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

CNL-17-107

August 31, 2017

10 CFR 2.202
10 CFR 50.4

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

Browns Ferry Nuclear Plant, Units 1, 2, and 3
Renewed Facility Operating License Nos. DPR-33, DPR-52, and DPR-68
NRC Docket Nos. 50-259, 50-260, and 50-296

Subject: **Ninth 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 Browns Ferry Nuclear Plant (TAC Nos. MF0902, MF0903, and MF0904)**

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, dated 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 Number 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 Browns Ferry Nuclear Plant,” dated February 28, 2013 (ML13064A465)

6. 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 Browns Ferry Nuclear Plant,” dated August 28, 2013 (ML13247A284)

7. Letter from NRC to TVA, “Browns Ferry Nuclear Plant, Units 1, 2, and 3 – Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Order EA-12-049 (Mitigation Strategies) (TAC Nos. MF0902, MF0903, and MF0904),” dated December 19, 2013 (ML13225A541)

8. Letter from TVA to NRC, “Second 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 Browns Ferry Nuclear Plant (TAC Nos. MF0902, MF0903, and MF0904),” dated February 28, 2014 (ML14064A240)

9. Letter from TVA to NRC, "Third 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 Browns Ferry Nuclear Plant (TAC Nos. MF0902, MF0903, and MF0904),” dated August 28, 2014 (ML14248A496)

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 Browns Ferry Nuclear Plant (TAC Nos. MF0902, MF0903, and MF0904),” dated February 27, 2015 (ML15064A162)

11. Letter from NRC to TVA, “Browns Ferry Nuclear Plant, Units 1, 2, and 3 - 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. MF0902, MF0903, MF0904, MF0881, MF0882, and MF0883),” dated April 6, 2015 (ML15069A358)

12. 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 Browns Ferry Nuclear Plant (TAC Nos. MF0902, MF0903, and MF0904)," dated August 28, 2015 (ML15240A228)

13. Letter from TVA to NRC, "Sixth 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 Browns Ferry Nuclear Plant (TAC Nos. MF0902, MF0903, and MF0904)," dated February 26, 2016 (ML16063A470)

14. Letter from TVA to NRC, "Seventh 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 Browns Ferry Nuclear Plant (TAC Nos. MF0902, MF0903, and MF0904)," dated August 26, 2016 (ML16242A030)

15. Letter from TVA to NRC, "Eighth 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 Browns Ferry Nuclear Plant (TAC Nos. MF0902, MF0903, and MF0904)," dated February 28, 2017 (ML17060A187)

On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued an order (Reference 1) to Tennessee Valley Authority (TVA). Reference 1 was immediately effective and directed TVA to develop, implement, and maintain guidance and strategies to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities following a beyond-design-basis external event. Specific requirements are outlined in Attachment 2 of Reference 1.

Reference 1 required submission of an initial status report 60 days following issuance of the final interim staff guidance (Reference 2) and an overall integrated plan (OIP) 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. Reference 5 provided the TVA Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3 OIP. Reference 9 provided Revision 1 of the OIP.

Reference 1 requires submission of a status report at six-month intervals following submittal of the OIP. Reference 3 provides direction regarding the content of the status reports. TVA provided the first six-month status report on August 28, 2013 (Reference 6). The NRC issued its Interim Staff Evaluation regarding TVA's OIP on December 19, 2013 (Reference 7). TVA has provided the subsequent six-month status reports in References 8 through 10, and 12 through 15. Additionally, Revision 1 of the OIP was provided in Reference 9. The NRC issued its onsite Audit Report on April 6, 2015 (Reference 11).

The purpose of this letter is to provide the ninth six-month status report pursuant to Section IV, Condition C.2, of Reference 1. The enclosed report provides an update of milestone accomplishments since submittal of the eighth six-month status report, including any changes to the compliance method or schedule.

There are no new regulatory commitments contained in this letter. If you have any question regarding this submittal, please contact Mike Oliver at (256) 729-7874.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 31st day of August 2017.

Respectfully,

J. W. Shea
Vice President, Nuclear Regulatory Affairs & Support Services

Enclosure: Tennessee Valley Authority Browns Ferry Nuclear Plant's Ninth 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)

cc (Enclosure):

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

ENCLOSURE

TENNESSEE VALLEY AUTHORITY BROWNS FERRY NUCLEAR PLANT'S NINTH 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)

1 Introduction

In response to Order EA-12-049 (Reference 2 in Section 8), Browns Ferry Nuclear Plant (BFN) developed an Overall Integrated Plan (OIP) (Reference 1 in Section 8) documenting the diverse and flexible strategies (FLEX). OIP Revision 1 was submitted with the third six-month status report (Reference 7 in Section 8). This enclosure provides an update of milestone accomplishments since the submittal of the eighth six-month status report (Reference 14 in Section 8) regarding the OIP, including any changes to the compliance method or schedule.

2 Milestone Accomplishments

The following milestones have been completed since the submittal of the eighth six-month status report regarding the OIP. Milestone accomplishments are current as of August 21, 2017.

- Unit 2 FLEX Implementation

3 Milestone Schedule

The following provides an update to Attachment 2, Milestones, of OIP Revision 1. The update provides the activity status of each item and whether the target date has changed. The target completion dates are planning dates subject to change as design and implementation details are developed.

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

Activity	Original Target Date	Activity Status	Revised Target Completion Date
Submit Overall Integrated Plan	February 2013	Complete	
Submit 6 Month Updates:			
Update 1	August 2013	Complete	
Update 2	February 2014	Complete	
Update 3	August 2014	Complete	
Update 4	February 2015	Complete	
Update 5	August 2015	Complete	
Update 6	February 2016	Complete	
Update 7	August 2016	Complete	
Update 8	February 2017	Complete	
Update 9	August 2017	**Complete**	
Update 10	February 2018	Not Started	
FLEX Strategy Evaluation	March 2014	Complete	
Unit 1 - Validation of connection points for FLEX Phase 2 & 3 via walkthrough or demonstration. (Graded approach)	November 2016	Complete	
Unit 2 - Validation of connection points for FLEX Phase 2 & 3 via walkthrough or demonstration. (Graded approach)	April 2015	Complete	
Unit 3 - Validation of connection points for FLEX Phase 2 & 3 via walkthrough or demonstration. (Graded approach)	April 2016	Complete	
Perform Staffing Analysis	January 2015	Complete	
Modifications:			
Modifications Evaluation	March 2014	Complete	
Unit 1 N-1 Walkdown	October 2014	Complete	
Unit 1 Design Engineering	November 2014	Complete	
Unit 1 Implementation Outage	November 2016	Complete	
Unit 2 N-1 Walkdown	March 2013	Complete	
Unit 2 Design Engineering	December 2014	Complete	
Unit 2 Implementation Outage	April 2015	Complete	
Unit 3 N-1 Walkdown	March 2014	Complete	
Unit 3 Design Engineering	November 2014	Complete	
Unit 3 Implementation Outage	April 2016	Complete	
Storage:			
Storage Design Engineering	August 2014	Complete	
Storage Implementation	April 2015	Complete	
FLEX Equipment:			
Procure On-Site Equipment	January 2015	Complete	
Develop Strategies with RRC	February 2015	Complete	
Identify Off-Site Delivery Station	April 2015	Complete	
Procedures:			

Activity	Original Target Date	Activity Status	Revised Target Completion Date
BWROG issues FSG guidelines	April 2014	Complete	
Create Browns Ferry FSIs	April 2015	Complete	
Create Maintenance Procedures	April 2015	Complete	
Training:			
Develop Training Plan	December 2014	Complete	
Implement Training	February 2015	Complete	
Unit 1 FLEX Implementation	November 2016	Complete	
Unit 2 FLEX Implementation	April 2015	**Complete**	April 2017
Unit 3 FLEX Implementation	April 2016	In-Progress	April 2018
Full Site FLEX Implementation	November 2016	In-Progress	April 2018
Submit Completion Report	December 2016	Not Started	May 2018

4 Changes to Compliance Method

The following is a list of changes made to the information provided in OIP Revision 1 (Reference 7 in Section 8) and not provided in previous 6 month updates. These changes meet the NEI 12-06 compliance method.

4.1 Section 4, discussion of time constraints identified in Attachment 1A table, revised to read as follows:

Item 15: Units 1 and 2 are equipped with a Hardened Containment Vent System that complies with NRC Order EA-13-109 Phase 1. Unit 3 is scheduled to be in compliance in April 2018 and will rely on the existing Hardened Wetwell Vent System venting capabilities in the interim.

4.2 Section 13, Maintain Containment, BWR Installed Equipment Phase 1, revised to read as follows:

For Unit 3, the current, as-designed Hardened Wetwell Vent System (HWWV) is capable of preventing the pressure in the pressure suppression chamber (torus) from exceeding the primary containment pressure limit of 56 psig by releasing 1 percent thermal power. This vent will later be modified in accordance with the schedule for NRC Order EA-13-109, “Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation under Severe Accident Conditions.” The revised schedule and implementation timeline contained in NRC Order EA-13-109 impacts the ability to achieve full implementation of the mitigations strategy requirements of NRC Order EA-12-049 with respect to current required dates for Unit 3. Relaxation and request for extension of the requirements contained in NRC Order EA-12-049 has been approved (References 8 and 9 in Section 8). In the interim, the primary strategy for maintaining containment is through the use of the current as-designed HWWV to remove heat from the Suppression Pool.

For Units 1 and 2, modifications have been completed that implement a reliable, severe accident capable Hardened Containment Vent System (HCVS) wetwell path, capable of releasing 1 percent thermal power at a power uprate of 3952 MWt, to ensure compliance with NRC Order EA-12-049 and Phase 1 of EA-13-109.

4.3 Section 14, Maintain Containment, BWR Portable Equipment Phase 2, revised to read as follows:

The Phase 2 strategy to maintain containment uses the Unit 3 Hardened Wetwell Vent System (HWWV) and the Units 1 and 2 Hardened Containment Vent System (HCVS) for torus (wetwell) venting to maintain containment parameters within EOI limits. This is a continuation of the Phase 1 strategy, with the addition of portable 4kV or 480V FLEX Generator as discussed in Section 11, Maintain Core Cooling, BWR Portable Equipment Phase 2 section.

The HWWV/HCVS are normally powered from the Class 1E Unit Batteries. As described in Section 11, Maintain Core Cooling, BWR Portable Equipment Phase 2 section, the 4kV or 480V FLEX Generator will be deployed to provide power to all 3 Unit Battery Chargers to maintain sufficient battery power to operate the HCVS DC solenoids. In addition, the Units 1 and 2 HCVS includes an independent battery bank, charger, and distribution equipment with the ability to power all required HCVS equipment for 24 hours. An alternate HCVS motive air supply from nitrogen bottles is also provided to assure 24 hours of operation without bottle change out. If necessary, these independent systems can be manually aligned to provide power/motive force to the HCVS system.

5 Need for Relief/Relaxation and Basis for the Relief/Relaxation

TVA requested and received relaxation from full implementation until the completion of the Spring 2017 refueling outage for BFN Unit 2 and the spring 2018 refueling outage for BFN Unit 3 to allow sufficient time to implement a severe accident capable hardened containment wetwell vent (References 8 and 9 in Section 8). The Milestone Schedule (Section 3 and OIP Attachment 2) has been revised to reflect this relaxation.

6 Open Items from Overall Integrated Plan and NRC Evaluation

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

Overall Integrated Plan Open Item	Status
OI-1: Flood and seismic re-evaluations pursuant to the 10 CFR 50.54(f) letter of March 12, 2012 are not completed and therefore not assumed in this submittal. As the re-evaluations are completed, appropriate issues will be entered into the corrective action system and addressed.	Open pending NRC review. No further TVA action required. The flood and seismic re-evaluations pursuant to the 10 CFR 50.54(f) letter of March 12, 2012 are complete. Reference TVA to NRC letter, Flood Hazard Reevaluation Report for Browns Ferry Nuclear Plant, Response to NRC 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, 2015; and calculation BFN Expedited Seismic Evaluation Process (ESEP) HCLPF [High-Confidence-of-Low-Probability-of-Failure] Capacity Evaluations, CDQ0009992014000268 R2, respectively.

Overall Integrated Plan Open Item	Status
OI-2: Liquefaction of haul routes for FLEX will be analyzed from Staging Area B to Staging Area A. Also, an evaluation will be conducted of haul routes from Staging Area D and Staging Area C to Staging Area B.	Closed - A liquefaction study for path from Staging Area B to the West Access Portal was performed by Amec Environment and Infrastructure Inc. and documented in their report dated August 19, 2014. The report concluded that liquefaction induced settlement will not exceed 2.5" and cracking due to lateral spreading will be insignificant. The Staging Areas inside the Protected Area (PA) were evaluated during construction of ISFSI Pad, and it was determined that there would be no significant displacement (< 1.0") due to SSE seismic event (Ref Calc No. CDQ007920030261, Soil Structure Interaction Analysis for BFN ISFSI Pad). Therefore, it can be concluded that paths to the staging areas inside the protected area will not be susceptible to any significant deformations that would impact deployment of FLEX Equipment after any severe seismic event.
OI-3: TVA will confirm that they have enough fuel onsite for the first 24 hours. A diesel fuel storage and refueling plan also has to be developed.	Closed - The duration of the ELAP is 72 hours, and all permanent plant sources of AC power are considered unavailable. The T/Gs will burn No. 2 Diesel Fuel at a full load consumption rate of 110 gallons/hour per T/G. The T/Gs are not provided with their own fuel oil storage tanks. Two portable trailer mounted "Transcube" fuel oil storage tanks with 1200 gallon of No. 2 Diesel Fuel each will be stored in the FESB and available for deployment with the 480V and 4kV generator sets. Each "Transcube" will be equipped with adequate hose, valves, manual priming pump, and compatible connections necessary to support initial generator operation. One dedicated "Transcube" for the 480V generator will provide adequate fuel for the first 10 hours of operation, and one shared "Transcube" between the two 4kV generators will provide adequate fuel for the first 5 hours. Three Gorman-Rupp portable diesel engine driven self-priming centrifugal diesel fuel pumps will be stored in the FESB. These pumps can be staged to transfer fuel oil from any of the eight Diesel 7 Day fuel oil storage tanks with a Technical Specifications minimum capacity of >35,280 gallons each or from one of two fuel oil storage tank located on the east side of the plant. The total combined Technical Specification minimum volume for the 8 installed EDGs is 282,240 gallons.

Overall Integrated Plan Open Item	Status
OI-4: BFN will evaluate SRV qualification against the predicted containment response with FLEX implementation to ensure there will be sufficient DC bus voltage and pneumatic pressure to operate the SRVs throughout Phase 1 and Phase 2.	Open pending NRC review. No further TVA action required. Based on review of Environmental Qualification (EQ) BFNEQ-SOL-009 D-4 for the SRV solenoid, testing results indicate that the SRV solenoid will actuate sufficiently with the following DC bus voltage and pneumatic pressure supply: Drywell Temperature < 340°F Pressure at least 45 psig > containment pressure DC voltage > 105 VDC MAAP analysis calculation NDN0009992014000242 provides accident progression timelines for cases that predict peak Drywell temperatures to be less than 317°F, which is well within qualifications (340°F). TVA calculation MDQ0009992014000239 provides sizing and requirements for the alternate nitrogen system to ensure adequate 100 psig pneumatic supply is available under Beyond Design Basis External Event (BDBEE) conditions. DCNs 71387, 70810, & 71386 (for Units 1, 2 & 3, respectively) have been completed that provides an alternate nitrogen supply to each of the two Drywell control air headers on each unit.

Overall Integrated Plan Open Item	Status
OI-5: A reference source for the plant operators will be developed that provides approaches to obtaining necessary instrument readings to support the implementation of the coping strategy (NE 12-06, Section 3.2.1.1 0). This reference source should include control room and non-control room readouts and should also provide guidance on how and where to measure key instrument readings at containment penetrations, where applicable, using a portable instrument (e.g., a Fluke meter). Such a resource could be provided as an attachment to the plant procedures/guidance. Guidance will include critical actions to perform until alternate indications can be connected and on how to control critical equipment without associated control power.	Closed - 1/2/3-FSI-6C, Key Instrument Readings During Loss of DC Power, are new FLEX procedures that have been developed to provide guidance during a BDBEE with the loss of instrument power. A 3-Tiered approach to FLEX measurement strategies as follows (all three tiers may not be applicable for every measurement to be obtained): TIER 1: Provide power to primary instruments (i.e., transmitter or RTD) and measure at locations directly accessible from the Control Bay. These locations are the Auxiliary Instrument Rooms or Electric Board Rooms. Primary instrument wiring would be lifted and handheld devices connected which provide both power and measuring capabilities. TIER 2: Provide power to primary instruments and measure at Reactor Building locations. These locations are within Secondary Containment. Primary instrument wiring would be lifted and handheld devices connected which provide both power and measuring capabilities. TIER 3: Provide alternate instruments to measure the desired parameters as close to the process as is practical.
OI-6: Validate the preliminary Battery studies that were performed to ensure appropriate battery life will be available with regards to the overall FLEX strategies. Ensure that buildup of hydrogen is considered and mitigated appropriately.	Closed - Calculation EDQ0009992013000202, 250V DC Unit Batteries 1, 2 & 3 Evaluation for BDBEE Extended Loss of AC Power (ELAP), documents the load calculation for the 250 volt unit batteries. This load study strips nonessential loads to allow BFN Units 1, 2, & 3 to last 12 hours. DCN 71470 is the modification that procures fans for installation in the battery rooms during a beyond design basis event to account for the hydrogen production during battery off gassing during battery charging. Flex procedure 0-FSI-4A, Control Bay/Reactor Building Lighting And Ventilation During ELAP, installs the fans during a beyond design basis event in the battery rooms on elevation 1C (593') in the control bay.

Overall Integrated Plan Open Item	Status
OI-7: BFN will take actions as necessary to assure RCIC can operate at elevated temperatures.	Open pending NRC review. No further TVA action required. In order to ensure continued operation with high RCIC room temperatures, 2 Emergency Operating Instruction (EOI) appendices are directed to be performed by the Station Blackout (SBO) flowchart. EOI Appendix-16K is performed to bypass the RCIC area high temperature isolations. EOI Appendix-20M is performed, and it contains steps to disable the RCIC electronic governor and control flow with the RCIC trip/throttle valve, FCV-71-9. The electronic governor is susceptible to failure at room temperatures above 150°F, which occurs at approximately 7.5 hours into the event. These appendices are performed as soon as the SBO flowchart is entered. In order to ensure continued operation with high suppression pool temperatures, DCN 71329 included a connection point from the Emergency Equipment Cooling Water (EECW) header, which will supply cooling water to the RCIC oil cooler. This allows the normal cooling water supply (suppression pool) to be valved out and cooler water from the FLEX pumps via the EECW header to be valved in.
OI-8: Perform modifications, as necessary, to ensure that RCIC is seismically robust.	Closed - Reactor Core Isolation Cooling (RCIC) system has been evaluated using the Expedited Seismic Evaluation Process (ESEP). Calculation CDQ0009992014000268, BFN Expedited Seismic Evaluation Process (ESEP) HCLPF Capacity Evaluations, has determined that the RCIC system is seismically rugged and complies with the requirements of BFN FLEX Strategies. Based on the conservative evaluation documented in this calculation, BFN Units 1, 2, & 3 meet all seismic capacity requirements for ESEP. The ESEP review performed for BFN Units 1, 2, & 3 was summarized in AREVA Inc. Document No. 51-9230498 Rev. 1, Expedited Seismic Evaluation Process (ESEP) Summary Report for Browns Ferry Nuclear Plant, dated December 10, 2014.

Overall Integrated Plan Open Item	Status
OI-9: Develop and perform the design modifications identified in the FLEX Strategy document to permit the timely and safe connection of the FLEX and NSRC equipment during the adverse conditions encountered during these beyond design basis events.	Closed - DCN 71329 installed connection points in the "B" EECW pump room, "D" Residual Heat Removal Service Water (RHRSW) pump room, and the "B" RHRSW pump room for connection of the portable FLEX pump systems. This DCN also established a connection point and isolation for the RCIC oil coolers. FLEX Support Instructions (FSIs) direct the connections and operation of FLEX pump systems. DCN 71454 installed a pump deployment path from the FESB to the new FLEX Pump Deployment pads at the Intake Pump Station forebay. 0-FSI-6A, Damage Assessment, (Ref. 13n) provides guidance during a BDBEE. Steps are directed to identify issues that will impede deployment of equipment and implementation of FLEX strategies.
OI-10: Design and construct a Flexible Equipment Storage Building, located above the probable maximum flood level, which is adequately protected from the hazards listed in Section 1.	Closed - Flex Mitigation System Design Criteria BFN-50-7360 identifies the design attributes and storage requirements for the FESB. DCN 70745 implemented the design of the building which complies with the Flex Design Criteria.
OI-11: Modify currently installed hardened wetwell vent to install backup pneumatic supply or provided procedural guidance for manual operation, to allow use within current design limits.	Closed - Proposed modifications to the existing Hardened Wet Well Vent (HWWV) to comply with NRC Order EA-13-109 includes the design for a backup pneumatic supply for operation of the Hardened Containment Vent System (HCVS) valves (FCV-064-0221 & 0222) during an BDBEE. However, compliance with Order EA-13-109 does not support implementation schedule of the FLEX Order EA-12-049. Based on the difference in implementation schedules between Orders EA-13-109 and EA-12-049, BFN has requested and received a relaxation for full compliance with Order EA-12-049. Valves FCV-064-0221 and -0222 have the ability to be manually operated based on the design implemented under GL 89-16, Installation of a Hardened Wetwell Vent. The event in which operation of the HCVS valves would be needed is a BDBEE. Operations would be performing actions as needed to maintain the plant in a safe condition, and operation of components to vent containment would be performed in accordance with procedure 2-EOI Appendix 13, Emergency Venting Primary Containment. Since the plant is performing mitigation strategies and fuel damage has not occurred, environmental conditions in the area would allow access to the valves for operation.

<table>
<tr><th>Overall Integrated Plan Open Item</th><th>Status</th></tr>
<tr><td>OI-12: Design and install the modifications required by Order EA-12-051 for enhancing the SFP.</td><td>Closed - The design and implementation of the Spent Fuel Pool Level Instrumentation was completed in accordance with Engineering Change Packages DCN 71159, DCN 71160, and DCN 71161 for BFN Units 1, 2, & 3, respectively. The applicable codes, standards, regulatory requirements, and procedures are spelled out within the stated DCNs.</td></tr>
<tr><td>OI-13: Determine the design specifications for FLEX equipment yet to be ordered, such as the six Portable Ventilation Fans, the Mobil Water Purification Unit, debris removal equipment for the FLEX Equipment Haul path and piping for the FLEX low pressure pumps.</td><td>Closed - BFN has two Ford F550 trucks equipped with scraper blades and winches for debris removal and one compact track loader CAT 299D for debris removal.
DCN 71470 provided a 480v supply and connection strategy to portable lighting and ventilation during a BDBEE.

20 Smithlight Battery operated LED work lights were provided in the DCN.

A total of 12 fans were provided in the DCN and will be deployed and operated using 0-FSI-4A in the Control Bay.

<table><tr><th>Fan</th><th>Quantity</th></tr><tr><td>TA16-5000</td><td>3</td></tr><tr><td>Coppus Vano 175CV</td><td>3</td></tr><tr><td>Coppus Vano 250CV</td><td>2</td></tr><tr><td>Pedestal Fan</td><td>3</td></tr><tr><td>30 inch Barrel Fan</td><td>1</td></tr></table></td></tr>
</table>

Overall Integrated Plan Open Item	Status
OI-14: Deployment strategies and deployment routes will be assessed for impact due to identified hazards and guidance developed/provided to ensure that 1) sufficient area is available for deployment, 2) haul paths remain accessible without interference from outage equipment during refueling outages and 3) deployment locations for the pumps including ramps, winches or other transfer assemblies as appropriate to deploy all pumps and hoses within the 8 hour Phase 1 coping interval.	Closed - DCN 70745 (Site Bunker Building), DCN 71454 (Install Deployment Roads and Pump Landings), DCN 71405 (Stage 4kv Diesels for Fukushima Event and Provide Connection Points), and DCN 71470 (Stage 480v power supply and support equipment to charge the Unit Battery Chargers) have ensured sufficient area is available for deployment. Additionally, all deployment accessories such as pumps, ramps, winches, and other transfer assemblies such as “equipment trailers,” as appropriate, have been assessed and are included to ensure OIP timeframes are met. Haul paths and deployment pads will be observed daily during Nuclear Security rounds to ensure both paths and pads are accessible without interference.

OI-15: Detailed staffing studies based on the procedures/guidance developed.	Closed - Browns Ferry Nuclear Plant has completed a Phase 2 ELAP ERO Staffing Analysis Report in accordance with NEI 12-01. The analysis concluded the on-shift ERO staffing present for the “no-site access” 6-hour time period is sufficient to perform the FSI, EOI, and emergency response tasks.
OI-16. Validation of the time lines for the various strategies.	Closed - Validation of the time lines for the various strategies was performed in accordance with 0-FSI-8B, FLEX Strategy Validation Process (Ref. 13s). This FSI utilized NEI 14-01 FLEX Validation Process as a reference.
OI-17: Browns Ferry Nuclear Plant (BFN) will utilize the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOIs.	Closed - BFN has utilized the industry-developed guidance from the BWROG, EPRI, and NEI Task team to develop site specific procedures that addressed the criteria in NEI 12-06 (Ref. 6). Procedure 0-AOI-57-1A, Loss Of Offsite Power (161 and 500 KV)/Station Blackout, the EOI appendices, and the FSIs support the existing symptom-based command and control strategies in the current EOIs.
OI-18: New training of general station staff and EP will be performed prior to the first BFN unit design implementation outage. These programs and controls will be implemented in accordance with the Systematic Approach to Training.	Closed - Procedure TRN-30, Radiological Emergency Preparedness Training, requires the Emergency Preparedness responders to complete INPO Generic Basic Flex Training (NANTEL 00002382), and, for persons assigned key positions, the INPO Generic Advanced Flex Training (NANTEL 00002385). Training requirements by position are listed in TRN-30, Attachment 3. This TRN was developed in accordance with the Systematic Approach to Training (SAT). Additional overview training was developed for Maintenance personnel that may be asked to deploy and connect equipment in various scenarios. This training was developed using the SAT process and approved by the respective Maintenance training oversight committees. The Technical training organizations also documented Training Needs Analysis for their groups with conclusions being that Nantel Basic FLEX overview is sufficient at this time.

OI-19: TVA will establish a contract with the Strategic Alliance for FLEX Emergency Response (SAFER) team. A local assembly area must also be established by SAFER and TVA for equipment moved from the National SAFER Response Center (NSRC) to BFN.	Closed - A contract has been established between TVA and the SAFER team, AREVA Inc. Document No. 51-9233061 Rev. 0, Browns Ferry Nuclear Plant SAFER Response Plan. Two off-site local staging areas have been identified, and one onsite staging area has been identified. The onsite staging area (Staging Area B) is located in the Northeast corner of the Owner Controlled Area at the Facility and Vehicles Maintenance Shop. The two off-site staging areas are TVA Helicopter Operations at the Northwest Alabama Regional Airport (Staging Area C) in Muscle Shoals, Alabama, and at the Pryor Field Regional Airport (Staging Area D) in Decatur, Alabama.
OI-20: Evaluate different strategies to allow removal of water from the Suppression Pool. Determine if any modifications are required and what strategies are deemed feasible.	Closed - New procedures 1/2/3-EOI Appendix-20K, Suppression Pool Pump Down Using RCIC (FLEX), utilize RCIC in test mode to pump the torus to the Condensate Storage Tanks. The required valves are dc-powered and will be available to be operated from the Main Control Room.
OI-21: Abnormal operating procedure, AOI-100-9, Turbine Building Internal Flooding, provides the symptoms and operator actions to be taken for this condition. During development of procedures to support FLEX strategies, adequate guidance will be given to operators to ensure their travel paths avoid these areas.	Closed - 0-FSI-6A, Damage Assessment, is a new FLEX procedure that has been developed to provide guidance during a BDBEE. Steps are directed to identify issues that will impede deployment of equipment and implementation of FLEX strategies. Building assessments are performed and information provided to the FLEX Response SRO, Shift Manager, or Site Emergency Director to make decisions based on results. Internal plant flooding will be identified, and alternate routes are available for performance of these strategies. Doors are verified unlocked and available to allow access to the Control Bay and Reactor Buildings via Electric Board Rooms on elevations 621’ and 593’.

7 Potential Draft Safety Evaluation Impacts

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

8 References

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

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 Browns Ferry Nuclear Plant,” dated February 28, 2013 (ML13064A465)
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. NEI 12-06 Revision 0, “Diverse and Flexible Coping Strategies (FLEX) Implementation Guide,” dated August 21, 2012 (ML12242A378)
4. 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 Browns Ferry Nuclear Plant,” dated August 28, 2013 (ML13247A284)
5. Letter from NRC to TVA, “Browns Ferry Nuclear Plant, Units 1, 2, and 3 – Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Order EA-12-049 (Mitigation Strategies) (TAC Nos. MF0902, MF0903, and MF0904),” dated December 19, 2013 (ML13225A541)
6. Letter from TVA to NRC, “Second 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 Browns Ferry Nuclear Plant (TAC Nos. MF0902, MF0903, and MF0904),” dated February 28, 2014 (ML14064A240)
7. Letter from TVA to NRC, "Third 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 Browns Ferry Nuclear Plant (TAC Nos. MF0902, MF0903, and MF0904),” dated August 28, 2014 (ML14248A496)
8. Letter from TVA to NRC, “Request for Relaxation from NRC Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events”," dated August 28, 2014 (ML14247A447)
9. Letter from NRC to TVA, "Browns Ferry Nuclear Plant, Units 2 and 3 - Relaxation of the Schedule Requirements for Order EA-12-049 “Issuance of Order to Modify Licenses With Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events” (TAC Nos. MF0903 and MF0904),” dated December 23, 2014 (ML14281A198).
10. Letter from TVA to NRC, "Fourth 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 Browns Ferry Nuclear Plant (TAC Nos. MF0902, MF0903, and MF0904),” dated February 27, 2015 (ML15064A162).

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 Browns Ferry Nuclear Plant (TAC Nos. MF0902, MF0903, and MF0904),” dated August 28, 2015 (ML15240A228)
12. Letter from TVA to NRC, “Sixth 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 Browns Ferry Nuclear Plant (TAC Nos. MF0902, MF0903, and MF0904),” dated February 26, 2016 (ML16063A470)
13. Letter from TVA to NRC, “Seventh 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 Browns Ferry Nuclear Plant (TAC Nos. MF0902, MF0903, and MF0904),” dated August 26, 2016 (ML160242A030)
14. Letter from TVA to NRC, “Eighth 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 Browns Ferry Nuclear Plant (TAC Nos. MF0902, MF0903, and MF0904),” dated February 28, 2017 (ML17060A187)