the AB and ADGB for hoses, fittings, tools required for implementation. Installed concrete pads and reinforced roads where required for FLEX equipment deployment. (DCN D23193).
Key Containment Parameters	*List instrumentation credited or recovered for this coping evaluation.* 1. Containment Pressure* 2. Containment Temperature** *Sequoyah relies on existing installed 125v DC Vital Batteries to power key instrumentation and emergency lighting. A battery coping calculation determined that the battery coping time is 8 hours. (Reference 30). **This instrumentation is only available until flood water enters the TSC inverter or station battery rooms.
Storage / Protection of Equipment: **Describe storage / protection plan or schedule to determine storage requirements**	
Seismic	The 6.9KV FLEX DGs are pre-staged inside the ADGB. The ADGB is a formidable structure designed and built to withstand 2X SSE HCLPF and 360 MPH winds. The distribution system from the ADGB to the EDGB is protected and from the kirk-key switches located in the EDGB through the 6.9KV and 480v safety class electrical distribution system is appropriately protected or located within a Class I structure. The 480v FLEX DGs are pre-staged on the roof of the AB. A protection structure has been built around the DGs, which is designed to the same Seismic Category I requirements as the AB. Seismic input for the design corresponds to the appropriate seismic accelerations at the roof of the AB. This design provides a seismic protection of 2X SSE HCLPF. Equipment required to implement this FLEX strategy is stored/staged/pre-staged in the FESB, ADGB, EDGB and/or AB which are designed for seismic loading in excess of the minimum requirements of the American Society of Civil Engineers (ASCE) 7-10.
Flooding	The 6.9KV FLEX DGs are pre-staged inside the ADGB which is located above the PMF elevation. The ADGB is a formidable structure designed and built to withstand 2X SSE HCLPF and 360 MPH winds. The distribution system from the ADGB to the EDGB is protected and from the kirk-key switches located in the EDGB through the 6.9KV and 480v safety class electrical distribution system is designed to withstand PMF waters, is appropriately protected or located within a Class I structure. The EDGB is located above the PMF flood elevation. The 480v FLEX DGs are pre-staged on the roof of the AB, which is sited in a suitable location that is above the PMF and as such is not susceptible to

Maintain Containment	
	flooding from any source. Equipment required to implement this FLEX strategy is maintained in the FESB, ADGB, EDGB and/or AB in suitable locations functionally above the Probable Maximum Flood (PMF) level or are capable of submersible operation. Portable equipment stored in the FESB will be relocated to above PMF level prior to flood waters reaching plant grade.
Severe Storms with High Winds	The 6.9KV FLEX DGs are pre-staged inside the ADGB. The ADGB is a formidable structure designed and built to withstand 2X SSE HCLPF and 360 MPH winds. The distribution system from the ADGB to the EDGB is protected and from the kirk-key switches located in the EDGB through the 6.9KV and 480v safety class electrical distribution system is appropriately protected or located within a Class I structure. The 480v FLEX DGs are pre-staged on the roof of the AB. A protection structure has been built around the DGs, which is sited in a suitable location that is protected from NRC Region 1 tornado, missiles, and velocities as defined in Nuclear Regulatory Commission (NRC) Regulatory Guide 1.76 Revision 1. Equipment required to implement this FLEX strategy is maintained in the FESB, ADGB, EDGB and/or AB which are designed to meet or exceed the licensing basis high wind hazard for Sequoyah Nuclear Plant.
Snow, Ice, and Extreme Cold	The 6.9KV FLEX DGs are pre-staged inside the ADGB. The ADGB is a formidable structure designed and built to withstand 2X SSE HCLPF and 360 MPH winds. The ADGB is provided with a heat and ventilation system to maintain an acceptable internal environment up to the point of ELAP. The 480v FLEX DGs are pre-staged on the roof of the AB. A protection structure has been built around the DGs, and has been evaluated for snow, ice and extreme cold temperature effects and heating has been provided as required to assure no adverse effects on the FLEX equipment. The FESB has been designed to address snow, ice and extreme cold temperature effects and heating is provided as required to assure no adverse effects on the FLEX equipment stored there. Equipment stored or staged in the ADGB, EDGB, or AB are protected from these extremes.
High Temperatures	The 6.9KV FLEX DGs are pre-staged inside the ADGB. The ADGB is a formidable structure designed and built to withstand 2X SSE HCLPF and 360 MPH winds. The ADGB is provided with a heating and ventilation system to maintain an acceptable environment up to the point of ELAP. The 6.9KV FLEX DGs are potentially load limited (de-rated) when the outside ambient temperature is greater than or could exceed 93°F. Operations FLEX procedures provide precautions to be observed during high outside ambient temperature 6.9KV FLEX DG operations. This potential de-rating does not impact Sequoyah's ability to successfully implement mitigation strategies. (Reference 80 & 105) The 480v FLEX DGs are pre-staged on the roof of the AB. A protection

Maintain Containment		
	structure has been built around the DGs, and has been evaluated for high temperature effects and ventilation is provided as required to assure no adverse effects. The FESB has been designed to address high temperature effects and HVAC is provided as required to assure no adverse effects on the FLEX equipment stored there. Equipment stored or staged in the ADGB, EDGB or AB are protected from high temperature extremes.	
Deployment Conceptual Modification **(Attachment 3 contains Conceptual Sketches)**		
Strategy	**Modifications**	**Protection of connections**
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
The hydrogen igniters can be repowered by the 6.9KV FLEX DGs that are pre-staged inside the ADGB or by the 480v FLEX DGs that are pre-staged on the roof of the AB. Additionally, repowering the 6.9KV and 480v Shutdown Electrical distribution system provides the ability to operate Containment Air Return Fans and other containment ventilation components (i.e., Lower Compartment Coolers), if required.	The 6.9KV FLEX DGs can provide power to the Hydrogen Igniter transformers via the normal shutdown power distribution system which powers the 480v portions of the system. (DCN D23197). The 480v FLEX DGs that are pre-staged on the roof of the AB can also be aligned to power the Hydrogen Igniter transformers, if required. (DCN D22929).	The protection structures for the 6.9KV FLEX DGs and the 480v FLEX DGs and the diverse power distribution system are protected from the five external hazards, as described in this section.
Notes: None		

Maintain Containment	
PWR Portable and Pre-staged Equipment Phase 3:	
Provide a general description of the coping strategies using Phase 3 equipment including modifications that are proposed to maintain containment. Identify methods (containment spray/hydrogen igniters) and strategy(ies) utilized to achieve this coping time. Sequoyah has performed a containment evaluation based on the boundary conditions described in Section 2 of NEI 12-06. Based on the results of this evaluation, required actions to ensure maintenance of containment integrity and required instrumentation function have been developed. (References 44 & 34). The Hydrogen Igniter transformers can be powered through the 6.9KV Shutdown Power and 480v Shutdown Power distribution systems. (See PWR Portable Equipment Phase 3 Medium Voltage and Low Voltage Backup listings).	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	Procedures and guidance to support deployment and implementation, including interfaces to EOPs, special event procedures, AOPs, and SOs, have been developed in accordance with NEI 12-06, Rev. 0, Section 11.4. Further, the PWROG has developed generic guidance, and Sequoyah's strategy aligns with the generic guidance and considers the NSSS specific guidance. TVA NPG has included in CECC EPIP - 3, Operations Duty Specialist Procedure For Alert, Site Area Emergency or General Emergency notification of the NSRC to arrange for delivery and deployment of off-site equipment and sufficient supplies of commodities. (Reference 21).
Identify modifications	The same modification as Phase 2 applies for Phase 3.
Key Containment Parameters	*List instrumentation credited or recovered for this coping evaluation.* 1. Containment Pressure* 2. Containment Temperature** *Sequoyah relies on existing installed 125v DC Vital Batteries to power key instrumentation and emergency lighting. A battery coping calculation determined that the battery coping time is 8 hours. (Reference 30). **This instrumentation is only available until flood water enters the TSC inverter or station battery rooms. Sequoyah has developed FSI-7, Loss of Vital Instrumentation or Control Power to facilitate reading instrumentation locally, where applicable, using portable instrumentation as required by Section 5.3.3 of NEI 12-06. (Reference 33).

Deployment Conceptual Modification (Attachment 3 contains Conceptual Sketches)		
Strategy	**Modifications**	**Protection of connections**
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
The same modification, as Phase 2 applies for Phase 3.	The same modification, as Phase 2 applies for Phase 3.	FLEX equipment and connection points are designed to meet or exceed Sequoyah design basis safe shutdown earthquake (SSE) protection requirements.

Maintain Containment		
		The same modification, as Phase 2 applies for Phase 3.
Notes: None		

Maintain Spent Fuel Pool Cooling
Determine Baseline coping capability with installed coping[4] modifications not including FLEX modifications, utilizing methods described in Table 3-2 of NEI 12-06: • **Makeup with Portable Injection Source**
PWR Installed Equipment Phase 1:
Provide a general description of the coping strategies using installed equipment including modifications that are proposed to maintain spent fuel pool cooling. Identify methods (makeup via portable injection source)and strategy(ies) utilized to achieve this coping time. Reference 65 summarizes that there will be no significant volume lost from the SFP due to sloshing. A small range of critical damping factors were investigated and it was shown that the critical damping factor had no influence on the amount of water sloshed out of the pool. However, for all critical damping factors, there was water lost into the ventilation ducts regardless of the direction of the seismic motion. The volume of the water lost in the ducts was conservatively calculated to be ~ 451 ft^3. The potential lost volume would be ~ 3.98 inches from normal pool level. Access to the SFP area as part of Phase 2 response could be challenged due to environmental conditions near the pool. Therefore, the required action is to establish ventilation in this area and establish any equipment local to the SFP required to accomplish the coping strategies (such as the primary SFP cooling strategy discussed below). If the air environment in the SFP area requires the area to be ventilated, doors will be opened to establish air movement and venting of the SFP area. For accessibility, establishing the SFP area vent and any other actions required inside the fuel handling area should be completed before boil off occurs. <u>Operating, Pre-fuel Transfer or Post-fuel Transfer (normal credible decay heat load) and Fuel in Transfer or Full Core Offload (maximum credible decay heat load)</u> 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. All credible decay heat loads were determined based on plant calculated spent fuel pool decay heat values. For the normal credible load, the decay heat was determined at the time during an outage when the core has been fully reloaded in the reactor vessel. The maximum credible heat load was determined at the time after shutdown when the last fuel assembly from the core has been loaded in the spent fuel pool. The above results assume no loss of coolant through the vents. If the maximum possible loss of coolant through the vents is considered, the time to boil for the credible normal decay load is 11.65 hours. For the maximum credible heat load, the time to boil is 5.34 hours. These values were calculated assuming an initial pool temperature of 127°F. Boil off rates for normal and maximum credible decay heart loads in the SFP were determined to be 43.45 gpm and 94.38 gpm, respectively. (Reference 65). 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. (Reference 65). 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. (Reference 65).

[4] Coping modifications consist of modifications installed to increase initial coping time, i.e., generators to preserve vital instruments or increase operating time on battery powered equipment.

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 LP FLEX Pumps will be required to pressurize the ERCW headers to provide makeup to prevent a decrease in the level of the SFP.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	Procedures and guidance to support implementation of this strategy, including interfaces to EOPs, special event procedures, AOPs and SOs, have been developed in accordance with NEI 12-06, Revision 0, Section 11.4. Further, the PWROG has developed generic guidance, and Sequoyah's strategy aligns with the generic guidance and considers the NSSS specific guidance.
Identify modifications	1). 8 Hour Battery Coping. (DCN D23096 & D23391) 2). Two independent SFP level instruments have been added to facilitate remote monitoring of SFP level in response to NRC Order EA 12-051. (DCN D23195).
Key SFP Parameter	The implementation of DCN D23195 aligned 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 2 (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 1 (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. (Reference 68).
Notes:	

Maintain Spent Fuel Pool Cooling	
PWR Portable and Pre-staged Equipment Phase 2:	
Provide a general description of the coping strategies using on-site portable equipment including modifications that are proposed to maintain spent fuel pool cooling. Identify methods (makeup via portable injection source)and strategy(ies) utilized to achieve this coping time. The transition to Phase 2 strategies will be as the inventory in the SFP slowly declines due to boiling. Initial SFP makeup should be from the Demineralized Water Head Tank until it is depleted. SFP cooling through makeup and/or spray will be provided by using LP FLEX pumps providing raw water to the ERCW headers providing the capability for makeup from an ERCW FLEX connection at the ERCW to CCS spool pieces (next to the CCS Surge Tanks) on AB elevation 734 through hose or hoses routed directly across the floor to the SFP. An alternate option for SFP makeup water is from an ERCW FLEX connection located on AB elevation 714 via hose deployment to a FLEX connection on the existing SFP Demineralized Water System (DWS) makeup piping located on AB elevation 714. This alignment provides makeup control when the refuel floor is not accessible. The primary connection strategy can be used during both flood and non-flood scenarios. Sequoyah can provide two portable (fire-fighting type) flow/spray nozzles with a combined capacity of 500 gpm, which equal the FLEX requirement to provide 250 gpm of spray flow per unit to the SFP. Through completion of proceduralized ERCW system alignment (FSI-5.05, FLEX ERCW Alignment) to focus available raw cooling water resources and with the capability provided by the 6.9KV FLEX DGs CCS and a Spent Fuel Pool Cooling Pumps could be placed in service to restore SFP cooling capability.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	Procedures and guidance to support deployment and implementation, including interfaces to EOPs, special event procedures, AOPs and SOs, have been developed in accordance with NEI 12-06, Revision 0, Section 11.4. Further, the PWROG has developed generic guidance, and Sequoyah's strategy aligns with the generic guidance and considers the NSSS specific guidance.
Identify modifications	*List modifications* 1. FLEX connections have been provided at the ERCW headers at the IPS for the LP FLEX Pumps to pressurize the ERCW headers during non-flood and flood conditions. (DCN D23193). 2. FLEX connections have been provided at the ERCW headers in the AERCW Pumping Station for the LP FLEX Pumps to pressurize the ERCW headers during non-flood or flood conditions. (DCN D23193). 3. FLEX connections have been provided on the ERCW headers in the AB elevation 714 for supplying raw water. (DCN D23193). 4. FLEX connections have been provided to the Primary Water Storage Tanks (PWSTs) and Demineralized Water Storage Tank for water transfer capability. (DCN D23193). 5. The primary SFP FLEX connections with Storz fittings are located at the ERCW to CCS spool pieces (next to the CCS Surge Tanks) on Refuel floor elevation 734. These can supply direct makeup or spray if required. (DCN

Maintain Spent Fuel Pool Cooling	
	D23193). 6. The secondary SFP FLEX connection is located on Auxiliary Building elevation 714 (a tee, upstream isolation valve and FLEX connection are provided) on the Demineralized Water System piping leading to the SFP. (DCN D23193). 7. 480v FLEX DGs (225kva DGs). (DCN D22929). 8. 6900v FLEX DGs (2.75 MWe DGs). (DCN D23197). 9. 8 Hour Battery Coping. (D23096 & D23391). 10. Upgraded site communication capability with the Harris Radio System (DCN 23096) - Note: Not a direct FLEX related modification. 11. Two independent SFP level instruments have been added to facilitate remote monitoring of SFP level in response to NRC Order EA 12-051. (DCN D23195). 12. Installed storage boxes/lockers/enclosures in the AB and ADGB for hoses, fittings, tools required for implementation. Installed concrete pads and reinforced roads where required for FLEX equipment deployment. (DCN D23193).
Key SFP Parameter	The implementation of DCN D23195 aligned 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 2 (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 1 (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. (Reference 68).
Storage / Protection of Equipment: **Describe storage / protection plan or schedule to determine storage requirements**	
Seismic	The 6.9KV FLEX DGs are pre-staged in the Additional Diesel Generator Building (ADGB). The ADGB is a formidable building constructed to Class 1 rigor. The FLEX 6.9KV distribution systems have been analyzed to survive 2X SSE High Confidence of Low Probability Failure (HCLPF). The distribution system from the ADGB to the EDGB is housed in robust structures and is missile protected and from the kirk-key switches located in the EDGB through the 6.9KV and 480v safety class electrical distribution system is appropriately protected or located within a Class I structure. The 480v FLEX DGs are pre-staged on the roof of the Auxiliary Building. A protection structure has been built around the DGs, which is designed to the same Seismic Category I requirements as the Auxiliary Building. Seismic input

Maintain Spent Fuel Pool Cooling	
	for the design corresponds to the appropriate seismic accelerations at the roof of the Auxiliary Building. This design provides a seismic protection of 2X SSE HCLPF. Equipment required to implement this FLEX strategy is stored/staged/pre-staged in the FESB, ADGB, EDGB and/or AB which are designed for seismic loading in excess of the minimum requirements of the American Society of Civil Engineers (ASCE) 7-10. The SFP level instruments are mounted in the AB which is a protected structure.
Flooding	The 6.9KV FLEX DGs are pre-staged inside the ADGB which is located above the PMF elevation. The ADGB is a formidable structure designed and built to withstand 2X SSE HCLPF and 360 MPH winds. The distribution system from the ADGB to the EDGB is protected and from the kirk-key switches located in the EDGB through the 6.9KV and 480v safety class electrical distribution system is designed to withstand PMF waters, is appropriately protected or located within a class I structure. The 480v FLEX DGs are pre-staged on the roof of the AB, which is sited in a suitable location that is above the PMF and as such is not susceptible to flooding from any source. The SFP Level Instrumentation is located in the AB on the refuel floor elevation 734 with the level indication readout and backup power supply battery packs located in the shutdown board rooms on elevation 734. These are above PMF levels. Required portable equipment would be deployed from the FESB to locations above PMF level prior to flood levels reaching grade level.
Severe Storms with High Winds	The 6.9KV FLEX DGs are pre-staged inside the ADGB. The ADGB is a formidable structure designed and built to withstand 2X SSE HCLPF and 360 MPH winds. The distribution system from the ADGB to the EDGB is protected and from the kirk-key switches located in the EDGB through the 6.9KV and 480v safety class electrical distribution system is appropriately protected or located within a Class I structure. The 480v FLEX DGs are pre-staged on the roof of the AB. A protection structure has been built around the DGs, which is sited in a suitable location that is protected from NRC Region 1 tornado, missiles, and velocities as defined in Nuclear Regulatory Commission (NRC) Regulatory Guide 1.76 Revision 1. Equipment required to implement this FLEX strategy is maintained in the FESB, ADGB, EDGB and/or AB which are designed to meet or exceed the licensing basis high wind hazard for Sequoyah. (Reference 4, Section 3.8.1.3). The SFP level instruments are mounted in the AB which is a protected structure.

Maintain Spent Fuel Pool Cooling	
Snow, Ice, and Extreme Cold	The 6.9KV FLEX DGs are pre-staged inside the ADGB. The ADGB is a formidable structure designed and built to withstand 2X SSE HCLPF and 360 MPH winds. The ADGB is provided with a heat and ventilation system to maintain an acceptable internal environment up to the point of ELAP. The 480v FLEX DGs are pre-staged on the roof of the AB. A protection structure has been built around the DGs, and has been evaluated for snow, ice and extreme cold temperature effects and heating has been provided as required to assure no adverse effects on the FLEX equipment. The FESB has been designed to address snow, ice and extreme cold temperature effects and heating will be provided as required to assure no adverse effects on the FLEX equipment stored there. Equipment stored or staged in the FESB, ADGB, EDGB or AB are protected from these extremes. The SFP level instruments are mounted in the AB which is a protected structure.
High Temperatures	The 6.9KV FLEX DGs are pre-staged inside the ADGB. The ADGB is a formidable structure designed and built to withstand 2X SSE HCLPF and 360 MPH winds. The ADGB is provided with a heating and ventilation system to maintain an acceptable environment up to the point of ELAP. The 6.9KV FLEX DGs are potentially load limited (de-rated) when the outside ambient temperature is greater than or could exceed 93°F. Operations FLEX procedures provide precautions to be observed during high outside ambient temperature 6.9KV FLEX DG operations. This potential de-rating does not impact Sequoyah's ability to successfully implement mitigation strategies. (Reference 80 & 105) The 480v FLEX DGs are pre-staged on the roof of the AB. A protection structure has been built around the DGs, and has been evaluated for high temperature effects and ventilation is provided as required to assure no adverse effects. The FESB has been designed to address high temperature effects and HVAC is provided as required to assure no adverse effects on the FLEX equipment stored there. Equipment stored or staged in the FESB, ADGB, EDGB or AB are protected from high temperature extremes. The SFP level instruments are mounted in the AB which is a protected structure.

Deployment Conceptual Design (Attachment 3 contains Conceptual Sketches)		
Strategy	**Modifications**	**Protection of connections**
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
The primary method is flow from the ERCW headers at two locations using adapters and FLEX	<u>Primary Method Modification</u> Adapters with Storz hose connections are available to be	FLEX equipment and connection points are designed to meet or exceed Sequoyah design basis SSE

Maintain Spent Fuel Pool Cooling		
hose connections. This strategy can be implemented in non-flood or flood conditions. Note that the SFP spray option would be routed in an identical manner; however, the end of the hose would have fire protection type spray nozzles installed. The proposed hose routing for the primary method and the associated equipment can be found in Attachment 3, Figure A3-25 and A3-26. ERCW connections can be found in Attachment 3, Figures A3-23.	installed at the ERCW to CCS Flood Mode spool pieces next to the CCS surge tanks (AB elevation 734). <u>ERCW Modifications</u> The same modifications required to pressurize ERCW headers are described under Phase 2 Maintain Core Cooling and Heat Removal.	protection requirements. The FLEX connections are located in the AB, which is a Class I structure seismically qualified and missile protected. This strategy can be implemented in non-flood or flood conditions.
The secondary SFP connection is to the DWS makeup line on elevation 714 of the AB. This strategy can be implemented in non-flood conditions. FLEX hose will be routed from an elevation 714 ERCW FLEX connection across the floor to the DWS SFP makeup FLEX connection located on AB elevation 714. The hose routing for the secondary connection and the associated equipment can be found in Attachment 3, Figure A3-27. The system connection points can be found in Attachment 3, Figure A3-24. ERCW connections can be found in Attachment 3, Figure A3-23.	<u>Secondary Connection Modification</u> • A tee has been added to the normal DWS makeup line to the SFP. • An isolation valve has been added to the main line upstream of the connection. • An isolation valve has been added to the new branch. • Storz cap/adapter has been added to the new branch. The modifications that added FLEX connections to the ERCW headers on AB elevation 714 are described in the Reactor Core Cooling and Heat Removal section and apply to this case.	FLEX equipment and connection points are designed to meet or exceed Sequoyah design basis SSE protection requirements. In a flood event scenario hose routing to the secondary connection would have to be performed before flood conditions made the area inaccessible.
Two independent SFP level instrument loops have been provided. One loop on the Unit 1 plant side on the Northeast corner of the SFP provides a SFP level indication mounted on the Northwest wall of the 1B-B 480v Shutdown Board Rooms. One loop on the Unit 2 plant side on	Two SFP level instruments have been added to facilitate remote monitoring of SFP level in response to NRC Order EA 12 - 051. (DCN D23195).	These SFP level instrument loop mounting are designed to meet or exceed Sequoyah design basis SSE protection requirements. All components are located in the AB, which is a Class I structure seismically qualified and missile protected.

Maintain Spent Fuel Pool Cooling		
the Southwest corner of the SFP provides a SFP level indication mounted on the Southwest wall of the 2A-A 480v Shutdown Board Room. These SFP Level instruments are powered from the 120v AC Vital Power System. The primary power supply to Spent Fuel Level Continuous Monitoring Loop 2 (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 1 (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. (Reference 68).		

Notes:

1. System modifications are described in the "Modifications" section above and are illustrated in Attachment 3.
2. Figures A3-25 through A3-27 in Attachment 3 provides the hose routes for the SFP makeup strategies.

Maintain Spent Fuel Pool Cooling	
PWR Portable and Pre-staged Equipment Phase 3:	
Provide a general description of the coping strategies using Phase 3 equipment including modifications that are proposed to maintain spent fuel pool cooling. Identify methods (makeup via portable injection source) and strategy(ies) utilized to achieve this coping time.	
Details:	
The strategies described for Phase 2 can continue as long as there is sufficient inventory available to feed the strategies. See SAFER/NSRC description and reference in the Phase 3 Details sections for Maintaining Core Cooling and Heat Removal or the RCS Inventory Control.	
Provide a brief description of Procedures / Strategies / Guidelines	Procedures and guidance to support deployment and implementation, including interfaces to EOPs, special event procedures, AOPs and SOs have been developed in accordance with NEI 12-06, Revision 0, Section 11.4. Further, the PWROG has developed generic guidance, and Sequoyah's strategy aligns with the generic guidance and considers the NSSS specific guidance. TVA NPG has included in CECC EPIP - 3, Operations Duty Specialist Procedure For Alert, Site Area Emergency or General Emergency notification of the NSRC to arrange for delivery and deployment of off-site equipment and sufficient supplies of commodities. (Reference 21).
Identify modifications	N/A
Key SFP Parameter	The implementation of this parameter aligns with the requirements of NRC Order EA 12-051 and NEI 12-02. Two independent SFP level instrument loops have been provided. One loop (0-LT-78-43) is on the Unit 1 plant side on the northeast corner of the SFP provides a SFP level indication mounted in the 1B1-B 480v Shutdown Board Room. One loop (0-LT-78-44) on the Unit 2 plant side on the southwest corner of the SFP provides a SFP level indication mounted in the 2A-1-A 480v Shutdown Board Room. The SFPLI mountings are designed to meet or exceed SQN design basis SSE protection requirements. Components are located in the AB, which is seismically qualified and missile protected. These SFP Level instruments are powered from the 120v AC Vital Power System. The primary power supply to Spent Fuel Level Continuous Monitoring Loop 2 (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 1 (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. (Reference 68).

Deployment Conceptual Design (Attachment 3 contains Conceptual Sketches)		
Strategy	**Modifications**	**Protection of connections**

Maintain Spent Fuel Pool Cooling		
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
The description for the mobile water purification units is the same as was mentioned for the Maintain Core Cooling & Heat Removal and Maintain RCS Inventory Control functions.	Each of the Phase 3 strategies utilize common connections or adapters as described for the Phase 2 connections to prevent compatibility issues with the offsite equipment.	The protection connection points are identical to the ones used for Phase 2. The protection for those points is described in the sections for Phase 2 for Maintain Core Cooling & Heat Removal and Maintain RCS Inventory Control.
The primary and secondary methods would remain the same. The difference could be the drivers which would be the NSRC delivered pumps, if they were required. The primary method is flow from the ERCW headers at two AB elevation 734 locations using adapters and hose connections. This strategy can be implemented in flood and non-flood conditions. The proposed hose routing for the primary method and the associated equipment can be found in Attachment 3, Figure A3-25 and A3-26. The system connection point can be found in Attachment 3, Figure A3-23. Note that SFP spray would be routed in an identical manner; however, the end of the hose would have the fire fighting type spray nozzles installed. ERCW connections can be found in Attachment 3, Figures A3-23. The secondary SFP connection will be to the DWS makeup line, on Elevation 714 of the AB. This strategy can be implemented in non-flood conditions. FLEX hose will be routed from the ERCW FLEX connections across	The following FLEX connections provide potential connection points or adapters for Phase 3 portable pumps (suction source and discharge options) if they are required to be deployed: 1. FLEX connections have been provided at the ERCW headers at the Intake Pumping Station (IPS) for the LP FLEX Pumps to pressurize the ERCW headers during non-flood and flood conditions. (DCN D23193). 2. FLEX connections have been provided at the ERCW headers in the AERCW Pumping Station for the LP FLEX Pumps to pressurize the ERCW headers during non-flood or flood conditions. (DCN D23193). 3. FLEX connections have been provided on the ERCW headers in the AB elevation 714 for supplying raw water. (DCN D23193). 4. FLEX connections have been provided to the Primary Water Storage Tanks (PWSTs) and Demineralized Water Storage Tank (DWST) for potential water transfer capability. (DCN D23193). 5. The primary SFP FLEX	FLEX equipment connection points are designed to meet or exceed Sequoyah design basis SSE protection requirements. The FLEX connections are identical to the ones previously discussed for Phase 2 mitigation strategy applications or for SFP makeup specific applications that are located inside the AB which is a protected structure.

Maintain Spent Fuel Pool Cooling		
the floor on AB elevation 714 to the DWS SFP Makeup header FLEX connection on elevation 714. The proposed hose routing for the secondary connection and the associated equipment can be found in Attachment 3, Figure A3-27. The system connection point can be found in Attachment 3, Figure A3-24. ERCW connections can be found in Attachment 3, Figures A3-23.	connections with Storz fittings are located at the ERCW to CCS spool pieces (next to the CCS Surge Tanks) on Refuel Floor elevation 734. These can supply direct makeup or spray if required. (DCN D23193). 6. The secondary FLEX connection is located on AB elevation 714 (a tee, upstream isolation valve and FLEX connection are provided) on the Demineralized Water System piping leading to the SFP. (DCN D23193).	
Notes: 1. System modifications are described in the “Modifications” section above and are illustrated in Attachment 3. 2. Figures A3-25 through A3-27 in Attachment 3 provides the hose routes for the SFP makeup strategies.		

Safety Functions Support
Determine Baseline coping capability with installed coping[5] modifications not including FLEX modifications.
PWR Installed Equipment Phase 1
Provide a general description of the coping strategies using installed equipment including station modifications that are proposed to maintain and/or support safety functions. Identify methods and strategy(ies) utilized to achieve coping times. Analysis using conservative heat loads in the Control and Auxiliary Buildings has shown that installed equipment credited for mitigation response will remain available. In addition, accessibility of these areas for required actions is acceptable. (Reference 47). Habitability and Operations Operating Conditions Following a BDBEE and subsequent ELAP event, plant heating, ventilation and air conditioning (HVAC) in occupied areas and areas containing permanent plant and FLEX mitigation strategy equipment will be lost. Per NEI 12-06, FLEX mitigation strategies must be capable of execution under the adverse conditions (unavailability of normal plant lighting, ventilation, etc.) expected following a BDBEE resulting in an ELAP/LUHS. The primary concern with regard to ventilation is the heat buildup which occurs with the loss of forced ventilation in areas that continue to have heat loads. 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. (Reference 47). The areas identified for all phases of execution of the FLEX mitigation strategy activities are the MCR, Shutdown Board Rooms, AB, TDAFWP rooms, SIP rooms, EDGB, ADGB and FESB. These areas have been evaluated to determine the temperature profiles following an ELAP/LUHS event. The calculation has concluded that temperatures remain within acceptable limits based on conservative input heat load assumptions for all areas with no actions being taken to reduce heat load or to establish either active or passive ventilation (e.g., portable fans, open doors, etc.). In the case of the TDAFW Pump rooms the pump room doors will be opened and left open to facilitate natural circulation and ensure that the temperatures remain within the acceptable range for equipment and personnel. The temperatures expected in the MSVVs for local operation of SG PORVs, if required, are similar to conditions experienced during normal station operations, testing, and maintenance. Therefore, actions performed for FLEX activities will be essentially the same as those evaluated for the current site procedure ECA-0.0, Loss of All AC Power or B.5.b strategies which also address potential local operation of the TDAFWP, AFW LCVs and/or SG PORVs. Off-gassing of hydrogen from batteries is only a concern when the batteries are charging. Vital Battery Room doors will be blocked open to facilitate natural ventilation. Lighting In an ELAP event initial lighting for the MCR and Shutdown Board Room areas is provided by the plant designed 125v DC powered emergency lighting system, designated by the LD prefix. This system now utilizes LED light bulbs which have enhanced 125v Vital Battery coping capability. (Reference 30). 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. Tasks required to implement FLEX mitigation strategies including traveling to/from the various areas necessary to implement the FLEX strategies,

making performing instrumentation monitoring, and component manipulations are similar to tasks previously walked down for ECA-0.0 Loss of Shutdown Power, B.5.b and Appendix 'R' Safe Shutdown operations.

These emergency lights are periodically tested under the plant's preventative maintenance program to insure the battery pack will provide a minimum of eight (8) hours of lighting with no external AC power sources.

Communications

Sequoyah Unit 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.

Three regulatory rules from the Code of Federal Regulations (CFR) that are satisfied by the system upgrade are:

- Emergency Preparedness (EP): both on site and offsite communication system exists with a normal and backup power supply.
- Security: constant communication between the Central Alarm Station (CAS) and any officer in the field at all times.
- 10CFR50 Appendix R for fire protection: communication method is available to respond to certain Design Basis fires with in the plant.

Six new cabinets containing communication equipment have been installed inside the AB, a Class I structure protected against environmental events such as seismic, tornado, high winds, extreme cold or high temperatures and they and their power supplies are located above site probable maximum flood elevation.

Five cabinets are installed in the 480v Board Room 2A on AB elevation 749. These cabinets are normally powered from safety related normal and backup 120V AC feeds. The normal and backup feeds are auctioneered from either 120v AC Vital Instrument Power Board 2-II or 2-III. The 120V AC Vital Instrument Power Boards are fed from their designated vital inverter powered respectively by 125v Vital Battery II or III. In an ELAP event the ultimate source for normal power once placed in service would be the 480v FLEX DGs (225KVA DGs) repowering 125v DC Vital Battery Chargers ensuring continuous 125v DC coping capability and power to the 120 AC Vital Inverters. During an ELAP event designated breakers would be opened on Vital Instrument Power Board 2-II feeding the Harris Radio System. The Harris radio design has redundant power feeds so removal of the Channel II feed will not impact Harris Radio System operation and the reduced battery loading allows SQN to meet the 8 hour coping requirement for vital battery life during the ELAP. The 120v AC Vital Instrument Power Board 2-II feeds to the Harris Radio System will remain open even with the 480v FLEX DGs powering the 125v DC Vital Battery Chargers to ensure the Vital Battery Charger can carry designated loads on the battery for the duration of the event. (Reference 30).

The sixth cabinet is installed in the 480v Shutdown Transformer Room 2B on AB elevation 749. The sixth cabinet and radio is separated from the other five cabinets to address Appendix R requirements and is powered from a standby lighting cabinet LS-2 which is powered from a diesel backed safety related 480v Shutdown Board. This cabinet would not be available during Phase I of an ELAP event.

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. These systems provide two communication functions, the first of which is to furnish voice communications when conventional voice circuits are inoperative, and the second of which is to furnish voice communications for plant operation or

maintenance purposes. The Backup Control Center System is the only sound powered communication system designed expressly for supporting the emergency shutdown of the reactors and is to provide communications between the ACR and other stations which must be staffed if the MCR is abandoned or if the use of this system is required. This system consists of fixed and portable sound powered telephones and jack circuits for two separate, redundant circuits called the primary system and alternate system. Although this system maybe used as deemed necessary, its intended use is not for normal plant operations. It provides a backup communication vehicle for operations in the Auxiliary Control Room (ACR), 6900v and 480v Shutdown Board Rooms, AB elevation 669 near TDAFWP rooms and East and West MSVVs elevation 706 near SG PORVs during an emergency. The Backup Control Center System is not accessible in the MCR. Instructions are provided in plant system operating procedures and an 'AOP-C.04 ' cabinets, located outside of the ACR on elevation 734, on AB elevation 669 close to the TDAFWPs and in the EDG Building contain sound powered communication headsets and support equipment. This system is active in the plant's preventative maintenance program. TVA purchased 17 IsatPhone PRO global handheld satellite phones for Sequoyah. The IsatPhone 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. A fixed docking station, IsatDock PRO allows the IsatPhone Pro handset to be interfaced with a PBX system presenting standard ring, busy and dial tones like a standard phone network. This docking station is located in the NODE 2, Telecommunications Building. The phones are located in the MCR, TSC, and OSC.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* Procedures and guidance to support deployment and implementation, including interfaces to EOPs, special event procedures, AOPs and SOs, have been developed in accordance with NEI 12-06, Revision 0, Section 11.4. Further, the PWROG has developed generic guidance, and Sequoyah's strategy aligns with the generic guidance and considers the NSSS specific guidance.
Identify modifications	*List modifications and describe how they support coping time.* 1. 8 Hour Battery Coping. (DCN D23096 & D23391).
Key Parameters	*List instrumentation credited for this coping evaluation phase.* • 125v DC Vital Battery Bus Voltage (for 125v DC Vital Batteries I, II, III & IV). SQN relies on existing installed 125v DC Vital Batteries to power key instrumentation and emergency lighting. A battery coping calculation determined that the battery coping time is 8 hours. (Reference 30).
Notes: None	

[1] Coping modifications consist of modifications installed to increase initial coping time, i.e., generators to preserve vital instruments or increase operating time on battery powered equipment.

Safety Functions Support
PWR Portable and Pre-staged Equipment Phase 2

Provide a general description of the coping strategies using on-site portable equipment including station modifications that are proposed to maintain and/or support safety functions. Identify methods and strategy(ies) utilized to achieve coping times.

Analysis using conservative heat loads in the Control and Auxiliary Buildings has shown that installed equipment credited for mitigation response will remain available. In addition, accessibility of these areas for required actions is acceptable. (Reference 47).

The onsite 480v FLEX DGs are pre-staged to provide power to the 125v DC Vital Batteries and through the Vital Inverters the 120v AC Vital Instrument Power System. These generators are pre-staged on the Auxiliary Building roof and will be protected from external hazards with an initial supply of fuel for 10 hours of operation.

Note: The 6.9KV FLEX DGs are potentially load limited (de-rated) when the outside ambient temperature is greater than or could exceed 93°F. Operations FLEX procedures provide precautions to be observed during high outside ambient temperature 6.9KV FLEX DG operations. This potential de-rating does not impact Sequoyah's ability to successfully implement mitigation strategies. (Reference 80 & 105).

Additionally, the onsite 6.9KV FLEX DGs are pre-staged in the ADGB to provide power to the existing 6.9KV Shutdown Power distribution system and via the 480v Shutdown Transformers the 480v Shutdown Power distribution system. The 6.9KV FLEX DGs also provide an alternative power source capability for the loads supplied by the onsite 480v FLEX DGs. The 6.9KV FLEX DGs' electrical distribution network is protected from the external hazards as discussed in this document.

Habitability and Operations

Operating Conditions

Following a BDBEE and subsequent ELAP event, plant heating, ventilation and air conditioning (HVAC) in occupied areas and areas containing permanent plant and FLEX mitigation strategy equipment will be lost. Per NEI 12-06, FLEX mitigation strategies must be capable of execution under the adverse conditions (unavailability of normal plant lighting, ventilation, etc.) expected following a BDBEE resulting in an ELAP/LUHS. The primary concern with regard to ventilation is the heat buildup which occurs with the loss of forced ventilation in areas that continue to have heat loads. 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. (Reference 47).

The areas identified for all phases of execution of the FLEX mitigation strategy activities are the MCR, Shutdown Board Rooms, AB, TDAFWP rooms, EDG Building, ADGB and FESB. These areas have been evaluated to determine the temperature profiles following an ELAP/LUHS event. The calculation has concluded that temperatures remain within acceptable limits based on conservative input heat load assumptions for all areas with no actions being taken to reduce heat load or to establish either active or passive ventilation (e.g., portable fans, open doors, etc.) In the case of the TDAFW Pump rooms, Safety Injection Pumps rooms, and the PD Pumps rooms (location of the HP FLEX Pumps) the pump room doors will be opened and left open to facilitate natural circulation and ensure that the temperatures remain within the acceptable range for equipment and personnel. These doors will remain open to support pump operation.

The temperatures expected in the MSVVs for local operation of SG PORVs, if required, are similar to conditions experienced during normal station operations, testing, and maintenance. Actions performed within the plant for FLEX activities will be essentially the same as those performed for the current site procedure ECA-0.0, Loss of All AC Power or potentially for B.5.b or Appendix 'R' Safe Shutdown strategies which also address potential

Safety Functions Support
PWR Portable and Pre-staged Equipment Phase 2

local operation of the TDAFWP, AFW LCVs and SG PORVs.

An additional ventilation concern applicable to Phase 2 is when the 480v FLEX DGs repower the 125v Vital Battery Chargers. Off-gassing of hydrogen from batteries is only a concern when the batteries are charging. Vital Battery room doors will be blocked open to facilitate natural ventilation. Once the 6900v FLEX DGs restore power to the 6.9KV and 480v shutdown power distribution systems the capability of returning the battery room ventilation fans to service exists.

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.

Battery Powered (Appendix 'R') emergency lights were determined to provide adequate lighting for all interior travel pathways needed to access the connection points. These emergency lights are designed and periodically tested under the plant's preventative maintenance program to insure the battery pack will provide a minimum of eight (8) hours of lighting with no external AC power sources.

Once the 6900v FLEX DGs repower the 6.9KV Shutdown Boards and the 480v shutdown powered distribution system the Standby Lighting system, designated by the LS prefix, could be directed to be repowered from the Reactor MOV Boards supplying lighting and placing the 125v DC powered emergency lighting system (LD system) back in a standby mode.

There are no emergency lighting fixtures in the yard outside of the protected area to provide necessary lighting in those areas where portable FLEX equipment is to be deployed. Therefore, the diesel powered FLEX pumps and generators are outfitted with light plants that are powered from their respective diesels to support connection and operation. In addition to the lights installed on the portable diesel powered FLEX equipment, portable diesel generator powered light stanchions, battery powered light packs and small generators to provide power and battery charging capability are available to be deployed to support fading light or night time operations.

A stock of flashlights and head lights is available to further assist the staff responding to an ELAP.

Communications

Sequoyah Unit 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.

Three regulatory rules from the Code of Federal Regulations (CFR) that are satisfied by the system upgrade are:

- Emergency Preparedness (EP): both an on site and offsite communication system exists with a normal and backup power supply.

Safety Functions Support
PWR Portable and Pre-staged Equipment Phase 2

- Security: constant communication between the Central Alarm Station (CAS) and any officer in the field at all times.
- 10CFR50 Appendix R for fire protection: communication method is available to respond to certain Design Basis fires with in the plant.

Six new cabinets containing communication equipment have been installed inside the AB, a Class I structure protected against environmental events such as seismic, tornado, high winds, extreme cold or high temperatures and they and their power supplies are located above site probable maximum flood elevation.

Five cabinets are installed in the 480v Board Room 2A on AB elevation 749. These cabinets are normally powered from safety related normal and backup 120V AC feeds. The normal and backup feeds are auctioneered from either 120v AC Vital Instrument Power Board 2-II or 2-III. The 120V AC Vital Instrument Power Boards are fed from their designated vital inverter powered respectively by 125v Vital Battery II or III. In an ELAP event the ultimate source for normal power once placed in service would be the 480v FLEX DGs (225KVA DGs) repowering 125v DC Vital Battery Chargers ensuring continuous 125v DC coping capability and power to the 120 AC Vital Inverters. During an ELAP event designated breakers would be opened on Vital Instrument Power Board 2-II feeding the Harris Radio System. The Harris radio design has redundant power feeds so removal of the Channel II feed will not impact Harris Radio System operation and the reduced battery loading allows SQN to meet the 8 hour coping requirement for vital battery life during the ELAP. The 120v AC Vital Instrument Power Board 2-II feeds to the Harris Radio System will remain open even with the 480v FLEX DGs powering the 125v DC Vital Battery Chargers to ensure the Vital Battery Charger can carry designated loads on the battery for the duration of the event. (Reference 30).

The sixth cabinet is installed in the 480v Shutdown Transformer Room 2B on AB elevation 749. The sixth cabinet and radio is separated from the other five cabinets to address Appendix R requirements and is powered from a standby lighting cabinet LS-2 which is powered from a diesel backed safety related 480v Shutdown Board. This cabinet would not be available during Phase I of an ELAP event.

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. These systems provide two communication functions, the first of which is to furnish voice communications when conventional voice circuits are inoperative, and the second of which is to furnish voice communications for plant operation or maintenance purposes. The Backup Control Center System is the only sound powered communication system designed expressly for supporting the emergency shutdown of the reactors and is to provide communications between the ACR and other stations which must be staffed if the MCR is abandoned or if the use of this system is required. This system consists of fixed and portable sound powered telephones and jack circuits for two separate, redundant circuits called the primary system and alternate system. Although this system maybe used as deemed necessary, its intended use is not for normal plant operations. It provides a backup communication vehicle for operations in the Auxiliary Control Room (ACR), 6900v and 480v Shutdown Board Rooms, AB elevation 669 near TDAFWP rooms and East and West MSVVs elevation 706 near SG PORVs during an emergency. The Backup Control Center System is not accessible in the MCR. Instructions are provided in plant system operating procedures and an ‘AOP - C.04’ cabinets, located outside of the ACR on elevation 734, on AB elevation 669 close to the TDAFWPs and in the EDG Building contain sound powered communication headsets and support equipment. This system is active in the plant’s preventative maintenance program.

TVA purchased 17 IsatPhone PRO global handheld satellite phones for Sequoyah. The IsatPhone Battery Life is

<table>
<tr><th colspan="2">Safety Functions Support</th></tr>
<tr><th colspan="2">PWR Portable and Pre-staged Equipment Phase 2</th></tr>
<tr><td colspan="2">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.

A fixed docking station, IsatDock PRO allows the IsatPhone Pro handset to be interfaced with a PBX system presenting standard ring, busy and dial tones like a standard phone network. This docking station is located in the NODE 2, Telecommunications Building. The phones are located in the MCR, TSC, and OSC.</td></tr>
<tr><th colspan="2">Details:</th></tr>
<tr><td>Provide a brief description of Procedures / Strategies / Guidelines</td><td>Confirm that procedure/guidance exists or will be developed to support implementation with a description of the procedure / strategy / guideline.

Procedures and guidance to support deployment and implementation, including interfaces to EOPs, special event procedures, AOPs and SOs, have been developed in accordance with NEI 12-06, Revision 0, Section 11.4. Further, the PWROG has developed generic guidance, and Sequoyah's strategy aligns with the generic guidance and considers the NSSS specific guidance.</td></tr>
<tr><td>Identify modifications</td><td>For the 480v FLEX DGs, two fused distribution panels are be used to provide power to the loads supplied. Each 480v FLEX DG fuse panel provides connections to two Vital Battery chargers. Each fuse distribution panel provides connection capability to the 480v AC Shutdown Power distribution system’s 480V Reactor MOV Boards with the ability to close Cold Leg Accumulator Isolation Valves during cooldown, if required. In an ELAP event ‘A’ 480v FLEX DG would supply power to 125v DC Vital Battery Chargers I & III and ‘B’ 480v FLEX DG would supply power to 125v DC Vital Battery Chargers II & IV. The ‘A’ 480v FLEX DG schematic is shown on Attachment 3, Figure A3-37. ‘B’ 480v FLEX DG schematic (not shown) is similar.

Each 480v FLEX DG is provided with a 180 gallon day tank. Makeup for the 480v FLEX DGs’ day tanks is provided by a dedicated 8,000 gallon fuel oil storage tank located at ground level on the South side of the Unit 2 Control and Auxiliary Buildings. Each 480v FLEX DG has a dedicated fuel oil transfer pump located in the fuel oil storage tank, powered by its FLEX DG.

To connect the existing 6.9KV Shutdown Power distribution system to the 6.9KV FLEX DGs for FLEX implementation and operation, the existing KIRK-KEY transfer switch connections from the EDGs are opened and from the 6.9KV FLEX DGs are closed. These operations are performed by operating the existing interlocked (Kirk-Key) transfer switches 1A-A, 1B-B, 2A-A, or 2B-B.

The installed electrical connection points for the 6.9KV FLEX DGs are from the DGs integral output connection panel through conduits within the ADGB to underground conduits located on the outside of the ADGB to the Kirk-Key transfer switches located in the EDG Building and from these transfer switches through the normal safety related distribution network to the</td></tr>
</table>

Safety Functions Support	
PWR Portable and Pre-staged Equipment Phase 2	
	designated 6.9KV Shutdown Board emergency feeder breaker. 6900v FLEX DG 'A' is assigned to power 1A-A and 2A-A 6.9KV Shutdown Boards and 6900v FLEX DG 'B' is assigned to power 1B-B and 2B-B 6.9KV Shutdown Boards. 'A' 6.9KV FLEX DG power supply routing to 1A-A 6.9KV Shutdown Board and distribution is shown on Attachment 3, Figure A3-37. 'A' 6.9KV FLX DG would supply both 1A-A and 2A-A 6.9KV Shutdown Boards through their respective Kirk-Key disconnect switches and shutdown board emergency feeder breaker. 'B' 6.9KV FLEX DG (not shown) would supply 1B-B and 2B-B 6.9KV Shutdown Boards. The conduits meet seismic Class I requirements for safety related and quality-related structures. Actual mechanical and electrical connections to the presently installed safety related DG equipment shall meet safety related requirements at the interfaces. Refueling of the 6.9KV FLEX DGs is accomplished by separate diesel fuel transfer pumps taking suction from two separate designated EDG 7-day fuel oil tanks and transferring and maintaining fuel to the 6.9KV FLEX DGs' fuel oil day tanks. (DCN D23197).
Key Parameters	*List instrumentation credited or recovered for this coping evaluation.* • 125v DC Vital Batteries Bus Voltage Sequoyah relies on existing installed 125v DC Vital Batteries to power key instrumentation and emergency lighting. A battery coping calculation determined that the battery coping time is 8 hours. (Reference 30).
Storage / Protection of Equipment **Describe storage / protection plan or schedule to determine storage requirements**	
Seismic	The 6.9KV FLEX DGs are pre-staged in the Additional Diesel Generator Building (ADGB). The ADGB is a formidable building constructed to Class 1 rigor. The FLEX 6.9KV distribution systems have been analyzed to survive 2X SSE High Confidence of Low Probability Failure (HCLPF). The distribution system from the ADGB to the EDGB is housed in robust structures and is missile protected and from the kirk-key switches located in the EDGB through the 6.9KV and 480v safety class electrical distribution system is appropriately protected or located within a Class I structure. The 480v FLEX DGs are pre-staged on the roof of the Auxiliary Building. A protection structure has been built around the DGs, which is designed to the same Seismic Category I requirements as the Auxiliary Building. Seismic input for the design corresponds to the appropriate seismic accelerations at the roof of the Auxiliary Building. This design provides a seismic protection of 2X SSE HCLPF. Equipment required to implement this FLEX strategy is stored/staged/pre-staged in the FESB, ADGB, EDGB and/or AB which are designed for seismic loading in excess of the minimum requirements of the American Society of Civil Engineers (ASCE) 7-10.

Safety Functions Support	
PWR Portable and Pre-staged Equipment Phase 2	
Flooding	The 6.9KV FLEX DGs are pre-staged inside the ADGB which is located above the PMF elevation. The ADGB is a formidable structure designed and built to withstand 2X SSE HCLPF and 360 MPH winds. The distribution system from the ADGB to the EDGB is protected and from the kirk-key switches located in the EDGB through the 6.9KV and 480v safety class electrical distribution system is designed to withstand PMF waters, is appropriately protected or located within a class I structure. The 480v FLEX DGs are pre-staged on the roof of the AB, which is sited in a suitable location that is above the PMF and as such is not susceptible to flooding from any source. Equipment for this function will either be stored or pre-staged in the ADGB, FESB, Auxiliary Building, or on the AB roof. Required portable equipment would be deployed from the FESB to locations above PMF level prior to flood levels reaching grade level.
Severe Storms with High Winds	The 6.9KV FLEX DGs are pre-staged inside the ADGB. The ADGB is a formidable structure designed and built to withstand 2X SSE HCLPF and 360 MPH winds. The distribution system from the ADGB to the EDGB is protected and from the kirk-key switches located in the EDGB through the 6.9KV and 480v safety class electrical distribution system is appropriately protected or located within a Class I structure. The 480v FLEX DGs are pre-staged on the roof of the AB. A protection structure has been built around the DGs, which is sited in a suitable location that is protected from NRC Region 1 tornado, missiles, and velocities as defined in Nuclear Regulatory Commission (NRC) Regulatory Guide 1.76 Revision 1. Equipment required to implement this FLEX strategy will be maintained in the FESB, ADGB, EDGB and/or AB which are designed to meet or exceed the licensing basis high wind hazard for Sequoyah. (Reference 4, Section 3.8.1.3).
Snow, Ice, and Extreme Cold	The 6.9KV FLEX DGs are pre-staged inside the ADGB. The ADGB is a formidable structure designed and built to withstand 2X SSE HCLPF and 360 MPH winds. The ADGB is provided with a heat and ventilation system to maintain an acceptable internal environment up to the point of ELAP. The 480v FLEX DGs are pre-staged on the roof of the AB. A protection structure has been built around the DGs, and has been evaluated for snow, ice and extreme cold temperature effects and heating has been provided as required to assure no adverse effects on the FLEX equipment. The FESB has been designed to address snow, ice and extreme cold temperature effects and heating is provided as required to assure no adverse effects on the FLEX equipment stored there. Equipment stored or staged in the FESB, ADGB, EDGB or AB are protected from these extremes.

<table>
<tr><th colspan="3">Safety Functions Support</th></tr>
<tr><th colspan="3">PWR Portable and Pre-staged Equipment Phase 2</th></tr>
<tr><td>High Temperatures</td><td colspan="2"> The 6.9KV FLEX DGs are pre-staged inside the ADGB. The ADGB is a formidable structure designed and built to withstand 2X SSE HCLPF and 360 MPH winds. The ADGB is provided with a heating and ventilation system to maintain an acceptable environment up to the point of ELAP. The 6.9KV FLEX DGs are potentially load limited (de-rated) when the outside ambient temperature is greater than or could exceed 93°F. Operations FLEX procedures provide precautions to be observed during high outside ambient temperature 6.9KV FLEX DG operations. This potential de-rating does not impact Sequoyah's ability to successfully implement mitigation strategies. (Reference 80 & 105) The 480v FLEX DGs are pre-staged on the roof of the AB. A protection structure has been built around the DGs, and has been evaluated for high temperature effects and ventilation is provided as required to assure no adverse effects. The FESB has been designed to address high temperature effects and HVAC is provided as required to assure no adverse effects on the FLEX equipment stored there. Equipment stored or staged in the FESB, ADGB, EDGB or AB are protected from high temperature extremes. </td></tr>
<tr><th colspan="3">Deployment Conceptual Design
(Attachment 3 contains Conceptual Sketches)</th></tr>
<tr><td>Strategy</td><td>Modifications</td><td>Protection of connections</td></tr>
<tr><td>Identify Strategy including how the equipment will be deployed to the point of use.</td><td>Identify modifications</td><td>Identify how the connection is protected</td></tr>
<tr><td>The strategy for this function is described above in the Identify Modifications section.</td><td>1. 480v FLEX DGs (225kva DGs). (DCN D22929).
2. 6900v FLEX DGs (2.75 MWe DGs). (DCN D23197).
3. 8 Hour Battery Coping. (DCN D23096 & D23391).
4. Upgraded site communication capability with the Harris Radio System. (DCN 23096). - Note: Not a direct FLEX related modification.</td><td>The protection structure for the 480v FLEX DGs is designed and installed such that each is protected from the five external hazards, as described in this section. The fuse distribution panels for the 480v FLEX DGs are located inside the Auxiliary Building which provides protection from the external hazards, as described in this section.</td></tr>
<tr><td colspan="3">Notes: None</td></tr>
</table>

Safety Functions Support	
PWR Portable and Pre-staged Equipment Phase 3	
Provide a general description of the coping strategies using Phase 3 equipment including modifications that are proposed to maintain and/or support safety functions. Identify methods and strategy(ies) utilized to achieve coping times. See SAFER/NSRC description and reference in the Phase 3 Details section for Maintaining Core Cooling and Heat Removal or the RCS Inventory Control sections. A backup or alternate set of Phase 2 equipment will be provided by the NSRC or from offsite TVA sources, as needed. (Reference 17).	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	Procedures and guidance to support deployment and implementation, including interfaces to EOPs, special event procedures, AOPs and SOs, have been developed in accordance with NEI 12-06, Revision 0, Section 11.4. Further, the PWROG has developed generic guidance, and Sequoyah's strategy aligns with the generic guidance and considers the NSSS specific guidance. TVA NPG has included in CECC EPIP - 3, Operations Duty Specialist Procedure For Alert, Site Area Emergency or General Emergency notification of the NSRC to arrange for delivery and deployment of off-site equipment and sufficient supplies of commodities. (Reference 21).
Identify modifications	N/A
Key Parameters	No additional instrumentation is required to support the Phase 3 safety function support.

Deployment Conceptual Design (Attachment 3 contains Conceptual Sketches)		
Strategy	**Modifications**	**Protection of connections**
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
A backup or alternate set of Phase 2 equipment will be provided by the NSRC, as needed.	Each of the Phase 3 strategies will utilize common connections as described for the Phase 2 connections to prevent any compatibility issues with the offsite equipment.	There are no connection points for this strategy. All equipment will be provided by offsite resources.
Notes: None		

PWR Portable & Pre-Staged Equipment Phase 2							
Use and (potential / flexibility) diverse uses						*Performance Criteria*[6]	*Maintenance*
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility		Maintenance / PM requirements
Two Pre-Staged Medium Voltage Diesel Generators (6900v FLEX DGs) - Repowers 6.9 KV Shutdown Boards.	X	X	X	X	X	6900 V AC 2.75 MWe. (Reference 80 & 105)	Follows EPRI template and SQN preventive maintenance (PM) program requirements. (References 98 & 99).
Two Pre-Staged Low Voltage Diesel Generators (480v FLEX DGs) - Powers the 125v DC Vital Battery Chargers.	X	X	X	X	X	480v AC 225 kva.	Follows EPRI template and SQN PM program requirements. (References 98 & 99).
Three (Dominator) Low Pressure FLEX Pumps (Pressurizes ERCW Headers).	X	X	X			5000 gpm 150 psig [350 ft. Total Dynamic Head (TDH)] Diesel Driven.	Follows EPRI template and SQN PM program requirements. (References 98 & 99).
Three (Triton) LP FLEX Pump Systems - each consist of 2 floating hydraulically driven booster pumps supplying positive suction to the Low Pressure FLEX Pumps (Dominators).	X	X	X			5000 gpm 50 ft. lift Diesel Powered Hydraulically Driven Floating Booster Pumps.	Follows EPRI template and SQN PM program requirements. (References 98 & 99).

[6] Performance criteria of FLEX equipment is conservative and was determined during conceptual design as a basis for the selection of required FLEX equipment. (Reference 55).

PWR Portable & Pre-Staged Equipment Phase 2							
Use and (potential / flexibility) diverse uses						*Performance Criteria*[6]	*Maintenance*
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility		Maintenance / PM requirements
Two Intermediate Pressure (IP) FLEX Pumps (Core Cooling Makeup Pumps - Non-Flood Events).	X					150 gpm 350 psig (823 ft. TDH) Diesel Driven.	Follows EPRI template and SQN PM program requirements. (References 98 & 99).
Two Pre-Staged IP FLEX Pumps (Core Cooling Makeup Pumps - Backup to Diesel Driven IP FLEX Pump - Non-Flood Event & Core Cooling - Flood Event).	X					150 gpm 350 psig (823 ft. TDH) 480v AC Motor Driven.	Follows EPRI template and SQN PM program requirements. (References 98 & 99).
Two Pre-Staged Mode 5 & 6 IP FLEX Pumps (RCS makeup source during Mode 5 & 6 - Non-Flood and Flood. Backup to the 480v IP FLEX Pumps - Non-Flood Event & Flood Event).	X					150 gpm 350 psig (823 ft. TDH) 480v AC Motor Driven.	Follows EPRI template and SQN PM program requirements. (References 98 & 99).
Three Pre-Staged High Pressure FLEX Pumps (RCS Inventory Control -Non-Flood or Flood Event).	X					40 gpm 600 psig (1384 ft. TDH) 480v AC Motor Driven.	Follows EPRI template and SQN PM program requirements. (References 98 & 99).
Two Water Transfer pumps.	X		X			500 gpm 160 psig (374 ft. TDH) Diesel Driven.	Follows EPRI template and SQN PM program requirements. (References 98 & 99).

PWR Portable & Pre-Staged Equipment Phase 2							
Use and (potential / flexibility) diverse uses						*Performance Criteria*[6]	*Maintenance*
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility		Maintenance / PM requirements
Two SFP Spray Nozzles			X			250 gpm per nozzle	Follows EPRI template and SQN PM program requirements. (References 98 & 99).
Two Heavy Duty 4X4 Vehicles each capable of debris removal, deployment of FLEX equipment, personnel transport and refueling of diesel powered FLEX equipment from a mounted 500 gallon fuel tank, fuel transfer pump, hose and nozzle.	X	X	X		X	Capable of on-site debris removal, deployment of trailer mounted FLEX equipment, transport of personnel, refueling of diesel powered FLEX equipment. Equal to or greater tow capacity of 14,000 Gross Vehicle Weight (GVW). Each truck has a bed mounted 500 gallon fuel tank and fuel transfer pump.	Follows EPRI template and SQN PM program requirements. (References 98 & 99).
Fuel Transfer Equipment • Two Electric Motor Driven Fuel Transfer Pumps.	X	X	X	X	X	Provides refuel capability by fuel transfer from the EDG 7-day tanks or surviving fuel oil storage tanks to the truck mounted 500 gallon fuel tanks or transfer from tank to tank.	Follows EPRI template and SQN PM program requirements. (References 98 & 99).

PWR Portable & Pre-Staged Equipment Phase 2							
Use and (potential / flexibility) diverse uses						*Performance Criteria*[6]	*Maintenance*
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility		Maintenance / PM requirements
Debris Clearing Equipment One Compact Track Loader. The previously identified deployment vehicles (4X4 trucks) equipped for debris removal duty, if required.	X	X	X		X	Capable of clearing trees, light poles, building, fencing or wire, construction materials and/or miscellaneous debris. One 4X4 truck is equipped with a heavy duty front mounted 16.5 ton winch and a second truck is mounted with a debris or snow removal plow.	Follows EPRI template and SQN PM program requirements. (References 98 & 99).

PWR Portable and Pre-staged Equipment Phase 3							
Use and (potential / flexibility) diverse uses						*Performance Criteria* [7]	Phase 3 NSRC/SAFER Equipment or Other available offsite equipment.
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility		
Medium Voltage Diesel Generator Backup.	X	X	X	X	X	6900v AC capable of powering minimum mitigation strategy equipment.	Use of TVA owned 2.2 MW Diesel Generator(s) and 480v to 6.9KV transformer(s).
Low Voltage Diesel Generators Backup.	X	X	X	X	X	480v AC 225 kva.	Low Voltage Generator.
Low Pressure FLEX Pumps (Dominators) - Pressurizes ERCW Headers.	X	X	X			5000 gpm 150 psig (350 ft. TDH) Diesel Driven.	Low Pressure High Flow Pumps (5000gpm at 150psi).
Floating Booster Pumps (Tritons) - Supplies Low Pressure FLEX Pump (Dominators).	X	X	X			5000 gpm 50 ft. lift Diesel Driven.	Low Pressure High Flow Suction Booster Pumps (5000gpm at 26 foot head).
Intermediate Pressure (IP) FLEX Pumps (Core Cooling Backup Pumps Non-Flood Event).	X					150 gpm 350 psig (823 ft. TDH) Diesel Driven.	SG Makeup/RCS Makeup Capable Pumps (500gpm/500psi).

[7] Performance criteria of FLEX equipment is conservative and was determined during conceptual design as a basis for the selection of required FLEX equipment. (Reference 55).

PWR Portable and Pre-staged Equipment Phase 3							
Use and (potential / flexibility) diverse uses						*Performance Criteria* [7]	Phase 3 NSRC/SAFER Equipment or Other available offsite equipment.
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility		
IP FLEX Pumps (Core Cooling Backups to Diesel Driven IP FLEX Pumps - Non-Flood Event & Backup Pumps - Flood Event).	X					150 gpm 350 psig (823 ft. TDH) 480v AC.	See Above - SG Makeup/RCS Makeup Capable Pump (500gpm/500psi).
Mode 5 & 6 IP FLEX Pumps (RCS makeup source during Mode 5 & 6 Non-Flood and Flood. Backup for 480v motor driven RCS Core Cooling IP FLEX Pumps - Non-Flood or Flood Event).	X					150 gpm 350 psig (823 ft. TDH) 480v AC.	See Above - SG Makeup/RCS Makeup Capable Pump (500gpm/500psi).
High Pressure FLEX Pumps Backup (RCS Inventory Control).	X					40 gpm 600 psig (3561 ft. TDH) 480v AC.	High Pressure Injection Pump (60gpm/1500psi).
Water Transfer Pumps Backup.	X		X			500 gpm 160 psig (374 ft. TDH) Diesel Driven.	Low Pressure Medium Flow Pumps (2500gpm/300psi).

PWR Portable and Pre-staged Equipment Phase 3							
Use and (potential / flexibility) diverse uses						*Performance Criteria* [7]	Phase 3 NSRC/SAFER Equipment or Other available offsite equipment.
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility		
Fuel Transfer Equipment: • Fuel Tankers • Fuel Oil Transfer Pumps.	X	X	X	X	X	2 - 4X4 Deployment Truck each with mounted 500 gallon fuel tank with integral fuel transfer pump, hose and nozzle providing refuel capability. 2 - Independent Fuel Oil Transfer Pumps.	Portable Diesel Fuel Tanks with Fuel Transfer Pumps (364 gallon tank with AC/DC powered transfer pumps).
Mobile Reverse Osmosis Units/Water Purification (provide makeup to the CSTs and/or other needs).	X		X			The Reverse Osmosis units will have an output flow capacity of 250 gpm per unit.	Portable makeup water treatment system capable of supplying purified water, supplied by NSRC.

Phase 3 Response Equipment/Commodities	
Item	**Notes**
Radiation Protection Equipment • Survey instruments • Dosimetry • Off-site monitoring/sampling • Radiological counting equipment • Radiation protection supplies • Equipment decontamination supplies • Respiratory protection • Portable Meteorological (MET) Tower.	
Commodities • Potable water.	
Fuel Requirements • Diesel Fuel.	
Heavy Equipment • Transportation equipment ○ 4 wheel drive tow vehicles • Debris clearing equipment.	TVA as the largest public electrical power utility in the U. S. has access to heavy equipment, resources and other support services from its system wide transmission, hydro and fossil departments, other nuclear sites and its various service shops.
Communications Equipment • Satellite Phones • Portable Radios.	
Portable Interior Lighting • Flashlights • Headlamps • Batteries • LED Light packs.	
Portable Exterior Lighting • Diesel generator powered light units. • Portable battery powered LED light packs	

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34. Evaluation of Potential Impact of FLEX Deployment on Design Basis Flood Mode Preparations, EDMS W50 150603 001.

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37. 125v DC Vital Batteries Hydrogen Generation Calculation RIMS Accession Number B87931021001, EDMS W50 150727 001.

38. Westinghouse Letter LTR-FSE-14-97, Input to Watts Bar Open Items 2, 3, 5 and 7 (RCP Seal Leakage Responses), Revision 0, December 11, 2014, EDMS W50 150727 002.

39. Sequoyah Unit 1 and Unit 2 Plant Specific Evaluation of Significant PWROG Generic NSSS Parameters Supporting FLEX Integrated Plan, July 28, 2015, EDMS W50 150727 003.

Open Items

Open Item Number	Description	Status	Notes
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.	Closed	The Condensate Storage Tanks (CSTs) have been modified to provide missile protection and seismic qualification. DCNs 23191 & 23376.
2	Liquefaction of haul routes for FLEX will be analyzed.	Closed	See References 28 and 71.
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.	Closed	See SQN FLEX Diesel Fuel White Paper (EDMS W50 152905 008).
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.	Closed	Containment MAAP Analysis complete - See Reference 44.
5	The Phase 3 equipment staging area has not been determined.	Closed	Areas are identified and are included in the National SAFER Response Center (NSRC) playbook. See Reference 17.
6	A strategy for clearing and removing debris will be determined.	Closed	Debris removal equipment is identified and storage determined. See following 'PWR Portable Equipment Phase 3' table.

Open Item Number	Description	Status	Notes
7	A thorough analysis of the makeup flow rate requirements and other equipment characteristics will be finalized during the detailed design phase of FLEX.	Closed	See References 73, 76 & 77.
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.	Closed	See Reference 65.
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.	Closed	See following 'PWR Portable Equipment Phase 3' Table.
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.	Closed	SQN procedure FSI-7, Loss of Vital Instrumentation or Control Power will provide the vehicle to attain/monitor containment temperature post flood. A pyrometer will be used to monitor containment wall temperature. See Reference 44.
11	The heating, ventilation and air conditioning (HVAC) analysis is preliminary, and has not been finalized.	Closed	See References 45, 46 & 47.
12	Verify ability to deploy FLEX equipment to provide core cooling in Modes 5 and 6 with steam generators (SGs) unavailable.	Closed	See Reference 32.
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.	Closed	See References 22 & 82.

Open Item Number	Description	Status	Notes
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.	Closed	See Reference 76.
15	Perform conceptual hydraulic performance analyses. The purpose of this analysis is to conservatively evaluate hydraulic performance of FLEX systems.	Closed	See Reference 77.
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.	Closed	See Reference 41.
17	Perform an 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	See Reference 55.
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	See Reference 65.
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	See Reference 67.
21	Develop a programmatic control report. The purpose of this report is to summarize the need to implement programmatic control of the FLEX program.	Closed	See References 96 & 97.
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.	Closed	See References 2, and 15.

Open Item Number	Description	Status	Notes
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.	Closed	See SE Tracker Item 23-C Response Closeout Notes.
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.	Closed	See Reference 67.
25	Complete battery calculations to document Vital Battery life of 8 hours after loss of all AC.	Closed	See Reference 30.
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.	Closed	See Reference 33.
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.	Closed	See SE Tracker Item 27-C Response Closeout Notes.
28	Establish a contract with the SAFER team in accordance with the requirements of Section 12 of Reference 2.	Closed	Agreement with National SAFER Response Center (NSRC) is in place.

Acronyms

AB	auxiliary building
ABMT	auxiliary boration makeup tank
AC	alternating current
ACR	auxiliary control room
ACS	alternate cooling source
ADAMS	agency wide documents access and management systems
ADGB	additional diesel generator building
AFW	auxiliary feedwater system
ANS	American Nuclear Society
ANSI	American National Standards Institute
AOP	abnormal operating procedure
AOV	air-operated valve
APM	available physical margin
ARV	atmospheric relief valve
ASCE	American Society of Civil Engineers
AUO	assistant unit operator
BAT	boric acid tank
BCS	backup control station
BDB	beyond-design-basis
BDBEE	beyond-design-basis external events
C & A	control & auxiliary
CAS	central alarm station
CCS	component cooling system
CCSP	component cooling system pump
CCW	condenser circulating water
CECC	central emergency control center
CET	core exit thermocouple
CFR	Code of Federal Regulations
CFS	cubic feet per second
CFT	core flood tank
CLA	cold leg accumulator
CLB	current licensing basis
CST	condensate storage tank
CVCS	chemical and volume control system
CWST	cask washdown storage tank
DBE	design basis event
DBF	design basis flood
DBFL	design basis flood level
DC	direct current
DCN	design change notice
DG	diesel generator
DGB	diesel generator building
DWHT	demineralized water head tank
DWS	demineralized water system
DWST	demineralized water storage tank

ECA	emergency contingency action procedure
EDG	emergency diesel generator
EDGB	emergency diesel generator building
EDMG	extreme damage mitigation guideline
EDMS	electronic document management system
EFW	emergency feedwater
ELAP	extended loss of ac power
EOI	emergency operating instruction
EOP	emergency operating procedure
EP	emergency preparedness
EPG	emergency procedure guideline
EPIP	emergency program implementing procedure
EPRI	Electric Power Research Institute
ERCW	essential raw cooling water
ERO	Emergency Response Organization
ESF	engineered safety feature
ESBO	extended station blackout
EWR	engineering work order
FAQ	frequently asked question
FESB	FLEX equipment storage building
FIP	final integrated plan
FLEX	Diverse and Flexible Coping Strategies
FMBMS	flood mode boration makeup system
FMI	FLEX maintenance instruction
FPU	fire protection unit
FSG	FLEX support guideline
FSI	FLEX support instruction
GOP	general operating procedure
GMRS	ground motion response spectra
HCLPF	high confidence of low probability failure
HPFP	high pressure fire protection
HP FLEX Pump	High Pressure FLEX Pumps
HVAC	heating, ventilation, and air conditioning
IER	Industry Event Report
INPO	Institute of Nuclear Power Operations
IP FLEX Pump	Intermediate Pressure FLEX Pumps
IPS	intake pumping station
ISG	Interim Staff Guidance
KVA	kilovolt-amperes
LCV	level control valve
LOCA	loss-of-coolant accident
LOOP	loss of offsite power
LP FLEX Pump	Low Pressure FLEX Pump
LUHS	loss of normal access to the ultimate heat sink
MCC	Motor Control Center
MCR	main control room
MDAFWP	motor driven auxiliary feedwater pump
MI	maintenance instruction

MOV	motor operated valve
MRE	meals ready to eat
MSL	mean sea level
MWe	megawatt electric
NEI	Nuclear Energy Institute
NPG	Nuclear Power Group
NPSH	net positive suction head
NRC	Nuclear Regulatory Commission
NSRC	National SAFER Response Center
NSSS	nuclear steam supply system
NTTF	Near Term Task Force
OBE	Operating Basis Earthquake
OCC	Operations Control Center
OIP	Overall Integrated Plan
PD	positive displacement
PI	periodic instruction
PM	preventive maintenance
PMF	probable maximum flood
PMP	probable maximum precipitation
PORV	power operated relief valve
PRA	probabilistic risk assessment
PWR	pressurized water reactor
PWROG	Pressurized Water Reactor Owners Group
PWST	primary water storage tank
QR	quality related
RAI	request for additional information
RCP	reactor coolant pump
RCS	reactor coolant system
REOC	River Emergency Operations Center
RHR	residual heat removal
RLGM	review level ground motion
RSO	River Systems Operations
RVLIS	reactor vessel level indicating system
RWST	refueling water storage tank
RWT	raw water tank
SAFER	Strategic Alliance for FLEX Emergency Response
SAMG	severe accident management guideline
SBO	station blackout
SDB	shutdown board
SDM	shutdown margin
SFP	spent fuel pool
SG	steam generator
SIP	safety injection pump
SIS	safety injection system
SMA	seismic margin assessment
SO	system operations
SOI	system operations instruction
SPP	standard programs and processes

SPRA	seismic probabilistic risk assessment
SR	safety related
SRO	senior reactor operator
S/RV	safety/relieve valve
SSC	systems, structures and components
SSE	safe shutdown earthquake
TD	turbine driven
TDH	total dynamic head
TDAFWP	turbine driven auxiliary feedwater pump
TI	technical instruction
TOAF	top of active fuel
TSC	technical support center
TVA	Tennessee Valley Authority
UFSAR	updated final safety analysis report
UHS	ultimate heat sink

Attachment 1A
Sequence of Events Timeline
Non-Flood Event

Action Item(s)	Elapsed Time from Event Initiation (T-0)	Action	ELAP time constraint Y/N	Task Duration (hours)	Remarks / Applicability
	0	Event Starts	NA	NA	Plant @100% power.
	0	SBO	N	NA	ECA-0.0 (Reference 26).
1	0	Initial Load Shed (Station Blackout (SBO) Load Shed)	Y	Complete Within .75 hours of T-0	Sheds 125v DC Vital Loads to ensure 4 hour coping.
2	Within 1 hour of T-0	Declare ELAP	Y	Within 1 hour of T-0	ELAP entry can be verified by control room staff and it is validated that the Emergency Diesel Generators (EDGs) are not available. This declaration needs to occur within 1 hour from T-0 to provide operators with guidance to perform ELAP actions.
3	0.5 hours	Align and place in service the 480v FLEX Diesel Generators (DG)	Y	0.75 hour	Ensures power to the 125v Vital DC Battery Boards (vital control power) and through the vital inverters the 120v AC Vital Instrument Power Boards (vital instrument indication).

Action Item(s)	Elapsed Time from Event Initiation (T-0)	Action	ELAP time constraint Y/N	Task Duration (hours)	Remarks / Applicability
4	0.75 hour	Extended Load Shed (Extended Station Blackout (ESBO) Load Shed)	Y	Complete Within 1.5 hours of T-0	Completed within 90 minutes (1.5 hours) from T-0. This ensures the 480v FLEX DGs supply to necessary loads for the 125v DC Vital Battery Boards and 120v AC Vital Instrument Power Boards (systems) to support FLEX Mitigation Strategy Response. Note: The limited capability of the 125v DC Vital Battery Chargers prevents ensured charging of the 125v DC Vital Batteries.
5 & 6	0.5 hour	Damage Assessment and FLEX Equipment Staging	N	2 hours	Sequoyah is developing a post event damage assessment procedure. The damage assessment will evaluate and document the condition of plant systems, structures and components (SSCs) after an ELAP event. The assessment will be consistent with guidelines contained in supplement 5 of Reference 7. FLEX equipment staging locations and access routes will be a priority for the damage assessment. This assessment will facilitate debris removal, if required, to support FLEX equipment staging.

Action Item(s)	Elapsed Time from Event Initiation (T-0)	Action	ELAP time constraint Y/N	Task Duration (hours)	Remarks / Applicability
7	1 hour	Stage and align Low Pressure (LP) FLEX pumps (Triton and Dominator)	Y	3 hours	Staged and aligned to take suction from the intake channel and discharge routed to the Essential Raw Cooling Water (ERCW) FLEX connections at the Intake Pumping Station (IPS).
8	Within 1 hour of T-0	RCS Depressurization and Cooldown.	Y	3 hours	Initiate RCS depressurization and cooldown due to increased RCP seal leakage upon loss of seal cooling. At RCS full temperature and pressure the calculated RCP leak rate is 16gpm and is 17.5gpm at a RCS pressure and temperature of 1485psig and 572°F. A RCS cooldown rate of 75-100°F/hour should be sustained until stabilized at 225psig SG pressure within T+4 hours. With SG pressure stabilized at 225psig (397°F) the RCS would be at 397°F and ~ 295psig. The RCP seal leak rate should be 5.7gpm/RCP. The CLAs must be isolated prior to initiating further depressurization to prevent nitrogen injection into the RCS. (References 55, 60, 62 & 78)

Action Item(s)	Elapsed Time from Event Initiation (T-0)	Action	ELAP time constraint Y/N	Task Duration (hours)	Remarks / Applicability
9	1.5 hours	6.9KV FLEX Diesel Generator (DG) (ADGB), kirk-key transfer switches (EDGB), 6.9 KV Shutdown Board emergency feeder breaker and 6900V and 480 V Shutdown Boards alignment (Shutdown Board Rooms).	Y	2 hours	This is to ensure switching at the ADGB. EDGB and Shutdown Board Rooms are complete, potential board loading is reduced and interlocks are cleared to allow the emergency feeder breakers to be used to safely power the 6.9 KV Shutdown Boards from the 6.9KV FLEX DGs.
10	3.5 hours	Energize the 6.9 KV Shutdown Boards with the 6.9KV FLEX DGs. Place the following components in service and restore RCS pressurizer level: • Safety Injection Pumps (SIPs), as required to recover and maintain RCS pressurizer level.	Y	1.5 hour	Ensure raw water cooling flow to the SIP bearing oil heat exchanger prior to repowering SIPs to restore RCS inventory.
Note: Note that the second and final depressurization and cooldown holdpoints and times may be delayed as deemed appropriate by Operations provided the plant achieves a RCS cold leg temperature of 350°F within 24 hours to support RCP seal requirements.					

Action Item(s)	Elapsed Time from Event Initiation (T-0)	Action	ELAP time constraint Y/N	Task Duration (hours)	Remarks / Applicability
11	5 hours	Once RCS inventory has been restored by SIP operation, calculated boration and required mixing completed (SDM Verified) and CLAs isolated to ensure against nitrogen injection into the RCS a second SG depressurization and cooldown to 160 psig (370°F) per ECA-0.0 is accomplished.	N	2 hours	This second depressurization and cooldown action occurs after RCS inventory has been restored by SIP operation, calculated boration and required mixing are completed (SDM verified) and CLAs isolated to ensure against nitrogen injection into the RCS. A further depressurization and cooldown within T+24 hours is required to achieve a RCS cold leg temperature of 350°F in order to maintain RCP number 2 seal integrity. (References 55, 60, 62 & 78)

Note: Due to the potential for de-rating of the 6.9KV FLEX DGs at high outside ambient temperatures 6.9KV FLEX DG loading margin should be verified prior to exercising the Motor Driven Auxiliary Feedwater Pumps (MDAFWPs) option to replace the TDAFWP. (Reference 80 & 105).

Note: The MDAFWPs and the Auxiliary Air Compressors can be placed in service and serve as the secondary or backup SG makeup source, if required.

Action Item(s)	Elapsed Time from Event Initiation (T-0)	Action	ELAP time constraint Y/N	Task Duration (hours)	Remarks / Applicability
12	5 hours	Place the following equipment in service, if required. Verify 6.9KV FLEX DG loading between component starts. • Auxiliary Air Compressors • Motor Driven Auxiliary Feedwater Pumps (MDAFWP) • Component Cooling System Pump • Spent Fuel Pool (SFP) Cooling Pump (Restore SFP cooling).	Y	2 hours	Action initiated to support repowering various installed pumps to provide indefinite coping capability.
13 & 20	5 hours	Initiate alignment of ERCW headers to ensure cooling water supplied by the LP FLEX Pumps is effectively directed to support FLEX Strategies. Complete alignment within 12 hours of event.	N	7 hours	The realignment of ERCW headers are parallel responsibilities for assigned AUOs and ROs. The majority of the realignment will be accomplished by closure of MOVs once the 480v Reactor MOV Boards are repowered by the 6.9KV FLEX DGs.
14	6 hours	Stage and align the High Pressure (HP) FLEX Pumps with suction from the Refueling Water Storage Tank (RWST) FLEX connections for RCS boration and makeup. {Alternate is from the Boric Acid Storage Tanks (BATs) FLEX connection}.	Y	2.5 hours	The HP FLEX pump discharge can be routed to either Safety Injection Pump discharge header's FLEX connection. RCS makeup is required to compensate for cooldown (shrinkage and RCP seal leakage). Hoses will remain isolated and pumps out of service until required.

Action Item(s)	Elapsed Time from Event Initiation (T-0)	Action	ELAP time constraint Y/N	Task Duration (hours)	Remarks / Applicability
15	6 hours	Stage and align the diesel driven Intermediate Pressure (IP) FLEX pumps at the Condensate Storage Tank (CST) FLEX connections for backup for SG makeup (backup to the TDAFWP (or) MDAFWPs).	N	3 hours	Suction is aligned from the CST. The IP FLEX pump discharge can be routed to FLEX connections upstream of the TDAFWP Level Control Valves (LCV) (primary) or upstream of the MDAFWP LCVs (alternate). This is a contingency in case of loss of the normal SG makeup capabilities. Hoses will remain isolated and pumps out of service until required.
16	6 hours	Deploy hoses (and spray nozzles if required) as a contingency for SFP makeup.	Y	2 hours	Hoses will be routed from an Auxiliary Building elevation 714 ERCW FLEX connection to the SFP area or from the demineralized water FLEX connection on elevation 714.
Note: Diesel fuel transfer to the 480v FLEX DGs' 8,000 gallon fuel tank must be initiated to support 480v FLEX DGs' day tank makeup within 10 hours.					
Note: 480v FLEX DG refueling connections (mechanical and electrical) are required to be complete and day tank refueling process in operation within 10 hours of initial 480v FLEX DG operation.					

Action Item(s)	Elapsed Time from Event Initiation (T-0)	Action	ELAP time constraint Y/N	Task Duration (hours)	Remarks / Applicability
17	7 hours	Initiate refueling preparation for diesel fueled FLEX equipment that require manual refueling operations. • Refueling of portable FLEX equipment from truck mounted 500 gallon fuel tanks. • Initiate fuel transfer to the 480v FLEX DG 8,000 gallon fuel tank and complete 480v FLEX DGs day tank refueling connections (mechanical and electrical). Verify complete, fuel transfer pumps operation and day tanks makeup. • Complete 6900v FLEX DGs day tanks refueling connections. Verify complete, fuel transfer pumps operation and day tanks makeup.	N	Continuous from initiation	This will need to be initiated within 7 to 8 hours of initiation of diesel fueled FLEX equipment operation. Note that this action could be initiated earlier, if resources are available.
Note: If a tornado or high wind driven missile penetrated the CSTs at the top of their protective barrier the CSTs will provide approximately 7.5 hours of makeup water for the SGs. This would expedite the need for evaluating and directing SG makeup water options.					

Action Item(s)	Elapsed Time from Event Initiation (T-0)	Action	ELAP time constraint Y/N	Task Duration (hours)	Remarks / Applicability
18	10 hours	Evaluate makeup to the CSTs. The CSTs provide approximately 14 hours for 2 unit operation. Static water available in the ERCW headers could provide approximately 18.5 hours of raw water, if required.	N	Continuous from initiation	Sources of makeup to the CSTs are identified and FLEX connections are provided to facilitate transfer of quality water. Alignment to the ERCW system and an ultimate heat sink source via the LP FLEX pumps remains an option. Note that this activity could be started earlier if resources are available.
19	7 hours	Initiate portable lighting for MCR, Shutdown Board Room and FLEX equipment locations, as required.	N	Continuous from initiation	This is not a time constraint and MCR and Shutdown Board Rooms are provided with battery backup lighting. Portable lighting for FLEX equipment staging locations could be required. Portable lighting will be available for internal and external service, if required.
21, 22, 23 & 24	7 hours	Monitor TDAFWP Room, Main Control Room (MCR), Shutdown Board Room, Vital Battery Board Room and SFP area ventilation needs.	N	Continuous from initiation	If required, verify 6.9KV FLEX DG loading and restore selected heating, ventilation and air conditioning (HVAC) systems to service. (Reference 47).
25 & 26	7 hours	Evaluate, identify and address long term (within 72 hours) needs including: • Mobile water purification units. • Site diesel fuel service.	N	Continuous	

Attachment 1A
Sequence of Events Timeline
Flood Event

Action Item	Elapsed Time from Event Initiation (T-0)	Action	New ELAP time constraint Y/N	Task Duration (hours)	Remarks / Applicability
Note: An ELAP could occur at anytime during flood preparation or a flood event therefore FLEX equipment and strategies must be staged and ready for implementation if required. **Note**: During a Design Basis Flood Mode response, prior to flood waters exceeding plant grade, the EDGs are placed in service supplying plant safety related loads designed for flood mode operations and plant offsite power supplies are removed from service. Plant generation would have been removed from service prior to Flood Mode Stage II entry. Design Basis Flood Mode Operations are controlled by AOP-N.03, External Flooding. **Note**: To assure that FLEX response actions do not impact on design basis flood mode preparations, Sequoyah 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 have been revised to provide the notification and direct the pre-staging of FLEX equipment. (Reference 22). **Note**: The scenario described below assumes an ELAP event occurs post initial flood warning received from TVA's River System Operations and prior to a Stage 1 warning notification. This provides a 27 hour period before flood waters reach grade elevation. This flood preparation time period allows for initial use of the same strategy as a non-flood event for Steps 1-9 for stabilizing the plant and staging FLEX equipment for flood mitigation strategy. **Note**: The permanent plant equipment incorporated into FLEX strategies that are located below the Probable Maximum Flood (PMF) elevation of 722 and not designed for submerged operation will be removed from service and protection transitioned to flood capable FLEX equipment and strategies prior to flood waters reaching plant grade.					
	0	Event Starts	NA	NA	Plant @100% power.
	0	SBO	N	NA	ECA-0.0 (Reference 26).

Action Item	Elapsed Time from Event Initiation (T-0)	Action	New ELAP time constraint Y/N	Task Duration (hours)	Remarks / Applicability
1	0	Initial Load Shed (Station Blackout (SBO) Load Shed).	Y	0.75 hrs.	Sheds 125v DC Vital Loads to ensure 4 hour coping.
2	Within 1 hour of T-0	Declare ELAP.	N	Within 1 hour of T-0	ELAP entry can be verified by control room staff and it is validated that the Emergency Diesel Generators (EDGs) are not available. This declaration needs to occur within 1 hour from T-0 to provide operators with guidance to perform ELAP actions.
3	0.5 hours	Align and place in service the 480v FLEX Diesel Generators (DGs).	Y	0.75 hours	Ensures power to the 125v Vital DC Battery Boards (vital control power) and through the vital inverters the 120v AC Vital Instrument Power Boards (vital instrument indication).
4	0.75 hour	Extended Load Shed (Extended Station Blackout (ESBO) Load Shed).	Y	Complete Within 1.5 hours of T-0	Completed within 90 minutes (1.5 hours) from T-0. This ensures the 480v FLEX DGs supply to necessary loads for the 125v DC Vital Battery Boards and 120v AC Vital Instrument Power Boards (systems) to support FLEX Mitigation Strategy Response. Note: The limited capability of the 125v DC Vital Battery Chargers prevents ensured charging of the 125v DC Vital Batteries.

Action Item	Elapsed Time from Event Initiation (T-0)	Action	New ELAP time constraint Y/N	Task Duration (hours)	Remarks / Applicability
5 & 6	0.5 hour	Damage Assessment and FLEX Equipment Staging.	N	2 hours	Sequoyah is developing a post event damage assessment procedure. The damage assessment will evaluate and document the condition of plant systems, structures and components (SSCs) after an ELAP event. The assessment will be consistent with guidelines contained in supplement 5 of Reference 7. FLEX equipment staging locations and access routes will be a priority for the damage assessment. This assessment will facilitate debris removal, if required, to support FLEX equipment staging.
7	1 hour	Stage and align LP FLEX pumps (Dominator and Triton).	Y	3 hours	Staged and aligned to take suction from the intake channel and discharge routed to the Essential Raw Cooling Water (ERCW) FLEX connections at the Intake Pumping Station (IPS).

Action Item	Elapsed Time from Event Initiation (T-0)	Action	New ELAP time constraint Y/N	Task Duration (hours)	Remarks / Applicability
8	Within 1 hour of T-0	RCS Depressurization and Cooldown.	Y	3 hours	Initiate RCS depressurization and cooldown due to increased RCP seal leakage upon loss of seal cooling. At RCS full temperature and pressure the calculated RCP leak rate is 16 gpm and is 17.5 gpm at a RCS pressure and temperature of 1485 psig and 572°F. A RCS cooldown rate of 75-100°F/hour should be sustained until stabilized at 225 psig SG pressure within T+4 hours. With SG pressure stabilized at 225 psig (397°F) the RCS would be at 397°F and ~ 295 psig. The RCP seal leak rate should be 5.7 gpm/RCP. The CLAs must be isolated prior to initiating further depressurization to prevent nitrogen injection into the RCS. (References 55, 60, 62 & 78)
9	1.5 hours	6.9KV FLEX Diesel Generator (DG) (ADGB), kirk-key transfer switches (EDGB), 6.9 KV Shutdown Board emergency feeder breaker and 6900V and 480 V Shutdown Boards alignment (Shutdown Board Rooms).	Y	2 hours	This is to ensure switching at the ADGB, EDGB and Shutdown Board Rooms are complete, potential board loading is reduced and interlocks are cleared to allow the emergency feeder breakers to be used to safely power the 6.9 KV Shutdown Boards from the 6.9KV FLEX DGs.

Action Item	Elapsed Time from Event Initiation (T-0)	Action	New ELAP time constraint Y/N	Task Duration (hours)	Remarks / Applicability
10	3.5 hours	Energize the 6.9 KV Shutdown Boards with the 6.9KV FLEX DGs. Place the following component in service and restore RCS pressurizer level: • Safety Injection Pumps, as required to recover and maintain RCS pressurizer level.	Y	1.5 hours	Ensure raw water cooling flow to the SIP bearing oil heat exchanger prior to repowering SIPs to restore RCS inventory.
Note: Note that the second and final depressurization and cooldown holdpoints and times may be delayed as deemed appropriate by Operations provided the plant achieves a RCS cold leg temperature of 350°F within 24 hours to support RCP seal requirements.					
11	6 hours	Once RCS inventory has been restored by SIP operation, calculated boration and required mixing completed (SDM Verified) and CLAs isolated to ensure against nitrogen injection into the RCS a second SG depressurization and cooldown to 160 psig (370°F) per ECA-0.0 is accomplished.	N	2 hours	This second depressurization and cooldown action occurs after RCS inventory has been restored by SIP operation, calculated boration and required mixing are completed (SDM verified) and CLAs isolated to ensure against nitrogen injection into the RCS. A further depressurization and cooldown within T+24 hours is required to achieve a RCS cold leg temperature of 350°F in order to maintain RCP number 2 seal integrity. (References 55, 60, 62 & 78)
Note: Due to the potential for de-rating of the 6.9KV FLEX DGs at high outside ambient temperatures 6.9KV FLEX DG loading margin should be verified prior to exercising the Motor Driven Auxiliary Feedwater Pumps (MDAFWPs) option to replace the TDAFWP. (Reference 80 & 105).					

Action Item	Elapsed Time from Event Initiation (T-0)	Action	New ELAP time constraint Y/N	Task Duration (hours)	Remarks / Applicability
Note: The MDAFWPs and the Auxiliary Air Compressors can be placed in service and serve as the secondary or backup SG makeup source, if required.					
12	4 hours	Place the following equipment in service, if required. Verify 6.9KV FLEX DGs loading between component starts. • Auxiliary Air Compressors • Motor Driven Auxiliary Feedwater Pumps (MDAFWP) • Component Cooling System Pump • Spent Fuel Pool (SFP) Cooling Pump (Restore SFP cooling).	N	2 hours	Action initiated to support repowering various installed pumps to provide indefinite coping capability.
Note: The above Design Basis components will be removed from service and transition to FLEX strategies completed prior to flood waters reaching plant grade.					
13 & 21	5 hours	Initiate alignment of ERCW headers to ensure cooling water supplied by the LP FLEX Pumps are effectively directed to support FLEX Strategies. Complete alignment within 12 hours of event.	N	7 hours	The realignment of ERCW headers are parallel responsibilities for assigned AUOs and ROs. The majority of the realignment will be accomplished by closure of MOVs once the 480v Reactor MOV Boards are repowered by the 6.9KV FLEX DGs.

Action Item	Elapsed Time from Event Initiation (T-0)	Action	New ELAP time constraint Y/N	Task Duration (hours)	Remarks / Applicability
14	5.5 hours	Stage and align the second set of LP FLEX pumps - staged and aligned to take suction from the cold water channel east of the AERCW Pumping Station with discharge routed to the ERCW FLEX connections at the AERCW Pumping station.	N	2 hours	Hoses will remain isolated and pumps out of service until required.
15	6 hours	Stage and align the 480v motor driven HP FLEX pumps (AB elevation 669) with suction from the RWST FLEX connections (AB elevation 669).	N	2.5 hours	The HP FLEX pump discharge can be routed to either A Train or B Train Safety Injection Pump discharge header's FLEX connection. RCS makeup is required to compensate for cooldown (shrinkage and RCP seal leakage). Once RCS inventory is recovered the HP FLEX Pumps will maintain RCS inventory.
16	6 hours	Stage and align the 480v motor driven IP FLEX pumps (AB elevation 714) for makeup capability to the SGs.	N	2.5 hours	Suction hoses are aligned from the AB elevation 714 ERCW FLEX connections. The IP FLEX pump discharge hoses can be routed to the FLEX connection upstream of the TDAFWP Level Control Valves (LCVs) (primary) or the FLEX connections upstream of the MDAFWP LCVs (alternate). Hoses will remain isolated and pumps out of service until required.

Action Item	Elapsed Time from Event Initiation (T-0)	Action	New ELAP time constraint Y/N	Task Duration (hours)	Remarks / Applicability
17	6 hours	Deploy hoses (and if required, spray nozzles) as a contingency for SFP makeup.	Y	2 hours	Hoses will be routed from AB elevation 734 ERCW FLEX connections to the SFP or from an elevation 714 ERCW FLEX connection to the SFP demineralized water FLEX connection on elevation 714 to allow makeup to the SFP.
Note: Diesel fuel transfer to the 480v FLEX DGs' 8,000 gallon fuel tank must be initiated to support 480v FLEX DGs' day tank makeup within 10 hours and sustained to ensure fuel level established to support fuel makeup operations during the period when flood waters exceed plant grade.					
Note: 480v FLEX DGs refueling connections (mechanical and electrical) are required to be complete and day tank refueling process in operation within 10 hours of initial 480v FLEX DG operation. Maintaining the 480v FLEX DGs day tank levels is a manually controlled operation.					

Action Item	Elapsed Time from Event Initiation (T-0)	Action	New ELAP time constraint Y/N	Task Duration (hours)	Remarks / Applicability
18	7 hours	Initiate refueling preparation for diesel fueled FLEX equipment that require manual refueling operations. • Refueling of portable FLEX equipment from truck mounted 500 gallon fuel tanks. • Initiate fuel transfer to the 480v FLEX DGs 8,000 gallon fuel tank and complete 480v FLEX DGs day tank refueling connections (mechanical and electrical). Verify complete, fuel transfer pumps operation and day tanks makeup. • Complete 6900v FLEX DGs day tanks refueling connections. Verify complete, fuel transfer pumps operations and day tanks makeup.	N	Continuous requirement once initiated	This will need to be initiated within 7 - 8 hours of initiation of diesel fueled FLEX equipment operation. Note that this action could be initiated earlier, if resources are available.

Note: If a tornado or high wind driven missile penetrated the CSTs at the top of their protective barrier the CSTs will provide approximately 7.5 hours of makeup water for the SGs. This would expedite the need for evaluating and directing SG makeup water options.

Action Item	Elapsed Time from Event Initiation (T-0)	Action	New ELAP time constraint Y/N	Task Duration (hours)	Remarks / Applicability
19	10 hours	Evaluate makeup to the CSTs. The CSTs provide approximately 14 hours for 2 unit operation.	N	Continuous once initiated	Sources of makeup to the CSTs are identified and FLEX connections are provided to facilitate transfer of quality water. Alignment to the ERCW system and an ultimate heat sink source via the LP FLEX pumps remains an option.
20	7 hours	Initiate portable lighting for MCR, Shutdown Board Room and FLEX equipment locations, as required.	N	Continuous once initiated	This is not a time constraint and MCR and Shutdown Board Rooms are provided with battery backup lighting. Portable lighting for FLEX equipment staging locations could be required. Portable lighting will be available for internal and external service, if required.
22, 23, 24 & 25	7 hours	Monitor TDAFWP Room, Main Control Room (MCR), Shutdown Board Room, Vital Battery Board Room and SFP area ventilation needs.	N	Continuous once initiated	If required, verify 6.9KV FLEX DG loading and restore selected heating, ventilation and air conditioning (HVAC) systems to service. (References 45, 46 & 47).
26 & 27	7 hours	Evaluate, identify and address long term (within 72 hours) needs including: • Mobile water purification units. • Site diesel fuel service.	N	Continuous	

Attachment 1B
NSSS Significant Reference Analysis Deviation Table

Item	Parameter of interest	WCAP value WCAP-17601-P, Revision 1, January 2013 (Reference 50). NSAL-14-1, Revision 1, September 8, 2014 (Reference 53). CN-SEE-II-13-37, Revision 1 October 9, 2015 (Reference 55). LTR-SEE-15-55, Revision 0, November 19, 2015 (Reference 103)	WCAP page	Plant applied value	Gap and discussion
There are no deviations.					

Attachment 2

Milestone Schedule

The following milestone schedule is provided. The dates are planning dates subject to change as design and implementation details are developed. Any changes to the following target dates will be reflected in the subsequent 6 month status reports.

Activity	Target Completion Date	Activity Status (Will be updated every 6 months)	Revised Target Completion Date
Submit Overall Integrated Implementation Plan	**2/28/2013**		
6 Month Status Updates			
Update 1	**Aug-2013**	**Complete**	
Update 2	**Feb-2014**	**Complete**	
Update 3	**Aug-2014**	**Complete**	
Update 4	**Feb-2015**	**Complete**	
Update 5	**Aug-2015**	**Complete**	
Update 6	**Feb-2016**	**See Completion Report**	
FLEX Strategy Evaluation	**Jun-2013**	**Complete**	
Walk-throughs or Demonstrations	**Dec-2015**	**Complete**	
Perform Staffing Analysis	**Jan-2015**	**Complete**	
Modifications			
Modifications Evaluation	**Oct-2013**	**Complete**	
Unit 1 N-1 Walkdown	**Oct-2013**	**Complete**	
Unit 1 Design Engineering	**Mar-2015**	**Complete**	
Unit 1 Implementation Outage	**May-2015**	**Complete**	
Unit 2 N-1 Walkdown	**Apr-2014**	**Complete**	
Unit 2 Design Engineering	**Dec-2015**	**Complete**	
Unit 2 Implementation Outage	**Dec-2015**	**Complete**	
Storage			
Storage Design Engineering	**Mar-2015**	**Complete**	
Storage Implementation	**Dec-2015**	**Complete**	
FLEX Equipment			
Procure On-site Equipment	**Jan-2015**	**Complete**	
Develop Strategies with NSRC	**Dec-2013**	**Complete**	
Identify Off-site Delivery Stations	**Mar-2014**	**Complete**	

Procedures			
PWROG issues FSG guidelines	**Jun-2013**	**Complete**	
Create Site Specific FSIs	**Nov-2014**	**Complete**	
Create Maintenance Procedures	**Nov-2014**	**Complete**	
Training			
Develop Training Plan	**Nov-2014**	**Complete**	
Implement Training	**May-2015**	**Complete**	
Unit 1 FLEX Implementation	**Dec-2015**	**Complete**	
Unit 2 FLEX Implementation	**Dec-2015**	**Complete**	
Full Site FLEX Implementation	**Dec-2015**	**Complete**	
Submit Completion Report	**Jan-2016**	**Started**	**Feb 2016**