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

June 1, 2015

Mr. Ernest J. Harkness
Site Vice President
FirstEnergy Nuclear Operating Company
P.O. Box 97, A290
Perry, OH 44081

SUBJECT: PERRY NUCLEAR POWER PLANT, UNIT NO. 1 - REPORT FOR THE AUDIT REGARDING IMPLEMENTATION OF MITIGATING STRATEGIES AND RELIABLE SPENT FUEL POOL INSTRUMENTATION RELATED TO ORDERS EA-12-049 AND EA-12-051 (TAC NOS. MF0962 AND MF0802)

Dear Mr. Harkness:

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 27, 2013 (ADAMS Accession No. ML13064A243), FirstEnergy Nuclear Operating Company (FENOC, the licensee), submitted its OIP for Perry Nuclear Power Plant, Unit No. 1 (Perry), in response to Order EA-12-049. By letters dated August 26, 2013, February 27, 2014, August 28, 2014, and February 26, 2015 (ADAMS Accession Nos. ML13238A260, ML14058A666, ML14240A285, and ML15057A398, respectively), FENOC submitted its first four six-month updates to the OIP. By letter dated September 25, 2014 (ADAMS Accession No. ML14268A214), FENOC submitted a revised OIP that incorporated several significant changes to the planned coping strategies. 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 Perry interim staff evaluation (ISE) (ADAMS Accession No. ML13338A460) and continues with in-office and onsite portions of this audit.

By letter dated February 27, 2013 (ADAMS Accession No. ML13059A495), the licensee submitted its OIP for Perry, in response to Order EA-12-051. By letter dated June 10, 2013, and e-mail dated June 25, 2013 (ADAMS Accession Nos. ML13155A539 and ML13176A333, respectively), the NRC staff sent a request for additional information (RAI) to the licensee. By letters dated July 2, 2013, August 26, 2013, February 27, 2014, August 28, 2014, and February 26, 2015 (ADAMS Accession Nos. ML13184A019, ML13238A259, ML14058A665, ML14240A230, and ML15057A396, respectively), the licensee submitted its RAI responses and

first four six-month updates to the OIP. The NRC staff's review to date led to the issuance of the Perry ISE and RAI dated November 6, 2013 (ADAMS Accession No. ML13340A653). 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 audits allow 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 and updated information, audit information provided on e-portals, and preliminary Overall Program Documents/Final Integrated Plans while identifying additional information necessary for the licensee to supplement its plan and staff potential concerns.

In support of the ongoing audit of the licensee's OIPs, as supplemented, the NRC staff conducted an onsite audit at Perry from December 15 - 19, 2014, per the audit plan dated November 19, 2014 (ADAMS Accession No. ML14321A057). The purpose of the onsite portion of the audit was to provide the NRC staff the opportunity to continue the audit review and gain key insights most easily obtained at the plant as to whether the licensee is on the correct path for compliance with the Mitigation Strategies and SFPI orders. The onsite activities included detailed analysis and calculation discussion, walk-throughs of strategies and equipment laydown, visualization of portable equipment storage and deployment, staging and deployment of offsite equipment, and physical sizing and placement of SFPI equipment.

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

If you have any questions, please contact me at 301-415-2833 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 No.: 50-440

Enclosure:
Audit report

cc w/encl: Distribution via Listserv

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

AUDIT REPORT BY THE OFFICE OF NUCLEAR REACTOR REGULATION

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

WITH REGARD TO REQUIREMENTS FOR

MITIGATION STRATEGIES FOR BEYOND-DESIGN-BASIS EXTERNAL EVENTS

AND RELIABLE SPENT FUEL POOL INSTRUMENTATION

FIRSTENERGY NUCLEAR OPERATING COMPANY

PERRY NUCLEAR POWER PLANT, UNIT NO.1

DOCKET NO. 50-440

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 27, 2013 (ADAMS Accession No. ML13064A243), FirstEnergy Nuclear Operating Company (FENOC, the licensee), submitted its OIP for Perry Nuclear Power Plant Unit No. 1 (Perry), in response to Order EA-12-049. By letters dated August 26, 2013, February 27, 2014, August 28, 2014, and February 26, 2015 (ADAMS Accession Nos. ML13238A260, ML14058A666, ML14240A285, and ML15057A398, respectively), FENOC submitted its first four six-month updates to the OIP. By letter dated September 25, 2014 (ADAMS Accession No. ML14268A214), FENOC submitted a revised OIP that incorporated several significant changes to the planned coping strategies. 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 Perry interim staff evaluation (ISE) (ADAMS Accession No. ML13338A460) and continues with in-office and onsite portions of this audit.

By letter dated February 27, 2013 (ADAMS Accession No. ML13059A495), the licensee submitted its OIP for Perry, in response to Order EA-12-051. By letter dated June 10, 2013, and e-mail dated June 25, 2013 (ADAMS Accession Nos. ML13155A539 and ML13176A333, respectively), the NRC staff sent a request for additional information (RAI) to the licensee. By letters dated July 2, 2013, August 26, 2013, February 27, 2014, August 28, 2014, and February 26, 2015 (ADAMS Accession Nos. ML13184A019, ML13238A259, ML14058A665, ML14240A230, and ML15057A396, respectively), the licensee submitted its RAI responses and first four six-month updates to the OIP. The NRC staff's review to date led to the issuance of the Perry ISE and RAI dated November 6, 2013 (ADAMS Accession No. ML13340A653). 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.

In support of the ongoing audit of the licensee's OIPs, as supplemented, the NRC staff conducted an onsite audit at Perry from December 15 - 19, 2014, per the audit plan dated November 19, 2014 (ADAMS Accession No. ML14321A057). The purpose of the onsite portion of the audit was to provide the NRC staff the opportunity to continue the audit review and gain key insights most easily obtained at the plant as to whether the licensee is on the correct path for compliance with the Mitigation Strategies (MS) and Spent Fuel Pool Instrumentation (SFPI) orders. The onsite activities included detailed analysis and calculation discussion, walk-throughs of strategies and equipment laydown, visualization of portable equipment storage and deployment, staging and deployment of offsite equipment, and physical sizing and placement of SFPI equipment.

Following the licensee's declarations of order compliance, the NRC staff will evaluate the OIPs, as supplemented, the resulting site-specific Overall Program Documents/Final Integrated Plans, 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, Revision 1, "Industry Guidance for Compliance with NRC Order EA-12-051, 'To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation'" (ADAMS Accession No. ML12240A307), as endorsed, with exceptions and clarifications, by NRC ISG JLD-ISG-2012-03 "Compliance with Order EA-12-051, 'Reliable Spent Fuel Pool Instrumentation'" (ADAMS Accession No. ML12221A339) as providing one acceptable means of meeting the order

requirements. Should 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 ACTIVITIES

The onsite audit was conducted at the Perry facility from December 15-19, 2014. The NRC audit team staff was as follows:

Title	Team Member
Team Lead/Project Manager	Peter Bamford
Technical Support	Joshua Miller
Technical Support	Brett Titus
Technical Support	Prem Sahay
Technical Support	Michael Levine
Technical Support	Khoi Nguyen

The NRC staff executed the onsite portion of the audit per the three part approach discussed in the November 19, 2014, plan, to include conducting a tabletop discussion of the site's integrated mitigating strategies compliance program, a review of specific technical review items, and discussion of specific program topics. Activities that were planned to support the above included detailed analysis and calculation discussions; walk-throughs of strategies and equipment laydown; visualization of portable equipment storage and deployment; staging and deployment of offsite equipment; and physical sizing and placement of SFPI equipment.

AUDIT SUMMARY

1.0 Entrance Meeting (December 15, 2014)

At the audit entrance meeting, the NRC staff audit team introduced itself followed by introductions from the licensee's staff. The NRC audit team provided a brief overview of the audit's objectives and anticipated schedule.

2.0 Integrated Mitigating Strategies Compliance Program Overview

Per the audit plan and as an introduction to the site's program, the licensee provided a presentation to the NRC audit team titled "Perry Nuclear Power Plant NRC Mitigation Strategies Audit Entrance Meeting." The licensee provided an overview of its strategy to maintain core cooling, containment, and SFP cooling in the event of a BDBEE, and the plant modifications being done in order to implement the strategies. The licensee also presented the location of the FLEX equipment storage facilities, the FLEX equipment that would be stored there, the interface with the National SAFER Response Center, and information regarding communications, procedures, and training. The presentation included an overview of the spent fuel pool level indication modification.

3.0 Onsite Audit Technical Discussion Topics

Based on the audit plan, and with a particular emphasis on the Part 2 "Specific Technical Review Items," the NRC staff technical reviewers conducted interviews with licensee technical staff, site walk-downs, and detailed document reviews for the items listed in the plan. Results of these technical reviews that require additional information from the licensee or are still under NRC review are documented in the audit item status tables in Attachment 3, as discussed in the Conclusion section below.

3.1 Reactor Systems Technical Discussions and Walk-Downs

During the onsite audit the staff reviewed Perry's modeling of an extended loss of alternating current power event (ELAP) and its ability to mitigate the event, including the computer code used for the ELAP analysis (Modular Accident Analysis Program, or MAAP) and input parameters assumed to generate the results of the analysis. The staff noted that the Perry analysis did not follow the approved template for the use of MAAP in a mitigating strategies application (see endorsement letter from J. Davis to J. Pollock, dated October 3, 2013, ADAMS Accession No. ML13275A318) and therefore the staff could not determine whether the MAAP code was being appropriately used. After the onsite audit was completed the licensee staff supplemented the MAAP analysis with the approved template and made it available for NRC audit. Based on the updated analysis, the NRC staff closed associated confirmatory items (CI) 3.2.1.1.A, 3.2.1.1.B, 3.2.1.1.C and 3.2.1.1.D, 3.2.1.2.A and audit question (AQ) 77. The staff also performed plant walk-throughs of the proposed mitigating strategies to provide core cooling and Reactor Pressure Vessel (RPV) inventory makeup, including portable pumping equipment, flow paths, and water storage locations.

3.2 Electrical Technical Discussions and Walk-Downs

The NRC staff walked down the battery rooms and other associated electrical component locations to evaluate strategies for powering the FLEX equipment, battery room hydrogen and temperature control, as well as load shed feasibility and timing. The staff also reviewed electrical drawings that support the FLEX strategy. Multiple audit items in the electrical area remain open. These are described in Attachment 3, along with a description of the information the NRC staff needs to evaluate each item.

3.2 Balance of Plant Technical Discussions and Walk-Downs

During the onsite audit the NRC staff noted that the hydraulic analysis did not reflect the most recent strategy revisions and thus the evaluation of the capability to supply the necessary cooling and makeup flow under ELAP conditions was identified by several audit items. After the completion of the onsite audit activities, the licensee notified the NRC staff that a revised hydraulic analysis was being prepared. The NRC staff made a return visit to the Perry site to evaluate the new analysis. Though the analysis was not completed in time for the return visit, the staff was able to review the critical assumptions and modeling details such that the associated audit item (AQ.39) was closed. The NRC staff also reviewed the licensee's evaluations regarding portable FLEX equipment diesel fuel consumption requirements, fuel quality, and the strategy to provide adequate fuel supplies for the duration of the postulated event. No concerns were identified for the diesel fuel supply review.

3.5 Containment and Room Ventilation Technical Discussions and Walk-Downs

The Perry containment design is a Mark III system, and the licensee plans to cool containment by using either the installed suppression pool cleanup (SPC) pump or the installed alternate decay heat removal (ADHR) pump, flowing water from the suppression pool through the installed residual heat removal (RHR) heat exchangers. In the licensee's strategy, the SPC and ADHR pumps are powered from a FLEX power supply. The RHR heat exchangers would in turn be cooled by ultimate heat sink (UHS) water pumped by FLEX pumps. The staff did not identify any concerns with the proposed use of installed pumps; however, the licensee's strategy results in the containment suppression pool exceeding its design temperature under the postulated conditions. At the time of the onsite audit, the licensee had not evaluated the impact of exceeding the suppression pool design temperature on the ability of the systems, structures, and components necessary to support the overall strategy as anticipated. Therefore, this remains an open issue, tracked by CI 3.2.1.3.A and CI 3.2.3.A. In addition, certain room locations that support the FLEX strategy such as the RCIC room and SFP area had not yet been evaluated for acceptable temperatures. Therefore this also remains as an open issue, tracked by CI 3.2.4.2.A.

3.4 SFPI Technical Discussions and Walk-Downs

The NRC staff walked down the SFP area, SFPI locations, and related equipment mounting areas. No concerns were identified during the walk-downs. Open items remain as described in Attachment 3, associated with the licensees sloshing analysis and the licensee's criteria for evaluating channel functionality.

3.5 Other Technical Discussion Areas and Walk-Downs.

a. Regarding FLEX equipment deployment, the staff reviewed the location of the FLEX storage buildings and staging area B. Along with the licensee, the staff walked down the deployment pathways from these locations. The staff observed that, in general, there are multiple pathways to get the necessary equipment to its deployed location.

b. Regarding communications, the staff noted that the licensee had made changes to the strategy as compared to the plan that was submitted by FENOC (ADAMS Accession Nos. ML12306A131 and ML13053A366, respectively), in response to NRC near-term task force recommendation 9.3. The previous strategy was reviewed and assessed by the NRC staff (ADAMS Accession No. ML13197A144). During the onsite audit, the licensee stated that a letter to the NRC staff documenting the changes is planned. Thus, this issue remains open pending further staff review of the change letter, and is tracked by CI 3.2.4.4.A.

c. Regarding program controls, the licensee provided draft program documents for NRC review during the audit. There are both fleet level and site-specific program controls. The licensee stated that the site program document is controlled similar to a procedure, such that the plan will be maintained up-to-date and will receive a multi-disciplinary review when changes are made. The NRC staff identified no concerns with this approach.

d. Human factors considerations were reviewed as part of the audit. These considerations were looked at in the form of walkdowns, procedure reviews, and discussion with licensee personnel. The questions included training, accessibility, habitability, procedures, programs, and various other topics. The staff identified no concerns in this area.

e. The NRC staff reviewed the licensee's plan for RPV injection and noted that the licensee had made provisions for prioritization of water supply starting with clean water sources and proceeding to UHS water. The staff also noted that when RCIC is no longer available, the high pressure core spray (HPCS) and low pressure core spray (LPCS) spargers could be used such that water enters the fuel from the top down. Regarding the UHS raw water, the licensee still needs to provide a justification for the assumption that the FLEX pump strainers will remain clear of debris throughout the postulated event. This is tracked by safety evaluation (SE) audit item SE.2.

4.0 Exit Meeting (December 19, 2014)

The NRC staff audit team conducted pre-exit and exit meetings with licensee staff following the completion of the onsite review activities. The NRC staff highlighted items still under review and noted that the results of the onsite audit trip will be documented in this report. Items that require additional information from the licensee or are still under NRC review are detailed in Attachment 3 of this report.

CONCLUSION

The NRC staff completed all three parts of the November 19, 2014, onsite audit plan. Each audit item listed in Part 2 of the plan was reviewed by NRC staff members while on site. In addition to the list of NRC and licensee onsite audit staff participants in Attachment 1, Attachment 2 provides a list of documents reviewed during the onsite audit portion.

In support of the continuing audit process as the licensee proceeds towards orders compliance for this site, Attachment 3 provides the status of all open audit review items that the NRC staff is evaluating in anticipation of issuance of a combined SE for both the MS and SFPI orders. Attachment 3 includes items remaining from the onsite audit, as well as any items that are being reviewed exclusively in the NRC offices, or have been added since the onsite audit (and thus were not included in the onsite audit plan). The five sources for the audit items referenced below are as follows:

a. MS ISE Open Items (OIs) and CIs

b. MS AQs

c. Licensee-identified Overall Integrated Plan (OIP) Open Items (none for Perry)

d. SFPI RAIs

e. Additional SE needed information

While this report notes the completion of the onsite portion of the audit per the audit plan dated November 19, 2014, the ongoing audit process continues, as per letters dated August 28, 2013, and March 26, 2014, to all licensees and construction permit holders for both orders.

Additionally, while Attachment 3 provides a progress snapshot of the NRC staff's review of the licensee's OIPs, as supplemented, and as augmented in the audit process, the status and progress of the NRC staff's review may change based on licensee plan changes, resolution of generic issues, and other NRC staff concerns not previously documented. Changes in the NRC staff review will be communicated in the ongoing audit process.

Attachments:
1. NRC and Licensee Staff Onsite Audit Participants
2. Onsite Audit Documents Reviewed
3. Perry MS/SFPI SE Audit Items currently under NRC staff review and requiring licensee input

Onsite Audit Participants

NRC Staff:

Peter Bamford	NRR/JLD/JOMB
Joshua Miller	NRR/JLD/JERB
Prem Sahay	NRR/JLD/JERB
Khoi Nguyen	NRR/JLD/JERB
Brett Titus	NRR/JLD/JCBB
Michael Levine	NRR/JLD/JCBB

Perry Staff:

David Lockwood	Regulatory Compliance Engineer
Bob Coad	Supervisor Design Engineering
Ed Condo	Operations – Shift Manager
Kathy Nevins	Fleet Licensing
Mark Bensi	Mechanical Design Engineering
Dan Roninger	Operations – Perry FLEX Lead
Tom Lentz	Manager, Fleet Licensing
Michael Casey	Senior Consultant - Projects
David Stoltz	Electrical Design Engineering
Craig Butrick	Electrical Design Engineering
Nick Conicella	Manager, Regulatory Compliance

Documents Reviewed

FLEX Support Guidelines (FSGs)

FSG-90.3, "Alternate Room Ventilation," Rev. 0

FSG 90.1, "Reading Instrumentation Locally During Station Blackout," Rev. 0

FSG 50.1, "Fuel Pool Fill Using Fire Main or Portable Pump," Rev. 0

FSG-50.2, "Fuel Pool Spray Using Fire Main or Portable Pump," Rev. 0

FSG 50.3, "Fuel Pool Fill Using Emergency Makeup System," Rev. 0

FSG-10.1, "RCIC FLEX Operation," Rev. 1

Procedures

EPI-A-0008, "Emergency Operations Facility Activation," Rev. 20

NOBP-LP-5001, "Fleet Support of Emergency Plans at FENOC Nuclear Plants," Rev. 5

ONI-SPI D-3, "Cross-Tying Unit 1 and 2 Batteries," Rev. 2

ONI-SP1 D-1, "Maintaining System Availability," Rev. 3

EOP-03, "Secondary Containment Control and Radioactive Release Control," Rev. 4

NOP-OP-1002, "Conduct of Operations," Rev. 3

FENOC fleet procedure GEN-SAF-0001, "Generation Personal Safety Manual," Rev. 2

ONI-SPI D-2, "Non-Essential DC Loads," Rev. 5

ONI-SPI H-3, "Instrument Available During Station Blackout," Rev. 1

TXI-0429, "Primary SFPIS System Power-Up and Acceptance Testing," Rev. 0

TXI-0430, "Back-up SFPIS System Power-Up and Acceptance Testing," Rev. 0

ICI-B01-012, "ABB/K-TEK MT5000 Guided Wave Radar Level Transmitter Calibration Check," Rev. 1

ICI-B18-0002, "GE 180/185 Edgewise Panel Meter (B18-2)," Rev. 2

NOP-LP-7300, "FLEX Program for the Perry Nuclear Power Plant (PNPP)," Rev. 1

Calculations/Analyses

Calculation X11-001, "FLEX Event Coping Strategies and Time Analysis," Rev. 0

Calculation PRDC-0012, "Evaluate the DC Loads Supplied by the Division 1 & 2 Batteries, 1R42S0002 OR 2R42S0002 AND 1R42S0003 OR 2R42S0003 During an Extended 24 Hour SBO Event," Rev. 3

Calculation CN-FSE-12-12, "Perry FLEX Conceptual Design ATF Fathom Model," Rev. 1

Calculation X11-004, "FLEX Hydraulic Flow Model," Rev. 0

Calculation CN-SEE-II-12-45, "Determination of the Time to Boil for the Perry Nuclear Power Plant Unit 1 Spent Fuel Pool after Earthquake," Rev. 1-A

Calculation CN-PEUS-13-27, "Seismic Analysis of the SFP Mounting Bracket at Perry Nuclear Power Plant," Rev. 2

Calculation ECA-007, "Determine a Steady State Temperature Profile for Zone FB-4 Under Various Operating Conditions," Rev. 1

WNA-CN-00301-GEN, "Spent Fuel Instrumentation System Channel Accuracy Analysis," Rev. 1

Drawings

015-0008-00000, "Final Plant Layout Fuel Handling Facilities Plant Elevation 620'-6"," Rev. A

215-0434-00502, "Electrical Conduit Layout –Sections & Details Fuel Handling Area - West EL.620'-6"," Rev. U

215-0434-00502, "Electrical Conduit Layout Intermediate Building - South - EL.620'-6"," Rev. G

215-0432-00000, "Electrical Conduit Layout Intermediate Building - South - EL.620'-6"," Rev. DD

10066E88, "Perry Nuclear Generating Station Spent Fuel Pool Mounting Bracket Plan, Sections, and Details," Rev. 3

022-0041-00000, "Environmental Conditions for Intermediate Building," Rev. G

Other Documents

PNPP Updated Final Safety Analysis Report (UFSAR), Rev. 19

NORM-LP-7303, "FLEX Integrated Plan for the Perry Nuclear Power Plant," Rev. 0

FENOC Letter L-14-401, "FENOC Expedited Seismic Evaluation Process (ESEP) Report, Rev. 1, ADAMS Accession Nos. ML14353A059 and ML14353A060

AREVA Engineering Information Record 51-9233427-001, "Perry Nuclear Power Plant SAFER Response Plan 38-9233762-000," Rev. 001, (still unsigned)

ECP 14-0283, "Reference Documents-FLEX Storage Modifications – "Hot Shop" Conversion Activities," Rev. 6

ECP 13-0523, "FLEX Modifications for Emergency Lighting," Rev. 6

ECP 12-0835-001, "Fukushima Spent Fuel Pool (SFP) Level Instrumentation Design - Supplement 001," Rev. 3

Report WNA-TR-03149-GEN, "Automation and Field Services SFPIS Standard Product Final Summary Design Verification Report," Rev. 2

LTR-SEE-II-13-47, "Determination if the Proposed Spent Fuel Pool Level Instrumentation can be Sloshed out of the Spent Fuel Pool during a Seismic Event," Rev. 0

Purchase Order No. 45457881 CO.2

Report S0020.0, "Seismic Test Report for a Namco Limit Switch and a Weschler Indicator," Rev. 2

WNA-IG-00452-GEN, "Spent Fuel Pool Instrumentation System Torque Specification," Rev. 3

BWROG-TP-14-018, "Beyond Design Basis RCIC Elevated Temperature Functionality Assessment," Rev. 0

NEDC-33771P, "GEH Evaluation of FLEX Implementation Guidelines," Rev. 0

LTR-SFPIS-14-68, "Accuracy Calc Note Addendum for Perry Cable Probe," Rev. 0

Perry
Mitigation Strategies/Spent Fuel Pool Instrumentation Safety Evaluation Audit Items:

Audit Items Currently Under NRC Staff Review and Requiring Licensee Input

Audit Item Reference	Item Description	Licensee Input Needed
CI 3.2.1.2.A	RCIC Capability	Make available for audit: 1. The recirculation pump design and pump seal design. 2. A testing reference that justifies the assumed leakage rate 3. An evaluation that FLEX makeup pumps have sufficient capacity to maintain or restore reactor vessel level in light of expected leakage under expected pressures at the corresponding phase of the event.
CI 3.2.1.3.A	Suppression Pool Temperature	Make available for audit a site-specific evaluation discussing why the suppression pool temperatures and durations shown in the credited MAAP case (all of which are currently above the design limit for some period of time) are acceptable.
CI 3.2.3.A	Containment response calculation.	Make available for audit an explanation of which case is credited/relied upon to represent the success of the proposed strategy and a more detailed explanation of the modeling of the RHR heat exchanger in the MAAP evaluation. The resolution of these issues also needs to be reflected in the hydraulic analysis, the final OIP, and applicable site procedures.
CI 3.2.3.B	"Robustness" evaluation of Suppression Pool Cleanup (SPCU) pump and piping.	Make available for audit review the pipe stress and support calculations for the credited SPCU piping.
CI 3.2.4.2.A	RCIC and SFP area temperature evaluations	Make available for audit review the final RCIC room heat up calculation and the habitability evaluation for the SFP area.
CI 3.2.4.2.B	Battery room temperature evaluations	Make available for audit review an evaluation of the impact of temperatures (extreme high or low temperatures) in the battery rooms on performance of station batteries.
CI 3.2.4.4.A	Confirm that the proposed communications upgrades in the licensee's communications assessment are completed as planned.	Provide a docketed supplement letter describing changes to communications strategy that have been made since the previous NRC assessment was issued.

Audit Item Reference	Item Description	Licensee Input Needed
CI 3.2.4.8.A	Confirm that the battery loading analyses considers the appropriate minimum voltage.	Make available for audit: 1. An explanation of the dc battery loading, sizing and load profile calculation (PRDC-0012, Rev. 3) which does not appear to be consistent with the ELAP event loading with respect to the Emergency Diesel Generator (EDG) field flash load. 2. An analysis showing Unit 1 battery capacity before Unit 2 battery is cross-tied, Unit 2 battery capacity before cross-tie and then the overall capacity of the cross-tied batteries for the remaining time (i.e. discharge current (Ampere) and time characteristics)). 3. A brief discussion on precautions if any that need to be considered for cross-tying batteries for satisfactory performance of cross-tied batteries. 4. Documentation to show that the Perry Unit 2, Division I, battery is maintained and tested to allow crediting in the FLEX strategy. 5. A brief discussion of potential voltage differences between the two batteries before cross-tie since the first battery will be depleted more than the second battery. 6. An explanation of the capability of the cross-tie breaker to quench any expected arc that may result from the cross connection.
CI 3.2.4.10.B	Load shedding	The battery cross-tying procedure is entered for station blackout or Total Loss of AC (TLAC) when both EH11 and EH12 are unavailable. TLAC does not appear to be consistent with NEI 12-06, Rev. 0 which uses the term ELAP (Extended Loss of AC Power). Make available for audit a clarification for the difference in terms.
AQ.28	Protection of FLEX Equipment from high temperatures while in storage.	Make available for audit a high temperature assessment of the various FLEX storage locations.
AQ.37	Sequence of Events Verification	Make available for audit an explanation of the walkthroughs and table top exercises that have been completed and confirm that completion times are consistent with the completed MAAP analysis

Audit Item Reference	Item Description	Licensee Input Needed
AQ.43	Safety Relief Valve (SRV) air capacity	Make available for audit the number of SRV actuations expected and the amount of air used by the actuations for comparison to the 24 hour calculation.
AQ.79	Electrical Isolation	Make available for audit: 1. A summary of electrical protection scheme on the FLEX and installed electrical equipment. 2. The electrical fault protection and coordination analysis to show that the installed electrical equipment will be protected from an electrical fault on the FLEX portable electrical equipment.
AQ.83	FLEX generator sizing and machine specifications	Make available for audit a copy of FLEX DG calculation.
SFP.4	Seismic evaluation for SFP instrumentation	1. Make available for audit the seismic evaluation for the mountings of the electronics enclosures, transmitters, pull boxes and conduit supports. 2. Make available for audit an evaluation or a justification that hydrodynamic forces will not impact the integrity and function of the probe.
SFP.11	SFPI maintenance and calibration	Make available for audit the criteria for how the operations staff will evaluate the SFP instrumentation to ensure that both channels are performing properly. Include a description of (a) how channel verification/comparison will be performed and (b) how often the instruments will be monitored.
SE.2	FLEX lake water pump strainers	Make available for audit a design description and justification that the strainers on the pumps will not be blocked by debris and/or show the ability to remove debris from the pump suction strainers.
SE.5	High temperature evaluation of the electrical equipment in the RCIC room and battery charger/switchgear rooms during ELAP event.	Make available for audit a summary evaluation and conclusion regarding the capability of the electrical equipment credited for the FLEX strategy under the expected environmental conditions. This item is related to CI 3.2.4.2.A

Audit Item Reference	Item Description	Licensee Input Needed
SE.6	Maintenance and testing program for electrical FLEX equipment not covered by EPRI Maintenance and Testing Template.	Make available for audit a summary of the licensee's maintenance and testing program that addresses: (1) the acceptance and replacement criteria for electrical equipment (especially for FLEX DGs, batteries, cables etc.), (2) voltage and frequency limits when starting a generator, and (3) shelf life considerations for age-susceptible components (i.e. O-rings, seals, batteries)
SE.7	Provide an evaluation of the environmental qualification of containment electrical equipment including SRV components, showing that the equipment will be functional for the ELAP mission time.	Make available for audit an evaluation of the qualification of the containment electrical components under ELAP conditions.

first four six-month updates to the OIP. The NRC staff's review to date led to the issuance of the Perry ISE and RAI dated November 6, 2013 (ADAMS Accession No. ML13340A653). 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 audits allow 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 and updated information, audit information provided on e-portals, and preliminary Overall Program Documents/Final Integrated Plans while identifying additional information necessary for the licensee to supplement its plan and staff potential concerns.

In support of the ongoing audit of the licensee's OIPs, as supplemented, the NRC staff conducted an onsite audit at Perry from December 15 - 19, 2014, per the audit plan dated November 19, 2014 (ADAMS Accession No. ML14321A057). The purpose of the onsite portion of the audit was to provide the NRC staff the opportunity to continue the audit review and gain key insights most easily obtained at the plant as to whether the licensee is on the correct path for compliance with the Mitigation Strategies and SFPI orders. The onsite activities included detailed analysis and calculation discussion, walk-throughs of strategies and equipment laydown, visualization of portable equipment storage and deployment, staging and deployment of offsite equipment, and physical sizing and placement of SFPI equipment.

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

If you have any questions, please contact me at 301-415-2833 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 No.: 50-440
Enclosure: Audit report
cc w/encl: Distribution via Listserv

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DATE	04/07/15	04/09/15	05/13/15	05/19/15
OFFICE	NRR/JLD/JERB/BC	NRR/JLD/JOMB/BC(A)	NRR/JLD/D	NRR/JLD/JOMB/PM
NAME	SWhaley (JMiller for)	MHalter (MBrown for)	JDavis	PBamford
DATE	05/19/15	05/20/15	05/21/15	06/01/15

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