UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

November 17, 2014

Mr. David A. Heacock
President and Chief Nuclear Officer
Dominion Nuclear Connecticut, Inc.
Innsbrook Technical Center
5000 Dominion Boulevard
Glen Allen, VA 23060-6711

SUBJECT: MILLSTONE POWER STATION, UNITS 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. MF0858, MF0859, MF0838, AND MF0839)

Dear Mr. Heacock:

On March 12, 2012, the U.S. Nuclear Regulatory Commission (NRC) issued Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond Design-Basis External Events" and Order EA-12-051, "Order to Modify Licenses With Regard To Reliable Spent Fuel Pool Instrumentation," (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML12054A736 and ML12054A679, respectively). The orders require holders of operating reactor licenses and construction permits issued under Title 10 of the *Code of Federal Regulations* Part 50 to submit for review, Overall Integrated Plans (OIPs) including descriptions of how compliance with the requirements of Attachment 2 of each order will be achieved.

By letter dated February 28, 2013 (ADAMS Accession No. ML13064A265), Dominion Nuclear Connecticut, Inc. (Dominion, the licensee) submitted its OIP for Millstone Power Station, Units 2 and 3 (Millstone) in response to Order EA-12-049. By letters dated April 30, 2013, August 23, 2013, and February 28, 2014 (ADAMS Accession Nos. ML13126A206, ML13242A011, and ML14069A013, respectively), Dominion submitted a supplement and its first two six-month updates to the OIP. By letter dated August 28, 2013 (ADAMS Accession No. ML13234A503), the NRC notified all licensees and construction permit holders that the NRC staff is conducting audits of their responses to Order EA-12-049 in accordance with NRC Office of Nuclear Reactor Regulation (NRR) Office Instruction LIC-111, "Regulatory Audits" (ADAMS Accession No. ML082900195). This audit process led to the issuance of the Millstone interim staff evaluation (ISE) and audit report on January 31, 2014 (ADAMS Accession No. ML13338A433) and continues with in-office and onsite portions of this audit.

By letter dated February 28, 2013 (ADAMS Accession No. ML13063A012), Dominion submitted its OIP for Millstone in response to Order EA-12-051. By letter dated June 26, 2013 (ADAMS Accession No. ML13175A242), the NRC staff sent a request for additional information (RAI) to the licensee. By letters dated July 26, 2013, August 23, 2013, and February 28, 2014 (ADAMS Accession Nos. ML13213A015, ML13242A014, and ML14069A011, respectively), Dominion submitted its RAI responses and first two six-month updates to the OIP. The NRC staff's review to date led to the issuance of the Millstone ISE and RAI dated October 29, 2013 (ADAMS Accession No. ML13291A115). By letter dated March 26, 2014 (ADAMS Accession No.

ML14083A620), the NRC notified all licensees and construction permit holders that the staff is conducting in-office and onsite audits of their responses to Order EA-12-051 in accordance with NRC NRR Office Instruction LIC-111, as discussed above.

The ongoing audit allows the NRC staff to review open and confirmatory items from the mitigation strategies ISE, RAI responses from the spent fuel pool instrumentation (SFPI) ISE, the licensee's integrated plans, and other audit questions. Additionally, the NRC staff gains a better understanding of submitted and updated information, audit information provided on ePortals, and preliminary Overall Program Documents/Final Integrated Plans while identifying additional information necessary for the licensee to supplement its plan and NRC staff potential concerns.

In support of the ongoing audit of the Millstone OIPs as supplemented, the NRC staff conducted an onsite audit at the Millstone Power Station from July 21-25, 2014, pursuant to the plan dated July 2, 2014 (ADAMS Accession No. ML14176A952). The purpose of the onsite portion of the audit was to provide the NRC staff the opportunity to continue the audit review and gain key insights most easily obtained at the plant as to whether the licensee is on the correct path for compliance with the Mitigation Strategies and Spent Fuel Pool Instrumentation orders. The onsite activities included detailed analysis and calculation discussion, walk-throughs of strategies and equipment laydown, visualization of portable equipment storage and deployment, staging and deployment of offsite equipment, and physical sizing and placement of SFPI equipment.

The enclosed audit report provides a summary of the activities for the onsite audit portion. Additionally, this report contains an attachment listing all open audit items currently under NRC staff review.

If you have any questions, please contact me at 301-415-1544 or by e-mail at stephen.monarque@nrc.gov.

Sincerely,

Stephen R Monarque

Stephen Monarque, Project Manager
Orders Management Branch
Japan Lessons-Learned Division
Office of Nuclear Reactor Regulation

Docket Nos.: 50-336 and 50-423

Enclosure:
Audit report

cc w/encl: Distribution via Listserv

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

AUDIT REPORT BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO ORDERS EA-12-049 AND EA-12-051 MODIFYING LICENSES

WITH REGARD TO REQUIREMENTS FOR

MITIGATION STRATEGIES FOR BEYOND-DESIGN-BASIS EXTERNAL EVENTS

AND RELIABLE SPENT FUEL POOL INSTRUMENTATION

DOMINION NUCLEAR CONNECTICUT, INC.

MILLSTONE POWER STATION, UNITS 2 AND 3

DOCKET NOS. 50-336 and 50-423

BACKGROUND AND AUDIT BASIS

On March 12, 2012, the U.S. Nuclear Regulatory Commission (NRC) issued Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond Design-Basis External Events" and Order EA-12-051, "Order to Modify Licenses With Regard To Reliable Spent Fuel Pool Instrumentation," (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML12054A736 and ML12054A679, respectively). Order EA-12-049 directs licensees to develop, implement, and maintain guidance and strategies to maintain or restore core cooling, containment, and spent fuel pool (SFP) cooling capabilities in the event of a beyond-design-basis external event (BDBEE). Order EA-12-051 requires, in part, that all operating reactor sites have a reliable means of remotely monitoring wide-range SFP levels to support effective prioritization of event mitigation and recovery actions in the event of a BDBEE. The orders require holders of operating reactor licenses and construction permits issued under Title 10 of the *Code of Federal Regulations* Part 50 to submit for review, Overall Integrated Plans (OIPs) including descriptions of how compliance with the requirements of Attachment 2 of each order will be achieved.

By letter dated February 28, 2013 (ADAMS Accession No. ML13064A265), Dominion Nuclear Connecticut, Inc. (Dominion, the licensee) submitted its OIP for Millstone Power Station, Units 2 and 3 (Millstone, or MPS2 and MPS3) in response to Order EA-12-049. By letters dated April 30, 2013, August 23, 2013, and February 28, 2014 (ADAMS Accession Nos. ML13126A206, ML13242A011, and ML14069A013, respectively), Dominion submitted a supplement and its first two six-month updates to the OIP. By letter dated August 28, 2013 (ADAMS Accession No. ML13234A503), the NRC notified all licensees and construction permit holders that the NRC staff is conducting audits of their responses to Order EA-12-049 in accordance with NRC Office

of Nuclear Reactor Regulation (NRR) Office Instruction LIC-111, "Regulatory Audits" (ADAMS Accession No. ML082900195). This audit process led to the issuance of the Millstone interim staff evaluation (ISE) and audit report on January 31, 2014 (ADAMS Accession No. ML13338A433), and continues with in-office and onsite portions of this audit.

By letter dated February 28, 2013 (ADAMS Accession No. ML13063A012), Dominion submitted its OIP for Millstone in response to Order EA-12-051. By letter dated June 26, 2013 (ADAMS Accession No. ML13175A242), the NRC staff sent a request for additional information (RAI) to Dominion. By letters dated July 26, 2013, August 23, 2013, and February 28, 2014 (ADAMS Accession Nos. ML13213A015, ML13242A014, and ML14069A011, respectively), Dominion submitted its RAI responses and first two six-month updates to the OIP. The NRC staff's review to date led to the issuance of the Millstone ISE and RAI dated October 29, 2013 (ADAMS Accession No. ML13291A115). By letter dated March 26, 2014 (ADAMS Accession No. ML14083A620), the NRC notified all licensees and construction permit holders that the staff is conducting in-office and onsite audits of their responses to Order EA-12-051 in accordance with NRC NRR Office Instruction LIC-111, as discussed above.

The ongoing audit allows the NRC staff to review open (OI) and confirmatory items (CI) from the mitigation strategies ISE, RAI responses from the spent fuel pool instrumentation (SFPI) ISE, Dominion's integrated plans, and other audit questions (AQs). Additionally, the NRC staff gains a better understanding of submitted and updated information, audit information provided on ePortals, and preliminary Overall Program Documents (OPDs)/Final Integrated Plans (FIPs) while identifying additional information necessary for Dominion to supplement its plan and NRC staff potential concerns.

In support of the ongoing audit of the Millstone OIPs as supplemented, the NRC staff conducted an onsite audit at the Millstone Power Station from July 21-25, 2014, pursuant to the plan dated July 2, 2014, (ADAMS Accession No. ML14176A952). The purpose of the onsite portion of the audit was to provide the NRC staff the opportunity to continue the audit review and gain key insights most easily obtained at the plant as to whether Dominion is on the correct path for compliance with the Mitigation Strategies and SFPI orders.

Following Dominion's declarations of order compliance, the NRC staff will evaluate the OIPs, as supplemented; the resulting site-specific OPDs/FIPs; and, as appropriate, other licensee submittals based on the requirements in the orders. For Order EA-12-049, the NRC staff will make a safety determination using the Nuclear Energy Institute (NEI) developed guidance document NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide" issued in August 2012 (ADAMS Accession No. ML12242A378), as endorsed by NRC Japan Lessons-Learned Project Directorate (JLD) interim staff guidance (ISG) 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'" (ADAMS Accession No. ML12229A174). For Order EA-12-051, the NRC staff will make a safety determination using the NEI developed guidance document NEI 12-02, Revision 1, "Industry Guidance for Compliance with NRC Order EA-12-051, 'To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation'" (ADAMS Accession No. ML12240A307), as endorsed, with exceptions and clarifications, by NRC ISG JLD-ISG-2012-03 "Compliance with Order EA-12-051, 'Reliable Spent Fuel Pool Instrumentation'" (ADAMS Accession No. ML12221A339) as providing one acceptable means of meeting the order requirements. Should Dominion propose an alternative

strategy for compliance, additional NRC staff review will be required to evaluate the alternative strategy in reference to the applicable order.

AUDIT ACTIVITIES

The onsite audit was conducted at the Millstone Power Station facility from Monday, July 21, 2014, through Friday, July 25, 2014. The NRC audit team staff was as follows:

Title	Team Member	Organization
Team Lead	James Isom	NRR/DIRS
Technical Support – Reactor Systems	John Lehning (remote)	NRR/JLD
Technical Support – Reactor Systems	Josh Miller	NRR/JLD
Technical Support – Balance of Plant	Brian Lee	NRR/JLD
Technical Support – Balance of Plant	Garry Armstrong	NRR/JLD
Technical Support - Electrical	Matthew McConnell	NRR/JLD
Technical Support - Electrical	Duc Nguyen	NRR/JLD
Technical Support - SFPI	Steve Wyman	NRR/JLD
Branch Chief	Stewart Bailey	NRR/JLD
Senior Resident Inspector	Josephine Ambrosini	R-I
Project Manager	James Polickoski	NRR/JLD

The NRC staff executed the onsite portion of the audit in accordance with the three part approach discussed in the July 2, 2014, plan, to include conducting a tabletop discussion of the site's integrated mitigating strategies compliance program, a review of specific technical review items, and discussion of specific program topics. Activities that were planned to support the above included detailed analysis and calculation discussions, walk-throughs of strategies and equipment laydown, visualization of portable equipment storage and deployment, staging and deployment of offsite equipment, and physical sizing and placement of SFPI equipment.

AUDIT SUMMARY

1.0 Entrance Meeting (Monday, July 21, 2014)

At the audit entrance meeting, the NRC staff audit team introduced itself followed by introductions from Dominion. The list of participating NRC and licensee staff members is provided in Attachment 1. The NRC audit team provided a brief overview of the audit's objectives and anticipated schedule. Dominion provided the list of review staff pairings and site logistics to support the audit.

2.0 Integrated Mitigating Strategies Compliance Program Overview

In accordance with the audit plan and as an introduction to the site's program, Dominion provided a presentation to the NRC audit team titled, "NRC Audit Presentation: Millstone July 21, 2014." Dominion reviewed the design and purpose of the FLEX Strategies and Modifications, FLEX Storage facility, FLEX Program, Communications, Training, and SFPI. Additionally, Dominion provided and presented the Millstone Power Station extended loss of alternating current (ac) power (ELAP) Initiated Event Timeline.

3.0 Onsite Audit Technical Discussion Topics

Based on the audit plan, and with a particular emphasis on the Part 2 "Specific Technical Review Items," the NRC staff technical reviewers conducted interviews with licensee technical staff, site walk downs, and detailed document reviews for the items listed in the plan. Summaries of these activities are discussed below in the particular technical area of review, with the documents reviewed listed in Attachment 2. Results of these technical reviews and any additional review items needed from the licensee are documented in the audit item status tables in Attachments 3 and 4, as discussed in the Conclusion section below.

3.1 Reactor Systems Technical Discussions and Walk Downs

At both the Millstone site and concurrently in Rockville, MD, the NRC staff reviewed calculations and engaged Dominion and vendor engineers in technical discussions associated with the mitigating strategies for maintaining reactor core cooling and adequate shutdown margin for Millstone. Additionally while at the Millstone site, the NRC staff conducted walk downs to audit the feasibility of the mitigating strategies, discussed issues associated with the implementation of the mitigating strategies, and focused on evaluating the OIs identified in the audit plan. Key issues discussed during the audit are identified below along with a summary of the audit discussion:

Millstone Unit 2

a. The NRC staff reviewed ISE OI 3.2.1.8.A and looked at the adequate boron mixing and subcriticality. Dominion stated that they intended to comply with the Pressurized-Water Reactor Owners Group (PWROG) white paper on boric acid mixing as well as the additional conditions imposed by the staff's endorsement. They intended to inject before reflux cooling occurs and that there would be more than one hour of mixing time. They did not need to inject boron to remain less than 0.99 k-effective for core inlet temperatures as low as 315 degrees Fahrenheit (°F).

b. The NRC staff reviewed ISE CI 3.2.1.A on site. Dominion was requested to provide a table comparing the assumed WCAP values with the actual plant values for Unit 2. This table was requested to be put onto the e-portal so that the NRC staff could review this table in the office as well.

c. The NRC staff observed the demonstration that RCS makeup is provided in sufficient time to ensure continuity of natural circulation and boric acid mixing in ISE CI 3.2.1.1.A. Dominion stated that it will be using the definition that is used in the white paper endorsement. Dominion is injecting 8 hours before their predicted time to reflux cooling being reached.

d. The NRC staff looked at the seal leakage rate being assumed in ISE CI 3.2.1.2.A. Dominion confirmed that it is using the 15 gpm per seal leak rate that is used in the CENTS coping analysis.

e. ISE 3.2.1.6.B and C - The NRC staff looked at the actions as well as the staffing needed to perform the cooldown of Unit 2. The locations of the operator actions as well as an understanding of the actions needed to accomplish the cooldowns were gained through walk downs, looking at the FLEX Support Guidelines (FSGs), as well as staff discussions. Dominion showed sufficient staff availability to perform the required tasks.

f. Demonstration of the ability to control flow to the steam generators and the calculations behind the procedures were looked at in AQ 10. The calculations were reviewed to look at assumptions, as well as the decay heat model used (ANS 79+2sigma, 11787 Rev. 0). The cooldown will be started at 2 hours (WCAP 17601) and they assume that the flow into the SGs is initially unthrottled. The evaluations, as well as the FSGs were reviewed in order to look at the number of staff needed, as well as the actions they would need to perform.

g. AQ 26 was reviewed and the NRC staff found the information in the SAFER playbook Table 7.1.

h. The NRC staff reviewed and discussed the plans for cooldown and depressurization in AQ 44. Dominion is revising the station blackout (SBO) response to do early cooldown and depressurize to 120 psig to help protect the reactor coolant pump (RCP) seals. For ensuring adequate shutdown margin, Dominion will perform checks of the cores every reload to ensure that existing calculations remain bounding. Dominion's goal is 120 psig in 6 hours. By the time they reach 16 hours into the event, they will have the ability to start injection from the reactor coolant system (RCS) flex injection pump and they can ensure that they won't overfill the RCS because the pressurizer level instrumentation will become available. Dominion will not blind feed steam generators (SGs); instead, they will have instrumentation and manual means of getting instrumentation back if direct current (dc) power is not available. This process is proceduralized. The licensee's plan is to depressurize to 120 psig and hold at this point. When 480v power is returned they can look at wide range level on the safety injection tank (SIT) and then isolate them if necessary. The NRC staff asked the licensee to review its SIT nitrogen injection calculation and confirm that a secondary pressure of 120 psig would preclude nitrogen injection. The NRC staff is waiting for an answer to this request. Dominion is not planning on performing an asymmetric natural circulation cooldown.

i. Confirmation that the mitigation strategies procedures provide appropriate guidance regarding RCS venting safety evaluation (SE) 1. The positive displacement pump (PDP) can inject at full RCS pressure. Dominion did not expect to need to vent in order to ensure adequate boration. Dominion would vent if they exceeded 2250 psig and would use the head vent. They will not use

the power-operated relief valves (PORVs) and the block valves will not be available for the PORVs.

j. Confirming Dominion would not delay setting up the necessary Phase 2 equipment due to conditions better than expected SE 3. Although it is reasonable for plant operators to control the injection of RCS makeup in accordance with signals from available instrumentation, the NRC staff's expectation is that licensees will stage and deploy the equipment necessary for providing makeup to the RCS in accordance with the timeline prescribed in the integrated plan, even if early indications suggest reduced RCS leakage. During the audit, Dominion agreed that deployment of FLEX equipment necessary to support RCS makeup would not be delayed based upon early indications of reduced RCS leakage and further stated that the intent of the FLEX strategy guidelines is to provide flexibility to operators in case conditions are more severe than expected.

k. SE-5 - The ability to batch water for boration injection from the portable batch tanks was looked at by the NRC staff. Dominion is planning on using the charging pump for injection. They will have the ability to batch to the Boric Acid Storage Tanks (BASTs) and the margin to needing the batch tanks is greater. They will also not be using the batch tank to switch between units.

Millstone Unit 3

a. The NRC staff reviewed ISE OI 3.2.1.8.A and looked at the adequate boron mixing and subcriticality. The licensee stated they intended to comply with the PWROG white paper on boric acid mixing, as well as the additional conditions imposed by the staff's endorsement. They intended to inject before reflux cooling occurs and that there would be more than one hour of mixing time. They did not need to inject boron to remain less than .99 k-effective for core inlet temperatures as low as 315 °F. The NRC staff reviewed the shutdown margin calculations.

b. The NRC staff reviewed ISE CI 3.2.1.A on site. Dominion was requested to provide a table comparing the assumed WCAP values with the actual plant values for Unit 3. This table was requested to be put onto the e-portal so that the NRC staff could review in office as well.

c. The NRC staff looked at the demonstration that RCS makeup is provided in sufficient time to ensure continuity of natural circulation and boric acid mixing (ISE CI 3.2.1.1.A). Dominion stated that it will be using the definition that is used in the white paper endorsement. Dominion is injecting at 16 hours and will have two Flowserve low leakage seals installed.

d. The NRC staff looked at the seal leakage rate being assumed ISE CI 3.2.1.2.A, B and C. Dominion and the NRC staff had discussions with representatives from Westinghouse to discuss the seal leakage issue. The Westinghouse standard

seal leak rate is still being developed. Two of the Unit 3 seals will be Flowserve low leakage seals.

e. The NRC staff looked at the decay heat model used for the bounding initial conditions for ISE CI 3.2.1.3.A.

f. Demonstration of the ability to deploy the portable boric acid batching tank and the acceptability of the deployment time. The NRC staff looked at the deployment plan and the time at which the portable batching tank would be needed. The NRC staff also looked at the boration needs for Unit 3 including the number of bags of boron that would be needed.

g. Demonstration of the cooldown strategies and timelines involved in cooling down the plant and controlling the level in the steam generators in AQ 11. The NRC staff reviewed the calculation and verified the decay heat model being used (ANS 79+2sigma, 11787 Rev. 0). The mass and heat balances used in the calculation were reviewed as well. The calculation provided timing for which the flow from the turbine-driven auxiliary feedwater (TDAFW) pump needed to be throttled to ensure that the steam generators did not over fill. The NRC staff reviewed the actions as well as the staffing needed to perform the cooldown of Unit 3. The locations of the operator actions, as well as an understanding of the actions needed to accomplish the cooldowns, were gained through walk downs, looking at the FSGs, as well as discussions with Dominion.

h. Demonstration of the ability of the portable RCS injection pump to provide the necessary flow rate with high enough pressure to inject into the RCS (AQ 14). The NRC staff reviewed the flow rate of the pump and the pressure shutoff head of the PDP as well as the assumed seal leak rates for the two Westinghouse standard seals and the two Flowserve low leakage seals. Dominion showed that they would have sufficient margin from the capacity of the pump to the flow needed to overcome inventory loss. The Westinghouse standard seal leak rates are subject to change, but there is still expected to be margin to the flow rate of the pump.

i. The NRC staff reviewed the seal cooling isolation the potential impact on thermal shock of the seals due to restoration of seal cooling. Dominion stated that the seal cooling would be isolated and would not be restored (AQ 16).

j. For AQ 20, the NRC staff reviewed the TDAFW pump Surveillance Requirements to verify the timing.

k. For AQ 23, the NRC staff verified and understood the timing for the declaration of ELAP.

l. Demonstration of the cooldown completion time and the analysis as well as the required actions that need to be done to accomplish this time (AQ 25). The NRC staff reviewed the cooldown calculations as well as the timing for the required cooldown. The NRC staff also looked at the operator actions needed to perform

the cooldown. Some of the operator actions occurred on the top floor of the atmospheric dump valve (ADV) building. The temperatures in that room needed to be recalculated and could be in excess of 200 °F. The NRC staff is continuing to review AQ 25.

m. For AQ 33, the NRC staff reviewed the SAFER playbook and verified the required equipment.

n. Demonstration that the seal leakoff is isolable (AQ 72). The NRC staff verified the timing and the availability to isolate the seal leakoff.

o. Confirmation that the mitigation strategy procedures provide appropriate guidance regarding RCS venting (SE 1). Unit 3 does not need to vent in order to ensure shutdown margin. The shrinkage from the cooldown and loss of inventory is enough to allow the needed boration. Dominion will only use the reactor head vents if the necessary criteria are met to need to vent the RCS.

p. SE 2 discusses the seal leakage and mechanisms for the seals at Millstone Unit 3. The NRC staff and licensee as well as Westinghouse representatives discussed the seal leakage models. The NRC staff has revised questions regarding new information from the PWROG.

q. Confirming Dominion would not delay setting up the necessary Phase 2 equipment due to conditions better than expected (SE 3). Although it is reasonable for plant operators to control the injection of RCS makeup in accordance with signals from available instrumentation, the NRC staff's expectation is that licensees will stage and deploy the equipment necessary for providing makeup to the RCS in accordance with the timeline prescribed in the integrated plan, even if early indications suggest reduced RCS leakage. During the audit, Dominion agreed that deployment of FLEX equipment necessary to support RCS makeup would not be delayed based upon early indications of reduced RCS leakage and further stated that the intent of the FLEX strategy guidelines is to provide flexibility to operators in case conditions are more severe than expected.

r. SE 5, the ability to batch water for boration injection from the portable batch tanks, was reviewed by the NRC staff. Dominion will also not be using the batch tank to switch between units.

s. Demonstration of the basis that NOTRUMP code adequately predicts the sequence of events during an ELAP event (SE 6). The NRC staff has been discussing this issue with the PWROG as well as the licensee to resolve this question.

Human Factors

The NRC staff reviewed various human factors questions during the audit in review of SE review item 4 as well as various questions through Electrical, Balance of Plant, and

Reactor Systems areas regarding the actions required by personnel to complete tasks during the ELAP event. The questions addressed areas of the generic plant, program and policy, and operations as detailed during plant walk downs. The human factors questions focused more on the ability of plant personnel to perform functions required during the ELAP event rather than the ability of the equipment to perform the functions.

The NRC staff discussed 33 human factors related questions with Dominion at the Millstone site. The NRC staff's review focused on the strategy and plans to deal with the ELAP, the licensee's procedures in place, and the human factors issues that arose during the implementation of the Integrated Plan. The NRC staff reviewed the Millstone FSGs and staffing plan to verify the number of staff on-site to perform the required functions in the required amount of time. The review also focused on any new or changed operator actions that were a result of the mitigating strategies. Some of the areas of review during the audit with regards to human factors included:

- New or changed procedures;
- New or changed interfaces or controls;
- New or changed alarms or displays;
- New or changed training;
- Protective equipment for personnel responding to the ELAP;
- Effects on the personnel's ability to respond to the ELAP;
- Effects of the environment in equipment locations as well as outside on the ability of the plant personnel to respond to the ELAP;
- Beyond-Design Basis (BDB) equipment identification;
- Responsibilities of various personnel during the ELAP;
- The interaction of the two units on site;
- The current procedures and controls used in developing strategies and procedures; and
- Operator actions in various ELAP response activities such as RCS injection or repowering electrical busses

During its review, the NRC staff noted human factors aids for BDB equipment and the licensee's analyses regarding the time needed to cover distances to employ the strategy. This review noted area accessibility and the availability of area cooling. Dominion provided the NRC staff the procedures used to ensure that human factors are accounted for in their implementation of the ELAP event. Roles of personnel in coordination of ELAP activities were discussed as well as methods of communication and verification.

One noted item that has been left open is the ability to perform actions in the Unit 3 ADV room. The calculation for the temperature in the room as well as the ability of the personnel performing the actions in the room while wearing the necessary protective equipment should be better justified by Dominion. This is covered by AQ 25.

Walk downs

The NRC staff performed walk downs at the Millstone site in review of Human Factors SE review item 4 for both units as well as: Unit 2; ISE CI 3.2.1.1.A, ISE CI 3.2.1.6.B, AQ 10, Unit 3; ISE CI 3.2.1.1.A, AQ 14, AQ 20. The walk downs were done to verify locations of equipment, connections, modifications, accessibility, and distances throughout the plant. The walk downs helped in visualizing the Millstone plan for BDBEE response, and the locations reviewed included:

Unit 2

- Aux feed connections from the CST in the turbine building
- The ADVs up ladders where the handwheels are
- The RCS injection pump connection points for the secondary strategy
- PDP repower and the reactor water storage tank (RWST) as well as portable batch tank location

Unit 3

- ADV rooms. Modifications that will be made to 4 ADVs to attach hoses
- Aux feed location. Suction and discharge of the TDAFW pump
- Flex Aux feed pump staged out of the building by the TDAFW pump
- Tornado doors outside of the TDAFW pump room
- Makeup from CST or other sources
- Suction from RWST at the suction of HPI pump to the RCS injection PDP
- Discharge of flex RCS injection pump goes to discharge of the HPI pump
- Portable batch tank can be provided for borated water injection
- RWST is protected from everything but missiles

The NRC staff focused on the cooldown and boration aspects of the Phase 2 RCS injection strategy. The NRC staff noted whether the available water sources for RCS injection or RCS cooldown were robust or not as well as the locations, quality, and robustness of the backup sources and other available sources. The NRC staff noted the locations of pump staging areas and injection points as well as the routes that would be utilized to deploy hoses for FLEX make-up. The NRC staff gained a better understanding of the functional component of the Phase 2 plans for deployment of equipment and its locations as well as the necessary human actions that would go along with deployment of the equipment.

3.2 Electrical Technical Discussions and Walk Downs

During the onsite audit, the NRC staff met with the licensee and reviewed electrical single-line diagrams, summaries of calculations for sizing the FLEX diesel generators (DGs) and station batteries, and refueling strategies for portable diesel powered equipment. The NRC staff also reviewed summary calculation that addressed the effects of temperature on the electrical equipment credited in the mitigating strategies integrated plan as a result of losing heating, ventilation, and air conditioning (HVAC) during an ELAP as a result of a BDBEE. The NRC staff also performed a walk down of load shed procedures as well as the areas where the portable and pre-staged electrical equipment will be located, the connection points to the electrical distribution systems, and the cable runs from the portable 120 V, 480 V, and 4160 V FLEX DGs.

a. ISE CI 3.2.4.2.A, AQ 32, AQ 49, AQ 59, AQ 75, AQ 82, and Dominion's Identified OIs 17 and 19: Effect of Temperature on Electrical Equipment (Including Hydrogen Ventilation Strategies) Due to Loss of HVAC during an ELAP.

The NRC staff reviewed Dominion's Engineer Technical Evaluation (ETE)-CPR-2012-0008 Rev. 2 "MP3 Beyond Design Basis – FLEX Strategy Overall Integrated Plan Basis Document," and ETE-CPR-2012-0009 Rev. 2, "MP2 Beyond Design Basis – FLEX Strategy Overall Integrated Plan Basis Document," to verify that electrical equipment relied upon as part of the Milestone Power Station mitigation strategy for ELAP, as a result of a BDBEE, will not be adversely affected by increase temperature as a result of loss of HVAC.

For MPS2 TDAFW pump rooms, Dominion noted that the steady-state normal operating temperature for this room, with no credit for the ventilation fan, has been calculated to 130 °F during the summer time. 130 °F is less than the room design temperature of 135 °F. Since this room is not expected to experience a greater heat load during an ELAP/Loss of Ultimate Heat Sink (LUHS) scenario, Dominion noted that no compensatory cooling measures are required for this room. Dominion also noted that the MPS3 TDAFW pump room (EQ Zone ES-07) equipment qualification temperature limit is 162 °F for maximum abnormal excursion accident conditions. The licensee calculated the maximum room temperature 8 hours post-ELAP event to be 156 °F which is less than the temperature limit of 162 °F. Nonetheless, the licensee stated that it will implement compensatory measures such as opening doors and/or use portable fan units to bring the area temperature down to the 110 °F, primarily for supporting human habitability. For the control room, the licensee noted that equipment operability for instrumentation cabinets will be ensured by maintaining the cabinet temperature below 120 °F, the design limit, by opening cabinet doors within 30 minutes after the onset of an ELAP event. The licensee's evaluation showed that these actions will maintain internal cabinet temperatures below 110 °F for the duration of the ELAP/LUHS scenario. For the East/West switchgear room, including the battery rooms, the licensee noted that post ELAP area temperature will remain below 120 °F, the design limit, for the initial 8 hours. Dominion noted that it will open the doors to the battery rooms 8 hours after the initiation of an ELAP event. For the MPS3 Main Steam Valve Building (MSVB) which contains ADV room, Dominion noted that the room could heat up to 225 °F in two hours following an ELAP event. However, Dominion did not consider the missile shield that could affect ventilation and heat load in this room. The licensee will update their analysis to consider the effect of the missile shield on the temperature in the MSVB/ADV room. Pending NRC staff review of the re-analysis of the heat load in the MSVB/ADV room, the CI 3.2.4.2.A will remain open.

The NRC staff also reviewed Dominion's assessment of battery room hydrogen accumulation due to loss of the HVAC system during an ELAP event. The NRC staff reviewed Dominion's analysis (ETE-CPR-2012-0008 and ETE-CPR-2012-0009) to verify that hydrogen gas accumulation in the 125 V dc vital battery rooms will not reach combustible levels while HVAC is lost during an ELAP. The minimal amount of hydrogen generated during the initial period when the batteries are discharged will be

dissipated upon opening the dc switchgear room doors at 60 minutes. Upon restoration of power to vital 480 V bus from a 480 V alternating current (VAC) portable generator or from the BDB/FLEX 4160 VAC Turbine Generators during Phase 3, power will be restored to the battery room HVAC system. Therefore, the battery room exhaust fans will exhaust battery room air through the normal exhaust flow path to prevent hydrogen accumulation. Based on its review, the NRC staff finds that hydrogen generation during initial battery discharge period is insignificant and will be adequately dissipated by opening the dc switchgear room doors. Additionally, the NRC staff finds that hydrogen accumulation will not reach combustible levels in the 125 V dc vital battery rooms during Phases 2 and 3 of an ELAP event when the station batteries are being recharged, since the battery room HVAC system will be operating during the recharge period.

b. ISE CI 3.2.4.4.A and Licensee's Identified OIs 15 and 17: Adequacy of Existing Lighting and Portable Lighting to Perform FLEX Strategy Actions

The NRC staff reviewed the licensee's assessment of lighting strategies to ensure that existing lighting and portable lighting (i.e., flashlights or headlamps) are adequate to perform FLEX strategy actions during a BDBEE. Specifically, the NRC staff reviewed ETE-CPR-0008 and ETE-CPR-2012-0009. In these evaluations, the licensee noted that all accessible areas for FLEX strategies were determined to require portable lighting for illumination. Appendix "R" lighting is rated to be in service for 8 hours and the remainder of the emergency dc lighting is only rated for 90 minutes. Also, the Appendix "R" lighting is not seismically qualified, thus cannot be credited for a seismically induced ELAP. Considering this, portable lighting needs to be continuously available for MPS2 and MPS3 to ensure safe transit and occupation of areas required for implementation of FLEX strategies. In addition, all operators are provided with flashlights and FSG procedures will direct operators to utilize suitcase lights and head lamps. Emergency lighting will be re-powered during Phase 2 from the 480 VAC portable generators. Larger lighting equipment would also be deployed in outside areas to support deployment of BDB pumps and generators. Based on its review, the NRC staff finds that Dominion's lighting strategy is adequate for implementation of FLEX strategies. Therefore, CI 3.2.4.4.A can be closed.

c. ISE CI 3.2.4.9.A, AQ 48, AQ 58, and Licensee's Identified OIs 14 and 16: Equipment Fuel Consumption and Required Re-Fill Strategies

The NRC staff reviewed Dominion's fuel management strategy during an ELAP event. In particular, the NRC staff reviewed the equipment fuel consumption rates in ETE-CPR-2012-0008 and ETE-CPR-2012-0009. Dominion noted that fuel sources for the BDB portable pumps and generators used for the FLEX strategies during Phase 2 and 3 of an ELAP event are provided from two 12,000 gallons (TS minimum) seismically installed, missile protected storage tanks located in the MPS2 Auxiliary Building. These two tanks are located above the maximum postulated flood elevation. As an alternate supply, two below-ground fuel oil (FO) storage tanks, each containing 32,670 gallons (TS minimum) are located outside the MPS3 emergency diesel generator facility. These tanks are seismically installed, missile protected, and located above the maximum postulated flood elevation. Diesel fuel in storage tanks are routinely sampled and tested to assure FO quality is maintained to American Society for Testing and Materials standards. The

licensee also noted that the BDB FLEX equipment includes a refueling tank truck. This truck will be stored in the fully protected FLEX storage building and will be used to refuel the diesel-fueled BDB equipment. The licensee has completed an evaluation of all BDB equipment fuel consumption. Based on this evaluation, the licensee noted that the two 13,000 gallon diesel fuel oil tanks at MPS2 will have adequate capacity to provide the on-site BDB equipment with diesel fuel for more than 6 days. The two 32,760 gallon underground FO storage tanks at MPS3 will provide fuel for an additional 18 days. This fuel can be transferred to the FO truck using the suction hose from the FO truck's installed pump. Dominion also noted that to facilitate deployment of the BDB portable pumps and generators, the equipment is to be stored in a fueled condition. As part of the PM templates being created by the Electric Power Research Institute (EPRI), the oil tanks on this FLEX equipment will also be routinely sampled and tested to assure proper fuel oil quality is maintained. Based on its review, the NRC staff finds that Dominion's refueling strategy will ensure that sufficient fuel quantities are available and that the fuel delivery capabilities are adequate so that credited diesel operated equipment can continuously perform its intended function during an ELAP event. Therefore, CI 3.2.4.9.A can be closed.

d. ISE CI 3.2.4.10.A, AQ 38, AQ 39, AQ 46, AQ 47, AQ 48, AQ 52, AQ 71, AQ 72, AQ 73, AQ 79, AQ 80, AQ 81, and Licensee's Identified OIs 2 and 15: (a) Battery Run Time and (b) Battery Duty Cycle Load Profiles and Load Shedding

   (a) Battery Run Time

   During the audit process, the NRC staff noted that Dominion's FLEX strategy station battery run-time was calculated in accordance with the Institute of Electrical and Electronic Engineers (IEEE) Standard (Std.) 485 methodology using manufacturer discharge test data applicable to the licensee's FLEX strategy as outlined in the NEI position paper, "EA-12-049 Mitigating Strategies Resolution of Extended Battery Duty Cycles Generic Concerns," (ADAMS Accession No. ML13241A186).

   During the onsite audit, the NRC staff noted that the licensee calculated the extended battery discharge to appropriately 29 hours for the MPS2 vital batteries.
   The MPS2 vital batteries are C&D Technologies LCR-33 60 cells with a capacity of 2320 ampere-hour (A-H). Nuclear-grade batteries are qualified to support up to an 8-hour discharge. The NRC staff has requested additional information from C&D Technologies to demonstrate that their nuclear grade batteries can support battery discharges greater than 8 hours. CI 3.2.4.10.A (a) will remain open for MPS2 pending the NRC staff's review of additional information from the battery manufacturer. CI 3.2.4.10.A (a) is not applicable to MPS3 since they are not relying on a battery discharge greater than 8 hours (for a single battery).

   b) Battery Duty Cycle Load Profiles and Load Shedding

   The NRC staff reviewed summaries of the results, conclusions, and key assumptions of the licensee's battery calculations (2013-ENG-04408E2 Rev. 0, "MP2 BDB Battery Calculation," and 2013-ENG-04501E3 Rev. 0, "MP3 BDB Battery Calculation"). The NRC staff reviewed these summaries to verify the adequacy of the capacity and

capability of the vital batteries to supply dc power to the required loads during the first phase of the Milestone FLEX mitigation strategies plan for an ELAP as a result of a BDBEE. The NRC staff also successfully walked down the load shedding procedures (EOP 25-FSG-4 Rev. 0 Draft C "ELAP DC Load Shed/Management and EOP 35-FSG-4 Rev. 0 Draft C "ELAP DC Load Shed/Management') with the licensee to verify that load shedding could be completed within the time assumed in its analysis.

Dominion's evaluations identified the required loads and their associated ratings (ampere and minimum required voltage) and the loads that would be shed within 75 minutes to ensure battery operation for least 29 hours 9 minutes and 14 hours for MPS2 and MPS3, respectively. Power is expected to be restored to the battery chargers by the end of the battery coping period. Table 1 of the licensee's evaluations identified the minimum end voltage at the battery terminals that will be required to meet the minimum required voltage of the downstream equipment to ensure their proper operation. The licensee used the methodology in IEEE Std. 485-2010 for determining battery discharge durations. The proposed strategy to extend the battery discharge time for MPS2 is to cross tie 2-vital 125 V dc buses after shedding non-essential dc loads. The two cross-tied batteries were modeled as one battery supplying half of the remaining loads until the batteries were depleted. The vital batteries at MPS3 are NCN-27 60 cells with 1945 A-H and NCN-11 60 cells with 825 A-H. The proposed strategy for MPS3 is to power loads with one battery until it is nearly depleted and then switch to the other battery until this battery is also depleted. The total discharge time for MPS3 batteries is calculated to be 14 hours with each battery discharge time being less than 8 hours.

As previously mentioned, the licensee plans to cross-tie both vital 125 V dc buses to extend the battery discharge time for MPS2. Closing the dc tie breaker between dc buses 201A and 201B could result of a significant electrical arc due to the difference in voltage between batteries 201A and 201B at the time of the breaker closure. Based on this concern, the NRC staff requested the licensee to perform an assessment of any adverse impacts as a result of closing the dc tie breakers during an ELAP event. In response to the NRC staff's request, the licensee noted that the installed dc cross-tie at MPS2 utilizes General Electric (GE) breakers that are 1600 amp frame breakers with an 800 amp trip coil rating. These breakers are designed for switching loads up to 800 amps and quench a fault current up to 50,000 amps without causing any arc flashes outside the switchgear assembly. Therefore, as long as the circulating current is less than 800 amps, the breaker will close and the battery voltage will equalize without any cause for personnel safety concerns. Dominion also noted that the MPS2 cross-tie is implemented each refueling outage in Mode 5 with a slight voltage differential between the dc buses with no issues having occurred to date. Vital batteries 201A and 201B are the same size and made by the same manufacturer. The battery duty cycles for these batteries are almost identical as verified by comparing the battery terminal voltage at 75 minutes after a loss of ac charging. Dominion's review of the design-basis calculations indicated that the battery terminal voltages track together throughout the battery cycle and that the terminal battery voltage difference is minimal. Based on this information, the NRC staff finds that the dc cross-tie breakers should close as expected when implementing the cross-tie between dc buses 201A and 201B.

The NRC staff also finds that the Milestone Station dc system has adequate capacity and capability to power the loads required to mitigate the consequences during the first phase of an ELAP as a result of a BDBEE and necessary load shedding should be accomplished within the times assumed in the licensee's analysis. Therefore, CI/Audit Item 3.2.4.10.A item (b) is closed.

e. AQ 42, AQ 52, and AQ 63: Non-Safety-Related Equipment Taken Credit for in the ELAP Analysis

The NRC staff reviewed the electrical systems and equipment for mitigation strategies. Additionally, the NRC staff requested the licensee to list and specify functions of each non-safety related installed electrical systems or equipment that are credited in the ELAP analysis supporting the FLEX mitigation strategies. The NRC staff also requested the licensee to justify that the systems and equipment will be available and reliable to provide the desired functions on demand under ELAP conditions. In response to the NRC staff's requests, the licensee stated that the only non-safety-related equipment it is taking credit for in its ELAP analysis consists of 4160 VAC non-vital bus 34A. Non-vital bus 34A is located in the switchgear room at the 4'6" level of the control building. This room also contains vital 4160 VAC Bus 34C. As indicated in Table 3.2-1 of the Milestone Unit 3 Final Safety Analysis Report, the control building is seismically qualified as well as tornado missile protected. The licensee also stated that the switchgear in this room is installed to prevent physical interaction during a seismic event. Bus 34A is in a seismic structure that is also tornado missile protected and flood protected. Since reliance on the 4160 VAC non-vital bus is a Phase 3 action, significant time would be available to repair or bypass the bus should it be damaged as a result of a seismic event. Based on its review, the NRC staff finds that the non-safety-related 4160 VAC Bus 34A is located in a protected structure and is of similar design and installation as the safety-related buses. Therefore, this bus should be available and reliable during an ELAP event as a result of a BDBEE.

f. AQ 50, AQ 61, and Licensee's Identified OIs 13 and 15: FLEX Generator Sizing Calculations

The NRC staff reviewed Dominion's sizing calculations for FLEX generators to verify that they can supply the loads assumed in phases 2 and 3 of an ELAP event. The NRC staff reviewed 2013-ENG-04503E3 Rev. 1, "MP3 BDB - FLEX Electrical 4160V, 480V, and 120VAC System Loading Analysis," and 2013-ENG-04383E2 Rev. 1, "MP2 BDB - FLEX 4160V, 480V and 120V AC System Loading Analysis." The NRC staff noted that Dominion plans to use one 480 V FLEX DG for Unit 2 and one 120V FLEX DG for Unit 3 to support Phase 2 operation. The MPS2 480 V generator is rated for 500 kilowatts (KW), which will support the calculated load of 296.03 KW. The MPS3 120 V generator is rated for 23.3 KW, which will support the calculated load of 6.16 KW. 120 V and 480 V FLEX DGs are available as a backup for MPS2 and MPS3, respectively. For Phase 3, the licensee plans to use one 4160 V generator for each unit. This generator will be rated for approximately 2 megawatts (MW). The licensee calculated loads to be 1.3 MW and 0.895 MW for MPS3 and MPS2, respectively. Based on this information, the NRC staff finds that the FLEX generators will have adequate margin and capability to power the loads assumed during Phases 2 and 3 of an ELAP event as a result of a BDBEE.

g. AQ 37, AQ 45, AQ 47, AQ 57, AQ 60, AQ 70, AQ 76, AQ 78, and AQ 83: Review Electrical Single Line Diagrams for Isolation/Protection

Dominion provided copies of conceptual electrical single line diagrams showing electrical connections to the 4160 V switchgear, 480 load centers, and motor control centers for the FLEX generators. The 4160 V switchgear and 480 V load center supply breakers for the FLEX generators can be closed or opened manually by using FLEX procedures to prevent electrical equipment damage from simultaneous power supply from two electrical power sources (i.e., FLEX generator and the existing Class 1E power supply).

The NRC staff reviewed document Nos. 25203-30001 Rev. 40, "MP2 Main Single Line Diagram," 25203-30008 Rev. 21, "Single Line Diagram 480V Unit Substation Emergency 22E (B05)& 22F (B06)," 1201171-E-25212-30015-B Rev. 23, "4.16kV One Line Diagram Bus 34A Sh.1," and 1201171-E-25212-30055-B Rev. 0, "MP3 480 V One Line Diagram." The NRC staff also walked down the electrical supply pathway (i.e., cable routing) and connection points. Based on its review, the NRC staff noted that the electrical single line diagrams and walkdown provided adequate electrical isolation between FLEX electrical (non-Class 1E) systems and Class 1E systems to maintain the integrity of Class 1E systems (i.e., single Class 1E breaker or two non-Class 1E breakers in series). The NRC staff finds that this is consistent with NEI guidance 12-06 for appropriate electrical isolation and interactions. Dominion noted that electrical isolation between Class 1E and non-Class 1E systems will be incorporated into the FLEX procedures that are currently under development and that the electrical isolation will be included in the electrical single line diagrams and FLEX procedure/guidance of the final design package.

Based on above, the NRC staff finds that the FLEX electrical equipment will be adequately protected from simultaneous power supply from two electrical power sources and that appropriate electrical isolation will be included in Dominion's FLEX procedures.

3.3 Balance-of-Plant Technical Discussions and Walk Downs

The NRC staff met with Dominion and reviewed FSGs, station procedures, FLEX equipment deployment strategies, site flooding analysis, summaries of calculations for hydraulic analysis of FLEX pumps and associated hoses and piping, and refueling strategies for portable and pre-staged diesel powered equipment. In addition, the NRC staff performed walk downs of FLEX deployment paths, the new FLEX building, deployment locations of portable and pre-staged FLEX equipment, connection points of hoses, hose and associated equipment laydown areas, and the SFP area.

a. The NRC staff reviewed ISE CI 3.1.1.3.A, listed as AQ 4-A (Unit 2) and AQ 3-A (Unit 3) in the audit plan, which related to confirmation of Dominion completing its review of impacts from large internal flooding sources that are not seismically robust and do not require ac power. For Unit 3, the NRC staff also needed to verify that groundwater in-leakage is limited, or can be addressed as part of the mitigation strategy.

At the audit, NRC staff spoke to Jim Craffrey and Will Thomas, who also provided a draft version of Rev. 3 of ETE-CPR-2012-009, which is the BDB guidance document for ELAP mitigating strategies for Millstone Unit 2. The document included an evaluation of internal flooding sources for Unit 2. The NRC staff reviewed the draft document for the various areas described in Section 11.1.3.2 of the guidance document and confirmed that Dominion did not identify any credible internal flooding sources that would impact the proposed BDB mitigating strategies.

Jim Craffrey and Will Thomas also provided a draft version of Rev. 3 of ETE-CPR-2012-008, which is the BDB guidance document for ELAP mitigating strategies for Millstone Unit 3. The document included an evaluation of internal flooding sources for Unit 3. The NRC staff reviewed the draft document for the various areas described in Section 11.1.3.3 and confirmed that Dominion did not identify any credible internal flooding sources that would impact the proposed BDB mitigating strategies. Also, the NRC staff reviewed the assessment of the groundwater accumulation, which is currently monitored every 24 hours to make sure the containment liner is dry. Based on the current process for monitoring of the groundwater in the engineered safety features building, the NRC staff concurred that the groundwater in-leakage would not impact the BDB equipment needed for mitigation.

b. The NRC staff reviewed ISE CI 3.1.2.2.A, listed as AQ 6-A (Unit 2) in the audit plan, which is related to OIs of the following items: deployment of equipment during flooding conditions resulting from a hurricane; verification of response times listed in the timeline and perform staffing assessment; evaluation of all BDB equipment fuel consumption and required re-fill strategies; and designated travel pathways using the guidance contained in NEI 12-06.

   During the audit, NRC staff spoke with Will Thomas, who also provided a reference of ETE-CPR-2012-009. ETE-CPR-2012-009 addressed the above items, and specifically included information in Section 13.3.1 that described proactive actions to be taken prior to a hurricane on site. Mr. Thomas also referenced AOP 2560 and COP 200.6, which are procedures for operators to follow for hurricane watches and warnings. These existing procedures will be revised for direct entry into BDB guidelines. NRC staff also reviewed the revised draft of the AOP 2560 procedure to confirm the inclusion of the procedure step to deploy of BDB AFW pump prior to hurricane and flooding. The NRC staff also observed the pathways to be used for BDB equipment deployment during walk-down on site audit.

c. The NRC staff reviewed ISE CI 3.2.4.7.A, listed as AQ 19-A (Unit 2) and AQ 17-A (Unit 3) in the audit plan, which involved confirmation by Dominion that the analyses was completed for the use of impure water sources for SG makeup in both Units.

   At the audit, NRC staff spoke to Will Thomas and Jim Craffrey, who provided Westinghouse calculations CN-CDME-13-11 (Unit 2) and CN-CDME-13-12 (Unit 3). The calculations gave information on corrosion allowance, solids and water chemistry in the designated water sources listed as part of the SG makeup strategy along with the time limits and limiting factors of usage. NRC staff reviewed the

calculations document along with the overall mitigation strategy guidance documents ETE-CPR-2012-009 (Unit 2) and ETE-CPR-2012-008 (Unit 3) to confirm prioritization of the water sources to be used to supply the SGs during an ELAP.

d. The NRC staff reviewed AQ 36-B (Unit 2) and AQ 44-B (Unit 3) in the audit plan, which involved Dominion providing an analysis of the possible consequences of injecting potentially impure or contaminated water from the UHS or the site's 3 million gallon pond into the RCS.

   At the audit, NRC staff spoke to Dave Moreski and Will Thomas, who provided references in the Rev 3 drafts of ETE-CPR-2012-009 (Unit 2) and ETE-CPR-2012-008 (Unit 3). Both documents discuss the prioritization of water sources to be used for RCS makeup once the RWST is depleted or is unavailable. Section 2.2.1 in both documents provide a listing of water sources to be used for RCS makeup, with the exclusion of the UHS due to the poor water quality as documented in the Westinghouse calculations CN-CDME-13-11 and CN-CDME-13-12 for Units 2 and 3 respectively. NRC staff reviewed the documents for RCS makeup and found the prioritization of water sources to be adequate for ELAP conditions.

e. The NRC staff reviewed AQ 59-B (Unit 2) and AQ 68-B (Unit 3) in the audit plan, which involved Dominion conducting a hydraulic analysis to confirm the flow rates from the BDB suction/fill connection to AFW system is adequate. NRC staff reviewed an additional item for Unit 2, which involved Dominion assessing the MS ADVs to withstand a seismic or tornado event.

   At the audit, NRC staff spoke to Jim Powers and Jim Craffrey, who provided Calculation 13-015, rev. 2 for review. Calculation 13-015 described the flow rates from BDB suction/fill to AFW for both Units. This included evaluation of leakage loss at connection points and hose runs along deployment paths. NRC staff reviewed the hydraulic analyses for all of the connection points for the BDB to AFW as well as the alternative connections and found that Dominion's evaluation was adequately addressed for both Units.

   For the Unit 2 item, NRC staff spoke to Will Thomas and Zach Withrow, who also provided the calculation 14-ENG-04426M2. Calculation 14-ENG-04426M2, provided the analysis for the existing supports used for the MS ADVs being qualified for seismic and tornado events. The MS ADVs exhaust lines are protected until the seismic/non-seismic interface anchor through the silencer to the exhaust on the EDG roof. The "A" exhaust line was evaluated to be currently qualified for seismic and tornado events. The "B" exhaust line will need additional 3-way support to withstand seismic events, but it is tornado-protected since it is located within a tornado protected building. Dominion plans to modify the "B" exhaust line with the additional 3-way support.

f. The NRC staff reviewed AQ 61-B (Unit 2) in the audit plan, which involved Dominion providing an evaluation of its alternate strategy for connecting the diesel driven BDB AFW pump is to remove the bonnet off of the feedwater regulating bypass valve.

At the audit, NRC staff spoke to Steve Baker, who also provided a reference to Section 2.2.2.2 in ETE-CPR-2012-009. Section 2.2.2.2 discussed the alternative strategy for the AFW connection with the accompanying drawing 25203-26002 Sh. 2. The drawing provided the locations where the flange will be installed for a 2 1/2 inch hose connection for manual control downstream. During the RCS/SG makeup walk-down at the site audit, NRC staff also observed these connection points in the Turbine and Aux. Building. The BDB AFW pump will be staged in the truck bay of the Turbine Building, which will allow for access to the alt AFW connection points. The activity for connecting the flange and making the hose connections were timed by Dominion not to exceed one hour. The NRC staff finds this alternative connection strategy to be adequate since Dominion described the connection points and the location of the BDB AFW will be located in an area that is protected from flooding.

g. The NRC staff reviewed AQ 62-B (Unit 2) in the audit plan, which involved Dominion providing details on its strategy for deploying the portable pump to include time requirements for installation in regards to RCS heat up and SG dry-out (50 minutes).

   At the audit, NRC staff spoke to Steve Baker, who provided the details of the alternative connection strategy as described in item f above. The guidance document ETE-CPR-2012-009 provides direction for early deployment of BDB AFW pump inside the Turbine Building truck bay prior to flooding concerns and also indicates that a second BDB AFW pump is available being deployed if the TDAFW pump is lost as described in Section 2.2.2.1. The NRC staff reviewed this portion of the licensee's strategy for SG makeup and found that the licensee has provided contingencies to ensure adequate SG makeup during ELAP.

h. The NRC staff reviewed AQ 70-B (Unit 3) in the audit plan, which involved Dominion providing details of the alternate strategy for connecting the diesel driven BDB AFW pump is to remove the bonnet off of the steam generator blowdown (SGBD) valve.

   At the audit, NRC staff spoke to Dave Moreski, who referenced ETE-CPR-2012-008 along with drawing 25212-26923 to describe the strategy for connecting to the SGBD valves in Unit 3 for the alternative AFW connection and identify the connection points. During the walk-down, John Curtis and Paul Parulis pointed out the actual connection points for the SG makeup. Mr. Moreski describe the connection activity to not to exceed more than 2 hours for the alternative connection. The NRC staff reviewed the above information and finds the alternative connection strategy for the AFW to be adequate due to the accessibility of the SGBD valves.

i. The NRC staff reviewed AQ 2-C (Unit 2) and AQ 3-C (Unit 3) in the audit plan, which involved Dominion providing analyses of the time to steam generator (SG) overfill without operator action to reduce Auxiliary Feedwater (AFW) flow, time to SG dry-out without AFW flow, and time to depletion of the Condensate Storage Tank (CST).

   At the audit, NRC staff spoke to Jim Power and Will Thomas, who provided calculation MISC-11787, Attachment 3. Calculation MISC-11787 provided the time for SG overfill without operator action to reduce AFW flow, time to SG dry-out without

AFW flow, and time to depletion of the CST. NRC staff reviewed the analyses to confirm that the times for above items are adequate.

j. During the audit, NRC staff reviewed AQ 3-C (Unit 2) and AQ 5-C (Unit 3) in the audit plan and determined that these items were being covered in item e above. Both items were respectively closed without any additional review needed.

During the audit, NRC staff reviewed AQ 10-C (Unit 2) in the audit plan and determined that this item was being covered in item g above. This item was closed without any additional review needed

3.4 Containment and Ventilation Technical Discussions and Walk Downs

The NRC staff met with Dominion and reviewed FSGs, station procedures, containment strategies and analyses, and ventilation strategies and summaries of ventilation calculations. In addition, the NRC staff performed walk downs of the Fuel Building, including SFP area and the Main Steam Valve Building/ADV room.

a. The NRC staff reviewed ISE CI 3.2.2.A, listed as AQ 29 (Unit 2) and AQ 36 (Unit 3) in the audit plan, which related to confirmation of an adequate ventilation pathway for steam and condensate from the SFP.

At the audit, NRC staff spoke to Albert Ghanakhanian, who provided the licensee's assessment of establishing a vent pathway for steam from the Unit 2 SFP as discussed in ETE-CPR-2012-0009. The NRC staff reviewed the licensee's evaluation which discussed that the inlet air flow is established by opening the Fuel Building roll-up door at elevation 14 feet (ft) and the outlet air flow is established by opening two personnel access doors at elevation 70 ft. The SFP is located at elevation 30 ft. The opening of these doors provides air flow and creates a chimney effect to vent the steam. The NRC staff performed a walkdown of the Unit 2 Fuel Building with Steve Baker in order to confirm the flow pathway of steam (coming off the boiling of the SFP). Based on review of the licensee's assessment and the physical walkdown of the Fuel Building, the NRC staff agrees that the licensee has an adequate strategy to vent steam and condensate from the SFP. The FSG's have been revised to direct operators to block open these doors prior to SFP boiling (at 6 hours).

At the audit, NRC staff spoke to Albert Ghanakhanian, who provided the licensee's assessment of establishing a vent pathway for steam from the Unit 3 SFP as discussed in ETE-CPR-2012-0008. NRC staff reviewed the licensee's evaluation which discussed that the inlet air flow is established by opening the Fuel Building roll-up door at elevation 24 ft and the outlet air flow is established by opening the casking roll-up door at elevation 52 ft and two personnel access doors at elevation 55 ft. The SFP is located at elevation 52 ft. The opening of these doors provides air flow and creates a chimney effect to vent the steam. NRC staff performed a walkdown of the Unit 3 Fuel Building with Paul Parulis in to order to confirm the flow pathway of steam (coming off the boiling of the SFP). Based on review of the licensee's assessment

and the physical walkdown of the Fuel Building, the NRC staff agrees that the licensee has an adequate strategy to vent steam and condensate from the SFP. The FSG's have been revised to direct operators to block open these doors prior to SFP boiling (at 10 hours).

b. The NRC staff reviewed ISE CI 3.2.3.A, listed as AQ 30 (Unit 2) and AQ 37 (Unit 3) in the audit plan, which is related to the strategy for containment cooldown and depressurization and confirmation that the analysis and the strategy to maintain the containment parameters within acceptable limits is satisfactory.

At the audit, NRC staff spoke to Albert Ghanakhanian, who provided the long term containment pressure and temperature analysis for MPS Unit 2, which is documented in calculation MISC-11793. Pages 21 and 22 of this calculation present the long term pressure and temperature profiles for the initial 7 days of the post ELAP scenario. As documented on pages 15 and 16 of the calculation, at the end of 7 days, the MPS Unit 2 containment pressure and temperature are calculated to be 28.78 psia and 198.7 °F, respectively, which is well below the containment design pressure and temperature limits of 54 psig and 289 °F, respectively.

The containment response analysis has been performed utilizing the same approved GOTHIC licensing model and methodology that was used for FSAR Chapter 14 containment integrity analysis. The Dominion containment analysis methodology is documented in topical report DOM-NAF-3-0.0-P-A. This topical report describes, in detail, the assumptions to be used and the mathematical formulations employed for containment integrity analysis for all Dominion fleet. The NRC has approved the use of the GOTHIC code and the analysis methodology described in this topical report in a letter dated August 30, 2006.

The NRC staff reviewed the details of the containment cooldown and depressurization strategies for MPS Unit 2, which are documented in section 5.3 of the ETE-CPR-2012-0009 Rev. 3. Several options were evaluated to provide operators with the ability to establish Containment cooling based on the equipment availability. All of these options require the restoration of support systems to remove heat from the containment thus reducing containment pressure and temperature. As documented in calculation 13-015, "MP2 & MP3 FLEX Proto Flo Model and Analysis", the analysis of the FLEX Service Water Connections shows that the Very Large Capacity (VLC) pump network configuration is capable of providing 4000 gpm to one of the MPS2 reactor building closed-cooling water heat exchangers. The establishment of this cooling flow rate to a single Containment Air Recirculation (CAR) fan is equivalent to the restoration of half of the minimum safeguard heat removal capability of the two CAR fans that are credited following a design basis LOCA scenario. This configuration is considered to be more than sufficient to provide for containment cooldown and depressurization and decay heat removal actions to ensure the long term integrity of the containment throughout the Phase 3 of the postulated ELAP/LUHS scenario. Based on review of Dominion's analysis, the NRC staff agrees that Dominion has an adequate Unit 2 strategy to maintain the containment parameters within acceptable limits during all phases of an ELAP.

At the audit, NRC staff spoke to Albert Ghanakhanian, who provided the long term containment pressure and temperature analysis for MPS Unit 3, which is documented in calculation MISC-11793. Pages 23 and 24 of the calculation document the long term pressure and temperature profiles for the initial 7 days of the post ELAP scenario. As documented on page 16 of the calculation, at the end of 7 days, the MPS Unit 3 containment pressure and temperature are calculated to be 28.46 psia and 203.1 °F respectively. As documented on Page 15 of the calculation, the calculated peak pressure and temperature, at the end of seven days following ELAP, are calculated to be well below the containment design pressure and temperature limits of 45 psig and 260 °F respectively.

The containment response analysis has been performed utilizing the same approved GOTHIC licensing model and methodology that was used for FSAR Chapter 6 containment integrity analysis. The Dominion containment analysis methodology is documented in topical report DOM-NAF-3-0.0-P-A. This topical report describes, in detail, the assumptions to be used and the mathematical formulations employed for containment integrity analysis for all Dominion fleet. The NRC has approved the use of the GOTHIC code and the analysis methodology described in this topical report in a letter dated August 30, 2006.

The NRC staff reviewed the details of the containment cooldown and depressurization strategies for MPS Unit 3, which are documented in section 5.3 of the ETE-CPR-2012-0008 Rev. 3. Several options were evaluated to provide operators with the ability to establish Containment cooling based on the equipment availability. All of these options require the restoration of support systems to remove heat from containment thus reducing containment pressure and temperature. As documented in calculation 13-015, "MP2 & MP3 FLEX Proto Flo Model and Analysis", the analysis of the FLEX Service Water Connections shows that the VLC pump network configuration is capable of providing 4000 gpm to one of the MPS3 Recirculation Spray System (RSS) heat exchangers. The establishment of this cooling flow rate to a single RSS heat exchanger is equivalent to the restoration of approximately 37 percent of the minimum safeguard heat removal capability of the two RSS heat exchangers that are credited following a design basis LOCA scenario. This configuration is considered to be more than sufficient to provide for containment cooldown and depressurization and decay heat removal actions to insure the long term integrity of the containment throughout the Phase 3 of the postulated ELAP/LUHS scenario. Based on review of Dominion's analysis, the NRC staff agrees that Dominion has an adequate Unit 3 strategy to maintain the containment parameters within acceptable limits during all phases of an ELAP.

c. The NRC staff reviewed ISE CI 3.2.4.2.A, which is related to the strategy for the ventilation and habitability of the MSVB/ADV room.

At the audit, NRC staff spoke to Albert Ghanakhanian, who discussed Dominion's strategy and also provided a GOTHIC room heat-up calculation, ETE-MP-2014-1030. For the MPS3 Main Steam Valve Building (MSVB) which contains the ADV

room, Dominion noted that the room could heat up to 225 °F in one hour following an ELAP event. The licensee's strategy is to open the stairway door and the exterior door on the opposite side of the room to provide preliminary cooling. NRC staff reviewed the GOTHIC calculation and found an error in the model, which was captured during the NRC walkdown of the MSVB. Dominion did not consider the missile shield that could affect ventilation and heat load in this room. Dominion will update their analysis to consider the effect of the missile shield on the temperature in the MSVB/ADV room. Pending NRC staff review of the re-analysis of the heat load in the MSVB/ADV room, the CI 3.2.4.2.A will remain open.

d. The NRC staff reviewed AQ 9 in the audit plan, which is related to the ability of the FLEX AFW pump to operate at potentially high ambient temperatures after being pre-staged inside the Turbine Building.

   At the audit, NRC staff spoke to Albert Ghanakhanian, who discussed the operating temperature qualified for the FLEX AFW pump, the analyzed temperature of the Turbine Building during an ELAP event and the ventilation flow path in the Turbine Building. The strategy is to establish a ventilation flow path by opening the roll-up door at elevation 13 ft and a personnel access door (70 ft). The maximum qualified temperature for the FLEX AFW pump is 117 °F. Dominion is performing a heat-up calculation of the Turbine Building in order to ensure the operability of the FLEX AFW pump.

3.5 Spent Fuel Pool Instrumentation Technical Discussions and Walk Downs

The NRC staff met with Dominion and reviewed diagrams depicting the SFPI locations and routing of cables from the SFP area to the display locations. The NRC staff also reviewed documentation related to the mounting of the SFPI to the SFP deck. In addition, the NRC staff discussed the issue of electromagnetic compliance (EMC) with Dominion.

a. In response to SFPI Request for Additional Information (RAI) # 2, Dominion submitted a diagram of the SFP area with the locations for the SFPI and the routing of the cables within the SFP. The NRC staff inquired as to the routing of cables and missile protection outside the SFP area. During the onsite audit, Dominion indicated that the routing of the SFPI cables outside the SFP area will be in accordance with its cable separation practices for safety-related components. Dominion also indicated that the cables for the primary and back-up SFP instruments are more than 2 feet apart at all times.

   During the onsite audit visit, the NRC staff walked down the SFP areas and the routes for the primary and back-up cables for Units 2 and 3. The walk downs started at each main control room (MCR) and proceeded to the displays so the staff could assess prompt accessibility. The NRC staff walked the complete cable routing from the SFP's to the display units for the primary and back-up SFPI's for Units 2 and 3. The NRC staff noted that the Unit 3 display locations in the Aux Building took 11 minutes to reach from the Unit 3 MCR, but is still

considered promptly accessible. In comparison, the Unit 2 displays were located in the cable vault below the Unit 2 MCR and were reached in less than two minutes.

The NRC staff's review of this item focused on the degree of separation between the primary and back-up cable routing and missile protection once outside the SFP area.

b. In reviewing SFPI RAI #3, the NRC staff reviewed Dominion's description of the location and the manner by which the SFPI mounting bracket would attach the SFPI level sensor to the refueling floor. During the onsite audit, the NRC staff reviewed licensee documentation and drawings describing the mounting bracket and anchor bolts dimensions, materials, and the seismic and hydrodynamic loads applicable to the mounting bracket site configuration.

For this item, the NRC staff reviewed calculation CALC-RA-0045, Revision 1, "Radiological Evaluation following a Beyond-Design-Basis MPS2 SFP Drain down for NEI 12-02, Westinghouse WNA-TP-04709-GEN, "Spent Fuel Pool Instrumentation System Calibration Procedure," MPS2 FLEX Strategy Document ETE-CPR-2008-0009, "Beyond Design Basis – FLEX Strategy Overall Integrated Plan Basis Document," Calculation MISC-11807, "MP3 Auxiliary Building 43'-6" Elevation Temperature profile (EQ-Zone AB-06) Following Loss of ac Power (ELAP) Beyond Design basis Scenario," and Westinghouse Report EQ-QR-269, "Design Verification Testing Summary report for the Spent Fuel Pool Instrumentation System." The NRC staff also walked down the proposed location for the mounting brackets on the east and west ends on the refueling deck. Dominion showed the NRC staff the locations (indicated by a mark-up on the refueling floors) where the base of the mounting brackets and anchor bolts would be located. Dominion also stated that the mounting bracket design will meet Millstone design and licensing basis requirements for Seismic Category I components and will include consideration of static weight loads and hydrodynamic loads.

The NRC staff's review of this item focused on the locations for the primary and back-up mounting bracket for the SFPI sensor probe and the impact the installation could have on the SFP refueling floor and/or other connection points.

c. During the onsite audit, the NRC staff reviewed the vendor tests performed in the area of EMC related to electromagnetic interference (EMI) that could affect the performance of the SFPI during a BDB event. The NRC staff discussed this issue with Dominion, and Dominion indicated their awareness of this issue. Dominion explained that they performed some additional testing at the vendor facility during the factory acceptance test using radios in the vicinity of the SFPI. Dominion indicated that further information addressing this issue would be provided to the NRC staff.

The NRC staff's review of this item focused on any EMI that could adversely affect the function of the SFPI during the BDB event. Additional SE review items Number 10 and 11 were opened to address the above NRC staff questions.

3.6 Other Technical Discussion Areas and Walk Downs

a. Dominion Nuclear Training Program - The NRC staff met with Dominion to discuss its Systematic Approach to Training (SAT) program as it applies to mitigating strategies and SFPI. The NRC staff reviewed administrative procedures anticipated for Millstone operators.

1) In response to Licensee Identified OIP OI 10 regarding the Dominion Nuclear Training Program, Dominion indicated that training documents and processes would be revised, developed, and maintained to assure personnel proficiency in the mitigation of BDB events. These programs and controls would be developed and implemented in accordance with the SAT.

2) In review of this item, the NRC staff reviewed administrative procedure TR-AA-100, "Analysis," Revision 10, and discussed the analysis phase of the SAT with Dominion. This analysis phase is the first step in determining whether training is needed and to identify the tasks, skills, knowledge and aptitudes that must be trained. Dominion described how new equipment, procedure changes, or policy changes would result in conducting a needs analysis in the SAT. This analysis would trigger the development of new training for site personnel. Dominion indicated that all non-licensed operators, reactor operators, senior reactor operators, and shift technical advisors will be trained in BDB mitigating strategies.

3) The NRC staff inquired about operator training related to testing and calibration of new technology and/or components at the site such as the SFPI. Dominion indicated that Millstone personnel visited the SFPI vendor facility to witness and train on the processes for operation, testing, and calibration of the SFP instruments and development of testing and calibration procedures.

4) The NRC staff's review of this item focused on Dominion's process SAT to revise, develop, and maintain the necessary training to assure personnel proficiency in the mitigation of BDB events.

b. In review of ISE CI 3.2.4.4.B; Unit 2 Licensee Identified OIP OI 18, and Unit 3 Licensee Identified OIP 16, the NRC staff discussed the site's communications enhancements with Dominion. The discussions reviewed Dominion's current plans regarding communications equipment to be purchased for the initial and follow-on long-term site communications strategy during the ELAP event. The discussions included a review of the commercial equipment details, storage locations, deployment procedures, and connections to pre-staged, installed

equipment in the MCR. NRC staff discussions with Dominion also included the use of hand-held radios and their storage locations, charging stations, power sources for the charging stations, applicable procedures under development in relation to site emergency communications, and other communications capabilities documented in procedure available to operators.

The NRC staff's review of the communications enhancements focused on the communications interface between the Unit 2 and Unit 3 MCRs; the initial communication and coordination with offsite agencies; and the inclusion of Security in the overall communication enhancement strategy.

c. In review of the security and building access procedures following an ELAP and BDB event, the NRC staff interviewed plant personnel and conducted plant walk downs focusing on the personnel and vehicle access system responses for the owner controlled area, protected areas, and vital areas following an ELAP during a BDBEE.

The NRC staff's review focused on the ability for onsite and supplemental personnel to access the plant following an ELAP and for any needed tools or documentation to support the above personnel and vehicle access. Additional SE review item 9 for Unit 2 and 8 for Unit 3 were opened to address the above NRC staff questions.

d. In review of ISE CI 3.1.1.4.A, the NRC staff reviewed the draft SAFER Response Plan for Millstone and conducted walk downs of the "B" staging area and the linkage to the Phase 2 equipment deployment haul routes. During the onsite audit, the NRC staff requested the liquefaction and safety of flight analysis for the "B" staging area designated to receive equipment and supplies from the RRC. Prior to the onsite audit, Dominion completed a qualitative liquefaction analysis and completed a safety of flight analysis with the designated helicopter SAFER contractor.

Additionally, the NRC staff discussed Phase 3 haul route coordination with offsite emergency management resources in light of the five hazards. This discussion focused on how the impact to regional infrastructure would impact decision making with state, local, and SAFER officials in the transit of RRC Phase 3 equipment to the site.

The NRC staff's review of the equipment staging and deployment capability from the "B" staging area focused on the viability of the chosen area as it receives the Phase 3 equipment and connects to the Phase 2 portion of the strategy and the emergency management coordination for Phase 3 equipment arriving over land or via air.

4.0 Exit Meeting (Friday, July 25, 2014)

The NRC staff audit team conducted an exit meeting with Dominion following the closure of onsite audit activities. The NRC staff highlighted items reviewed and noted that

detailed results of the onsite audit trip will be documented in this report. The following three items were discussed in detail at the exit meeting:

a. In reviewing the site damage and debris impact for the five applicable BDBEE hazards and the Phase 2 and Phase 3 equipment deployment paths and locations for Millstone Unit 2, the NRC staff noted that additional review by Dominion is needed to address the potential debris impact from the failure of the plant stack during a tornado wind event. As the stack debris field could potentially impact both the FLEX portable equipment deployment locations and deployment paths for Unit 2, the NRC staff requested additional detail and further audit discussion to understand the failure mode of the stack, impacted site locations, and additional debris removal considerations.

b. The NRC staff conveyed that NRC staff discussions are ongoing with PWROG representatives in regards to reactor systems code analysis, RCP seal leakage, and next generation RCP shutdown seal designs. As both Dominion and the Millstone site can be directly impacted by the resolution of these industry level generic discussions, the NRC and the licensee committed to continue to follow-up on audit level discussions. Additionally, further information was requested for building environmental analysis related to time critical operator actions with the atmospheric dump valves.

c. In reviewing Millstone's site emergency response plan during the applicable site wide BDBEEs and its planned communications and coordination with state, local, and national officials in light of spatially separated MCR's between Units 2 and 3, the NRC staff noted that additional review by the licensee is needed to address potential procedural, communication, and coordination limitations by either or both units in declaring and communicating the plant's emergency condition. As the current procedures are written from the standpoint of a lead MCR with some level of inter-unit communications expected, the NRC staff requested additional detail and further audit discussion to understand how each unit will maintain its individual offsite communication requirements and timelines; establish communications with the opposite unit; and ultimately re-establish site-wide emergency organization coordination.

CONCLUSION

The NRC staff completed all three parts of the Millstone onsite audit plan as issued on July 2, 2014. Each detailed audit item listed in Part 2 of the plan was reviewed by NRC staff members while on site. In addition to the list of NRC and licensee staff participants in Attachment 1, Attachment 2 provides a list of documents reviewed during the onsite audit portion.

In support of the continuing audit process, as Dominion proceeds towards orders compliance for the Millstone site, the six additional attachments noted below (three for Unit 2, three for Unit 3) provide the status of all audit review items (including what occurred onsite) that the NRC staff is evaluating in anticipation of issuance of a combined SE for both the Mitigation Strategies and Spent Fuel Pool Level Instrumentation orders. The five sources for the audit items referenced below are as follows:

a. ISE OIs and CIs

b. AQs

c. Licensee-identified OIP OIs

d. SFPI RAIs

e. Additional SE needed information

The tables in the attachments provide audit item status as follows:

a. Attachment 3: Millstone Unit 2 MS/SFPI SE Audit Items currently under NRC staff review and requiring licensee input as delineated

d. Attachment 4: Millstone Unit 3 MS/SFPI SE Audit Items currently under NRC staff review and requiring licensee input as delineated

While this report notes the completion of the onsite portion of the audit per the plan dated July 2, 2014, the ongoing audit process continues as per the letters to all licensees and construction permit holders for both orders dated August 28, 2013 and March 26, 2014. Additionally, while Attachments 3 and 4 provide a progress snapshot of the NRC staff's review of the licensee's OIPs, as supplemented, and as augmented in the audit process, the status and progress of the NRC staff's review may change based on licensee plan changes, resolution of generic issues, and other NRC staff concerns not previously documented. Changes in the NRC staff review will be communicated in the ongoing audit process.

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Date: November 17, 2014

Attachments:
1. NRC and Licensee Staff Onsite Audit Participants
2. Onsite/Rockville Audit Documents Reviewed
3. MS/SFPI Audit Items currently under NRC staff review, Unit 2
4. MS/SFPI Audit Items currently under NRC staff review, Unit 3

Onsite/NRC Audit Participants / Meeting Attendees

NRC Staff:

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Mark Goolsbey	Operations, MPS
Albert Ghanakhanian	- Beyond Design Basis

Documents Reviewed (SE Tracker)

- NRC Audit Presentation, July 21, 2014
- ETE-CPR-2012-0008, revision 3, BDB guidance document for ELAP mitigating strategies, Unit 3
- ETE-CPR-2012-0009, revision 3, BDB guidance document for ELAP mitigating strategies, Unit 2
- CM-AA-CLC-301, Attachment 2
- CM-AA-CLC-301, Attachment 6
- MISC-11793
- Calculation 13-015, "MP2 & MP3 FLEX Prot Flo Model and Analysis"
- ENG-07-ENG-04264M2
- Westinghouse calculation, CN-CDME-13-11 (Unit 2)
- Westinghouse calculation, CN-CDME-13-12 (Unit 3)
- LTR-TDA-13-20-P, Attachment B
- LTR-SEE-II-13-89
- LTR-TDA-13-31, Attachment 2
- DOM-NAF-3-0.0-P-A, Dominion containment analysis methodology
- Calculation 13-015, revision 0, "MP2 & MP3 FLEX Strategy Hydraulic Calculations"
- Calculation 14-ENG-04426M2, Main Steam Atmospheric Dump Valve seismic/tornado event qualification
- Calculation 13-024, "Turbine Driven Auxiliary Feedwater (TDAFW) Pump Delivered Flow at Reduced Steam Generator Pressure"
- ETE-MP-2013-1034, "MP2 Turbine Driven Aux Feedwater Pump Minimum Continuous Operating Speed"
- Drawing 25203-26002, Sheet 2
- MISC-11787, Attachment 3
- FLEX Support Guideline (FSG) - 1, "RCS Inventory Control"
- FSG - 8, "Alternate RCS Boration"
- LTR-LIS-13-515
- Drawing 25212-26923
- Calculation 97-014, "MP3 AFW System, Determination of AFW Turbine/Pump Speed and AFW System Flow for Steam Generator Pressures of 185 psig, 600 psig, and 125 psig, and Determination of the Turbine Exhaust Pressure"
- ETE-MP-2013-1037, "MP3 Turbine Driven Aux Feedwater Pump Minimum Continuous Operating Speed"
- CPR-2012-0008 Rev. 2 "MP3 Beyond Design Basis – FLEX Strategy Overall Integrated Plan Basis Document,"

- ETE-CPR-2012-0009 Rev. 2, "MP2 Beyond Design Basis – FLEX Strategy Overall Integrated Plan Basis Document,"
- EA-12-049 Mitigating Strategies Resolution of Extended Battery Duty Cycles Generic Concerns,"
- 2013-ENG-04408E2 Rev. 0, "MP2 BDB Battery Calculation,"
- 2013-ENG-04501E3 Rev. 0, "MP3 BDB Battery Calculation
- EOP 25-FSG-4 Rev. 0 Draft C "ELAP DC Load Shed/Management
- EOP 35-FSG-4 Rev. 0 Draft C "ELAP DC Load Shed/Management
- 2013-ENG-04503E3 Rev. 1, "MP3 BDB - FLEX Electrical 4160V, 480V, and 120VAC System Loading Analysis,"
- 2013-ENG-04383E2 Rev. 1, "MP2 BDB - FLEX 4160V, 480V and 120V AC System Loading Analysis."
- 25203-30001 Rev. 40, "MP2 Main Single Line Diagram," 25203-30008 Rev. 21, "Single Line Diagram 480V Unit Substation Emergency 22E (B05)& 22F (B06),"
- 1201171-E-25212-30015-B Rev. 23, "4.16kV One Line Diagram Bus 34A Sh.1," and 1201171-E-25212-30055-B Rev. 0, "MP3 480 V One Line Diagram."
- CALC-RA-0045, Revision 1, "Radiological Evaluation following a Beyond Design Basis MPS2 SFP Drain down for NEI 12-02"
- Westinghouse WNA-TP-04709-GEN, "Spent Fuel Pool Instrumentation System Calibration Procedure"
- MPS2 FLEX Strategy Document ETE-CPR-2008-0009, "Beyond Design Basis – FLEX Strategy Overall Integrated Plan Basis Document"
- Calculation MISC-11807, "MP3 Auxiliary Building 43'-6" Elevation Temperature profile (EQ-Zone AB-06) Following Loss of Ac Power (ELAP) Beyond Design basis Scenario"
- Westinghouse Report EQ-QR-269, "Design Verification Testing Summary report for the Spent Fuel Pool Instrumentation System"

Millstone, Unit 2
Mitigation Strategies/Spent Fuel Pool Instrumentation Safety Evaluation Audit Items:

Audit Items Currently Under NRC Staff Review, Requiring Licensee Input As Delineated

Audit Item Reference	Item Description	Licensee Input Needed
ISE CI 3.1.1.2.A	Confirm that the preferred travel pathways are 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.	Dominion to perform assessment of the impact of stack failure on the Unit 2 FLEX equipment haul pathways and deployment locations.
ISE CI 3.1.1.4.A	Dominion's plan for implementing the use of off-site resources is not complete. The local assembly areas have not been identified. Dominion is also evaluating the possibility of boat transport for personnel.	Dominion to provide details regarding coordination with state and local emergency management organizations.
ISE CI 3.2.1.2.A	The RCP seal initial maximum leakage rate should be greater than or equal to the upper bound expectation for the seal leakage rate for the ELAP event discussed in the PWROG position paper addressing the RCP seal leakage for [Combustion Engineering] CE plants (ADAMS Accession No. ML13235A151 (Non-Publicly Available)) or justification should be provided for use of a lower value.	Dominion to verify that RCP seal initial maximum leakage rate is greater than or equal to the upper bound expectation for the seal leakage rate for the ELAP event as discussed in the PWROG position paper addressing the RCP seal leakage for CE plants (ADAMS Accession No. ML13235A151 (Non-Publicly Available))

Audit Item Reference	Item Description	Licensee Input Needed
ISE CI 3.2.4.4.B	Confirm that upgrades to the site's communications systems have been completed.	1. Provide evaluation and possible plan changes regarding unit to unit communication early in the event. 2. Provide assessment of each unit's approach to offsite communication/notification. 3. Provide evidence of Security's inclusion in the overall communications enhancements.
ISE CI 3.2.4.10.A	Dominion has completed an analysis of the battery capability regarding expected time available with ac power. Site specific procedural guidance governing load stripping will be developed. Confirm electrical components performance requirements and electrical loading-related strategy objectives can be met.	The NRC staff has requested additional information from C&D Technologies to demonstrate that their nuclear grade batteries can support battery discharges greater than 8 hours. CI 3.2.4.10.A (a) will remain open for MPS2 pending the NRC staff review of additional information from the battery manufacturer.
AQ 2	NEI 12-06 Section 5.3.3 Consideration 1 specifies that seismically qualified electrical equipment can be affected by beyond-design-basis seismic events, therefore guidance should be available for determining instrument reading for both MCR and non-control room readouts regarding how and where to measure key instrument readings at containment penetrations for example, where applicable, using a portable instrument. Dominion's integrated plan did not include providing guidance for this situation. Provide a discussion of how plant staff will determine required key instrument readings if MCR instrumentation is not functioning following a seismic event.	Dominion to provide final location and equipment list for portable equipment needed for instrument reading.

Audit Item Reference	Item Description	Licensee Input Needed
AQ 3	NEI 12-06 Section 5.3.3 consideration 2 and 3 require providing guidance regarding seismic hazards related to large internal flooding sources that are not seismically robust and do not require ac power, and the use of ac power to mitigate ground water in critical locations.	Dominion to provide a discussion regarding of the need for any guidance to deal with potential large internal flooding sources and the potential need for ac power to mitigate ground water intrusion
AQ 6	NEI 12-06, Section 6.2.3.2 requires addressing nine considerations regarding deployment of FLEX equipment during flooding conditions. Dominion did not specifically address consideration 5 regarding the potential for a flooding limiting access to portable equipment connection points, consideration 7 regarding the need for dewatering or extraction pumps, and consideration 8 regarding the need for temporary flood barriers.	Dominion to address all deployment considerations and concerns during flooding.
AQ 7	NEI 12-06, Section 6.2.3.3 requires addressing three considerations regarding flood deployment procedures, alternate connection points, and guidance for temporary flood barriers. Dominion did not discuss the need for guidance for the potential deployment of temporary flood barriers and use of extraction pumps, per consideration 3 above.	Dominion to provide a discussion regarding the potential need for temporary flood barriers and extraction pumps if needed.

Audit Item Reference	Item Description	Licensee Input Needed
AQ 8	NEI 12-06, Section 8.3.3 requires addressing procedural interfaces associated with a snow, ice and extreme cold hazard. Dominion did not specifically address the amount, location and storage of snow removal equipment and procedures required for snow and ice conditions at the plant. Although Dominion plans to revise several extreme event procedures, it is not clear that this will include snow removal actions or the ability to transport equipment under these conditions.	Dominion to provide a discussion regarding the location and type of snow removal equipment and procedures required for snow and ice conditions at the plant.

Audit Item Reference	Item Description	Licensee Input Needed
AQ 9	NEI 12-06, Section 9.3.3 requires providing procedural enhancements that involve addressing the effects of high temperatures on the portable equipment. Dominion did not provide any information regarding operation of portable equipment at the high temperatures that may be experienced due to the ELAP, i.e., would the equipment have to operate in any high temperature areas of the plant when deployed. A review of the diagrams provided in Figures 1-8 of the integrated plan appear to show that all portable FLEX equipment, (BDB pumps and ac generators) will be set up in areas outside of the buildings where the connections will be made. This would allow operation only in the high ambient temperatures external to plant buildings. Dominion plans on storing BDB equipment so that it will be protected from high temperature events while stored in the BDB Storage Building(s) or in protected areas of the plant. However as noted on page 27 of the integrated plan, Dominion plans on locating the BDB AFW pump inside the Turbine Building for the specific case of imminent flooding for the installed TDAFW pump. In this situation the portable pump would be operating inside a confined space, subject to high temperatures due to lack of ventilation.	Dominion to provide a discussion regarding the ability of FLEX equipment to operate at potentially high ambient temperatures for placement of portable FLEX equipment in the situation where the portable BDB AFW pump is operated inside the Turbine Building

Audit Item Reference	Item Description	Licensee Input Needed
AQ 32	NEI 12-06, Section 3.2.2, Paragraph (3) provides that 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. Dominion's plans and strategies to provide cooling and ventilation to areas of the plant affected by loss of ac power during the ELAP are not finished. Dominion will provide strategies for ventilation of areas of the plant affected by ELAP at a later date and noted an OI regarding this issue. The areas of the plant that would most likely be affected by loss of ventilation and cooling systems are the ones that will be necessary to be occupied (e.g., MCR, TDAFW pump room) during the ELAP or will require ventilation for situations like hydrogen generation in the battery rooms. When developing strategies for cooling and ventilation for areas of the plant affected by ELAP, ensure that strategies include the above areas as a minimum. Provide a discussion of these issues in the appropriate update to the integrated plan.	Dominion's plans and strategies to provide cooling and ventilation to areas of the plant affected by loss of AC power during the ELAP are not finished. Dominion to provide strategies for ventilation of areas of the plant affected by ELAP at a later date and noted an OI regarding this issue and provide a discussion of these issues in the appropriate update to the integrated plan. In addition, this strategy should provide information on the adequacy of the ventilation provided in the battery room to protect the batteries from the effects of elevated or lowered temperatures, especially if the ELAP is due to high or low temperature hazard.
AQ 35	In its integrated plan, Dominion did not discuss the effects of loss of power to heat tracing. Provide a discussion and analysis of the effects of the loss of heat tracing for equipment required to cope with an ELAP.	Dominion to provide a discussion and analysis of the effects of the loss of heat tracing for equipment required to cope with an ELAP

Audit Item Reference	Item Description	Licensee Input Needed
AQ 44	Section 3.2 of WCAP-17601-P discusses the PWROG's recommendations that cover following subjects for consideration in developing FLEX mitigation strategies: (1) minimizing RCP seal leakage rates; (2) adequate shutdown margin; (3) time initiating cooldown and depressurization; (4) prevention of the RCS overfill; (5) blind feeding an SG with a portable pump; (6) nitrogen injection from SITs, and (7) asymmetric natural circulation cooldown.	Provide discussion on the calculation used to preclude nitrogen injection from the SIT tanks, taking account the potential containment heat-up during the ELAP event.
AQ 80	Generic OI: Dominions' plans for equipment maintenance and testing which endorses the EPRI industry program for maintenance which is currently under development does not provide reasonable assurance that guidance and strategies developed and implemented under them will conform to the guidance of NEI 12-06, Section 11.5.	Please provide details of the EPRI industry program for maintenance and testing of FLEX electrical equipment such as batteries, cables, and diesel generators.
Licensee Identified OI 4	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.	Dominion to provide a supplement to this submittal with the results of the equipment storage study.
Licensee Identified OI 5	FLEX Support Guidelines (FSGs) will be developed in accordance with PWROG guidance. Existing procedures will be revised as necessary to implement FSGs.	Dominion to revise existing procedures.

Millstone, Unit 3
Mitigation Strategies/Spent Fuel Pool Instrumentation Safety Evaluation Audit Items:

Audit Items Currently Under NRC Staff Review, Requiring Licensee Input As Delineated

Audit Item Reference	Item Description	Licensee Input Needed
ISE CI 3.1.1.4.A	Dominion's plan for implementing the use of off-site resources is not complete. The local assembly areas have not been identified. Dominion is also evaluating the possibility of boat transport for personnel.	Dominion to provide details regarding coordination with state and local emergency management organizations.
ISE CI 3.2.1.1.A	Confirm that the use of the NOTRUMP code for the ELAP analysis is limited to the flow conditions prior to reflux condensation initiation. This includes specifying an acceptable definition for reflux condensation cooling.	PWROG project PA-ASC-1274 should provide resolution on the accuracy of the NOTRUMP code and the ability to predict the time that reflux cooling starts.
ISE CI 3.2.1.2.C	If the seals are changed to the newly designed Generation 3 SHIELD seals, or non-Westinghouse seals, justify the acceptability of the use of the newly designed Generation 3 SHIELD seals or non-Westinghouse seals and the RCP seal leakages rates for use in the ELAP analysis. Address the compliance of the conditions and limitations specified in the NRC endorsement letter dated May 28, 2014 for the SHIELD seals (ADAMS ML14132A128), if the SHIELD seals are credited in the ELAP analysis.	Justification for leakage rate associated with the Flowserve N-9000 seals.

Audit Item Reference	Item Description	Licensee Input Needed
ISE CI 3.2.4.2.A	Analyses to evaluate the effects of loss of ventilation in various areas are currently underway. Upon completion of these analyses, detailed strategies and operator action timelines will be developed for the implementation of compensatory measures to maintain the area temperatures below the applicable design limits, if necessary. Confirm that the analyses and the compensatory measures show that room temperatures are acceptable to maintain functionality of the equipment needed to carry out the mitigation strategies.	Dominion did not consider the missile shield that could affect ventilation and heat load in this room. Dominion to update their analysis to consider the effect of the missile shield on the temperature in the MSVB/ADV room.
ISE CI 3.2.4.2.B	Confirm that the habitability limits of the main control room will be maintained in all Phases of an ELAP.	Dominion to provide the habitability limits.
ISE CI 3.2.4.4.B	Confirm that upgrades to the site's communications systems have been completed.	1. Provide evaluation and possible plan changes regarding unit to unit communication early in the event. 2. Provide assessment of each unit's approach to offsite communication/notification. 3. Provide evidence of Security's inclusion in the overall communications enhancements.

Audit Item Reference	Item Description	Licensee Input Needed
AQ 2	NEI 12-06 Section 5.3.3 Consideration 1 requires that seismically qualified electrical equipment can be affected by beyond-design-basis seismic events, therefore guidance should be available for determining instrument reading for both MCR and non-control room readouts regarding how and where to measure key instrument readings (e.g. at containment penetrations for in-containment sensors, using a portable instruments). Dominion's integrated plan did not include providing guidance for this situation. Provide a discussion of how plant staff will determine required key instrument readings if MCR instrumentation is not functioning following a seismic event.	Provide final location and equipment list for portable equipment needed for instrument reading.
AQ 3	NEI 12-06 Section 5.3.3 consideration 2 and 3 require providing guidance regarding seismic hazards related to large internal flooding sources that are not seismically robust and do not require ac power, and the use of ac power to mitigate ground water in critical locations. Dominion did proved information regarding these issues in the integrated plan.	Provide a discussion regarding of the need for any guidance needed to deal with potential large internal flooding sources and the potential need for ac power to mitigate ground water intrusion.

Audit Item Reference	Item Description	Licensee Input Needed
AQ 10	NEI 12-06, Section 9.3.2 states that the FLEX equipment should be transported to different locations, even during the extreme conditions applicable to the site. The potential impact of high or low temperatures on the storage of equipment should also be considered, e.g., expansion of sheet metal, swollen door seals, etc. Although Dominion addressed accessibility issues regarding loss of power to normal access points, no information was provided regarding any plans for managing access through doors/gates under extreme high temperature conditions.	Provide a discussion regarding deployment of FLEX equipment considering the potential effects of extreme high temperatures on accessibility noted in Item description.
AQ 25	Specify the required cooldown completion time that is supportable by adequate analysis. Discuss the required action to complete the cooldown and justify that all the required actions can be accomplished within the completion time.	Specify the required cooldown completion time that is supportable by adequate analysis. Discuss the required action to complete the cooldown and justify that the all the required actions can be accomplished.

Audit Item Reference	Item Description	Licensee Input Needed
AQ 37	NEI 12-06, Section 3.2.1.7 and JLD-ISG-2012-01, Section 2.1, requires strategies that have a time constraint to be successful should be identified and a basis provided that the time can be reasonably met. NEI 12-06, Table 3-2 and Appendix D provide some examples of acceptable approaches for demonstrating the baseline capability of the containment strategies to effectively maintain containment functions during all phases of an ELAP. Dominion provided evaluations and calculations that show no strategies are required in Phase 1 or 2 to maintain containment temperature and pressure below design limits and that key parameter instruments subject to the containment environment will remain functional for at least 7 days. Dominion did not provide any supporting details regarding actual containment pressures and temperatures to be experienced during the ELAP based on these calculations. Dominion provided a reference "Dominion Nuclear Engineering Calculation MISC-11793" that noted the GOTHIC computer code was used in the analysis.	Provide a discussion and the supporting details regarding actual containment pressures and temperatures vs. time functions to be experienced during the ELAP based on these calculations, to validate the assumptions that no strategies are required for Phase1 and 2 to maintain containment functions.

Audit Item Reference	Item Description	Licensee Input Needed
AQ 41	Regarding NRC Question 40, the NRC's has identified the following issues regarding habitability of the MCR during the ELAP. Without ventilation the MCR would most likely heat up. If temperatures approach a steady-state condition of 110°F, the environmental conditions within the main control room would remain at the uppermost habitability temperature limit defined in NUMARC 87-00 for efficient human performance. NUMARC 87-00 provides the technical basis for this habitability standard as MIL-STD-1472C, which concludes that 110°F is tolerable for light work for a 4 hour period while dressed in conventional clothing with a relative humidity of ~30%.	Dominion to add the effect of higher humidity at same or even lower temperature because higher humidity is more oppressive. Also, include a discussion of the above considerations regarding any expected high temperatures affecting MCR habitability in the appropriate.
AQ 43	NEI 12-06, Section 3.2.2, Paragraph (12) provides that: plant procedures/guidance should consider loss of heat tracing effects for equipment required to cope with an ELAP. Alternate steps, if needed, should be identified to supplement planned action. In the integrated plan Dominion did not discuss the effects of loss of power to heat tracing.	Provide a discussion and analysis of the effects of the loss of heat tracing for equipment required to cope with an ELAP.

Audit Item Reference	Item Description	Licensee Input Needed
AQ 84	Generic OI: The licensees' plans for equipment maintenance and testing which endorses the EPRI industry program for maintenance which is currently under development does not provide reasonable assurance that guidance and strategies developed and implemented under them will conform to the guidance of NEI 12-06, Section 11.5 with respect to maintenance and testing. Please provide details of the EPRI industry program for maintenance and testing of FLEX electrical equipment such as batteries, cables, and diesel generators.	Licensee to provide site procedural implementation for the EPRI maintenance and testing guidance.
Licensee Identified OI 1	Verify response times listed in timeline and perform staffing assessment.	
Licensee Identified OI 7	FLEX Support Guidelines (FSGs) will be developed in accordance with PWROG guidance. Existing procedures will be revised as necessary to implement FSGs.	Provide FSGs

Audit Item Reference	Item Description	Licensee Input Needed
SE review item 2	On February 10, 2014, Westinghouse issued Nuclear Safety Advisory Letter (NSAL)-14-1, which informed licensees of plants with standard Westinghouse RCP seals that 21 gpm may not be a conservative leakage rate for ELAP analysis. This value had been previously used in the ELAP analysis referenced by many Westinghouse PWRs, including the generic reference analysis in WCAP-17601-P. Therefore, please provide the following information: a. Clarify whether the assumption of 21 gpm of seal leakage per RCP (at 550 degrees F, 2250 psia) remains valid in light of the issues identified in NSAL-14-1. b. Identify the corresponding leakage rate from NSAL-14-1 or other associated documents (e.g., PWROG-14015-P, PWROG-14027-P) that is deemed applicable. c. Provide the plant-specific design parameters associated with the seal leakoff line and confirm whether they are bounded by each of the model input parameters in Table 2 of PWROG-14015-P for the appropriate analysis category. If any parameters in Table 2 are not bounded, please provide justification that the generically calculated leakage rate and maximum pressure are applicable.	Question revised based on current status of RCP seal leakage rates between PWROG and NRC staff.

Audit Item Reference	Item Description	Licensee Input Needed
SE review Item 2 (Continued)	d. Confirm that the #1 seal faceplate material is silicon nitride for all RCPs. Alternately, if one or more RCPs use a different material, please identify the material used and provide justification for the leakage rate assumed to apply to these RCPs. e. Provide the set pressure and flow area associated with the relief valve on the #1 seal leakoff line common header piping. f. Provide an estimate of the piping diameter, length, and number and type of components for the seal leakoff line common header piping. g. If plant modifications will be undertaken to move the plant to a more favorable category relative to RCP seal leakage, please identify the applicable modifications and discuss the associated completion timeline.	Question revised based on current status of RCP seal leakage rates between PWROG and NRC staff.
SE review Item 6	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.	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
SE review item 8	Security Related Issues.	Provide plan changes reflecting needed documentation, tools, and equipment needed to support personnel and vehicle access.

Audit Item Reference	Item Description	Licensee Input Needed
SE review item 9	Please provide adequate justification for the seal leakage rates calculated according to the Westinghouse seal leakage model that was revised following the issuance of NSAL-14-1. The justification should include a discussion of the following factors: a. benchmarking of the seal leakage model against relevant data from tests or operating events, b. discussion of the impact on the seal leakage rate due to fluid temperatures greater than 550°F resulting in increased deflection at the seal interface, c. clarification whether the second-stage reactor coolant pump seal would remain closed under ELAP conditions predicted by the revised seal leakage model and a technical basis to support the determination, and, d. justification that the interpolation scheme used to compute the integrated leakage from the reactor coolant pump seals from a limited number of computer simulations (e.g., three) is realistic or conservative.	New question based on current status of RCP seal leakage rates between PWROG and NRC staff.

Audit Item Reference	Item Description	Licensee Input Needed
SE review item 10	The NRC staff understands that Westinghouse has recently recalculated seal leakoff line pressures under loss of seal cooling events based on a revised seal leakage model and additional design-specific information for certain plants. a. Please clarify whether the piping and all components (e.g., flow elements, flanges, valves, etc.) in your seal leakoff line are capable of withstanding the pressure predicted during an ELAP event according to the revised seal leakage model. b. Please clarify whether operator actions are credited with isolating low-pressure portions of the seal leakoff line, and if so, please explain how these actions will be executed under ELAP conditions. c. If overpressurization of piping or components could occur under ELAP conditions, please discuss any planned modifications to the seal leakoff piping and component design and the associated completion timeline. d. Alternately, please identify the seal leakoff piping or components that would be susceptible to overpressurization under ELAP conditions, clarify their locations, and provide justification that the seal leakage rate would remain in an acceptable range if the affected piping or components were to rupture.	New question based on current status of RCP seal leakage rates between PWROG and NRC staff.
SE review item 11	Electromagnetic compatibility, as a result of vendor audit	

If you have any questions, please contact me at 301-415-1544 or by e-mail at stephen.monarque@nrc.gov.

Sincerely,

/RA/

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Docket Nos.: 50-336 and 50-423

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