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

November 6, 2014

Mr. William R. Gideon, Vice President
Brunswick Steam Electric Plant
Duke Energy Progress, Inc.
Post Office Box 10429
Southport, North Carolina 28461

SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2 - PLAN FOR THE ONSITE AUDIT REGARDING IMPLEMENTATION OF MITIGATING STRATEGIES AND RELIABLE SPENT FUEL POOL INSTRUMENTATION RELATED TO ORDERS EA-12-049 AND EA-12-051 (TAC NOS. MF0975, MF0976, MF0973 AND MF0974)

Dear Mr. Gideon:

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. ML13071A559) Carolina Power and Light Company, submitted its OIP for Brunswick Steam Electric Plant, Units 1 and 2 (BSEP) in response to Order EA-12-049. By letters dated August 20, 2013, February 28, 2014 and August 28, 2014 (ADAMS Accession Nos. ML13248A447, ML14073A451, and ML14254A176, respectively), Duke Energy Progress, Inc., (Duke, the licensee), formerly known as Carolina Power and Light Company, submitted its first three 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 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 BSEP interim staff evaluation (ISE) and audit report (ADAMS Accession No. ML13220A090) and continues with in-office and onsite portions of this audit.

By letter dated February 28, 2013 (ADAMS Accession No. ML13086A096), the licensee submitted its OIP for BSEP, in response to Order EA-12-051. By letter dated May 23, 2013 (ADAMS Accession No. ML13141A622), the NRC staff sent a request for additional information (RAI) to the licensee. By letters dated July 22, 2013, August 26, 2013, February 27, 2014, and August 28, 2014 (ADAMS Accession Nos. ML13219B117, ML13242A010, ML14073A063, and ML14254A404, respectively), the licensee submitted its RAI responses and first three six-month updates to the OIP.

The NRC staff's review to date led to the issuance of the BSEP ISE and RAI dated November 18, 2013 (ADAMS Accession No. ML13269A345). 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 process, to include the in-office and onsite portions, allows the staff to assess whether it has enough information to make a safety evaluation of the Integrated Plans. The audit allows the staff to review open and confirmatory items from the mitigation strategies ISE, RAI responses from the spent fuel pool instrumentation ISE, the licensee's integrated plans, and other audit questions. Additionally, the staff gains a better understanding of submitted information, identifies additional information necessary for the licensee to supplement its plan, and identifies any staff potential concerns. The audit's onsite portion will occur prior to declarations of compliance for the first unit at each site.

This document outlines the on-site audit process that occurs after ISE issuance as licensees provide new or updated information via periodic updates, update audit information on e-portals, provide preliminary Overall Program Documents/Final Integrated Plans, and continue in-office audit communications with staff while proceeding towards compliance with the orders.

The staff plans to conduct an onsite audit at BSEP in accordance with the enclosed audit plan from December 1-5, 2014.

If you have any questions, please contact me at 301-415-2833 or by e-mail at Peter.Bamford@nrc.gov.

Sincerely,

Peter Bamford

Peter Bamford, Senior Project Manager
Orders Management Branch
Japan Lessons-Learned Division
Office of Nuclear Reactor Regulation

Docket Nos.: 50-325 and 50-324

Enclosure:
Audit plan

cc w/encl: Distribution via Listserv

Audit Plan
Brunswick Steam Electric Plant, Units 1 and 2

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. ML13071A559) Carolina Power and Light Company, submitted its OIP for Brunswick Steam Electric Plant, Units 1 and 2 (Brunswick, BSEP) in response to Order EA-12-049. By letters dated August 20, 2013, February 28, 2014 and August 28, 2014 (ADAMS Accession Nos. ML13248A447, ML14073A451, and ML14254A176, respectively), Duke Energy Progress, Inc., (Duke, the licensee), formerly known as Carolina Power and Light Company, submitted its first three 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 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 BSEP interim staff evaluation (ISE) and audit report (ADAMS Accession No. ML13220A090) and continues with in-office and onsite portions of this audit.

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audit allows the 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 staff gains a better understanding of submitted information, identifies additional information necessary for the licensee to supplement its plan, and identifies any staff potential concerns. The audit's onsite portion will occur prior to declarations of compliance for the first unit at each site.

This document outlines the onsite audit process that occurs after ISE issuance as licensees provide new or updated information via periodic updates, update audit information on e-portals, provide preliminary Overall Program Documents (OPDs)/Final Integrated Plans (FIPs), and continue in-office audit communications with staff while proceeding towards compliance with the orders.

Following the licensee'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 staff will make a safety determination regarding order compliance using the Nuclear Energy Institute (NEI) 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 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) as providing one acceptable means of meeting the order requirements. For Order EA-12-051, the staff will make a safety determination regarding order compliance using the NEI guidance document NEI 12-02, "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 the licensee propose an alternative strategy or other method deviating from the guidance, additional staff review will be required to evaluate if the alternative strategy complies with the applicable order.

AUDIT SCOPE

As discussed, onsite audits will be performed per NRR Office Instruction LIC-111, "Regulatory Audits," to support the development of safety evaluations. Site-specific OIPs and OPDs/FIPs rely on equipment and procedures that apply to all units at a site, therefore, audits will be planned to support the "first unit at each site." On-site audits for subsequent units at a site will be on an as-needed basis.

The purpose of the audits is to obtain and review information responsive to the BSEP OIPs, as supplemented, open and confirmatory items from the mitigation strategies ISE, RAI responses from the SFPI ISE, and to observe and gain a better understanding of the basis for the site's overall programs to ensure the licensee is on the correct path for compliance with the Mitigation Strategies and Spent Fuel Pool Instrumentation orders. These may include, but are not limited to:

- Onsite review and discussion for the basis and approach for detailed analysis and calculations (Orders EA-12-049, EA-12-051);

- Walk-throughs of strategies and laydown of equipment to assess feasibility, timing, and effectiveness of a given mitigating strategy or integration of several strategies (Order EA-12-049);

- Storage, protection, access, and deployment feasibility and practicality for onsite portable equipment (Order EA-12-049);

- Evaluation of staging, access, and deployment of offsite resources to include Regional Response Center (RRC) provided equipment (Order EA-12-049); and

- Review dimensions and sizing of the SFP area, placement of the SFP level instrumentation, and applicable mounting methods and design criteria (Order EA-12-051).

NRC AUDIT TEAM

Title	Team Member
Team Lead and Project Manager	Peter Bamford
Technical Support	Brian Lee
Technical Support	Matthew Hardgrove
Technical Support	Khoi Nguyen
Technical Support	Michael Levine
Technical Support	Kerby Scales

LOGISTICS

The audit will be conducted onsite at BSEP on December 1 - 5, 2014. Entrance and exit briefings will be held with the licensee at the beginning and end of the audit, respectively, as well as daily briefings of team activities. Additional details will be addressed over the phone. A more detailed schedule is provided below.

A private conference room is requested for NRC audit team use with access to audit documentation upon arrival and as needed.

DELIVERABLES

An audit report/summary will be issued to the licensee within 90 days from the end of the audit.

INFORMATION NEEDS

- Materials/documentation provided in responses to open or confirmatory items and RAIs in the ISEs;

- OPD/FIP (current version), operator procedures, FLEX Support Guidelines (FSGs), operator training plans, RRC (SAFER) BSEP Response Plan; and

- Materials/documentation for staff audit questions as listed in the Part 2 table below

To provide supplemental input to the ongoing audit of documents submitted to the NRC and made available via e-portal, the onsite audit will have three components: 1) a review of the overall mitigating strategies for the site, including, if needed, walk-throughs of strategies and equipment laydown of select portions; 2) a review of material relating to open or confirmatory items and RAIs from the ISEs, and staff audit questions; and 3) additional specific issues requested by NRC technical reviewers related to preparation of a safety evaluation. Each part is described in more detail below:

Part 1 - Overall Mitigating Strategies and Program Review:

During the onsite audit, please be prepared to conduct a tabletop discussion of the site's integrated mitigating strategies and SFP instrumentation compliance program. This discussion should address the individual components of the plans, as well as the integrated implementation of the strategies including a timeline. The licensee team presenting this should include necessary representatives from site management, engineering, training, and operations that were responsible for program development, and will be responsible for training and execution.

Following the tabletop discussion, please be prepared to conduct walk-throughs of procedures and demonstrations of equipment as deemed necessary by NRC audit team members. Include representatives from engineering and operations that will be responsible for training and execution. At this time we expect, at a minimum, to walk-through the items below. Based on the tabletop presentations and audit activities, this list may change.

WALK-THROUGH LIST:

1. Walk-through a sample of strategies that will be delineated by specific NRC technical staff audit team members.

2. Walk-through of portable (FLEX) diesel generator (DG) procedures, to include power supply pathways, areas where manual actions are required, and electrical isolation.

3. Walk-through of building access procedures, to include any unique access control devices.

4. Strategy walk-through of transfer routes from staging and storage areas to deployment locations for both onsite and offsite equipment.

5. Strategy walk-through for core cooling and reactor coolant system (RCS) inventory, to include portable pumping equipment, flow paths, and water storage locations and the related reactor systems analysis and calculations.

6. Walk-through of communications enhancements.

7. Walk-through of SFP area, SFP instrumentation locations, main control room, and related equipment mounting areas.

Part 2 – Specific Technical Review Items:

During the visit, the following audit items will be addressed from the licensee's ISEs open items (OI), confirmatory items (CI), and SFPI RAIs; audit question list (AQ); licensee OIP, as supplemented, open items; and draft safety evaluation (SE) additional questions. Please provide documents or demonstrations as needed to respond to each item.

Audit Item Reference	Item Description
OI 3.1.1.C	The licensee has indicated that programs are being developed to address storage structure requirements, but insufficient information was provided regarding seismic considerations.
OI 3.1.1.3.B	The licensee did not discuss hazards associated with large internal flooding sources that are not seismically robust and do not require ac [alternating current] power and the use of ac power to mitigate ground water in critical locations.
OI 3.2.1.1.F	MAAP - The Modular Accident Analysis Program (MAAP) analysis uses an initial wetwell liquid volume that requires additional justification or provide a revised analysis of the coping time available under ELAP [extended loss of ac power] conditions that incorporates an initial wetwell water volume and level that is representative of Brunswick.
OI 3.2.1.2.A	A review was conducted of the licensee's integrated plan and it was determined that there is insufficient information provided to determine the adequacy of the determination of recirculation pump seal or other sources of leakage used in the ELAP analysis.
OI 3.2.1.3.A	The licensee has not provided information to support the reliability of the HPCI [High Pressure Coolant Injection] switchover function from the CST [condensate storage tank] to the suppression pool, similar to the information provided for the RCIC [Reactor Core Isolation Cooling] switchover function.

Audit Item Reference	Item Description
OI 3.2.1.3.B	The integrated plan is not consistent between the discussions in the Maintain Containment section and the timeline regarding RPV [reactor pressure vessel] pressure.
OI 3.2.1.3.C	Information was not provided to determine if RCIC will be started automatically or at a time required by analysis following the initiation of the event, if any elapsed time constraint exists for this action, if pressure and temperature conditions in the containment predicted in NEDC-33711P Rev 1, have been considered, and net positive suction head for RCIC.
OI 3.2.1.4.A	Regarding the use of portable pumps to provide RPV injection, the licensee did not provide technical basis or supporting analyses for the pump capabilities for the primary and alternate flow paths.
OI 3.2.3.A	The licensee has not provided plant-specific analysis information, commensurate with the level of detail contained in NEDC-33771P, to demonstrate that containment functions will be maintained in all phases of an ELAP.
OI 3.2.4.2.A	The licensee's response did not address maintaining battery room ventilation. A discussion on the hydrogen gas exhaust path for each strategy is needed, and a discussion of the accumulation of hydrogen when the batteries are being recharged during Phase 2 and 3.
OI 3.2.4.2.B	The licensee did not provide sufficient information regarding the effect of elevated temperatures on electrical equipment being credited as part of ELAP strategies.
OI 3.2.4.3.A	The licensee did not discuss the effects of loss of power to heat tracing.
OI 3.2.4.4.A	The licensee has not discussed their coping strategies for portable and emergency lighting necessary to facilitate personnel access into plant locations to implement mitigating strategies.
OI 3.2.4.8.A	The licensee did not provide any information or strategy regarding electrical isolation of the FLEX DGs from installed plant equipment to prevent simultaneously supplying power to the same Class 1E bus.
OI 3.2.4.9.A	The licensee did not provide sufficient information on the amount or the expected usage rates of fuel that would be necessary to support Phase 2 equipment.
OI 3.2.4.9.B	The licensee did not to discuss the diesel fuel oil supply pathway for the diesel driven FLEX pumps and the permanently pre-staged FLEX DGs. The primary concern is flooded conditions.
CI 3.1.1.2.A	The licensee identified two vehicles as a means to deploy equipment, provide fuel replenishment, etc., and four flatbed trailers as a means to store and transport hoses, strainers, cables, and miscellaneous equipment, but omitted discussion of the protection to be afforded these vehicles/trainers from seismic hazards.
CI 3.1.1.3.A	The licensee did not provide sufficient information concerning coping strategies for the failure of seismically qualified electrical equipment that can be affected by beyond-design-basis seismic events as discussed in NEI 12-06, Section 5.3.3 consideration 1. The licensee determined that a local process for local vital indications would be developed to support BSEP's FLEX response.
CI 3.1.1.4.A	The licensee has not identified local staging areas and method(s) of transportation of SAFER equipment.
CI 3.1.2.A	While the licensee has identified the limiting source of flooding as the Probable Maximum Hurricane, the applicable flooding hazard was not characterized in terms of warning time and persistence.
CI 3.1.2.2.A	There was no discussion of the considerations for movement of equipment and restocking of supplies in the context of a flood with long persistence.
CI 3.1.3.2.A	The licensee has not provided sufficient information with regard to the deployment of FLEX equipment. The licensee stated that strategies and movement of equipment during hurricanes will be incorporated into the Flex Support Guidelines to ensure successful deployment without endangering personnel. Due to hurricanes providing days of forewarning, strategies may include pre-staging or certain equipment in robust structures other than the permanent FLEX storage building. These strategies are still under development.
CI 3.1.4.2.A	The licensee stated that the deployment of debris removal equipment (including ice removal) has not been finalized.

Audit Item Reference	Item Description
CI 3.1.5.3.A	The licensee did not provide a discussion of the potential effects of high temperatures at the location where the portable equipment would actually operate during a high temperature hazard. The licensee stated that the equipment would be purchased with the requirements to operate during a high temperature hazard and that the FLEX DGs and structure will be purchased/designed to ensure proper operation at elevated temperatures.
CI 3.2.1.1.A	From the June 2013 position paper, benchmarks must be identified and discussed which demonstrate that MAAP4 is an appropriate code for the simulation of an ELAP event at Brunswick.
CI 3.2.1.1.B	The collapsed level must remain above Top of Active Fuel (TAF) and the cool down rate must be within technical specification limits.
CI 3.2.1.1.C	MAAP4 must be used in accordance with Sections 4.1, 4.2, 4.3, 4.4, and 4.5 of the June 2013 position paper.
CI 3.2.1.1.D	In using MAAP4, the licensee must identify and justify the subset of key modeling parameters cited from Tables 4-1 through 4-6 of the "MAAP4 Application Guidance, Desktop Reference for Using MAAP4 Software, Revision 2" (Electric Power Research Institute Report 1020236). This should include response at a plant-specific level regarding specific modeling options and parameter choices for key models that would be expected to substantially affect the ELAP analysis performed for that licensee's plant. Although some suggested key phenomena are identified below, other parameters considered important in the simulation of the ELAP event by the vendor / licensee should also be included. Nodalization General two-phase flow modeling Modeling of heat transfer and losses Choked flow Vent line pressure losses Decay heat (fission products / actinides / etc.)
CI 3.2.1.1.E	The specific MAAP4 analysis case that was used to validate the timing of mitigating strategies in the integrated plan must be identified and should be available on the ePortal for NRC staff to view. Alternately, a comparable level of information may be included in the supplemental response. In either case, the analysis should include a plot of the collapsed vessel level to confirm that TAF is not reached (the elevation of the TAF should be provided) and a plot of the temperature cool down to confirm that the cool down is within tech spec limits.
CI 3.2.1.3.E	On page 10 of their Integrated Plan, the licensee stated that SRVs [safety-relief valves] provide RPV pressure control during an ELAP. However, the licensee did not provide information regarding what was needed to support SRV actuation (dc power or pneumatics) or how long those support systems would be available. In addition, depending on primary containment environmental conditions during the event, SRV actuation may require a higher than nominal dc voltage to actuate the SRVs. The SRV pilot solenoid coil electrical resistance would increase due to a higher containment temperature with a longer duration event than an existing SBO [station blackout] coping time. In subsequent discussions with the licensee during the audit process, information was provided that included a plant modification for additional nitrogen bottles to ensure SRV pneumatics would be available for 24 hours into the event and an evaluation/qualification of the SRV solenoid voltage during thermal testing. Completion of the nitrogen supply modification and associated testing will be confirmed.
CI 3.2.3.C	The licensee has not demonstrated that the calculated drywell temperature will not exceed the limits of penetration seals or other equipment.
CI 3.2.4.4.B	The licensee described, and the staff accepted, upgrades to the site's communications systems (ADAMS Accession Nos. ML12311A299 and ML13093A341, respectively). The staff will confirm these upgrades have been completed.

Audit Item Reference	Item Description
CI 3.2.4.6.A	The licensee indicated in the audit process that Control Room long term habitability will be assured by monitoring of Control Room conditions, heat stress countermeasures, and rotation of personnel to the extent feasible and that the FLEX Support Guidelines will provide guidance for control room staff to evaluate the control room temperature and take actions as necessary. Further, Brunswick is evaluating the use of passive cooling technologies to be used for response personnel and is performing GOTHIC analysis for the Reactor Building (including RCIC area and refuel floor). Completion of these evaluations and confirmation of implementation needs to be performed.
CI 3.2.4.8.C	The licensee provided updated information as part of the audit process regarding sizing of the Phase 2 and 3 generators. The licensee has not finalized their load sizing analysis for the Phase 2 and 3 DGs.
CI 3.2.4.10.A	The Generic Concern related to extended battery duty cycles is applicable to this plant. The Generic Concern related to extended battery duty cycles has been resolved generically through the NRC endorsement of Nuclear Energy Institute (NEI) position paper entitled "Battery Life Issue" (ADAMS Accession no ML13241A186 (NRC endorsement letter) and ML13241A188 (NEI position paper)) The NRC staff will evaluate a licensee's application of the guidance (calculations and supporting data) in its development of the final Safety Evaluation documenting compliance with NRC Order EA-12-049.
CI 3.3.2.A	There is insufficient information to conclude that configuration control of equipment and connections will be controlled in conformance with the guidance of NEI 12-06, Section 11.8, Items 1 and 3 regarding a program documentation and change control process.
CI 3.4.A	The licensee's plans for off-site resources conform to the minimum capabilities specified in NEI 12-06 Section 12.2 Consideration 1; however, the licensee did not address Considerations 2 through 10 regarding the functionality of the equipment.
AQ.3	049-RAI-Brunswick-3: CP&L's plans for protection and accessibility of the connection points were reviewed. These plans imply, but do not state that the connection points for the modifications will be missile protected and enclosed within a Seismic Category 1 structure, which will inherently protect it from local hazards such as vehicle impact. Insufficient information has been provided to ascertain whether access to the connection points would only require access through seismically robust structures as specified by NEI 12-06, Section 5.3.2, consideration 2. CP&L is requested to provide additional information to confirm that that these connection points will only require access through seismically robust structures.
AQ.18	049-RAI-Brunswick-18: Page 10 of the integrated plan states: During an ELAP, with only dc power available, the main method of RPV level control is RCIC, with HPCI as a backup. RCIC takes suction from either the CST [condensate storage tank] or the Suppression Pool and pumps water into the RPV. The CST is the preferred source of feed to the RPV for makeup, since it is not subject to heat-up like the Suppression Pool. It also is the normally aligned suction source to RCIC and HPCI. However, if the CST is unavailable, RCIC takes suction from the Suppression Pool. In the event ELAP conditions significantly damage the CST, provide information with a discussion that supports the switchover instrumentation will remain operational and that HPCI injection to RPV will remain uninterrupted. The discussion should include whether switch-over function is automatic, fail-safe, and whether function logic and hardware, related piping, valves, systems, structures, and components to support the switchover function are of safety grade and are qualified for all criteria including tornado/high winds and seismic. If not, justify how the switchover from CST to Suppression Pool will be assured under ELAP conditions if the CSTs are unavailable.

Audit Item Reference	Item Description
AQ.21	049-RAI-Brunswick-21: Page 41 of the integrated plan notes the decision for deep load shedding is made at 15 minutes into the event while the severe accident management alternative (SAMA) diesel generators are not started and loaded until four hours into the event as described in the SOE [Sequence of Events] timeline with a maximum time constraint of five hours into the event. a) Provide the dc load profile for the mitigating strategies to maintain core cooling, containment, and spent fuel pool cooling during all modes of operation. b) Provide a detailed discussion on the loads that will be shed from the dc bus, the equipment location (or location where the required action needs to be taken), the required operator actions, and the time to complete each action. In your response, explain which functions are lost as a result of shedding each load and discuss any impact on defense in depth and redundancy. i. Are there any plant components that will change state if vital ac or dc is lost, de energized, during this evolution of dc load shed? When the operators manipulate dc breakers to load shed, will plant components actuate, de-energize pumps, etc.? The staff is particularly interested that a safety hazard is not created, such as de-energizing the dc powered seal oil pump for the main generator, which would allow the hydrogen to escape to the atmosphere, which may cause an explosion or fire, and may be compounded by high heat from the main turbine bearings if not cooled. ii. Which breakers will operators open as part of the load shed evolutions? iii. Will the dc breakers to be opened be physically identified by special markings to assist operators manipulating the correct breakers?
AQ.26	049-RAI-Brunswick-26: NEI 12-06, Section 3.2.2, guideline (5) specifies that plant procedures/guidance should identify backup water sources in order of intended use and specify clear criteria for transferring to the next preferred source of water. The sources of water that CP&L has identified as being available are the CST (assumed not available after a beyond-design-basis external event), the Suppression Pool and clean water tank. Provide discussion on the following: a) Are these the only sources of water that are being credited or are there other sources of water on site that could be used? b) How would these other sources be used (for example, to restore the clean water tank inventory or an alternate means of RPV injection)? c) For other sources of water, a discussion of the quality of this water (e.g., suspended solids) and a justification that its use will not result in blockage at the fuel assembly inlets to an extent that would inhibit adequate flow to the core is needed. d) Alternately, if deleterious blockage at the fuel assembly inlets cannot be precluded, an alternate means for assuring adequate core cooling is needed.
AQ.29	049-RAI-Brunswick-29: Refueling Strategies. The CP&L integrated plan response does not discuss providing core cooling if an ELAP occurs during Refueling as described in described in Order EA-12-049, Attachment 2, Requirement 4, which states "Licensees or CP holders must be capable of implementing the strategies in all modes." Provide a time line for boiling to occur for the most limiting condition of water level in the vessel with the reactor head removed, using the historically shortest time after shutdown in which the reactor head was removed is needed. Also, discuss the ability to place Phase 2 makeup measures in effect within this time and the basis for concluding that mitigating actions can be taken in time to satisfy the event acceptance criteria. Alternatively, provide the lowest RPV water level that could be reached before the Phase 2 measures are effective.

Audit Item Reference	Item Description
AQ.48	049-RAI-Brunswick-48: On page 38 of the integrated plan, table entitled "BWR Portable Equipment Phase 3," CP&L states that it has low pressure cooling pumps to "provide source of flow from Discharge / Intake Canal to RHRSW [residual heat removal service water] heat exchangers for Shutdown Cooling." Provide a discussion on how the pumps will connect to the RHR heat exchangers.
AQ.49	049-RAI-Brunswick-49: Page 31 of the integrated plan notes that "[d]uring Phase 2, the only available dc power is from station batteries. Continuous dc power will be maintained at the site using the SAMA diesel generators to connect to battery chargers to provide power to dc loads." Provide the minimum voltage that must be maintained and the basis for the minimum voltage on the dc bus.
AQ.54	049-RAI-Brunswick-54: Provide a discussion on the effects of heightened/lowered temperatures (i.e., temperatures above/below those assumed in the sizing calculation for each battery) on each battery's capability to perform its function for the duration of the ELAP event.
OIP.1	Perform a formal validation of FLEX deployment, connection, and action timelines after the procedural guidance is developed and related staffing study is completed.
OIP.2	Implement programmatic controls.
OIP.3	Develop plant equipment control guidelines, in accordance with NEI 12-06 Section 11.5, to manage the unavailability of equipment and applicable connections that directly perform a FLEX mitigation strategy.
OIP.4	Establish programs and process to assure personnel proficiency in the mitigation of beyond-design-basis events is developed and maintained in accordance with NEI 12-06 Section 11.6.
OIP.5	Maintain FLEX strategies in overall FLEX basis documents.
OIP.6	Modify existing plant configuration control procedures to ensure that changes to the plant design, physical plant layouts, roads, buildings, and miscellaneous structures will not adversely impact the approved FLEX strategies in accordance with NEI 12-06 Section 11.8.
OIP.7	Complete applicable training prior to the implementation of FLEX.
OIP.8	Complete construction of FLEX Equipment Storage Building prior to the implementation of FLEX.
OIP.9	Develop BSEP procedures and programs to address storage structure requirements, deployment path requirements, and FLEX equipment requirements relative to the hazards applicable to BSEP.
OIP.11	Perform study to validate Suppression Pool temperatures exceeding 220 degrees °F.
OIP.12	Develop site specific procedures or guidelines, utilizing the industry developed guidance from the Owners' Groups, EPRI, and NEI Task team, to address the criteria in NEI12-06.
OIP.14	Complete SFP level instrumentation modifications per NRC Order EA-12-051, Issuance of Order to Modify Licenses With Regard to Reliable Spent Fuel Pool Instrumentation
OIP.16	Modify procedures such that operator manual actions, in areas where habitability is a concern, occur early in the FLEX timeline, to the extent practical.
OIP.17	Revise procedures to open Reactor Building doors to provide a natural air circulation path.
OIP.18	Provide transportation equipment to move large skids/trailer-mounted equipment provided from offsite.
OIP.20	Develop a process/methodology to rupture the Wetwell Vent Disc with Containment pressure below 55 psi.
OIP.21	Develop a process/methodology to provide Clean Water Makeup to the CST during Phase 3 response.
OIP.22	Develop guidance for obtaining local vital indications during a loss of DC in conjunction with an ELAP. This strategy will be available for appropriate plant personnel use in response to these failures.
OIP.23	Provide justification showing the Unit 1 CST & Unit 2 CST are robust from applicable external hazards.

Audit Item Reference	Item Description
SFPI RAI.1	Please provide a clearly labeled sketch or marked-up plant drawing of the plan view of the SFP area, depicting the SFP inside dimensions, the planned locations/placement of the primary and backup SFP level sensor, and the proposed routing of the cables that will extend from these sensors toward the location of the readout/display device.
SFPI RAI.2	Please provide the following: a) The design criteria that will be used to estimate the total loading on the mounting device(s), including static weight loads and dynamic loads. Describe the methodology that will be used to estimate the total loading, inclusive of design basis maximum seismic loads and the hydrodynamic loads that could result from pool sloshing or other effects that could accompany such seismic forces. b) A description of the manner in which the level sensor (and stilling well, if appropriate) will be attached to the refueling floor and/or other support structures for each planned point of attachment of the probe assembly. Indicate in a schematic the portions of the level sensor that will serve as points of attachment for mechanical/mounting or electrical connections. c) A description of the manner by which the mechanical connections will attach the level instrument to permanent SFP structures so as to support the level sensor assembly.
SFPI RAI.3	For RAI 2(a) above, please provide the analyses used to verify the design criteria and methodology for seismic testing of the SFP instrumentation and the electronics units, including design-basis maximum seismic loads and the hydrodynamic loads that could result from pool sloshing or other effects that could accompany such seismic forces.
SFPI RAI.4	For each of the mounting attachments required to attach SFP Level equipment to plant structures, please describe the design inputs and methodology used to qualify the structural integrity of the affected structures/equipment.
SFPI RAI.5	Please provide the following: a) A description of the specific method or combination of methods you intend to apply to demonstrate the reliability of the permanently installed equipment under BDB [beyond-design-basis] ambient temperature, humidity, shock, vibration, and radiation conditions. b) A description of the testing and/or analyses that will be conducted to provide assurance that the equipment will perform reliably under the worst-case credible design basis loading at the location where the equipment will be mounted. Include a discussion of this seismic reliability demonstration as it applies to (a) the level sensor mounted in the SFP area, and (b) any control boxes, electronics, or read-out and re-transmitting devices that will be employed to convey the level information from the level sensor to the plant operators or emergency responders. c) A description of the specific method or combination of methods that will be used to confirm the reliability of the permanently installed equipment during and following seismic conditions to maintain its required accuracy.
SFPI RAI.6	For RAI #5 above, please provide the results for the selected methods, tests and analyses utilized to demonstrate the qualification and reliability of the installed equipment in accordance with the Order requirements.

Audit Item Reference	Item Description
SFPI RAI.7	Please provide the following: a) A description of how the two channels of the proposed level measurement system meet this requirement so that the potential for a common cause event to adversely affect both channels is precluded. b) Further information on how each level measurement system, consisting of level sensor electronics, cabling, and readout devices will be designed and installed to address independence through the application and selection of independent power sources, the use of physical and spatial separation, independence of signals sent to the location(s) of the readout devices, and the independence of the displays.
SFPI RAI.8	Please provide the results of the calculation depicting the battery backup duty cycle requirements demonstrating that its capacity is sufficient to maintain the level indication function until offsite resource availability is reasonably assured.
SFPI RAI.9	Please provide the following: a) An estimate of the expected instrument channel accuracy performance under both (a) normal SFP level conditions (approximately Level 1 or higher) and (b) at the BDB conditions (i.e., radiation, temperature, humidity, post-seismic and post-shock conditions) that would be present if the SFP level were at the Level 2 and Level 3 datum points. b) A description of the methodology that will be used for determining the maximum allowed deviation from the instrument channel design accuracy that will be employed under normal operating conditions as an acceptance criterion for a calibration procedure to flag to operators and to technicians that the channel requires adjustment to within the normal condition design accuracy.
SFPI RAI.10	Please provide the following: a) A description of the capability and provisions the proposed level sensing equipment will have to enable periodic testing and calibration, including how this capability enables the equipment to be tested in-situ. b) A description of how such testing and calibration will enable the conduct of regular channel checks of each independent channel against the other, and against any other permanently-installed SFP level instrumentation. c) A description of how functional checks will be performed, and the frequency at which they will be conducted. Describe how calibration tests will be performed, and the frequency at which they will be conducted. Provide a discussion as to how these surveillances will be incorporated into the plant surveillance program. d) A description of what preventive maintenance tasks are required to be performed during normal operation, and the planned maximum surveillance interval that is necessary to ensure that the channels are fully conditioned to accurately and reliably perform their functions when needed.

Audit Item Reference	Item Description
SFPI RAI.11	Please provide the following: a) The specific location for the primary and backup instrument channel display. b) If a display will be located somewhere other than the control room or alternate shutdown panel, please describe the evaluation used to validate that the display location can be accessed without unreasonable delay following a BDB event. Include the time available for personnel to access the display as credited in the evaluation, as we as the actual time (e.g., based on walk-throughs) that it will take for personnel to access the display. Additionally, please include a description of the radiological and environmental conditions on the paths personnel might take. Describe whether the display location remains habitable for radiological, heat and humidity, and other environmental conditions following a BDB event. Describe whether personnel are continuously stationed at the display or monitor the display periodically.
SFPI RAI.12	Please provide a list of the procedures addressing operation (both normal and abnormal response), calibration, test, maintenance, and inspection procedures that will be developed for use of the spent SFP instrumentation. The licensee is requested to include a brief description of the specific technical objectives to be achieved within each procedure.
SFPI RAI.13	Please provide the following: a) Further information describing the maintenance and testing program the licensee will establish and implement to ensure that regular testing and calibration is performed and verified by inspection and audit to demonstrate conformance with design and system readiness requirements. Include a description of your plans for ensuring that necessary channel checks, functional tests, periodic calibration, and maintenance will be conducted for the level measurement system and its supporting equipment. b) A description of how the guidance in NEI 12-02 section 4.3 regarding compensatory actions for one or both non-functioning channels will be addressed. c) A description of what compensatory actions are planned in the event that one of the non-functioning instrument channel cannot be restored to functional status within 90 days.
SE.1	Licensee has indicated that the CWST [clean water storage tank] will not be built and that the CST will be evaluated to show that it is robust for all hazards. a) Review justification for the use of the CST, including verification of robustness for all hazards, including tornado missile protection, and the stability of adjacent equipment (e.g., plant stack) b) Review the CST inventory relative to the usage requirements for makeup to the reactor, spent fuel pool, etc. (see previous audit item 27)
SE.2	Provide electrical Single Line Diagrams showing the proposed connections of Phase 2 and 3 electrical equipment to permanent plant equipment. This may be done on the e-Portal. Show protection information (breaker, relay etc.) and rating of the equipment on the Single Line Diagrams.
SE.3	Please provide an assessment of potential susceptibilities of EMI/RFI in the areas where the SFP instrument located and how to mitigate those susceptibilities.

Audit Item Reference	Item Description
SE.5	Please address the following items regarding the use of raw water sources for mitigating an ELAP event: a) Please discuss the quality of the water (e.g., suspended solids, dissolved salts) that will be used for primary makeup during ELAP events, accounting for the potential for increased suspended or dissolved material in some raw water sources during events such as flooding or severe storms. b) Please discuss whether instrumentation available during the ELAP event is capable of providing indication that inadequate core cooling exists for one or more fuel assemblies due to blockage at fuel assemblies' inlets or applicable bypass leakage flowpaths. c) As applicable, please provide justification that the use of the intended raw water sources will not result in blockage of coolant flow across fuel assemblies' inlets and applicable bypass leakage flowpaths to an extent that would inhibit adequate core cooling. Or, if deleterious blockage at the core inlet cannot be precluded under ELAP conditions, then please discuss alternate means for assuring the adequacy of adequate core cooling in light of available indications. For example, will ELAP mitigation procedures be capable of ensuring top-down cooling of the reactor core?
SE.6	a) Discuss the design of the suction strainers used with FLEX pumps taking suction from raw water sources, including perforation dimension(s) and approximate surface area. b) Provide reasonable assurance that the strainers will not be clogged with debris (accounting for conditions following, flooding, severe storms, earthquakes or other natural hazards), or else that the strainers can be cleaned of debris at a frequency that is sufficient to provide the required flow. In the response, consider the following factors: i. The timing at which FLEX pumps would take suction on raw water relative to the onset and duration of the natural hazard. ii. The timing at which FLEX pumps would take suction on raw water relative to the timing at which augmented staffing would be available onsite. iii. Whether multiple suction hoses exist for each FLEX pump taking suction on raw water, such that flow interruption would not be required to clean suction strainers.
SE.7	Verify that appropriate human factors are applied for the implementation of the FLEX strategies.

Part 3 – Specific Topics for Discussion:

1. Draft of BSEP OPD/FIP
2. Training
3. Portable (FLEX) equipment maintenance and testing
4. RRC (SAFER) Response Plan for BSEP

Proposed Schedule

Onsite Day 1, Monday, December 1, 2014

1200 Check in at site:
Badging
Dosimetry and whole body count for RCA entrance

1500 Entrance meeting

1515 NRC audit team meet with SRI/RI (time may change based on availability)

1600 NRC Audit Team meeting

1630 Team lead daily debrief/next day planning with licensee

Onsite Day 2, Tuesday, December 2, 2014

0800 Licensee presentation of strategies

1200 Lunch

1300 NRC Audit Team Activities:

- Technical area break-out discussions between NRC and licensee staff in the areas of reactor systems, electrical, balance-of-plant/structures, SFPI, and others
- Review documents relating to open or confirmatory items, RAIs, codes, analyses, etc.

1600 NRC Audit Team meeting

1700 Team lead daily debrief/next day planning with licensee

Onsite Day 3, Wednesday, December 3, 2014

0800 Continue NRC Audit Team Activities - Mitigating Strategies/SFPI walk-throughs with licensee

1200 Lunch

1300 Continue NRC Audit Team Activities

1600 NRC Audit Team meeting

1700 Team lead daily debrief/next day planning with licensee

Onsite Day 4, Thursday, December 4, 2014

0800 Continue NRC Audit Team Activities

1200 Lunch

1300 Continue NRC Audit Team Activities

1600 NRC Audit Team meeting

1700 Team lead daily debrief/pre-exit meeting

Onsite Day 5, Friday, December 5, 2014

0800 Continue NRC Audit Team Activities

1100 NRC Team Meeting

1200 Lunch

1300 NRC/Licensee exit meeting

1400 Audit closeout/departure

The NRC staff's review to date led to the issuance of the BSEP ISE and RAI dated November 18, 2013 (ADAMS Accession No. ML13269A345). 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 process, to include the in-office and onsite portions, allows the staff to assess whether it has enough information to make a safety evaluation of the Integrated Plans. The audit allows the staff to review open and confirmatory items from the mitigation strategies ISE, RAI responses from the spent fuel pool instrumentation ISE, the licensee's integrated plans, and other audit questions. Additionally, the staff gains a better understanding of submitted information, identifies additional information necessary for the licensee to supplement its plan, and identifies any staff potential concerns. The audit's onsite portion will occur prior to declarations of compliance for the first unit at each site.

This document outlines the on-site audit process that occurs after ISE issuance as licensees provide new or updated information via periodic updates, update audit information on e-portals, provide preliminary Overall Program Documents/Final Integrated Plans, and continue in-office audit communications with staff while proceeding towards compliance with the orders.

The staff plans to conduct an onsite audit at BSEP in accordance with the enclosed audit plan from December 1-5, 2014.

If you have any questions, please contact me at 301-415-2833 or by e-mail at Peter.Bamford@nrc.gov.

Sincerely,
/RA/
Peter Bamford, Senior Project Manager
Orders Management Branch
Japan Lessons-Learned Division
Office of Nuclear Reactor Regulation

Docket Nos.: 50-325 and 50-324
Enclosure: Audit plan
cc w/encl: Distribution via Listserv

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OFFICE	NRR/JLD/JOMB/PM	NRR/JLD/LA	NRR/DORL/LPL2-2/PM	NRR/JLD/JCBB/BC
NAME	PBamford	SLent	AHon (MB for)	SBailey
DATE	11/04/14	11/04/14	11/04/14	11/05/14
OFFICE	NRR/JLD/JERB/BC	NRR/JLD/JOMB/BC(A)	NRR/JLD/JOMB/PM	
NAME	BPham	CRoque-Cruz (JBoska for)	PBamford	
DATE	11/05/14	11/06/14	11/06/14	

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