



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

CNL-15-175

August 28, 2015

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

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

Subject: **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)**

- 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. 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)
  3. 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)
  4. 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)

5. Letter from TVA to NRC, "Second Six-Month Status Report and Revised Overall Integrated Plan in Response to the March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order-EA-12-049) for Sequoyah Nuclear Plant," dated February 28, 2014 (ML14064A181)
6. 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)
7. 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)
8. 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
9. 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)

The purpose of this letter is to provide the fifth six-month status report pursuant to Section IV, Condition C.2, of the March 12, 2012, U.S. Nuclear Regulatory Commission (NRC) order modifying licenses with regards to requirements for mitigation strategies for beyond-design-basis external events, Order EA-12-049, for the Sequoyah Nuclear Plant (SQN), Units 1 and 2 (Reference 1).

On February 28, 2013, the Tennessee Valley Authority (TVA) submitted an Overall Integrated Plan (OIP) in response to Reference 2. On August 28, 2013, TVA provided the first six-month status report to the OIP (Reference 3).

The OIP submitted in Reference 2 employed a strategy using reactor coolant pump (RCP) low leakage seals. TVA revised its strategy to use the existing conventional RCP seals. This change in RCP seals required a revision to the OIP submitted by Reference 2. Based on a review of TVA's plan, including the first six-month update and information obtained

through the mitigation strategies audit process, the NRC concluded in its Interim Staff Evaluation (ISE) that the plan, when properly implemented, will meet the requirements of the Order EA-12-049 (Reference 4). The ISE included open item 3.2.1.6.A that required revision to the Sequence of Events due to use of the conventional RCP seals for reanalysis by the NRC. On February 28, 2014, TVA provided the second six-month status report and revised OIP (Reference 5) which included the required revision to the Sequence of Events due to use of the conventional RCP seals.

On August 28, 2014, TVA provided the third six-month status report (Reference 6). Reference 6 noted changes to the pre-staged locations for the current 6900v FLEX Diesel Generators (3 MWe DGs) and the change in the site location for the FLEX Equipment Storage Building.

On February 27, 2015, TVA provided the fourth six-month status report (Reference 7). This status report provided an OIP update summary section by section including the use of the Condensate Storage Tanks (CSTs) as the primary water source in lieu of the Auxiliary Feedwater Storage Tank (AFWST). In addition, a copy of the SQN OIP updated to February, 2015 was uploaded to the ePortal.

On April 2, 2015, TVA requested an extension for SQN Unit 1 FLEX implementation (Reference 8) to allow deferral of implementation until the Unit 2 required implementation. This request was granted by the NRC (Reference 9).


The Enclosure of this letter provides a summary of updates to SQN's OIP since the fourth six-month status report.

Two items on the OIP Open Items table remain open (Open Items 13 and 21). These two open items are listed in the Enclosure. The OIP Milestone Schedule status and target completion dates have been updated as shown in the Enclosure.

There are no new regulatory commitments in this letter. If you have any questions regarding this report, please contact Erin Henderson at (423) 843-7170.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 28th day of August 2015.

Respectfully,



J. W. Shea  
Vice President, Nuclear Licensing

Enclosure

cc: See Page 4

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Enclosure:

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

cc (Enclosure):

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

## ENCLOSURE

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

#### Introduction

Tennessee Valley Authority (TVA) developed an initial Overall Integrated Plan (OIP) (Reference 1 in Reference section of this enclosure), for Sequoyah Nuclear Plant (SQN), Units 1 and 2, documenting the diverse and flexible strategies (FLEX), in response to Reference 2. TVA provided the first 6-month status report on August 28, 2013 (Reference 3). A second 6-month update and a revised OIP were provided on February 28, 2014 (Reference 4), and the third 6-month status report on August 28, 2014 (Reference 5). A fourth 6-month status report was submitted to NRC on February 27, 2015 (Reference 6) and an updated OIP was provided to the NRC through the ePortal. This enclosure provides an update of milestone accomplishments since submittal of the fourth 6-month status report, including any changes to the compliance method or schedule.

#### Milestone Accomplishments

The following milestones have been completed since submittal of the fourth 6-month status report, and are current as of August 21, 2015.

- Unit 1 Design Engineering
- Unit 1 Implementation Outage
- Storage Design Engineering
- Implement Training

#### Milestone Schedule

The following provides an update to Attachment 2 of the OIP (Reference 4). The activity status of each item is provided, as well as any change to the expected completion date. The dates are expected dates and are subject to change as design and implementation details are developed.

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

Activity	Target Completion Date	Activity Status (Will be updated every 6 months)	Revised Target Completion Date
Submit Overall Integrated Implementation Plan	Feb 2013		
6 Month Status Updates			
Update 1	Aug 2013	Complete	
Update 2	Feb 2014	Complete	
Update 3	Aug 2014	Complete	

Activity	Target Completion Date	Activity Status (Will be updated every 6 months)	Revised Target Completion Date
Update 4	Feb 2015	Complete	
Update 5	Aug 2015	Complete	
Update 6	Feb 2016	Not Started	
<b>FLEX Strategy Evaluation</b>	<b>Jun 2013</b>	<b>Complete</b>	
<b>Walk-throughs or Demonstrations</b>	<b>May 2015</b>	<b>Started</b>	<b>Jan 2016</b>
<b>Perform Staffing Analysis</b>	<b>Jan 2015</b>	<b>Complete</b>	
<b>Modifications</b>			
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	Started	
Unit 2 Design Engineering	Nov 2014	In-progress	Dec 2015
Unit 2 Implementation Outage	Dec 2015	Not Started	
<b>Storage</b>			
Storage Design Engineering	Mar 2015	Complete	
Storage Implementation	May 2015	In-progress	Dec 2015
<b>FLEX Equipment</b>			
Procure On-site Equipment	Jan 2015	Complete	
Develop Strategies with NSRC	Dec 2013	Complete	
Identify Off-site Delivery Stations	Mar 2014	Complete	
<b>Procedures</b>			
PWROG issues FSG guidelines	Jun 2013	Complete	
Create Site Specific FSIs	Nov 2014	Complete	
Create Maintenance Procedures	Nov 2014	Complete	
<b>Training</b>			
Develop Training Plan	Nov 2014	Complete	
Implement Training	May 2015	Complete	
<b>Unit 1 FLEX Implementation</b>	<b>May 2015</b>	<b>Started</b>	<b>Dec 2015</b>
<b>Unit 2 FLEX Implementation</b>	<b>Dec 2015</b>	<b>Started</b>	
<b>Full Site FLEX Implementation</b>	<b>Dec 2015</b>	<b>Not Started</b>	
<b>Submit Completion Report</b>	<b>Jan 2016</b>	<b>Not Started</b>	<b>Feb 2016</b>

## **FLEX Mitigation Strategy Update Summary**

The following is a list of updates made to the information provided since the fourth 6-month status report (Reference 6). A copy of the latest version of the OIP incorporating these changes will be uploaded to the ePortal. Additional discussion and detail are provided in the OIP.

### **General information:**

- The Developmental Reference listing has been updated, a SQN FLEX White Papers section included and TVA Electronic Document Management System (EDMS) numbers referenced to ease retrievability, as needed.

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

- The hardened and seismically qualified CSTs serve as the primary source of Steam Generator (SG) makeup water.
- Long term borated water source includes the (refueling water storage tank) RWST Alternate Strategy for maintaining core cooling with SGs not available. The RWSTs are missile protected from their base at plant grade (elevation 706 feet) to a height 3 feet above their base. The tank is fabricated of 5/16" thick SS SA 240 type 304 plate and has horizontal stiffener bands installed. The volume of water protected is 20,000 gallons. The Unit 1 and Unit 2 RWSTs are located on opposite sides of the plant with structures located between the tanks. In the event of a tornado, it is assumed that one RWST would be damaged by a missile, but the other RWST would survive. This is based on a separation distance of 500 feet in the north and south direction and the robust concrete structures located between the two tanks. These structures include the Reactor Buildings (height of 856.5'), Auxiliary Building (796.75'), and the Control Building (755') that provide shielding and separation between the RWSTs (749.7'). Other structures around the RWSTs that would provide a level of protection from tornado generated missiles include for Unit 1, the Unit 1 Primary Water Storage Tank to the east and the Service Building to the west; for Unit 2, the Unit 2 Primary Water Storage to the east and the Condensate Storage Tank shield wall to the west. TVA calculation for structural integrity analysis of the RWSTs is CEB-CQS-295. This calculation verifies structural integrity of the tank under static and dynamic loading.

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

- Identified revised reactor coolant pump (RCP) seal leakage rates based on PWROG/Westinghouse calculations. Based on the identified RCP seal leakage rates, there is no change to the strategy.

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

- The plant modification to add two independent spent fuel pool (SFP) level instruments which provide remote SFP level monitoring capability is complete. There are no open items relative to NRC Order EA 12-051 and NEI 12-02.

**Safety Functions Support:**

- Each 480v FLEX diesel generator (DG) is provided with a 180 gallon day tank. Each day tank will provide approximately 10 hours of 480v FLEX DG full load operation. Makeup for the 480v FLEX DGs' day tanks will be 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. Diesel fuel makeup to the 480v FLEX DG day tanks will require manual operator actions on a 7 to 8 hour periodicity to start the fuel transfer pumps and shut them off when day tank levels are full. Procedure 0-MI-FMI-360-024.0, FLEX - 480V FLEX DG Refueling Strategy will provide the instructions for ensuring a successful 480v fueling strategy.

**Items that remain Open from Overall Integrated Plan (OIP) and NRC Evaluation**

The following table provides a summary of the OIP open items that remain Open. The complete OIP Open Items listing is provided in the uploaded OIP.

Open Item Number	Description	Status
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.	Open TVA River Operations' procedure RvM-SOP-10.05.06, Nuclear Notifications and Flood Warning Procedure, Revision 0002, May 01, 2015, provides the flood warning notification protocol and SQN procedure AOP-N.03, External Flooding will be revised prior to FLEX implementation to integrate FLEX strategies.
21	Develop a programmatic control report. The purpose of this report is to summarize the need to implement programmatic control of the FLEX program.	Open TVA SQN Technical Instruction, 0-TI-DXX-000-922.3 Diverse and Flexible Coping Strategies (FLEX) Program Bases, and TVA SQN Technical Instruction, 0-TI-DXX-000-922.4 Diverse and Flexible Coping Strategies (FLEX) Program, once approved will comprise SQN's FLEX Program Document. To complete December, 2015.



## Potential NRC Evaluation Impacts

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

## References

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

1. Letter from TVA to NRC, "Tennessee Valley Authority (TVA) - Overall Integrated Plan in Response to the March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049) for Sequoyah Nuclear Plant," dated February 28, 2013 (ML13063A183)
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