

VIRGINIA ELECTRIC AND POWER COMPANY  
RICHMOND, VIRGINIA 23261

March 2, 2015

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EA-12-049

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

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Docket Nos.: 50-280/281  
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**VIRGINIA ELECTRIC AND POWER COMPANY**  
**SURRY POWER STATION UNITS 1 AND 2**  
**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)**

References:

1. NRC Order Number EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," dated March 12, 2012
2. Virginia Electric and Power Company's Overall Integrated Plan 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 February 28, 2013 (Serial No. 12-163B)
3. Virginia Electric and Power Company's 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), dated August 28, 2014 (Serial No. 14-395)

On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued an order (Reference 1) to Virginia Electric and Power Company (Dominion). Reference 1 was immediately effective and directed Dominion to develop, implement, and maintain guidance and strategies to maintain core cooling, containment, and spent fuel pool cooling capabilities in the event of a beyond-design-basis external event.

Reference 1 required submission of an Overall Integrated Plan (OIP) (Reference 2) pursuant to Section IV, Condition C. Reference 1 also required submission of a status report at six-month intervals following submittal of the OIP.

The attachment to this letter provides the fourth six-month status report and an update of milestone accomplishments since the submittal of the previous six-month status

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**Attachment**

**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**

**February 2015**

**Virginia Electric and Power Company  
(Dominion)  
Surry Power Station Units 1 and 2**

**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**

## **1 Introduction**

Dominion developed an Overall Integrated Plan (OIP) (Reference 1) documenting the diverse and flexible strategies (FLEX) for Surry Power Station (Surry) in response to NRC Order Number EA-12-049 (Reference 2). This attachment provides an update of milestone accomplishments and open items since submittal of the last status report (Reference 3), including any changes to the compliance method, schedule, or need for relief/relaxation and the basis, if any.

## **2 Milestone Accomplishments**

The following milestones have been completed since the development of the OIP and are current as of January 31, 2015.

- Submit OIP
- Develop Strategies
- Develop Modifications
- Develop Training Plan
- Purchase Equipment
- Receive Equipment
- Create Maintenance Procedures

## **3 Milestone Schedule Status**

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

The revised milestone and associated target completion dates for 'Implement Training,' 'Issue FSGs and Associated Procedure Revisions,' 'Develop Strategies/Contract with NSRC,' 'Validation Walk-throughs or Demonstrations of FLEX Strategies and Procedures,' and 'Unit 1 Outage Implementation,' do not impact the Order implementation dates for Surry Units 1 and 2, but accurately reflect that each Unit's modifications, procedure revisions, and offsite support will be implemented prior to or during the unit's next scheduled refueling outage.

<b>Milestone</b>	<b>Target Completion Date</b>	<b>Activity Status</b>	<b>Revised Target Completion Date</b>
Submit Integrated Plan	February 2013	Complete	
Develop Strategies	October 2013	Complete	
Develop Modifications	December 2014	Complete	
Implement Unit 1 Modifications	May 2015	Started	
Implement Unit 2 Modifications	November 2015	Started	
Develop Training Plan	April 2014	Complete	
Implement Training	August 2014	Started	May 2015*
Issue FSGs and Associated Procedure Revisions	December 2014	Started	April 2015*
Develop Strategies/Contract with NSRC**	August 2014	Started	March 2015*
Purchase Equipment	February 2014	Complete	
Receive Equipment	September 2014	Complete	
Validation Walk-throughs or Demonstrations of FLEX Strategies and Procedures	December 2014	Started	March 2015*
Create Maintenance Procedures	August 2014	Complete	
Unit 1 Outage Implementation	April 2015	Started	May 2015*
Unit 2 Outage Implementation	November 2015	Started	

\* Refer to Section 8, Supplemental Information, for an explanation of Milestone changes.

\*\* NSRC is the National SAFER Response Center.

#### **4 Changes to Compliance Method**

By letter dated February 28, 2013, Dominion provided an OIP to address Beyond-Design-Basis (BDB) events at Surry Units 1 and 2 (Reference 1) as required by Order Number EA-12-049, dated March 12, 2012 (Reference 2). The first, second, and third Six-Month Status Report of the OIP for Surry were provided by letters dated August 23, 2013 (Reference 4), February 27, 2014 (Reference 5), and August 28, 2014 (Reference 3), respectively. The following are changes to the compliance method information provided in the Surry OIP, which continue to meet NEI 12-06 guidance (Reference 6):

- a) Boric Acid Mixing Tanks: Dominion has reevaluated the proposed number of Boric Acid Mixing Tanks (BAMTs) to support the RCS injection strategy in the unlikely event that both Refueling Water Storage Tanks are unavailable following a tornado event. Two BAMTs provide the ability to batch one tank while the other is being injected into the RCS. Since two tanks allow for nearly continuous operation of a single RCS Injection pump, a third tank is being procured to comply with the N+1 philosophy outlined in NEI 12-06. Table 1 from the Overall Integrated Plan (and subsequent Six-Month Status Reports) which list the required BDB Equipment is not provided with this update. However, the BDB Equipment table in the Final Integrated Plan (FIP) will identify that three BAMTs are required for Surry and will be stored in the BDB Storage Building.
- b) Use of Portable UT Flow Measurement for AFW Flow Indication: Licensee Identified Open Item #12 identified three tasks associated with the use of existing station components to provide and monitor flow to the Turbine Driven Auxiliary Feedwater Pump (TDAFWP). Tasks 1 and 3, as described, have been completed. Task 2 included installation of permanent flow measurement devices in the discharge piping of each unit's TDAFWP. However, in lieu of the permanently installed flow meters, Dominion has decided to utilize portable UT flow measurement instrumentation. These devices will be attached to the TDAFWP discharge piping as part of the FLEX strategy implementation. These portable flow devices will be maintained and stored in the BDB Storage Building, which provides protection from BDB External Event hazards.

Following the Onsite NRC Audit at Surry, the NRC Staff indicated that further review of this Licensee Identified Open Item was not anticipated. Completion of the proposed Task 2 modification would be confirmed through completion of the modifications required for implementation. It is Dominion's position that, with use of the portable UT flow measurement instrumentation, Task 2 is considered "completed by alternate means," and consequently, the proposed Task 2 modification is no longer required.

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

Dominion expects to comply with the Order implementation date and no required relief/relaxation has been identified at this time.

## **6 Open Items**

### **6.1 Open Items from Overall Integrated Plan**

The following table provides a summary of the status of open items documented in Attachment 2B of the Surry Overall Integrated Plan submitted February 28, 2013 and the status of each item.

<b>Overall Integrated Plan Open Items</b>		
<b>OI #</b>	<b>Description</b>	<b>Status</b>
1	Verify response times listed in timeline and perform staffing assessment.	Started. (Reference 23) Scheduled completion date: March 2015*
2	Preliminary analyses have been performed to determine the Class 1E battery life based on implementation of load stripping actions. The final battery life duration will be provided when the analyses are completed.	Complete. (Reference 5, See Section 4, Item a.)  <b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b>
3	Preliminary analyses have been performed to determine the time to steam generator overfill without operator action to reduce AFW flow, time to steam generator dryout without AFW flow, and time to depletion of the useable volume of the ECST and ECMT. The final durations will be provided when the analyses are completed.	Complete. (Reference 7)  <b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b>
4	The Phase 3 coping strategy to maintain Containment integrity is under development. Methods to monitor and evaluate Containment conditions and depressurize/cool Containment, if necessary, will be provided in a future update.	Complete.  (See Reference 5, Attachment 2)
5	Analyses will be performed to develop fluid components performance requirements and confirm fluid hydraulic-related strategy objectives can be met.	Complete.  Hydraulic calculations for the FLEX pumps deployed using their associated hose networks have confirmed that the core cooling/decay heat removal, RCS Inventory, and



Overall Integrated Plan Open Items		
OI #	Description	Status
		<p>reactivity control (RCS Injection), and SFP Make-up strategies can be satisfactorily accomplished in response to an ELAP/Loss of Ultimate Heat Sink (LUHS) event. (References 8 and 9)</p> <p>A hydraulic calculation to confirm that the SW flow to support the Containment cooling options is not required since the source is expected to be gravity fed from the Intake Canal.</p> <p><b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b></p>
6	<p>A study is in progress to determine the design features, site location(s), and number of equipment storage facilities. The final design for BDB equipment storage will be based on the guidance contained in NEI 12-06, Section 11.3, Equipment Storage. A supplement to this submittal will be provided with the results of the equipment storage study.</p>	<p>Complete.</p> <p>A single 10,000 sq. ft. Type 1 building has been constructed at Surry for storage of BDB equipment. The building is designed to meet the plant's design basis for the Safe Shutdown Earthquake, high wind hazards, snow, ice and cold conditions, and will be located above the flood elevation from the most recent site flooding analysis. The BDB Storage Building will be sited just east of the south employee parking lot, inside the Owner Controlled Area. The location lies in an area between the Surry Nuclear Information Center</p>

Overall Integrated Plan Open Items		
OI #	Description	Status
		<p>and the Intake Canal. This update provides the supplemental information referred to in this open item. (Reference 10)</p> <p><b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b></p>
7	<p>FLEX Support Guidelines (FSGs) will be developed in accordance with PWROG guidance. Existing procedures will be revised as necessary to implement FSGs.</p>	<p>See Milestone Schedule above for completion schedule.</p> <p><b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b></p>
8	<p>EPRI guidance documents will be used to develop periodic testing and preventative maintenance procedures for BDB equipment. Procedures will be developed to manage unavailability of equipment such that risk to mitigating strategy capability is minimized.</p>	<p>Complete.</p> <p>EPRI guidance documents have been used, where available, to develop the testing and preventative maintenance strategies for the sites. Fleet-wide templates have been developed and input into the individual site maintenance strategies. Specific Periodic Maintenance (PM) procedures based on these strategies will be implemented prior to the required site compliance date for Order EA-12-049.</p>

Overall Integrated Plan Open Items		
OI #	Description	Status
		<p>A fleet-wide FLEX Strategy Program Document has been developed (Refer to Open Item 9). The program includes the requirement to manage unavailability of equipment such that risk to mitigating strategy capability is minimized. A fleet-wide procedure has been developed to specifically address equipment unavailability. (Reference 11)</p> <p><b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b></p>
9	An overall program document will be developed to maintain the FLEX strategies and their bases and to provide configuration control and change management for the FLEX Program.	<p>Complete.</p> <p>The fleet-wide programmatic control procedure has been provided for Staff review through the ongoing NRC audit process. (Reference 12)</p> <p><b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b></p>

<b>Overall Integrated Plan Open Items</b>		
<b>OI #</b>	<b>Description</b>	<b>Status</b>
10	The Dominion Nuclear Training Program will be revised to assure personnel proficiency in the mitigation of BDB events is developed and maintained. These programs and controls will be developed and implemented in accordance with the Systematic Approach to Training (SAT).	<p>Complete.</p> <p>Documentation of the Job Analysis performed for new operational tasks will be provided via the ongoing NRC audit process. (Reference 13)</p> <p><b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b></p>
11	Plant modifications will be completed for permanent plant changes required for implementation of FLEX strategies.	<p>Started.</p> <p>Scheduled completion date: See Milestone Schedule above.</p> <p><b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b></p>
12	The following actions will be completed to qualify the ECMT as a source of water to the TDAFW pump in response to an ELAP/LUHS event: (1) Upgrade the piping system from the ECMT to the TDAFW pump suction to Seismic Category I (2) Modify the TDAFW pump discharge piping to install local AFW flowrate indication (3) Confirm adequate TDAFW pump NPSH from the ECMT through the idle AFW booster pumps using conservative analysis.	<p>Items (1) and (3): Complete (Reference 10, Section 2.1.6)</p> <hr style="width: 20%; margin: 10px auto;"/> <p>Item (2): Completed by Alternate Means.</p> <p>The installation of flowrate indication at the discharge of the AFW pump is no longer required. Flow indication will be provided by portable UT flow measurement devices that will be attached to the</p>

Overall Integrated Plan Open Items		
OI #	Description	Status
		<p>discharge piping as needed. Refer to Section 4b for discussion on the change in compliance method for this item.</p> <p><b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b></p>
13	Complete the evaluation of TDAFW pump long term operation with $\leq$ 290 psig inlet steam pressure.	<p>Complete.</p> <p>TDAFW pump operation and adequate AFW flow to the SGs at SG pressures <math>\leq</math> 290 psig has been confirmed. (Reference 14)</p> <p><b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b></p>
14	Details of the ventilation strategy are under development and will conform to the guidance given in NEI 12-06. The details of this strategy will be provided at a later date.	<p>Complete.</p> <p>(See Reference 5, Attachment 2, OIP Section F5.)</p>
15	Analyses will be performed to develop electrical components performance requirements and confirm electrical loading-related strategy objectives can be met.	<p>Complete.</p> <p>Results for the sizing and loading analysis of the 120VAC and 480VAC generators confirm the electrical loading-related</p>

Overall Integrated Plan Open Items		
OI #	Description	Status
		<p>strategy objectives can be met. Final calculations confirming these results have been completed. (Reference 15)</p> <p>Calculations identifying the Phase 3 4160VAC generator load requirements and power cable ampacity rating have been completed. (Reference 16)</p> <p><b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b></p>
16	An evaluation of all BDB equipment fuel consumption and required re-fill strategies will be developed including any gasoline required for small miscellaneous equipment.	<p>Complete.</p> <p>An evaluation of all BDB equipment fuel consumption and required refill strategies has been completed. (Reference 10)</p> <p><b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b></p>

Overall Integrated Plan Open Items		
OI #	Description	Status
17	A lighting study will be performed to validate the adequacy of supplemental lighting and the adequacy and practicality of using portable lighting to perform FLEX strategy actions.	<p>Complete.</p> <p>A lighting study has been completed validating the adequacy of supplemental lighting and the adequacy and practicality of using portable lighting to perform FLEX Strategy actions. (Reference 10)</p> <p><b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b></p>
18	A comprehensive study of communication capabilities is being performed in accordance with the commitments made in Dominion letter S/N 12-208F dated October 29, 2012 in response to Recommendation 9.3 of the 10 CFR 50.54(f) letter dated March 12, 2012. The results of this study will identify the communication means available or needed to implement command and control of the FLEX strategies at Surry. Validation of communications required to implement FLEX strategies will be performed as part of Open Item No. 1.	<p>Complete.</p> <p>A study documenting the communications strategy has been completed. The plan concludes that FLEX strategies can be effectively implemented with a combination of sound powered phones, satellite phones and hand-held radios. (Reference 17)</p> <p><b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b></p>

Overall Integrated Plan Open Items		
OI #	Description	Status
19	Preferred travel pathways will be determined using the guidance contained in NEI 12-06. The pathways will attempt to avoid areas with trees, power lines, and other potential obstructions and will consider the potential for soil liquefaction.	<p>Started.</p> <p>A soil liquefaction study has been completed (Reference 18), which supports the location of the storage building and the haul routes. The results have been included with the final design package for the storage building. (Reference 19)</p> <p>Additional soil liquefaction samples have been ordered to address the extended haul routes to the NSRC storage areas.</p> <p>The final Haul Route Evaluation Report is scheduled for completion in February 2015*.</p>
20	The equipment listed in Table 1 will be received on site.	<p>Complete.</p> <p><b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b></p>

\* Refer to Section 8, Supplemental Information, for an explanation of the changes to Open Items.



## 6.2 Open Items from the Interim Staff Evaluation (ISE)

The following table provides a summary of the Open Items (OI) from the Surry Interim Staff Evaluation (Reference 20) and the current status of each item.

<b>Interim Staff Evaluation Open Items</b>		
<b>OI #</b>	<b>Description</b>	<b>Status</b>
3.2.1.8.A	Core Sub-Criticality- Verify that Surry will apply the generic resolution for boron mixing under natural circulation conditions potentially involving two-phase flow, in accordance with the Pressurized-Water Reactor Owners Group (PWROG) position paper, dated August 15, 2013 (ADAMS Accession No. ML13235A135 (non-public for proprietary reasons)), and subject to the conditions provided in the NRC endorsement letter dated January 8, 2014 (ADAMS Accession No. ML13276A183). Alternatively, justify the boric acid mixing assumptions that will ensure adequate shutdown margin exists through all 3 phases of an ELAP event.	<b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b>
3.2.4.10.A	Battery Duty Cycle. Verify that the licensee will abide by the generic approach for demonstrating that vented lead-acid batteries can be credited for durations longer than 8 hours, or justify an acceptable alternate approach.	<b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b>

### 6.3 Confirmatory Items from the Interim Staff Evaluation (ISE)

The following table provides a summary of the Confirmatory Items (CI) from the Surry Interim Staff Evaluation (Reference 20) and the current status of each item.

<b>Interim Staff Evaluation Confirmatory Items</b>		
<b>CI #</b>	<b>Description</b>	<b>Status</b>
3.1.1.2.A	Deployment of FLEX equipment- (Seismic Hazard, Flooding). Confirm protection of connections for maintaining containment – phase 3.	<b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b>
3.1.1.3.A	Procedural Interface Considerations - Seismic Hazard. Confirmation that the FLEX Support Guidelines (FSG) being developed for obtaining local instrument readings addresses critical actions to perform until alternate indications can be connected.	This ISE CI is being addressed through the ongoing NRC audit process. (References 21 and 13)
3.1.1.4.A	Off-Site Resources. Confirm ARC local staging area, evaluation of access routes, and method of transportation to the site.	This ISE CI is being addressed through the ongoing NRC audit process. (Reference 13)
3.2.1.A	RCS Cooling & RCS Inventory Control. Confirm the appropriate use of the analysis from Section 5.2 of WCAP-17601-P by demonstrating the important parameters and assumptions are representative of Surry.	<b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b>

<b>Interim Staff Evaluation Confirmatory Items</b>		
<b>CI #</b>	<b>Description</b>	<b>Status</b>
3.2.1.1.A	ELAP Analysis – 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. Confirm that the NOTRUMP code is used within acceptable limits.	<b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b>
3.2.1.2.A	RCP Seal Leakage. Confirm that, if the seals are changed to non-Westinghouse seals, the licensee addresses the acceptability of the use of non-Westinghouse seals, and provides the acceptable justification for the RCP seal leakage rates for use in the ELAP analysis, to include whether the FlowServe white paper justifies the use of the FlowServe N-9000 seals and bounds the 21 gpm/seal leakage rate assumed in the analysis.	This ISE CI is being addressed through the ongoing NRC audit process. (Generic) (Reference 13)
3.2.1.2.B	RCP Seal Leakage. Confirm FlowServe white paper justifies that the integrity of the O-rings will be maintained above the temperature conditions experienced during the ELAP event (approximately 556 °F) and if the SG PORV modification to add a protected backup air bottle system has an impact in the analysis.	This ISE CI is being addressed through the ongoing NRC audit process. (Generic) (Reference 13)
3.2.1.9.A	Use of Portable Pumps. Confirm that intermittent RCS injection by alternating between units is adequate using only one RCS injection pump.	This ISE CI is being addressed through the ongoing NRC audit process. (References 10 and 13)
3.2.1.9.B	Use of Portable Pumps. Confirm the capacity of one high capacity pump can supply 300 gpm AFW flow to each unit's SG and 500 gpm to the dual unit SFP simultaneously.	<b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b>

<b>Interim Staff Evaluation Confirmatory Items</b>		
<b>CI #</b>	<b>Description</b>	<b>Status</b>
3.2.3.A	Containment. Confirm the Phase 3 coping strategy for containment is appropriate.	This ISE CI is being addressed through the ongoing NRC audit process. (References 5 and 13)
3.2.4.2.A	Ventilation - Equipment cooling. Confirm that the licensee's ventilation strategy adequately supports equipment cooling.	This ISE CI is being addressed through the ongoing NRC audit process. (References 5 and 13)
3.2.4.4.A	Communications. Confirm that upgrades to the site's communications systems have been completed.	<b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b>
3.2.4.6.A	Personnel Habitability- Elevated Temperature. Confirm appropriate plans are made to account for the results of the ventilation study for personnel habitability when complete.	This ISE CI is being addressed through the ongoing NRC audit process. (References 10 and 13)
3.2.4.8.A	Electrical Power Source/Isolation and Interactions. Confirm that 2MW portable DGs are adequate to supply loads assumed in Phase 3.	<b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b>

<b>Interim Staff Evaluation Confirmatory Items</b>		
<b>CI #</b>	<b>Description</b>	<b>Status</b>
3.4.A	Confirm the licensee's arrangements for off-site resources address the guidance of Guidelines 2 through 10 in NEI 12-06, Section 12.2.	<b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b>

#### 6.4 Audit Questions Reviewed During the SPS NRC Onsite Audit

Various SPS Audit Questions (AQs) were evaluated during the SPS NRC Onsite Audit. The following AQs were evaluated and remained "Open."

<b>Audit Questions</b>		
<b>AQ #</b>	<b>Description</b>	<b>Status</b>
Audit Question #3	<p>As discussed in NEI 12-06, Section 5.3.3, the following four procedural interface considerations should be addressed: Seismic studies have shown that even seismically qualified electrical equipment can be affected by beyond-design-basis seismic events. In order to address these considerations, each plant should compile a reference source for the plant operators that provides approaches to obtaining necessary instrument readings to support the implementation of the coping strategy. 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 should include critical actions to perform until alternate indications can be connected and on how to control critical equipment without associated control power. The licensee's plan did not contain any information in regards to any plans for conforming to the following parts of consideration 1 above:</p> <p>a) The development of procedure/guidelines on critical actions to perform until alternate indications can be connected (measure); and</p>	This AQ is being addressed through the ongoing NRC audit process. (Reference 13)

<b>Audit Questions</b>		
<b>AQ #</b>	<b>Description</b>	<b>Status</b>
	b) The development of procedures/guidelines on how to control critical equipment without control power. Please provide a discussion of your plans to conform to the above considerations.	
Audit Question #7	NEI 12-06, Section 3.2.2 guideline (3) states: Plant procedures/guidance should specify actions necessary to assure that equipment functionality can be maintained (including support systems or alternate method) in an ELAP/[LNUHS] or can perform without ac power or normal access to the UHS. Cooling functions provided by such systems as auxiliary building cooling water, service water, or component cooling water may normally be used in order for equipment to perform their function. It may be necessary to provide an alternate means for support systems that require ac power or normal access to the UHS, or provide a technical justification for continued functionality without the support system. For permanently installed equipment used to support FLEX strategies, the licensee has provided insufficient information to provide reasonable assurance that the strategies and guidelines developed pursuant to the plan will comply with NEI 12-06, Section 3.2.2, guideline (3). The licensee is requested to provide a discussion as to whether equipment functionality can be maintained in regards to cooling functions for permanent equipment used to support FLEX strategies.	This AQ is being addressed through the ongoing NRC audit process. (Reference 13)
Audit Question #16	Containment Instrumentation: In the Integrated Plan, there are no instruments specified which will provide the operators with the temperature inside the containment, only the pressure. Excessive temperatures could result in a loss of containment integrity due to the failure of containment penetration seals or other portions of the containment boundary. Furthermore, excessive temperatures could result in the failure of necessary measurement instruments located in the containment. Please provide a discussion and the technical basis for concluding that the temperature inside containment will not need to be monitored to inform the operators of the potential to exceed the limits of penetration seals or other equipment.	This AQ is being addressed through the ongoing NRC audit process. (Reference 13)

<b>Audit Questions</b>		
<b>AQ #</b>	<b>Description</b>	<b>Status</b>
Audit Question #27	In the 6-month update, the licensee is changing their strategy from: installing manual operators on the SG PORVs, to installing a backup air bottle system. Note that Surry already has a backup air bottle system for the PORVs that allow the operators to operate the PORVs from the adjacent containment spray room. The staff requests the licensee describe the new backup air bottle system and its operation (e.g., expected cycles), include a discussion on where operators will be required to operate this system and evaluate effects of the environmental conditions, noise, communications, heat, etc.	This AQ is being addressed through the ongoing NRC audit process. (Reference 13)
Audit Question #36	Identify the non-safety related installed systems or equipment that are credited in establishing ELAP mitigation strategies. For all the identified systems or equipment, discuss the intended mitigation functions, and provide information to show that the identified systems or equipment are available and reliable to provide the intended mitigation functions on demand during an ELAP event.	This AQ is being addressed through the ongoing NRC audit process. (Reference 13)

### 6.5 Additional Items Reviewed During the SPS NRC Onsite Audit

The following table provides a list of the additional Safety Evaluation (SE) Review items related to Mitigating Strategies that were identified and evaluated during the SPS NRC Onsite Audit and the status of each item.

<b>Safety Evaluation Review Items</b>		
<b>SE #</b>	<b>Description</b>	<b>Status</b>
Safety Evaluation Review Item #2	Confirm the adequate NPSH, discharge head, flow capacity, and other pumping requirements for FLEX pumps injecting into the RCS.	<b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b>
Safety Evaluation Review Item #3a	<p>(RCS Venting) The generic analysis in WCAP-17601-P strictly addressed ELAP coping time without consideration of the actions directed by a site's mitigating strategies. WCAP-17792-P extends these analytical results through explicit consideration of mitigating strategies involving RCS makeup and boration. In support of the RCS makeup and boration strategies proposed therein, a generic recommendation is made that PWRs vent the RCS while makeup is being provided.</p> <p>a. If the mitigating strategy will include venting of the RCS, please provide the following information:</p> <p>i. The vent path to be used and the means for its opening and closure.</p> <p>ii. The criteria for opening the vent path.</p> <p>iii. The criteria for closing the vent path.</p> <p>iv. Clarification as to whether the vent path could experience two-phase or single-phase liquid flow during an ELAP. If two-phase or liquid flow is a possibility, please clarify whether the vent path is designed to ensure isolation capability after relieving two-phase or liquid flow.</p>	<b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b>



<b>Safety Evaluation Review Items</b>		
<b>SE #</b>	<b>Description</b>	<b>Status</b>
	<p>v. If relief of two-phase or liquid flow is to be avoided, please discuss the availability of instrumentation or other means that would ensure that the vent path is isolated prior to departing from single-phase steam flow.</p> <p>vi. If a pressurizer PORV is to be used for RCS venting, please clarify whether the associated block valve would be available (or the timeline by which it could be repowered) in the case that the PORV were to stick open. If applicable, please further explain why opening the pressurizer PORV is justified under ELAP conditions if the associated block valve would not be available.</p> <p>vii. If a pressurizer PORV is to be used for RCS venting, please clarify whether FLEX RCS makeup pumps and FLEX steam generator makeup pumps will both be available prior to opening the PORV. If they will not both be available, please provide justification.</p>	
Safety Evaluation Review Item #3b	<p>b. If RCS venting will not be used, please provide the following information:</p> <p>i. The expected RCS temperature and pressure after the necessary quantity of borated makeup has been added to an unvented RCS.</p> <p>ii. Adequate justification that the potential impacts of unvented makeup will not adversely affect the proposed mitigating strategy (e.g., FLEX pump discharge pressures will not be challenged, plant will not reach water solid condition, adequate boric acid can be injected, increased RCS leakage will not adversely affect the integrated plan timeline, etc.)</p>	<p><b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b></p>
Safety Evaluation Review Item #4	<p>(ELAP Calculations with NOTRUMP) Please provide adequate basis that calculations performed with the NOTRUMP code (e.g., those in WCAP-17601-P, WCAP-17792-P) are adequate to demonstrate that criteria associated with the analysis of an ELAP event (e.g., avoidance of reflux cooling, promotion of boric acid mixing) are satisfied. NRC staff confirmatory analysis suggests that the need for implementing certain mitigating strategies for providing core cooling and adequate shutdown margin may occur sooner than predicted in NOTRUMP simulations.</p>	<p><b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b></p>

<b>Safety Evaluation Review Items</b>		
<b>SE #</b>	<b>Description</b>	<b>Status</b>
Safety Evaluation Review Item #5	(Timeline to reflux cooling) Please clarify whether the intended timeline for aligning the FLEX RCS makeup pump may be delayed based on procedural guidance that derives from the analysis in WCAP-17792-P, pages 3-10 through 3-16. Although the staff recognizes that plant operators require leeway to control pumps and equipment in response to plant indications and other symptoms, the staff considers it prudent that equipment alignments proceed as outlined in the integrated plan to the extent possible. Therefore, please provide justification if the operators would delay the alignment of the FLEX RCS makeup pump(s) beyond the time specified in the integrated plan based on initial indications that the reactor coolant pump seal leakage is lower than the value assumed in the ELAP analysis.	<b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b>
Safety Evaluation Review Item #6	<p>(a) Clarify whether the ADVs or upstream associated piping is safety-related, protected from external events such as tornado missiles. If not, address the following questions:</p> <p>(b) Clarify whether damage to the ADV or upstream associated piping could occur during an ELAP that would result in an uncontrolled cooldown of the reactor coolant system and provide a basis.</p> <p>(c) Clarify whether postulated damage would be limited to a single ADV and/or associated piping, or whether failures could be postulated resulting in an uncontrolled cooldown affecting both steam generators and provide a basis.</p> <p>(d) If ELAP scenarios involving the uncontrolled cooldown of one or more steam generators may be postulated, describe key operator actions that would be taken to mitigate these events.</p> <p>(e) If ELAP scenarios involving the uncontrolled cooldown of one or more steam generators may be postulated, provide analysis demonstrating that the intended mitigating actions would lead to satisfaction of the requirements of Order EA-12-049 for these cases.</p> <p>(f) As applicable, if the operator actions to mitigate an ELAP event involving an uncontrolled cooldown results in an asymmetric cooldown of the reactor coolant system,</p>	<b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b>

<b>Safety Evaluation Review Items</b>		
<b>SE #</b>	<b>Description</b>	<b>Status</b>
	address the consequences of the asymmetric cooldown on the mixing of boric acid that is added to the reactor coolant system to ensure sub-criticality.	
Safety Evaluation Review Item #7	<p>a. Discuss the design of the suction strainers used with FLEX pumps taking suction from raw water sources, including perforation dimension(s) and approximate surface area.</p> <p>b. Provide reasonable assurance that the strainers will not be clogged with debris (accounting for conditions following, flooding, severe storms, earthquakes or other natural hazards), or else that the strainers can be cleaned of debris at a frequency that is sufficient to provide the required flow. In the response, consider the following factors:</p> <p>i. The timing at which FLEX pumps would take suction on raw water relative to the onset and duration of the natural hazard.</p> <p>ii. The timing at which FLEX pumps would take suction on raw water relative to the timing at which augmented staffing would be available onsite.</p> <p>iii. Whether multiple suction hoses exist for each FLEX pump taking suction on raw water, such that flow interruption would not be required to clean suction strainers.</p>	<b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b>
Safety Evaluation Review Item #8	Verify that appropriate human factors are applied for the implementation of the FLEX strategies.	<b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b>
Safety Evaluation Review Item #9	Security controls and accessibility. Ensure the licensee has evaluated and established controls to ensure personnel can access required spaces and equipment can be deployed to the required locations following BDBEE and ELAP.	<b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b>

<b>Safety Evaluation Review Items</b>		
<b>SE #</b>	<b>Description</b>	<b>Status</b>
Safety Evaluation Review Item #10	Licensee to provide discussion on DC cross-tie to include breaker arc quenching.	<b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b>
Safety Evaluation Review Item #11	Licensee to provide strategy for transitioning from Phase 2 to Phase 3 with respect to use of 4kV generators from NSRC.	<b>During the January 2015 NRC Onsite Audit, the NRC Staff indicated that further review of this item was not anticipated as Dominion proceeds towards compliance for Order EA-12-049.</b>

## **7 Potential Safety Evaluation Impacts**

Licensee Identified Open Item #12 identified three tasks associated with the use of existing station components to provide and monitor flow to the Turbine Driven Auxiliary Feedwater Pump (TDAFWP). Tasks 1 and 3, as described, have been completed. Task 2 included installations of permanent flow measurement devices in the discharge piping of each unit's TDAFWP. However, in lieu of the permanently installed flow meters, Dominion has decided to utilize portable UT flow measurement instrumentation. These devices would be attached to the TDAFWP discharge piping as part of the FLEX strategy implementation. These portable flow devices would be maintained and stored in the BDB Storage Building, which provides protection from BDB External Event hazards.

Following the Onsite NRC Audit at Surry, the NRC Staff indicated that further review of this Licensee Identified Open Item was not anticipated. Completion of the proposed Task 2 modification would be confirmed through completion of the modifications required for implementation. It is Dominion's position that, with use of the portable UT flow measurement instrumentation, Task 2 is considered "completed by alternate means," and consequently, the proposed Task 2 modification is no longer required.

Section 6.5 provides a list of the additional Safety Evaluation (SE) Review items related to Mitigating Strategies that were identified and evaluated during the SPS NRC Onsite Audit and the status of each item.

Dominion is participating in the ongoing industry effort to develop guidance for the Final

Integrated Plan that will support NRC preparation of the Safety Evaluation documenting Surry's compliance with Order EA-12-049. The format of the Final Integrated Plan is consistent with the Safety Evaluation Template provided with the July 1, 2014 Jack Davis memorandum (Reference 22).

## 8 Supplemental Information

This supplemental information provides details of the changes identified in the status updates above and addresses the following topics: a) 'Implement Training,' b) the Milestone Task 'Issue FSGs and Associated Procedure Revisions,' c) the Milestone Task 'Develop Strategy/Contract with NSRC,' d) a revision to Milestone Task 'Validation Walk-throughs or Demonstration of FLEX Strategies and Procedures,' e) a revision to Milestone Task 'Unit 1 Outage Implementation,' f) a revision to Open Item No. 1, and g) a revision to Open Item No. 19.

- a) **Surry, Milestone Task 'Implement Training'**: The revision to the scheduled milestone target completion date allows for completion of the SPS delta training after the FSGs are updated following validation testing.
- b) **Surry, Milestone Task 'Issue FSGs and Associated Procedure Revisions'**: The revision to the scheduled milestone target completion date allows for completion of the SPS FSGs in line with the schedule for validation testing on the FSGs.
- c) **Surry, Milestone Task 'Develop Strategy/Contract with NSRC'**: Completion of the final SAFER plan for Surry has been delayed until March 2015.
- d) **Surry, Milestone Task 'Validation Walk-throughs or Demonstration of FLEX Strategies and Procedures'**: Validation of the Time Sensitive Actions associated with the FSGs have been completed. Completion and documentation of the total scope of the FLEX strategies as implemented via the FSGs will be completed by March 2015 in order to support the Unit 1 implementation following the spring 2015 Refueling Outage.
- e) **Surry, Milestone Task 'Unit 1 Outage Implementation'**: The Milestone Task date is revised to May 2015 to reflect the completion of BDB modifications during the current outage schedule.
- f) **Surry, Open Item 1**: The Open Item completion date is revised to March 2015. The revised target completion date accounts for delays due to inclement weather, but still allows for completion of the validation in order to support the Unit 1 implementation following the spring 2015 Refueling Outage.
- g) **Surry, Open Item 19**: The initial liquefaction aspect of this item was completed. However, additional borings and evaluation for liquefaction was added to cover additional travel (haul route) pathways. The documentation of this additional evaluation of the haul routes is still in progress and will be completed by February 2015. Following the completion of this additional evaluation, the final SPS Haul Route Evaluation will be issued.

## 9 References

The following references support the updates to the OIP described in this attachment and are available in ADAMS or have previously been provided to the staff for their review.

1. Virginia Electric and Power Company Overall Integrated Plan 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 February 28, 2013 (Serial No. 12-163B).
2. NRC Order Number EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," dated March 12, 2012.
3. Virginia Electric and Power Company's 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), dated August 28, 2013 (Serial No. 14-395).
4. Virginia Electric and Power Company's 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), dated August 23, 2013 (Serial No. 12-163D).
5. Virginia Electric and Power Company's 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), dated February 27, 2014 (Serial No. 12-163E).
6. NEI 12-06, *Diverse and Flexible Coping Strategies (FLEX) Implementation Guide*, Revision 0, dated August 2012.
7. Virginia Electric and Power Company Supplement to Overall Integrated Plan in Response to March 21, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis Events (Order Number EA-12-049), dated April 30, 2013 (Serial No. 12-163C).
8. Dominion Calculation ME-0967, "Beyond Design Basis (BDB) – BDB High Capacity Pump and BDB AFW Pump Hydraulic Analysis for Spent Fuel Pool Makeup and AFW Injection at SPS Units 1 and 2," Rev. 0.
9. Dominion Calculation ME-0964, "Evaluate the High Head Injection Pump for Beyond Design Basis (BDB) at the Primary and Alternative Supply Locations in Modes 1-4, and the BDB AFW Pump in Modes 5 and 6," Rev. 0.
10. ETE-CPR-2012-0011, Rev. 3, "Beyond Design Basis – FLEX Strategy Overall Integrated Plan Basis Document."
11. Procedure CM-AA-BDB-102, Rev. 1, "Beyond Design Basis FLEX Equipment Unavailability Tracking."
12. Procedure CM-AA-BDB-10, Rev. 0, "Beyond Design Basis FLEX Program."

13. NRC letter from Jack R. Davis, Director Mitigating Strategies Directorate to All Operating Reactor Licensees and Holders of Construction Permits, "Nuclear Regulatory Commission Audits of Licensee Responses to Mitigating Strategies Order EA-12-049," dated August 28, 2013 (ML13234A503).
14. Dominion Calculation ME-0969, Rev. 0, "Evaluation of the TDAFW Pump Performance at Low Steam Generator Pressures," August 2013.
15. Calculation EE-0864, Rev 2, "FLEX Electrical 480VAC and 120VAC System Loading Analysis."
16. Calculation EE-0872, Rev. 0, "SPS BDB FLEX Electrical 4160VAC System Loading Analysis."
17. ETE-CPR-2013-0003, Beyond Design Basis Communications Strategy/Plan, Rev. 2.
18. Geotechnical Engineering Report, BDB FLEX Storage Building, Surry Power Station, Surry County, VA, Schnabel Reference #13613080, September 19, 2013, including Addendum No. 1.
19. Design Change SU-13-00015, BDB Storage Building/ Surry Power Station/ Units 1 & 2.
20. NRC Letter from Jeremy S. Bowen (NRC) to David A. Heacock (Dominion), "Surry Power Station, Units 1 and 2 – Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Order EA-12-049 (Mitigation Strategies)," dated February 19, 2014.
21. FSG-7, "Loss of Vital Instrumentation or Control Power."
22. Memorandum from Jack R. Davis, JLD, Office of NRR, to Stewart N. Bailey, Sheena A, Whaley, and Jeremy S. Bowen, "Supplemental Staff Guidance for the Safety Evaluations for Order EA-12-049 on Mitigation Strategies for Beyond-Design-Basis External Events and Order EA-12-051 on Spent Fuel Pool Instrumentation," dated July 1, 2014 (ML14161A643).
23. Dominion letter to NRC titled "Surry Power Station Units 1 and 2, March 12, 2012 Information Request, Phase 2 Staffing Assessment Report, dated December 17, 2014 (SN: 14-200).