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

November 26, 2014

Mr. Benjamin C. Waldrep, Vice President
Shearon Harris Nuclear Power Plant
5413 Shearon Harris Rd.
New Hill, NC 27562-0165

SUBJECT: SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1 - 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. MF0874 AND MF0792)

Dear Mr. Waldrep:

On March 12, 2012, the U.S. Nuclear Regulatory Commission (NRC) issued Order EA-12-049, "Issuance of Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond Design-Basis External Events" and Order EA-12-051, "Issuance of 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, in part, that all 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. ML13112A020), Duke Energy Progress Inc. (Duke, the licensee) submitted its OIP for Shearon Harris Nuclear Power Plant, Unit 1 (HNP) in response to Order EA-12-049. By letters dated August 27, 2013, February 27, and August 25, 2014 (ADAMS Accession Nos. ML13239A359, ML14072A051, and ML14241A115, respectively), Duke 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 HNP interim staff evaluation (ISE) on February 12, 2014 (ADAMS Accession No. ML13364A214) and continues with in-office and onsite portions of this audit.

By letter dated February 28, 2013 (ADAMS Accession No. ML13086A096), Duke submitted its OIP for HNP in response to Order EA-12-051. By letter dated July 11, 2013 (ADAMS Accession No. ML13189A225), the NRC staff issued a request for additional information (RAI). By letters dated August 12, and August 26, 2013, and February 27. and August 22, 2014 (ADAMS Accession Nos. ML13225A494, ML13242A010, ML14063A198, and ML14251A015, respectively), Duke submitted its RAI response and first three six-month updates to the OIP. The NRC staff issued the HNP ISE and RAI on November 19, 2013 (ADAMS Accession No. ML13280A482). 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 NRC staff to assess whether it has enough information to make a safety evaluation of the OIPs. The audit allows the NRC 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 NRC 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 NRC staff plans to conduct an onsite audit at HNP in accordance with the enclosed audit plan from December 8-11, 2014.

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

Sincerely,

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

Docket No.: 50-400

Enclosure:
Audit plan

cc w/encl: Distribution via Listserv

Audit Plan
Shearon Harris Nuclear Power Plant, Unit 1

BACKGROUND AND AUDIT BASIS

On March 12, 2012, the U.S. Nuclear Regulatory Commission (NRC) issued Order EA-12-049, "Issuance of Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond Design-Basis External Events" and Order EA-12-051, "Issuance of 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, in part, that all 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. ML13112A020), Duke Energy Progress, Inc. (Duke, the licensee) submitted its OIP for Shearon Harris Nuclear Power Plant, Unit 1 (HNP) in response to Order EA-12-049. By letters dated August 27, 2013, February 27, and August 25, 2014 (ADAMS Accession Nos. ML13239A359, ML14072A051, and ML14241A115, respectively), Duke 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). The purpose of the NRC staff's audit is to determine the extent to which the licensees are proceeding on a path towards successful implementation of the actions needed to achieve full compliance with the order. This audit process led to the issuance of the HNP interim staff evaluation (ISE) on February 12, 2014 (ADAMS Accession No. ML13364A214) and continues with in-office and onsite portions of this audit.

By letter dated February 28, 2013 (ADAMS Accession No. ML13086A096), Duke submitted its OIP for HNP in response to Order EA-12-051. By letter dated July 11, 2013 (ADAMS Accession No. ML13189A225), the NRC staff issued a request for additional information (RAI). By letters dated August 12, 2013 and August 26, 2013, and February 27, 2014 and August 22, 2014 (ADAMS Accession Nos. ML13225A494, ML13242A010, ML14063A198, and ML14251A015, respectively), Duke submitted its RAI responses and first three six-month updates to the OIP. The NRC staff issued the HNP ISE and RAI on November 19, 2013, (ADAMS Accession No. ML13280A482). 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 NRC staff to assess whether it has enough information to make a safety evaluation of the OIPs. The 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 OIPs, and other audit questions. Additionally, the NRC 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 (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 Integrated Plan 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 regarding order compliance 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 regarding order compliance using the NEI developed 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). Should Duke propose an alternative strategy or other method deviating from the guidance, additional staff review will be required to evaluate the alternative strategy in reference to 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 Integrated Plan 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 HNP Integrated Plan, 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 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
Lead Project Manager	Stephen Monarque
Technical Support	Kevin Roche
Technical Support	Kerby Scales
Technical Support	Khoi Nguyen
Technical Support	Josh Miller

LOGISTICS

The audit will be conducted onsite at HNP on December 8-11, 2014. Entrance and exit briefings will be held with Duke 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 Duke 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 HNP ISEs;

- OPD/FIP (current version), operator procedures, operator training plans, RRC (SAFER) playbook; and

- Materials/documentation for staff audit questions and/or Duke OIP identified open items 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, 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, staff audit questions, and Duke open items; 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 SFPI 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 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, described in Duke's submittal dated February 22, 2013 (ADAMS Accession No. ML13058045), and the NRC staff's assessment for HNP, dated May 2, 2013 (ADAMS Accession No. ML13105A402).

7. Walk-through of SFP area, SFPI locations, and related equipment mounting areas

Part 2 – Specific Technical Review Items:

During the visit, the following audit items will be addressed from the HNP ISEs (open items (OI), confirmatory items (CI), and SFPI RAIs; HNP audit question list (AQ); Duke's 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
ISE CI 3.1.1.3.A	Internal Plant Flooding Events - confirm completion of the analysis to determine the impact of large internal flooding sources that are not seismically robust and do not require ac [alternating current] power.
ISE CI 3.1.1.4.A	Offsite Resources - Confirm that the RRC local staging area, evaluation of access routes, and method of transportation to the site, support the implementation of the mitigating strategies for a BDBEE.
ISE CI 3.1.4.2.A	Deployment of FLEX Equipment - Snow, Ice, and Extreme Cold Hazard - Confirm that the engineering evaluation related to Duke's identified Open Item Number 49 adequately addresses the configuration and operation of the FLEX equipment under extreme cold, snow, or ice conditions.
ISE CI 3.2.1.A	Confirm that the HNP FLEX mitigation strategies address each of the 7 PWROG [Pressurized-Water Reactor Owners Group] recommendations listed in Section 3.2 of WCAP-17601-P, "Reactor Coolant System Response to the Extended Loss of AC Power Event [ELAP] for Westinghouse, Combustion Engineering and Babcock and Wilcox NSSS Designs," (ADAMS Accession Nos. ML13042A011 and ML13042A013, non-public). This information should include a rationale for whether each issue is applicable to the plant, how the applicable recommendations have been considered in the ELAP coping analysis, and how they will be implemented in the HNP mitigating strategies.
ISE CI 3.2.1.1.A	Confirm that the specific ELAP analysis performed in WCAP-17601-P is being applied to HNP appropriately. The important parameters and assumptions used should be demonstrated to be representative of the site and appropriate for simulating the ELAP transient. Duke to complete the template provided by the NRC staff to the industry and address any deviations from the template.

Audit Item Reference	Item Description
ISE CI 3.2.1.1.B	Confirm that Duke has limited its application of the NOTRUMP Code for the ELAP analysis to the flow conditions prior to reflux condensation initiation. This includes specifying an acceptable definition for reflux condensation cooling.
ISE CI 3.2.1.2.B	Confirm that the integrity of the O-rings used in the RCP seals will be maintained, as the qualification temperature of the O-rings could be exceeded under ELAP conditions for certain plant designs.
ISE CI 3.2.1.2.C	Confirm Duke has adequately addressed the additional issues raised in the audit regarding RCP seal leakage. These issues include the consideration of the effects on the seals of the varying temperatures and pressures experienced in response to an ELAP event. In particular, discuss whether or not cooling to seals will be restored after it has been lost. Provide justification if cooling would be restored, since this could shock the seal and increase seal leakage.
ISE CI 3.2.1.3.A	Confirm that appropriate methods and assumptions are used in the decay heat calculations for HNP following an ELAP event. This should include justification for the model and the values used for the following key parameters: (1) initial power level, (2) fuel enrichment, (3) fuel burnup, (4) effective full power operating days per fuel cycle, (5) number of fuel cycles, if hybrid fuels are used in the core, and (6) fuel characteristics are based on the beginning of the cycle, middle of the cycle, or end of the cycle. Confirm whether Duke will use the decay heat model for all purposes, not just RCS thermal-hydraulic analysis. For example, confirm decay heat model used in determining steam generator makeup requirements. Also, confirm that the decay heat model incorporates heat from actinides including Plutonium and Neptunium.
ISE CI 3.2.1.6.A	Verify that the final Sequence of Events (SOE) timeline is consistent with the time constraints associated with the specific actions necessary to implement the mitigating strategies.
ISE CI 3.2.1.8.A	Confirm that the required boron concentration will be attained for reactivity control when the RWST [Refueling Water Storage Tank] and/or the BAT [boric acid tank] are refilled from the auxiliary reservoir.
ISE CI 3.2.1.8.B	Confirm that HNP's analysis for boron addition demonstrates that the core will remain subcritical as RCS inventory is maintained throughout the three phases of an ELAP event.
ISE CI 3.2.1.9.A	Confirm that the performance requirements of the FLEX portable pumps are sufficient to support implementation of Duke's Phase 2 FLEX strategies.
ISE CI 3.2.4.1.A	Verify that analyses support the assumed duration of TDAFW turbine driven auxiliary feedwater] pump operation under ELAP conditions.
ISE CI 3.2.4.2.A	Confirm that sufficient ventilation is provided for TDAFW pump room equipment to function and to allow personnel access to perform manual actions during an ELAP event.
ISE CI 3.2.4.2.B	Confirm the adequacy of the ventilation provided in the battery room to protect the batteries from the effects of extreme high and low temperature.
ISE CI 3.2.4.2.C	Confirm that the battery room ventilation is adequate to prevent hydrogen accumulation during battery charging in Phases 2 and 3.
ISE CI 3.2.4.3.A	Confirm that equipment required to implement the FLEX strategies will not be impacted by the loss of heat tracing.

Audit Item Reference	Item Description
ISE CI 3.2.4.4.A	Confirm that adequate lighting will be available throughout the plant during ELAP conditions.
ISE CI 3.2.4.4.B	The NRC staff has reviewed Duke's communications assessment (ADAMS Accession Nos. ML12311A299 and ML13058A045) and has determined that the assessment is reasonable (ADAMS Accession No. ML13105A402). Confirm that upgrades to the sites communications systems have been completed.
ISE CI 3.2.4.6.A	Confirm that environmental conditions in various areas/compartments requiring access during an ELAP event have been analyzed and that specific actions to cope with extreme temperatures have been identified, if needed.
ISE CI 3.2.4.7.A	Confirm that analysis of the CST water volume that can be credited following a seismic event shows that there is sufficient volume and makeup to support the SOE timeline and associated mitigating strategies.
ISE CI 3.2.4.7.B	Verify that the calculation of the RWST volume that can be credited as a borated water source is consistent with the assumptions used in the FLEX strategies. Confirm that the RWST is adequately protected from tornado missiles.
ISE CI 3.2.4.9.A	Based on the calculated FLEX equipment total fuel consumption rate, confirm that sufficient fuel supplies are available on site to support the FLEX strategies until offsite resources arrive for replenishment.
ISE CI 3.2.4.9.B	Confirm that the closure of Duke's identified Open Items Number 36 and 73 establish appropriate delivery methods for supplying fuel oil to the FLEX equipment from fuel oil storage tanks and the FLEX storage facility.
ISE CI 3.2.4.10.A	Confirm that the ELAP load shed analysis validates the extended coping times assumed for the station batteries, and that the analysis is consistent with the NEI white paper entitled, "Battery Life Issue" (ADAMS Accession No. ML13241A186) as endorsed by the NRC (ADAMS Accession No. ML13241A188).
ISE CI 3.2.4.10.C	Confirm that the ELAP load shed analysis has adequately accounted for the loss of functions and has addressed any impacts on defense in depth and redundancy.
ISE CI 3.2.4.10.D	Confirm the sizing calculations for the FLEX DGs to show that they can supply the loads assumed in Phases 2 and 3.
ISE CI 3.4.A	Confirm that NEI 12-06, Section 12.2 guidelines 2 through 10, regarding minimum capabilities for offsite resources have been adequately addressed.
AQ 1	The HNP OIP stated the Dedicated Shutdown Diesel Generator (DSDG) would be hardened and protected to provide power to Motor Control Center (MCC) 1D23 (Figures 26 & 27) (Modification Open Item #40). The primary change identified in the six-month update, dated August 27, 2013, was that Duke decided not to harden and protect the DSDG; therefore the DSDG will not be used as a credited power source for FLEX (Evaluation Open Item #65). Instead, a FLEX power source will serve as the credited supply. Please provide further clarification on the FLEX power source that will power MCC 1D23, and address how it will be sufficiently hardened and protected during an ELAP event.

Audit Item Reference	Item Description
AQ. 2	On page 18 of 103 of the OIP, regarding deployment conceptual design for RCS core cooling and heat removal during the transition phase (phase 2) for PWR portable equipment, Duke stated: D. Permanent cable and raceway will be installed to make cable deployment directly to the 1A3-SA and 1B3-SB SWGR and MCCs 1A21-SA, 1A31-SA, 1B21-SB, and 1B31-SB feasible (Figures 4, 5, 6, and 26) (Open Item 44). The permanent cable and raceway will be installed to make cable deployment directly as identified in Item D and presented in Licensee Open Item 44. Discuss whether the permanent cable and raceway, installed as part of Licensee Open Item 44, will be seismically robust. If not, how will Phase 2 core cooling strategies be achieved by using equipment relying on this modification.
AQ. 4	On page 19 of 103 of the OIP, regarding deployment conceptual design for RCS core cooling and heat removal during the transition phase (phase 2) for PWR portable equipment, Duke stated: K. Add FLEX pump discharge connection points to both trains of the ESW system (Figure 10) (Open Item #49). On page 99 of 103, Duke stated in Licensee Open Item 49 that: Modification - Add FLEX pump discharge connection points to the Emergency Service Water system. Provides a pressurized water source to CST, RAB and FHB Fire Protection SSE hose station headers, and Spent Fuel Pools. It is unclear if the modifications will be seismically qualified. Provide information that indicates that the modifications identified in Licensee Open Item 49 are seismically qualified. If not, explain why they will be capable of functioning in an ELAP event.

Audit Item Reference	Item Description
AQ. 5	Seismic - effects of soil liquefaction On page 16 of 103 of the OIP, in the in the Seismic section, Duke states that: Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06, Section 11. The structures will be built prior to the FLEX implementation date (Open Item #71). The HNP procedures and programs are being developed to address storage structure requirements, deployment path requirements, and FLEX equipment requirements relative to the hazards applicable to HNP (Open Item #72). Duke states that after the structure design and location are finalized, the deployment routes will be evaluated for external hazards to demonstrate a clear deployment path. Because susceptibility of the site to the effects of soil liquefaction is not discussed in the seismic assessment section of the integrated report, it is not clear that soil liquefaction will be considered for the deployment routes. Describe how the deployment paths will be assessed for the effects of soil liquefaction.
AQ. 6	Seismic hazards associated with large internal flooding sources Duke's clarification plan did not adequately address NEI 12-06, Section 5.3.3, items 1, 2 and 3. Provide an assessment of how FLEX strategies can be implemented considering the seismic hazards associated with large internal flooding sources that are not seismically robust and do not require ac power (item 2); or the use of ac power to mitigate ground water in critical locations (item 3). For item 1, describe the reference source to be provided for the operators for obtaining necessary instrument readings to support implementation of the coping strategy.
AQ 7	Deployment of Portable Equipment (Severe Storms with High Winds). On page 18 of 103 of the OIP, regarding deployment conceptual design for RCS core cooling and heat removal during the transition phase (phase 2), Duke stated: The FLEX equipment storage building and location has not yet been decided. Specific deployment of the FLEX equipment to the point of use will be identified and conceptual sketches provided once storage building and location is identified and the deployment strategy is finalized, including an evaluation of the likely site hazards arising from different events (Open Item # 56). A similar statement is provided on pages 28, 41, and 51 of 103 for the transition phase for Maintain RCS Inventory Control, Maintain Spent Fuel Pool Cooling, Safety Functions Support in Phase 2, respectively. The Licensee Open Item # 56 does not refer to deployment of equipment, but to the structural integrity. This appears to be an incorrect reference to a Licensee Open Item, which discusses deployment. Provide the correct Licensee Open Item reference number.

Audit Item Reference	Item Description
AQ. 8	Deploying equipment in snow, ice, and extreme cold On page 57 of 103 in the OIP, regarding PWR Portable Equipment Phase 2, for the last item in the list, Duke stated: TBD (e.g., Lighting, hoses, cable, fittings, tools, debris/snow removal equipment, portable equipment, transport vehicles) The plan did not provide any information in regard to ice removal as needed to obtain and transport equipment from storage to its location for deployment. None of the equipment listed under phase 2 equipment specifically addressed ice removal. Provide a discussion that addresses the areas specified in NEI 12-06, Section 8.3.1, such as ice removal, and describe how this will be accomplished.
AQ. 9	Deploying equipment in snow, ice, and extreme cold On page 14 of 103 in the OIP, regarding maintaining RCS cooling and heat removal during phase 2, Duke stated: The electric motor-driven FLEX pump suction can be aligned to a pressurized ESW header via installed ESW valves (Figure 9) when the CST inventory is depleted (Reference 30). An ESW header will be pressurized by a portable diesel-driven pump taking suction from an ESW pump bay in the Intake Structure. The ESW pump bay is gravity fed with water via existing ESW piping from the Screening Structure. If necessary, the traveling screens will be bypassed by use of an additional portable diesel-driven pump taking suction from the Auxiliary Reservoir Intake Canal and discharging to the applicable bay in the Screening Structure (Figure 10). The Auxiliary Reservoir will provide a sustained water supply with the Main Reservoir serving as a backup supply (UFSAR, Section 9.2.5). The portable diesel-driven pump takes suction from the ESW bay in the intake structure. In the case of large snowfall or excessive ice, this intake structure may be blocked. The Auxiliary Reservoir Intake Canal could also be blocked with ice and snow. Provide an assessment for losing the suction path in the ESW intake structure and the suction path from the Auxiliary Reservoir due to ice and snow blocking the suction paths.
AQ 10	Procedural interfaces for snow, ice, and extreme cold The OIP did not provide any procedural interfaces that direct ice removal and/or deployment of equipment. Provide a discussion of the procedural interface considerations for snow, ice and extreme cold that addresses the guidelines in NEI 12-06 Section 8.3.3.

Audit Item Reference	Item Description
AQ. 13	Equipment functionality Duke's plan for instrumentation and equipment to be used for ELAP mitigation did not provide a discussion on the equipment functionality, as discussed in NEI 12-06, Section 3.2.2, guideline (3) in regards to equipment functionality in an ELAP. Provide a discussion with regard to equipment functionality for the instrumentation and equipment to demonstrate that equipment functionality can be maintained, consistent with guideline (3) in NEI 12-06, Section 3.2.2.
AQ. 14	Shutdown and Refueling Modes Clarify whether Duke plans to abide by the NEI position paper addressing mitigating strategies in shutdown and refueling modes that is dated September 18, 2013 (ADAMS Accession No. ML13273A514), and which has been endorsed by the NRC staff (ADAMS Accession No. ML13267A382). If not, clarify how mitigating strategies for shutdown and refueling modes will be addressed and provide justification for the planned approach. Duke to complete its commitment and provide it to the NRC staff.

Audit Item Reference	Item Description
AQ. 15	Core Sub-Criticality On page 14 of 103 of the OIP, under Maintain Core Cooling & Heat Removal, Duke states: If necessary, the traveling screens will be bypassed by use of an additional portable diesel-driven pump taking suction from the Auxiliary Reservoir Intake Canal and discharging to the applicable bay in the Screening Structure (Figure 10). The Auxiliary Reservoir will provide a sustained water supply with the Main Reservoir serving as a backup supply (UFSAR, Section 9.2.5). On page 25 of 103, in the section for RCS inventory control during Phase 2, Duke states in part: The RWST can be refilled from the Auxiliary Reservoir via SSE Fire Protection hose stations cross-tied to an ESW header pressurized by a portable diesel driven pump (Figure 10). The RWST will be filled in a similar manner using the guidance in Reference 33. Boron crystals can be added via the RWST upper manway (Open Item #26). When refilling the RWST from the Auxiliary Reservoir when the screens are removed, there is a possibility that significant debris can enter the RWST and/or BAT. It is unclear if this debris will inhibit the boron effectiveness and/or the effectiveness of the pumps. Provide an assessment of the boron effectiveness when significant debris, which may contain different minerals and chemicals, is being mixed with the boron. Also, assess if the debris will affect the pump and the design water flow and/or the water flow through the piping, valves and the core. Since this unfiltered water will be sent directly to the reactor vessel and core inlet, discuss the possibility that debris could block the core inlet and impede core flow. Duke to address how the RWST can be used as a boric acid preparation volume. It may be difficult to ensure adequate mixing when adding boric acid into a tank of several hundred thousand gallons, especially at ambient temperatures that may not facilitate ready mixing.
AQ. 16	Core Sub-Criticality On page 26 of 103, under Maintain RCS Inventory Control, Duke states in part: Add FLEX RCS make-up pump suction and discharge connections on the A and B train CVCS headers. Provides the capability to inject inventory (borate) from a FLEX pump to the RCS from the BAT or RWST (Figure 13) (Open Item #48). For events when the BAT is used instead of the RWST, provide a calculation to determine the concentration of boron for the BAT as a function of time that considers different water levels when the BAT is refilled. The function of time calculation should address the refilling at different initial water levels in the BAT when refilling starts. Also, provide a discussion of how the boron will be added to the BAT and identify the appropriate procedure that provides the direction to accomplish that activity.

Audit Item Reference	Item Description
AQ. 18	Core Sub-Criticality On page 97 of 103 of the OIP, in Attachment 5 under Open Item 12, Duke states that: RCS boron concentration and boration in gallons to maintain inventory control and core cooling in regards to keeping the core subcritical with RCS cooldown strategy in PA-PSC-0965 Attachment 3 and for Open Item # 26 Calculation to determine pounds of boron versus RWST tank level percent to achieve desired boron concentration. Duke indicates that a calculation will be performed to determine pounds of boron versus RWST tank level percent to achieve desired boron concentration. Since the tank will be refilled many times and new boron will be added for new levels of water, it is unclear how the boron concentration will be tracked as a function of time. If boron crystals are added to the RWST, there is no way to determine what the concentration of boron is in the tank at any given time. Provide the calculation that provides the pounds of boron that are required to be added to the RWST as a function of time to ensure that the reactor remains subcritical. If not available, indicate when the calculation will be completed.
AQ. 20	Use of portable pumps On page 14 of 103, in the section of its OIP discussing the strategy for maintaining RCS core cooling and heat removal in the Phase 2 under Primary Strategy, Duke stated in part: The electric motor driven FLEX pump suction can be aligned to a pressurized ESW header via installed ESW valves (Figure 9) when the CST inventory is depleted (Reference 30). An ESW header will be pressurized by a portable diesel-driven pump taking suction from an ESW pump bay in the Intake Structure. The ESW pump bay is gravity fed with water via existing ESW piping from the Screening Structure. If necessary, the traveling screens will be bypassed by use of an additional portable diesel-driven pump taking suction from the Auxiliary Reservoir Intake Canal and discharging to the applicable bay in the Screening Structure (Figure 10). The Auxiliary Reservoir will provide a sustained water supply with the Main Reservoir serving as a backup supply (UFSAR, Section 9.2.5). When the screens are removed, a potential for a significant amount of debris may enter the pump suction causing the pump to degrade and limit the amount of water to the appropriate tanks that will ultimately provide water to the core. Significant debris could be present when from an ELAP event. Provide an assessment concerning debris that could cause significant degradation to the pumping capacity of water to the core.

Audit Item Reference	Item Description
AQ. 21	NEI 12-06 Section 3.2.2, Guideline (13) discusses the use of portable equipment, and states that the procedures/guidance for implementation of these portable systems should address the transition from installed sources to portable sources. The transition to a portable pump for SG makeup may require cooldown and depressurization of the SGs in advance of using the portable pump connections. Guidance should address both the proactive transition from installed equipment to portable and reactive transitions in the event installed equipment degrades or fails. The OIP does not address the transition to portable pumps and does not provide guidance on proactive transition from installed equipment to portable, nor reactive transitions in the event installed equipment degrades or fails. Provide a discussion that addresses the guidance in NEI 12-03 Section 3.2.2, Guideline (13).
AQ 22	Fuel Pool Cooling On page 39 of 103 in its OIP regarding maintaining SFP cooling during the initial phase, Duke describes the makeup requirements for the spent fuel pools under normal operations and emergency core offload conditions, and further describes the primary and alternate FLEX strategies for providing pool makeup. Duke plans to use the Fuel Pool Cooling Pumps to transfer water from the RWST to the SFP. Please confirm that the fuel pool cooling pumps are seismically qualified, or justify why they can be credited to perform as FLEX pumps.
AQ. 23	Fuel Pool Cooling On page 39 and 40 of 103 of the OIP, PWR Portable Equipment Phase 2, regarding the Primary Strategy to maintain spent fuel pool cooling: Verify that the piping bounded by valves 1CT-23, 1SF-10, 2SF-10, and 1SF-193 is seismically qualified. This allows HNP to credit spent fuel pool make-up from the RWST via the installed Fuel Pool Cooling Pumps which are being powered from a FLEX generator (Figures 11 and 12) (Open Item #52). Provide a description on how the fluid piping and connecting valves with full water flow between the RWST and the fuel pool pumps will be installed and connected during phase 2. It is unclear if the temperature in the fuel pool pump room is within accessibility limits during the ELAP event. Discuss the evaluation of maximum temperatures in the fuel pool pump room during an ELAP event and confirm that the room will be habitable and equipment qualification temperature limits will not be exceeded.
AQ. 24	Fuel Pool Cooling In NEI 12-06 Table D-3 - Summary of Performance Attributes for PWR SFP Cooling Functions, the Base Line Capability for Fuel Pool Cooling states: • Vent pathway for steam & condensate from SFP Duke has not established in the OIP a vent pathway for SFP cooling. Identify the vent pathway for steam and condensate from the SFP and discuss how this will be accomplished.

Audit Item Reference	Item Description
AQ. 27	Equipment Cooling. (Support Functions) The TDAFW pump is the only permanently installed pump available at the plant and it is being used for several important strategies. It is unclear how the turbine and pump bearings are being cooled. It appears that water is diverted from the TDAFW pump discharge, routed through a filter, routed to the bearing for cooling and then returned to the pump suction. Due to the potential of significant debris in the water traveling to the TDAFW pump suction and discharge, it appears the debris in the water diverted from the pump discharge to the pump bearings could plug the filter in that line and ultimately the bearings could overheat and fail the pump. Provide a discussion concerning the cooling requirements for the TDAFW pump and the pump bearings, and explain why debris is not a concern. Additionally, it is unclear if the TDAFW turbine and pump are seismically and environmentally qualified for FLEX operation. Provide evidence that the TDAFW system is seismically and environmentally qualified for an ELAP event.
AQ. 31	Accessibility (lighting, communications, and entrance into protected areas and internal locked areas) Duke's plan for accessibility, with respect to lighting, fails to address lighting in areas other than the MCR, such as the TDAFW pump room, the battery room and other locations that may require emergency lighting to support implementation of FLEX strategies. Provide a discussion that addresses lighting for other areas of the plant such as TDAFW pump room, the battery room and other locations that may require emergency lighting to support implementation of FLEX strategies.
AQ. 32	Accessibility (lighting, communications, and entrance into protected areas and internal locked areas) Duke's plan does not address an overall strategy for access to other areas of the plant that may require additional actions to obtain access. Discuss access to other areas of the plant that may require additional actions to obtain access, such as other areas in the protected area and internal locked areas as specified in NEI 12-06, Section 3.2.2, Guideline (8).
AQ. 33	Water Sources NEI 12-06, Section 3.2.2, Guideline (5) states in part: Plant procedures/guidance should ensure that a flow path is promptly established for makeup flow to the steam generator/nuclear boiler and identify backup water sources in order of intended use. Additionally, plant procedures/guidance should specify clear criteria for transferring to the next preferred source of water. Describe how operators will ensure that a flow path is promptly established for makeup flow to the steam generator/nuclear boiler. Additionally, describe the conditions under which the operator is expected to resort to increasingly impure water sources, such as when the traveling screens are bypassed by use of an alternative portable diesel-driven pump taking suction from the Auxiliary Reservoir Intake Canal and discharging to the applicable bay in the Screening Structure.

Audit Item Reference	Item Description
AQ. 34	Portable Equipment Fuel It is noted that two pumps are specified to be used to transfer fuel oil from the Diesel Fuel Oil Storage Tanks (DFOSTs), but it is unclear what will be used to transfer the fuel to all of the various FLEX diesel generators at the plant. These diesel engines appear to be long distances apart, so transfer would most likely by a fuel truck, but that is not clear in the OIP. Additionally, Figure 1 has been identified as showing the deployment routes for the fuel, but it is not clear. Provide a description of the deployment routes for fuel oil from the DFOSTs to the various diesel engines at the plant and provide a legible drawing showing the deployment routes.
AQ. 36	Describe how electrical isolation will be maintained such that (a) Class 1E equipment is protected from faults in portable/FLEX equipment and (b) multiple sources do not attempt to power electrical buses.
AQ. 37	Provide the direct current (dc) load profile with the required loads for the mitigating strategies to maintain core cooling, containment, and spent fuel pool cooling.
AQ. 38	Provide the basis for the minimum dc bus voltage that is required to ensure proper operation of all required electrical equipment.
AQ. 39	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), and the required operator actions needed to be performed 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.
AQ. 43	Provide Single Line Diagrams showing the proposed connections of Phase 2 and 3 electrical equipment on the e-Portal. Show protection information (breaker, relay, etc.) and rating of the equipment on Single Line Diagrams.
AQ 44	Please confirm your intention to commit to the generic EPRI industry program for maintenance and testing of FLEX electrical equipment such as batteries, cables, and diesel generators. [See NRC endorsement letter dated October 7, 2013; NRC ADAMS Accession No. ML13276A224]
AQ. 45	Provide a summary of non-safety-related installed equipment that is used in the mitigation strategies. Include a discussion of whether the equipment is qualified to survive all ELAP events.
AQ. 46	Page 11 of 103 in the OIP states "due to the presence of a non-seismic condensate transfer pump suction line nozzle, the available CST volume for ELAP coping is limited to approximately 238,000 gallons. Furthermore, the non-seismic nozzle will be upgraded to seismic qualification, which will increase the available CST volume to at least 80% indicated level or 345,000 gallons." The OIP discusses the need to seismically qualify the condensate transfer pump suction line nozzle, but does not address the need for seismic qualification of the attached piping to this nozzle. Discuss whether the attached piping also needs to be seismically qualified.

Audit Item Reference	Item Description
AQ 51.	Motive Force for S/G PORV/ARV/ADV Operations : (a) Specify the size of the steam generator(SG) power operated relief valve (PORV)/atmospheric relief valve (ARV)/ atmospheric dump valve(ADV) backup nitrogen supply source and the required time for its use as motive force to operate the SG PORV/ARV/ADV for mitigating an ELAP event. (b) Discuss the analysis determining the size of the subject nitrogen supply to show that the nitrogen sources are available and adequate, lasting for the required time. (c) Discuss the electrical power supply that is required for operators to throttle steam flow through the SG PORV/ARV/ADVs within the required time and show that the power is available and adequate for the intended use before the operator takes actions to manually operate the SG PORV/ARV/ADVs. (d) Discuss the operator actions that are required to operate SG PORV/ARV/ADVs manually and show that the required actions can be completed within the required time.
AQ 52.	Uncontrolled Cooldown: Clarify whether the SG PORV/ARV/ADV or upstream associated piping is a safety system, protecting from external events such as tornados, if not, address the following questions: (a) Clarify whether damage to an the SG PORV/ARV/ADV or upstream associated piping could occur during an ELAP that would result in an uncontrolled cooldown of the reactor coolant system and provide a basis. (b) Clarify whether postulated damage would be limited to a single SG PORV/ARV/ADV and/or associated piping, or whether failures could be postulated resulting in an uncontrolled cooldown affecting both steam generators and provide a basis. (c) If ELAP scenarios involving the uncontrolled cooldown of one or more steam generators may be postulated, describe key operator actions that would be taken to mitigate these events. (d) If ELAP scenarios involving the uncontrolled cooldown of one or more steam generators may be postulated, provide analysis demonstrating that the intended mitigating actions would lead to satisfaction of the requirements of Order EA-12-049 for these cases. (e) As applicable, if the operator actions to mitigate an ELAP event involving an uncontrolled cooldown result in an asymmetric cooldown of the reactor coolant system, address the consequences of the asymmetric cooldown on the mixing of boric acid that is added to the reactor coolant system to ensure sub-criticality.
AQ 53.	Discuss which components change state when loads are shed and actions needed to mitigate resultant hazards (for example, allowing hydrogen release from the main generator, disabling credited equipment via interlocks, etc.).
SFPI RAI 1	Provide clearly labeled sketches or marked up plant drawings of the plan view of SFP areas showing the SFP inside dimensions, planned locations/placement of primary and backup SFP level sensor, proposed routing of cables that will extend from these sensors toward location of display device.

Audit Item Reference	Item Description
SFPI RAI 2	a) The design criteria that will be used to estimate the total loading on the mounting devices, including static weight loads. Describe the methodology that will be used to estimate the total loading, inclusive of design basis maximum seismic loads and 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 wet, 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 Number 2, provide the analyses used to verify the design criteria and methodology for seismic testing of the SFP instrumentation and the electronic 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 loads.
SFPI RAI 4	For each of the mounting attachments required to attach SFP Level equipment to plant structures, please describe the design inputs, and the methodology that was used to qualify the structural integrity of the affected structures/equipment.
SFPI RAI 5	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 readout 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	Regarding RAI Number 5 above, provide the results for the selected methods, tests, and analyses used to demonstrate the qualification and reliability of the installed equipment in accordance with the requirements of the Order.

Audit Item Reference	Item Description
SFPI RAI 7	a) Provide a description of how all three channels of the proposed level measurement system meet this requirement so that the potential for a common cause event to adversely affect all channels is minimized to the extent practicable. b) Provide 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 9	a) Provide 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) Provide 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	a) Please provide 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) Provide 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) Provide 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) Provide 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	a) Provide the specific location for the primary and backup instrument channel display. b) For any SFP level instrumentation displays outside the main control room, 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 well as the actual time (e.g., based on walk-through) 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 procedures/programs addressing operation (normal and abnormal), periodic calibration, test, maintenance, and inspection that will be developed for use of the SFP instrumentation. A brief description of the scope and technical objectives should be included for each procedure/program.
SFPI RAI 13	a) Provide compensatory actions will be taken when one or both channels out-of service in accordance with the guidance in NEI 12-02 section 4.3. b) Provide compensatory actions will be taken when a non-functioning instrument channel cannot be restored to functional status within 90 days.
SFPI RAI 14	Please provide a table listing all possible pool interconnections and separation conditions with gate combinations, and the available number(s) of level indication for each pool under those conditions. Assuming one instrument is out-of-service, describe in detail the compensatory measures to assure that reliable level monitoring still exists for each pool under those gate operating conditions.
SE. 1	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. 2	(RCS Venting) The generic analysis in WCAP-17601-P strictly addressed ELAP coping time without consideration of the actions directed by a site's mitigating strategies. WCAP-17792-P extends these analytical results through explicit consideration of mitigating strategies involving RCS makeup and boration. In support of the RCS makeup and boration strategies proposed therein, a generic recommendation is made that PWRs vent the RCS while makeup is being provided. a. If the mitigating strategy will include venting of the RCS, please provide the following information: i. The vent path to be used and the means for its opening and closure. ii. The criteria for opening the vent path. iii. The criteria for closing the vent path. iv. Clarification as to whether the vent path could experience two-phase or single-phase liquid flow during an ELAP. If two-phase or liquid flow is a possibility, please clarify whether the vent path is designed to ensure isolation capability after relieving two-phase or liquid flow. v. If relief of two-phase or liquid flow is to be avoided, please discuss the availability of instrumentation or other means that would ensure that the vent path is isolated prior to departing from single-phase steam flow. vi. If a pressurizer PORV is to be used for RCS venting, please clarify whether the associated block valve would be available (or the timeline by which it could be repowered) in the case that the PORV were to stick open. If applicable, please further explain why opening the pressurizer PORV is justified under ELAP conditions if the associated block valve would not be available. vii. If a pressurizer PORV is to be used for RCS venting, please clarify whether FLEX RCS makeup pumps and FLEX steam generator makeup pumps will both be available prior to opening the PORV. If they will not both be available, please provide justification. b. If RCS venting will not be used, please provide the following information: i. The expected RCS temperature and pressure after the necessary quantity of borated makeup has been added to an unvented RCS. ii. Adequate justification that the potential impacts of unvented makeup will not adversely affect the proposed mitigating strategy (e.g., FLEX pump discharge pressures will not be challenged, plant will not reach water solid condition, adequate boric acid can be injected, increased RCS leakage will not adversely affect the integrated plan timeline, etc.).

Audit Item Reference	Item Description
SE. 3	(Westinghouse Standard RCP Seals: NSAL-14-1) 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 leak off 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. 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 leak off line common header piping. f. Provide an estimate of the piping diameter, length, and number and type of components for the seal leak off 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.
SE. 4	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.

Audit Item Reference	Item Description
SE. 5	The NRC staff understands that Westinghouse has recently recalculated seal leak off line pressures under loss of seal cooling events based on a revised seal leakage model and additional design-specific information for certain plants. a. Clarify whether the piping and all components (e.g., flow elements, flanges, valves, etc.) in your seal leak off line are capable of withstanding the pressure predicted during an ELAP event according to the revised seal leakage model. b. Clarify whether operator actions are credited with isolating low-pressure portions of the seal leak off 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, discuss any planned modifications to the seal leak off piping and component design and the associated completion timeline. d. Alternately, please identify the seal leak off 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.
SE. 6	(ELAP Calculations with NOTRUMP) 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.
SE. 7	(Timeline to reflux cooling) Clarify whether the intended timeline for aligning the FLEX RCS makeup pump may be delayed based on procedural guidance that derives from the analysis in WCAP-17792-P, pages 3-10 through 3-16. Although the NRC staff recognizes that plant operators require leeway to control pumps and equipment in response to plant indications and other symptoms, the NRC staff considers it prudent that equipment alignments proceed as outlined in the integrated plan to the extent possible. Therefore, please provide justification if the operators would delay the alignment of the FLEX RCS makeup pump(s) beyond the time specified in the integrated plan based on initial indications that the reactor coolant pump seal leakage is lower than the value assumed in the ELAP analysis.

Audit Item Reference	Item Description
SE. 8	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. 9	Verify that appropriate human factors are applied for the implementation of the FLEX strategies.

Part 3 – Specific Topics for Discussion:

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

Proposed Schedule for HNP Audit

Onsite Day 1, Monday December 8, 2014

0800 Check in at site; Badging

0930 Entrance meeting

0945 Duke Energy Presentation of strategies

1230 Lunch

1330 NRC Audit Team Activities

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

1400 Dosimetry

1430 Continue NRC Audit Team Activities

1600 NRC Audit Team meeting

1700 Team lead daily debrief/next day planning with Duke

Onsite Day 2, Tuesday, December 9, 2014

0800 Continue NRC Audit Team Activities:

- Review documents relating to open or confirmatory items, RAIs, codes, analyses, etc.
- Mitigating Strategies/SFPI walk-throughs with Duke

1200 Lunch

1300 Continue NRC Audit Team Activities

1600 NRC Audit Team meeting

1700 Team lead daily debrief/next day planning with Duke

Onsite Day 3, Wednesday, December 10, 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/next day planning with Duke

Onsite Day 4, Thursday, December 11, 2014

0800 Continue NRC Audit Team Activities

1200 Lunch

1300 Continue NRC Audit Team Activities

1500 NRC/Duke pre-exit meeting

1600 Audit closeout/departure

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 NRC staff to assess whether it has enough information to make a safety evaluation of the OIPs. The audit allows the NRC 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 NRC 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 NRC staff plans to conduct an onsite audit at HNP in accordance with the enclosed audit plan from December 8-11, 2014.

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

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

Docket No.: 50-400

Enclosure:
Audit plan

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OFFICE	NRR/JLD/JOMB/PM	NRR/JLD/LA	NRR/DORL/LPL2-2/PM	NRR/JLD/JCBB/BC*
NAME	SMonarque	SLent	MBarillas	SBailey*
DATE	11/18/2014	11/18/14	11/19/2014	11/17/2014
OFFICE	NRR/JLD/JERB/BC	NRR/JLD/JOMB/BC(A)	NRR/JLD/JOMB/PM	
NAME	BPham*	CRoque-Cruz (JPaige for)	SMonarque	
DATE	11/17/2014	11/26/14	11/26/14	

OFFICIAL AGENCY RECORD