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

February 20, 2015

Mr. Kelvin Henderson
Site Vice President
Duke Energy Carolinas, LLC
Catawba Nuclear Station
4800 Concord Road
York, SC 29745

SUBJECT: CATAWBA NUCLEAR STATION, UNITS 1 AND 2 - 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. MF1162, MF1163, MF1060, AND MF1061)

Dear Mr. Henderson:

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

By letter dated February 28, 2013 (ADAMS Accession No. ML13066A173), Duke Energy Carolinas, LLC (the licensee) submitted its OIP for Catawba Nuclear Station, Units 1 and 2 (CNS) in response to Order EA-12-049. By letters dated August 28, 2013, February 28, 2014 and August 28, 2014 (ADAMS Accession Nos. ML13298A010, ML14065A038, and ML14247A232, respectively), the licensee 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 CNS interim staff evaluation (ISE) (ADAMS Accession No. ML13364A175) and continues with in-office and onsite portions of this audit.

By letter dated February 28, 2013 (ADAMS Accession No. ML13086A095), the licensee submitted its OIP for CNS in response to Order EA-12-051. By letter dated June 24, 2013 (ADAMS Accession No. ML13171A274), the NRC staff sent a request for additional information (RAI) to the licensee. By letters dated July 23, 2013, August 26, 2013, February 26, 2014, and August 14, 2014 (ADAMS Accession Nos. ML13206A384, ML13242A009, ML14063A279, and ML14227A717, respectively), the licensee submitted its RAI responses and first three six-month updates to the OIP.

The NRC staff's review to date led to the issuance of the CNS ISE and RAI dated October 28, 2013 (ADAMS Accession No. ML13281A562). 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 onsite review activities at CNS from September 29 – October 3, 2014 per the audit plan dated September 15, 2014 (ADAMS Accession No. ML14252A760). 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 Nos.: 50-413 and 50-414

Enclosure:
Audit report

cc w/encl: Distribution via Listserv

UNITED STATES
NUCLEAR REGULATORY COMMISSION
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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

DUKE ENERGY CAROLINAS, LLC

CATAWBA NUCLEAR STATION, UNITS 1 AND 2

DOCKET NOS. 50-413 AND 50-414

BACKGROUND AND AUDIT BASIS

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

By letter dated February 28, 2013 (ADAMS Accession No. ML13066A173), Duke Energy Carolinas, LLC (the licensee) submitted its OIP for Catawba Nuclear Station, Units 1 and 2 (CNS) in response to Order EA-12-049. By letters dated August 28, 2013, February 28, 2014 and August 28, 2014 (ADAMS Accession Nos. ML13298A010, ML14065A038, and ML14247A232, respectively), the licensee 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

Enclosure

process led to the issuance of the CNS interim staff evaluation (ISE) (ADAMS Accession No. ML13364A175) and continues with in-office and onsite portions of this audit.

By letter dated February 28, 2013 (ADAMS Accession No. ML13086A095), the licensee submitted its OIP for CNS in response to Order EA-12-051. By letter dated June 24, 2013 (ADAMS Accession No. ML13171A274), the NRC staff sent a request for additional information (RAI) to the licensee. By letters dated July 23, 2013, August 26, 2013, February 26, 2014, and August 14, 2014 (ADAMS Accession Nos. ML13206A384, ML13242A009, ML14063A279, and ML14227A717, respectively), the licensee submitted its RAI responses and first three six-month updates to the OIP. The NRC staff's review to date led to the issuance of the CNS ISE and RAI dated October 28, 2013 (ADAMS Accession No. ML13281A562). 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 (OPDs)/Final Integrated Plans (FIPs) while identifying additional information necessary for the licensee to supplement its plan and address staff potential concerns.

In support of the ongoing audit of the licensee's OIPs as supplemented, the NRC staff conducted onsite review activities at CNS from September 29 – October 3, 2014, per the audit plan dated September 15, 2014 (ADAMS Accession No. ML14252A760). 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 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 OPDs/FIPs, and, as appropriate, other licensee submittals based on the requirements in the orders. For Order EA-12-049, the staff will make a safety determination regarding order compliance using the Nuclear Energy Institute (NEI) guidance document NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide" issued in August, 2012 (ADAMS Accession No. ML12242A378), as endorsed, by NRC Japan Lessons-Learned Directorate (JLD) interim staff guidance (ISG) JLD-ISG-2012-01 "Compliance with Order EA-12-049, 'Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events'" (ADAMS Accession No. ML12229A174) as providing one acceptable means of meeting the order requirements. For Order EA-12-051, the staff will make a safety determination regarding order compliance using the NEI guidance document NEI 12-02, 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 CNS facility from September 29, 2014, through October 3, 2014. The NRC audit team staff was as follows:

Title	Team Member
Team Lead/Project Manager	Peter Bamford
Technical Support	Joshua Miller
Technical Support	Bruce Heida
Technical Support	Kerby Scales
Technical Support	Duc Nguyen
Technical Support	Khoi Nguyen

The NRC staff executed the onsite portion of the audit per the three part approach discussed in the September 15, 2014, plan, to include conducting a tabletop discussion of the site's integrated MS 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 (September 29, 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 "Diverse and Flexible (FLEX) Coping Strategies: NRC FLEX Audit Presentation, Catawba Nuclear Station." 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. Also presented was the design and location of the FLEX equipment storage facility, the FLEX equipment that would be stored there, the interface with the National SAFER Response Center, overview of the spent fuel pool level indication modification, and information regarding communications, staffing, and training.

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 Attachments 3 and 4, as discussed in the Conclusion section below.

3.1 Reactor Systems Technical Discussions and Walk-Downs

The staff reviewed CNS' 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 and input parameters assumed to generate the results of the analysis (i.e., the reactor coolant pump seal leakage, reactor coolant system (RCS) venting, etc.). The NRC staff met with licensee staff to discuss the timing of the injection of borated water into the RCS, and the mixing of that water during natural circulation conditions.

3.2 Electrical Technical Discussions and Walk-Downs

NRC staff reviewed the calculations on extending battery life based on load shedding, and walked down the turbine-driven auxiliary feedwater (TDAFW) Pump, Switchgear, Battery, and Control Rooms to evaluate strategies for hydrogen and temperature control. The staff also walked down panels used for load shedding to evaluate feasibility and timing. Lastly, the NRC staff walked down FLEX electrical equipment which was already on site. Regarding audit question (AQ) 37, the staff reviewed the licensee's calculations to verify the minimum [direct current] dc bus voltage that is required to ensure proper operation of all required electrical equipment. To complete the review of this item the staff does not need any additional information from the licensee; however, the staff is reviewing battery life beyond 8 hours on a generic basis with the applicable battery vendors. Once this generic review is completed, and acceptable results confirmed, this item will be closed.

3.3 SFPI Technical Discussions and Walk-Downs

NRC staff walked down the SFP area, SFPI locations, and related equipment mounting areas. No concerns were identified during the walk-downs.

3.4 Other Technical Discussion Areas and Walk-Downs.

a. Regarding confirmatory item (CI) 3.1.1.2.A, the staff reviewed the location of the new FLEX storage building and the primary and backup locations for staging area B. Along with the licensee, the staff walked down the deployment pathways from these locations. The staff confirmed that the licensee had evaluated the travel routes for soil liquefaction such that the necessary equipment could be deployed after a seismic event. The staff also confirmed that, in general, there are multiple pathways to get the necessary equipment to its deployed location.

b. Regarding CI 3.2.4.4.B, Communications, the staff reviewed the items planned for completion in the licensee's Near-Term Task Force Recommendation 9.3 communications assessment, dated May 13, 2013 (ADAMS Accession No. ML13108A152) to ensure that they were completed as planned. The staff noted one procedure which had not yet been updated during the site visit. This procedure change was subsequently completed and the CI closed.

c. Regarding safety evaluation (SE) tracker items 2, 3, and 4, and licensee OIP item 79, the licensee provided information on the configuration of the seal leak-off line, the seal interface materials and the seal O-ring materials. The staff evaluated these and found them acceptable. The staff looked at the justification for the leak-off line category and found it acceptable as well. CNS will need to perform additional piping and support analysis to ensure that the seal leak-off line temperature and pressure seen during the ELAP event will be supported by the current configuration. Regarding the seal leak-off rate assumed, dialogue needs to occur at the pressurized water reactor owners group (PWROG) / vendor level to resolve this question. While the seal O-rings will remain intact for at least several hours at normal operating pressure and temperature, the licensee will need to justify that the integrity of the associated O-rings will be maintained, throughout the analysis time period.

d. Regarding Programs/Training, OIP item 29, CNS has elected to treat the FLEX implementation plan as a design basis specification. This classification brings the attendant controls as would be applied to any other design-basis document, thus ensuring that the plan will be maintained up-to-date. Draft training lesson plans were reviewed during the audit and the licensee has taken steps to ensure that the planned training occurs as planned through the use of the plant corrective action program to track completion, in addition to the controls inherent in the training program.

e. Approximately 44 human factors questions were looked at as part of the audit. These 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. This review identified one item to be pursued further regarding adequate nitrogen for the steam generator (SG) power-operated relief valves (PORVs), which was resolved onsite, during the audit.

f. The NRC audit staff reviewed the licensee's plans for the station batteries, including capacity, load profiles, and load shedding. Regarding battery capacity, CNS plans to have the station batteries discharging for longer than 8 hours. The staff has requested additional information from the manufacturer (Gould National Battery, or GNB) to demonstrate that their nuclear grade batteries can support battery discharges greater than 8 hours. AQ-37 will remain open for CNS pending the staff review of additional information from the battery manufacturer. Regarding battery duty cycle load profiles and load shedding, the NRC audit staff reviewed summaries of the results, conclusions, and key assumptions of the licensee's battery calculation to verify the adequacy of the capacity and capability of the vital batteries to supply

direct current (dc) power to the required loads during the first phase of the CNS FLEX mitigation strategies. The NRC audit staff also walked down the load shedding procedures with the licensee to verify that load shedding could be completed within the time assumed in its analysis. Based on the onsite audit activities, the NRC audit staff concluded that the CNS dc system has adequate capacity and capability for the BDBEE mitigation strategy, pending resolution of AQ-37, and that the necessary load shedding could be accomplished within the times assumed in the licensee's analysis.

g. Regarding SFPI, the NRC staff reviewed the licensee's proposed level instrument arrangement, cable routing, instrument diversity, power supply, and display location in the main control room using both document reviews and plant walkdowns. The staff also reviewed the licensee's sloshing calculation. No issues requiring follow-up in these areas were identified. Several SFPI open items remain, awaiting completion of the calibration procedures, and certain analyses and evaluations as documented in Table 3.

4.0 Exit Meeting (October 3, 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 Attachments 3 and 4 of this report.

CONCLUSION

The NRC staff completed all three parts of the September 15, 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, Attachments 3 and 4 provide the status of all open audit review items that the NRC staff is evaluating in anticipation of issuance of a combined safety evaluation for both the Mitigation Strategies and Spent Fuel Pool Level Instrumentation orders. Attachments 3 and 4 include items remaining from the onsite audit, as well as any items that are being reviewed exclusively in the NRC offices (and thus were not included in the onsite audit plan). The five sources for the audit items referenced below are as follows:

a. Interim Staff Evaluation (ISE) Open Items (OIs) and Confirmatory Items (CIs)

b. Audit Questions (AQs)

c. Licensee-identified Overall Integrated Plan (OIP) Open Items

d. Spent Fuel Pool Instrumentation (SFPI) Requests for Additional Information (RAIs)

e. Additional SE needed information

The attachments provide audit information as follows:

a. Attachment 1: List of NRC staff and licensee staff audit participants

b. Attachment 2: List of documents reviewed during the onsite audit

c. Attachment 3: Catawba MS/SFPI SE Audit Items currently under NRC staff review and requiring licensee input as delineated

d. Attachment 4: Catawba MS/SFPI SE Audit Items currently under NRC staff review, but not requiring further licensee input

While this report notes the completion of the onsite portion of the audit per the audit plan dated September 15, 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 Attachments 3 and 4 provide a progress snapshot of the NRC staff's review of the licensee's OIPs, as supplemented, and as augmented in the audit process, the status and progress of the NRC staff's review may change based on licensee plan changes, resolution of generic issues, and other NRC staff concerns not previously documented. Changes in the NRC staff review will be communicated in the ongoing audit process.

Lastly, the licensee has identified open items that need to be completed to implement Orders EA-12-049 and EA-12-051, and the staff expects that the licensee continue to provide updates on the status of the licensee identified open items in their 6-month updates or on the e-portal.

Attachments:
1. NRC and Licensee Staff Onsite Audit Participants
2. Onsite Audit Documents Reviewed
3. Catawba MS/SFPI SE Audit Items currently under NRC staff review and requiring licensee input
4. Catawba MS/SFPI SE Audit Items currently under NRC staff review but not requiring further licensee input

Onsite Audit Participants

NRC Staff:

Peter Bamford	NRR/JLD/JOMB
Joshua Miller	NRR/JLD/JERB
Kerby Scales	NRR/JLD/JERB
Duc Nguyen	NRR/JLD/JERB
Khoi Nguyen	NRR/JLD/JERB
Bruce Heida	NRR/JLD/JCBB

CNS Staff:

Bob Ferguson	Oversight Manager
Bob Pryce	Fukushima Response Manager
Darrell Davies	Fukushima Technical Lead
Kyle Hemker	Safety Analysis - General Office
John Lubatti	Safety Analysis - General Office
Staci Fisher	Emergency Planning
Allen Dickard	Fukushima Response Team - Electrical
Gary Mitchell	Emergency Planning - Communications
Phil Barrett	Regulatory Affairs
Sarah McDaniel	Regulatory Affairs
Randy Hart	Regulatory Affairs Manager
Larry Rudy	Regulatory Affairs
Billy Williams	Security
Tom Baumgardner	Fukushima Response Team - Operations Support
Russ Lytton	Design Engineering – McGuire Nuclear Station
Jim Neal	Operations Training
Larry Bladel	Operations Training
Steve Tripi	Operations Training
Buck Black	Fukushima Response Team - Electrical
Dennis Mason	Fukushima Response Team - Mechanical

Documents Reviewed

FLEX Support Guidelines (FSGs)

- CNS-FG/2/A/CFLX/FSG-04, "ELAP DC Bus Management"
- CNS-FG/0/A/CFLX/FSG-05, "Initial Assessment and FLEX Equipment Staging"
- FG/1(2)/A/CFLX/FSG-08, "Alternate NC [Reactor Coolant] System Boration"
- FG/1(2)/A/CFLX/FSG-11, "FLEX Support Guide for Alternate SFP Makeup and Cooling"
- CNS-FG/2/CFLX/FSG-12, "Alternate Containment Cooling"
- CNS-FG/0/A/CFLX/FSG-20, "FLEX Electrical Distribution"
- CNS-FG/2/A/CFLX/FSG-23, "Long Term FLEX Strategies"

Procedures

- EP/1(2)/A/5000/ECA-0.0, "Loss of All AC Power"
- EP/1(2)/A/5000/ECA-0.0, "Enclosure 28, Monitoring of Spent Fuel Pool"
- PT/0/B/4600/123, "Surveillance of Emergency Equipment for Backup Communications"
- AD-EG-ALL-1170, "Design Basis Documents"
- PT/0/A/4400/002E, "Flood/FLEX Equipment Inspection"
- AM/0/A/5100/011 "Maintenance Support Procedure for FLEX Strategies" (Draft)
- SR/0/A/2000/003, Enclosure 6.19, "EOF Services Manager Checklist," (Draft)
- AP/(1)2/A/5500/041, "Loss of SFP Cooling or Level"
- PT/1(2)/A/4600/003, "Operations Monthly Surveillance Procedure"
- IP/1(2)/B/3111/009, "Maintenance Calibration Procedure"

Calculations/Analyses

- DPC-1552.08-00-0278, "Boration Analysis for Extended Loss of AC Power at MNS/CNS"

- "Evaluation of FLEX Deployment Paths Report for Catawba Nuclear Station," AMEC Environmental and Infrastructure, Inc. Revision 1, dated September 17, 2014, Project No. 6234-13-0125

- CNC-1381.05-00-0122, "Station Blackout Battery Sizing Calculation for the 125 VDC Vital I&C Batteries" and Appendix A, "Supplement Analysis for INPO IER L1-11-4"

- CNC-1381.05-00-0122, "Station Blackout Battery Sizing Calculation for the 125 VDC Vital I&C Batteries"

- DPC1552.08-00-0268/CNC-1552.08-00-0455, "Extended Loss of AC Power – Ice Condenser Containment Response (IER 11-4)"

- CNC-1223.21-00-0005, "FWST Missile Strike Volume"

- ARES Report 030321.12.01-001, "Seismic Robustness Review of Catawba Unit 1 Non-Safety Piping and Components for Diverse and Flexible Mitigation Strategies (FWST)"

- ARES Report, Attachment A, "Seismic Analysis of FLEX Access Paths through Auxiliary, Service, and Radiation Protection Buildings"

- CNC-1336.04-00-0001, "Seismic Induced Hydrodynamic Response in the Catawba and McGuire Spent Fuel Pools"

- Document 51-9202556-005, "Qualification Analysis of Vegapuls 62 ER Through Air Radar"

- CNC-1223.43-01-0011 "Minimum Nitrogen Pressure Requirement for Modulation of SG PORV's"

Drawings

- CN-2499-NV.63-00, "Instrument Detail Spent Fuel Pool Wide Range Level," Rev. A

- CN-SEE-II-13-22, "Decay Heat Removal," Rev. 0

- 02-92222913C, "Catawba Nuclear Station, Unit 2 Wave Guide, Spool 2, Weldment," Rev. 000

- 02-92222914D, "Catawba Nuclear Station, Unit 2 Wave Guide, Assembly (Southwest SFP Corner)," Rev. 000

- 9217546 C, "Catawba Nuclear Station Unit 2 Vega Waveguide Isometric (Southwest SFP Corner)," Rev 001

- 9217547 C, "Catawba Nuclear Station Unit 1 Vega Waveguide Isometric (Northwest SFP Corner)," Rev 001

- CN-2710-02.04-03, "Auxiliary Building Cable Trough Geometry, Below EL. 594' + 0"," Rev. 2
- CN-2710-02.11-06, "Auxiliary Building Electrical Equipment Layout Cable Room, EL. 587' + 0" Computer Cable Routing," Rev. 16
- CN-2710-02.11-02, "Auxiliary Building Electrical Equipment Layout Cable Room, EL. 591' + 0" Computer Cable Routing," Rev. 14
- CN-2710-02.11-03, "Auxiliary Building Electrical Equipment Layout Cable Room, EL. 590' + 0" Computer Cable Routing," Rev. 16
- CN-2894-01.01, "Computer Cable Routing Auxiliary Building Plan Below EL. 611' + 0" Cols. EE-QQ & 57-64," Rev. 23
- CN-2893-01.01, "Computer Cable Routing Auxiliary Building Plan Below EL. 594' + 0" Cols. EE-QQ & 57-64," Rev. 27
- CN-2710-02.11-08, "Auxiliary Building Electrical Equipment Layout Cable Room, EL. 585' + 0" Computer Cable Routing," Rev. 10
- CN-2710-02.11-11, "Auxiliary Building Electrical Equipment Layout Cable Room, EL. 582' + 0" Computer Cable Routing," Rev. 5
- CN-2710-02.04-08, "Auxiliary Building Cable Trough Geometry, Below EL. 594' + 0"," Rev. 3
- CN-2710-02.11-07, "Auxiliary Building Electrical Equipment Layout Cable Room, EL. 586' + 0" Computer Cable Routing," Rev. 20
- CN-2897-01.01, "Computer Cable Routing Auxiliary Building Elect. Pene. & Swgr. Room Plan Below EL. 594' + 0"," Rev. 38
- CN-2918-01.01, "Computer Cable Routing Reactor Building Annulus Elevation Azimuth 180° – 0° Plan Below EL. 594' + 0" Cols. EE-QQ & 57-64," Rev. 27

Other Documents

- CNS-1465.00-00-0022, "Design Basis Specification, FLEX Program for NRC Order EA-12-049," (Draft)
- Engineering Change (EC) EC110305 (Unit 1) and EC 110306 (Unit 2), "Install Unit 1/2 FD [Diesel Generator Fuel Oil] System Connection For Portable Pump"
- Diesel Fuel Oil Group (DFOG) white paper "DFOG Suggestions for FLEX Diesel Fuel Management," Rev. 0, dated June 4, 2014.

- Engineering Changes EC110083 (Unit 1) and EC110084 (Unit 2), "Automatic Alignment of the Turbine Driven Auxiliary Feedwater Pump Suction to the Condenser Circulating Water (RC/CCW) System Seismically Qualified Piping"

Catawba
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 3.1.1.3.A	Procedural Interfaces – Seismic	Complete evaluation of internal flooding concerns in Auxiliary Buildings and post on e-portal for review.
CI 3.2.4.1.A	Room Temperature Analyses - Auxiliary Building, SFP Building and Control Room	Final calculation(s) or analysis needs to be completed and placed on the e-portal for staff review.
CI 3.2.4.3.A	Freeze Protection	Complete review of freeze protection requirements after FSGs are completed and post summary of evaluation on e-portal for review.
CI 3.2.4.4.A	Lighting Analyses	Lighting assessment need to be completed and placed on e-portal for staff review
CI 3.4.A	Offsite Resources - Confirm NEI 12-06 Section 12.2, Guidelines 2 through 10, are addressed with SAFER.	Complete site specific playbook documenting interface with NSRC and post on e-portal for review
AQ.26d	Reactor Coolant Pump O-rings	Confirm that, beyond order compliance date, plant will use only high-temperature-qualified O-rings where applicable, or that steam generator relief valve will be operated to control temperature to 550 degrees F or below.
AQ.47	FLEX diesel generator sizing	Sizing calculations need to be completed and placed on e-portal for staff's review.
AQ.49	Battery Room Ventilation - Temperature	Final HVAC calculation for battery room needs to be completed and placed on the e-portal for staff review.
AQ.50	Diesel Fuel Oil Supply and Quality	Fuel consumption analysis need to be completed and placed on the e-portal for staff review.

Audit Item Reference	Item Description	Licensee Input Needed
AQ.51	Battery Room Ventilation - Hydrogen Accumulation Potential	Final HVAC analysis of hydrogen accumulation in the battery room needs to be completed and placed on the e-portal for staff review.
OIP.32	Cooling Water Flow Model	Final calculation needs to be completed and placed on the e-portal for staff review.
OIP.42	Determine need for Containment Spray	Final calculation/analysis needs to be completed and placed on the e-portal for staff review.
OIP.43	SFP Level Instruments	Completion of modifications to install the redundant SFP Level Monitoring channel.
SFPI.4	SFP Level Instrument Mounting	Complete the "Intermediate Waveguide Mounting Support" calculation and place on e-portal for review.
SFPI.6	SFP Level Instrument Mounting	Complete the "Intermediate Waveguide Mounting Support" calculation and place on e-portal for review.
SFPI.7	SFP Level Instrument Reliability	Complete the following and place on e-portal for review: - The justification for the Shock and Vibration test deviation. - An assessment of potential susceptibilities of electromagnetic/radiofrequency interference (EMI/RFI) in the areas where the SFP instrument located and how to mitigate those susceptibilities. - The calibration procedure for the Back-up SFP Level Monitoring differential pressure transmitter
SFPI.8	SFP Level Instrument Qualification	Complete the calibration procedure for the Back-up SFP Level Monitoring differential pressure transmitter and place on e-portal for review.

Audit Item Reference	Item Description	Licensee Input Needed
SFPI.11	SFP Level Instrument Calibration	Complete the calibration procedure for the Back-up SFP Level Monitoring differential pressure transmitter and place on e-portal for review.
SFPI.12	SFP Level Instrument Calibration	Complete the calibration procedure for the Back-up SFP Level Monitoring differential pressure transmitter and place on e-portal for review.
SFPI.15	SFP Level Instrument Maintenance and Test	Complete the calibration procedure for the Back-up SFP Level Monitoring differential pressure transmitter and place on e-portal for review.
SE.3	RCP Seal Leakage	This item is being addressed generically with the Pressurized Water Reactors Owners Group.
SE.4	RCP Seal Leakoff Piping	Perform additional piping and support analysis to ensure the seal leakoff line temperature and pressure seen during the ELAP event will be supported by the current configuration.
SE.8	RCS Cooling & RCS Inventory Control Analysis	Justification is needed to show that the WCAP 17601-P analysis used for CNS is representative and bounding of the actual plant conditions for the ELAP event. In particular the time to reach reflux cooling needs to be justified.
SE.9	RCS Cooldown and Prevention of Nitrogen Injection from Safety Injection Accumulators	Specify whether CNS is using Emergency Operating Procedure Setpoint Number O-8 or O-11 for the cooldown. Also, the licensee needs to specify whether the plan for isolation of the Cold Leg Accumulators occurs prior to cooling down to Emergency Operating Procedure setpoint O-12 or O-13. Provide the footnote calculations for whichever setpoints are being used on the e-portal for review.

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

Audit Items Currently Under NRC Staff Review, But Not Requiring Further Licensee Input

Audit Item Reference	Item Description	Action
AQ.37	Direct Current (dc) load profile, load shedding, and dc bus voltage	NRC generic review of battery life beyond 8 hours
OIP.56	Staffing	NRC review of CNP Phase 2 staffing assessment
SE.5	NOTRUMP Code	NRC staff needs to review the current margin from 13.8 hours injection time to the calculated generic time, as well as review of the presented information.

The NRC staff's review to date led to the issuance of the CNS ISE and RAI dated October 28, 2013 (ADAMS Accession No. ML13281A562). 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 onsite review activities at CNS from September 29 – October 3, 2014 per the audit plan dated September 15, 2014 (ADAMS Accession No. ML14252A760). 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 Nos.: 50-413 and 50-414
Enclosure:
Audit report
cc w/encl: Distribution via Listserv

DISTRIBUTION:
PUBLIC
JLD R/F
RidsNrrDorlLpl 2-1Resource
RidsNrrPMCatawba Resource
RidsNrrLASLent Resource
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PBamford, NRR/JLD
RidsAcrsAcnw_MailCTR Resource

ADAMS Accession No. ML15035A679 * via email

OFFICE	NRR/JLD/JOMB/PM	NRR/JLD/LA	NRR/DORL/LPL2-1/PM	NRR/JLD/JCBB/BC*
NAME	PBamford	SLent	EMiller	SBailey
DATE	02/04/15	02/18/15	02/18/15	02/18/15
OFFICE	NRR/JLD/JERB/BC	NRR/JLD/JOMB/BC(A)	NRR/JLD/JOMB/PM	
NAME	BPham	MHalter	PBamford	
DATE	02/19/15	02/19/15	02/20/15	

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