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10 CFR 50.4
10 CFR 2.202(b)

May 1, 2015
CNS-15-035

Attention: Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555-001

Duke Energy Carolinas, LLC (Duke Energy)
Catawba Nuclear Station (CNS), Unit 2
Docket Number 50-414
Renewed License Number NPF-52

Subject: Notification of Full Compliance with Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond Design Basis External Events" and with Order EA-12-051, "Order to Modify Licenses With Regard To Reliable Spent Fuel Pool Instrumentation" - Catawba Nuclear Station Unit 2

References:

1. Nuclear Regulatory Commission (NRC) Order Number EA-12-049, Order Modifying Licenses With Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events, Revision 0, dated March 12, 2012, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12054A735).

2. Catawba Nuclear Station (CNS) Overall Integrated Plan in Response to March 12, 2012, Commission Order to Modify Licenses With Regard To Requirements for Mitigation Strategies for Beyond Design Basis External Events (Order EA-12-049), dated February 28, 2013 (ADAMS Accession No. ML13066A173).

3. Catawba Nuclear Station, Units 1 and 2 - Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Order EA-12-049 (Mitigation Strategies), dated February 6, 2014 (ADAMS Accession No. ML13364A175).

4. NRC Order Number EA-12-051, Order to Modify Licenses With Regard To Reliable Spent Fuel Pool Instrumentation, dated March 12, 2012 (ADAMS Accession No. ML12054A679).

5. Letter from Duke Energy to NRC, Overall Integrated Plans in Response to March 12, 2012, Commission Order Modifying Licenses With Regard To Requirements for Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051), dated February 28, 2013 (ADAMS Accession No. ML13086A095).

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6. Catawba Nuclear Station, Units 1 and 2 - Interim Staff Evaluation and Request for Additional Information Regarding the Overall Integrated Plan for Implementation of Order EA-12-051, Reliable Spent Fuel Pool Instrumentation, dated October 28, 2013 (ADAMS Accession No. ML13281A562).

7. Catawba Nuclear Station, Units 1 and 2 Report for the Audit Regarding Implementation of Mitigating Strategies and Reliable Spent Fuel Pool Instrumentation to Orders EA-12-049 and EA-12-051, dated October 9, 2014 (ADAMS Accession No. ML15035A679).

8. NRC Letter, Nuclear Regulatory Commission Audits of Licensee Responses to Reliable Spent Fuel Pool Instrumentation Order EA-12-051, dated March 26, 2014 (ADAMS Accession No. ML14083A620).

Ladies and Gentlemen:

On March 12, 2012, the 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," (Reference 1 and Reference 4, 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 each Order will be achieved. By letter dated February 28, 2013 (Reference 2), the OIP for CNS in response to Order EA-12-049 was submitted. In separate correspondence, the OIP for CNS in response to Order EA-12-051 was submitted by letter dated February 28, 2013 (Reference 5).

A review conducted by the NRC for both Orders EA-12-049 and EA-12-051, as documented in Interim Staff Evaluations (References 3 and 6), concludes that Duke's plan, when properly implemented, will meet the requirement of both orders.

Order EA-12-049, Section IV.A.2 and Order EA-12-051, Section IV.A.2 requires completion of full implementation to be no later than two refueling cycles after submittal of the overall integrated plan, as required by Condition C.1.a, or December 31, 2016, whichever comes first. In addition, Section IV.C.3 of Orders EA-12-049 and EA-12-051 require that Licensees and CP holders report to the NRC when full compliance is achieved. For CNS Unit 2, the current requirement for full implementation of NRC Orders EA-12-049 and EA-12-051 is prior to restart from the 2EOC20 refueling outage in the spring of 2015.

On March 31, 2015, CNS Unit 2 entered Mode 2 (Startup) following the 2EOC20 refueling outage. As such, March 31, 2015, is the compliance date for CNS Unit 2, and CNS Unit 2 is in full compliance with Orders EA-12-049 and EA-12-051 as demonstrated by this submittal and any other docketed correspondence concerning these Orders.

Attachment 1 provides a brief summary of the key elements associated with compliance to Orders EA-12-049 and EA-12-051 for CNS Unit 2. The Open and Pending Items from the Audit Report (Reference 7) are provided in Attachment 2. For each Open and Pending Item identified in Attachment 2, a summary response in support of closure is provided. The responses are

based on information and analyses that have been completed as of the date of this letter. As such, Duke Energy considers these items complete pending NRC closure.

On October 28, 2013, the NRC requested additional information regarding the plan to implement Order EA-12-051, (Reference 6). The NRC requested that a response to the RAI be provided in the next six-month status report, with all information provided by September 30, 2014. Reference 8 instructed that the responses to the RAI need not be formally submitted on the docket, but instead can be placed on the plant specific ePortal. This action was completed by the September 30, 2014 date.

In support of the ongoing NRC Audit process, Duke Energy will continue working with the NRC staff in the issuance of a combined Safety Evaluation (SE) for both the Mitigation Strategies and the Spent Fuel Pool Level Instrumentation Orders.

There are no regulatory commitments contained in this letter or its attachments. Please address any comments or questions regarding this submittal to Phil Barrett at (803) 701-4138.

I declare under penalty of perjury that the foregoing is true and correct. Executed on May 1, 2015.

Sincerely,

Kelvin Henderson
Vice President, Catawba Nuclear Station

Attachments:

1. Catawba Nuclear Station, Unit 2 Summary of Compliance Elements for Orders EA-12-049 and EA-12-051

2. Catawba Nuclear Station, Unit 2 NRC Audit Report Open and Pending Items

xc:

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ATTACHMENT 1
CATAWBA NUCLEAR STATION, UNIT 2 SUMMARY OF COMPLIANCE ELEMENTS FOR ORDER
EA-12-049 AND EA-12-051

The elements identified below for Catawba Nuclear Station (CNS) Unit 2, as well as the Overall Integrated Plans (OIP) for Orders EA-12-049 and EA-12-051 (References 2 and 8, respectively), the 6-Month Status Reports for Orders EA-12-049 and EA-12-051 (References 4 thru 7 and 11 thru 14, respectively), and any additional docketed correspondence, demonstrate compliance with Orders EA-12-049 and EA-12-051.

STRATEGIES - COMPLETE

CNS Unit 2 strategies are in compliance with Order EA-12-049. All strategy related Open Items, Confirmatory Items, or Audit Questions/Audit Report Open Items have been addressed and are considered complete pending NRC closure.

MODIFICATIONS - COMPLETE

The modifications required to support the Mitigation Strategies and Reliable Spent Fuel Pool Level Instrumentation for CNS Unit 2 have been implemented in accordance with station design control processes.

EQUIPMENT - PROCURED AND MAINTENANCE & TESTING - COMPLETE

The equipment required to implement the Mitigation Strategies and Reliable Spent Fuel Pool Level Instrumentation has been procured and is ready for use at CNS Unit 2. Testing and Maintenance processes have been established through the use of Industry endorsed Electric Power Research Institute (EPRI) Guideline and the CNS Preventative Maintenance program such that FLEX equipment and Spent Fuel Pool Level Instrumentation reliability is achieved.

FLEX PROTECTED STORAGE - COMPLETE

The storage facility required to implement the Mitigation Strategies for CNS Unit 2 has been completed and provide protection from the applicable site hazards. The equipment required to implement the Mitigation Strategies for CNS Unit 2 is stored in the FLEX building or other Category 1 structures and is ready for use.

PROCEDURES - COMPLETE

FLEX Support Guidelines (FSG) and other supporting procedures and procedures for the maintenance and use of the Spent Fuel Pool Level Instrumentation for CNS Unit 2 have been developed in accordance with NEI 12-06, Revision 0, Section 3.2.2 and NEI 12-02, Revision 1, Section 4.2. The FSGs and affected existing procedures have been verified and are available for use in accordance with the site procedure control program.

TRAINING - COMPLETE

Training for CNS Unit 2 has been completed using the CNS Systematic Approach to Training (SAT) process as recommended in NEI 12-06, Revision 0, Section 11.6 and in NEI 12-02, Revision 1, Section 4.1.

ATTACHMENT 1
CATAWBA NUCLEAR STATION, UNIT 2 SUMMARY OF COMPLIANCE ELEMENTS FOR ORDER
EA-12-049 AND EA-12-051

STAFFING - COMPLETE

The staffing study for CNS has been completed in accordance with NEI 12-01, Revision 0, and 10CFR50.54(f), "Request for Information Pursuant to Title 10 of the Code of Federal Regulations Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," Recommendation 9.3, dated March 12, 2012 (Reference 16), as documented in letters dated April 30, 2013 (Reference 17), and October 28, 2014 (Reference 18). The staffing study confirmed that CNS has adequate staffing to perform the actions to mitigate beyond design basis events.

NATIONAL SAFER RESPONSE CENTERS - COMPLETE

Duke Energy has established a contract with the Pooled Equipment Inventory Company (PEICo) and has joined the Strategic Alliance for FLEX Emergency Response (SAFER) Team Equipment Committee for off-site facility coordination. PEICo is ready to support CNS with Phase 3 equipment stored in the National SAFER Response Centers in accordance with the site specific SAFER Response Plan.

VALIDATION - COMPLETE

Duke Energy has completed performance of validation in accordance with industry developed guidance to assure required tasks, manual actions, and decisions for FLEX strategies are feasible and may be executed within the constraints identified in the OIP for Order EA-12-049 and EA-12-051.

FLEX PROGRAM DOCUMENT - ESTABLISHED

The FLEX Program Document for CNS has been developed in accordance with the requirements of NEI 12-06, Revision 0.

ATTACHMENT 1
CATAWBA NUCLEAR STATION, UNIT 2 SUMMARY OF COMPLIANCE ELEMENTS FOR ORDER
EA-12-049 AND EA-12-051

REFERENCES

1. Nuclear Regulatory Commission Order Number EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events, Revision 0, dated March 12, 2012, ADAMS Accession No. ML12054A735.

2. Catawba Nuclear Station Overall Integrated Plan in Response to March 12, 2012, Commission Order to Modify Licenses With Regard To Requirements for Mitigation Strategies for Beyond Design Basis External Events (Order EA-12-049), dated February 28, 2013, ADAMS Accession No. ML13066A173.

3. Catawba Nuclear Station, Units 1&2 - Interim Staff Evaluation -Relating to Overall Integrated Plan in Response to Order EA-12-049 (Mitigation Strategies), dated February 6, 2014, ADAMS Accession No. ML13364A175.

4. Catawba Nuclear Station First 6-Month Status Report for the Implementation of Mitigation Strategies for Beyond Design Basis External Events, dated August 28, 2013, ADAMS Accession No. ML13298A010.

5. Catawba Nuclear Station Second 6-Month Status Report for the Implementation of Mitigation Strategies for Beyond Design Basis External Events, dated February 28 2013, ADAMS Accession No. ML14065A038.

6. Catawba Nuclear Station Third 6-Month Status Report for the Implementation of Mitigation Strategies for Beyond Design Basis External Events, dated August 28, 2014, ADAMS Accession No. ML14247A232.

7. Catawba Nuclear Station Fourth 6-Month Status Report for the Implementation of Mitigation Strategies for Beyond Design Basis External Events, dated February 26, 2015.

8. Letter from Duke Energy to NRC, Overall Integrated Plans in Response to March 12, 2012, Commission Order Modifying Licenses With Regard To Requirements for Reliable Spent Fuel Pool Instrumentation (Order EA-12-051), dated February 28, 2013, ADAMS Accession No. ML13086A095.

9. NRC Order Number EA-12-051, Order to Modify Licenses With Regard To Reliable Spent Fuel Pool Instrumentation, dated March 12, 2012, ADAMS Accession No. ML12054A679.

10. Catawba Nuclear Station, Units 1 and 2 - Interim Staff Evaluation and Request for Additional Information Regarding the Overall Integrated Plan for Implementation of Order EA-12-051, Reliable Spent Fuel Pool Instrumentation, dated October 28, 2013, ADAMS Accession No. ML13281A562.

11. Duke Energy Letter, First 6-Month SFPLI Status Report in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, dated August 26, 2013, ADAMS Accession No. ML13242A009.

12. Duke Energy Letter, Second 6-Month SFPLI Status Report in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, dated February 26, 2014, ADAMS Accession No. ML14063A279.

13. Duke Energy Letter, Third 6-Month SFPLI Status Report in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, dated August 14, 2014, ADAMS Accession No. ML14227A717.

14. Duke Energy Letter, Fourth 6-Month SFPLI Status Report in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, dated February 16, 2015.

15. Catawba Nuclear Station, Units 1 and 2 Report for the Audit Regarding Implementation of Mitigating Strategies and Reliable Spent Fuel Pool Instrumentation to Orders EA-12-049 and EA-12-051, dated February 20, 2015, ADAMS Accession No. ML15035A679.

16. 10CFR50.54(f), "Request for Information Pursuant to Title 10 of the Code of Federal Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force review of Insights from the Fukushima Dai-ichi Accident", Recommendation 9.3, dated March 12, 2012, ADAMS Accession No. ML12053A340.

17. Duke Energy Letter, Phase 1 Staffing Assessment pursuant to 10CFR50.54(f) regarding NTTF Recommendations 9.3, dated April 30, 2013.

18. Catawba Nuclear Station Phase 2 Staffing Assessment pursuant to 10CFR50.54(f) regarding NTTF Recommendations 9.3, dated October 28, 2014.

19. NEI 12-06, Revision 0 "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide", ADAMS Accession No. ML12242A378.

20. 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.

21. NEI 12-01, Revision 0 "Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities", ADAMS Accession No. ML12125A412.

22. Nuclear Regulatory Commission Audits of Licensees Responses to Reliable Spent Fuel Pool Instrumentation Order EA-12-051, ADAMS Accession No. ML14083A620.

ATTACHMENT 2
CATAWBA NUCLEAR STATION, UNIT 2 NRC AUDIT REPORT OPEN AND PENDING ITEMS

Duke Energy provides the following response for the Audit Report Open Items and considers them to be complete pending NRC closure for Catawba Nuclear Station Unit 2:

Item[1]	*Description*	*Response Summary*
ISE CI 3.1.1.3.A	Procedural Interfaces – Seismic	Procedural Interfaces – Seismic – Confirm completion of evaluation of potential internal Aux Building flooding and appropriate actions and procurement of sump pumps. Response: Sump pumps have been procured and strategies developed to address internal flooding issues. Calculation CNC-1206.03-00-0001, Flood Levels for Structures Outside of the Reactor Building, has been completed and posted to the e-portal. Information has been provided to support NRC closure of this item.
ISE CI 3.2.4.1.A	Room Temperature Analyses - Auxiliary Building, SFP Building and Control Room	Room temperature analyses being performed will provide a better idea of the environmental conditions expected during the event. Confirm completion of analyses and appropriate actions. Response: Catawba has purchased sufficient fans and spot coolers to perform Phase 1, 2, and 3 strategies, provide sufficient cooling for equipment operation/personnel habitability, and Hydrogen gas control based on a GOTHIC analysis performed by Zachry (Reference CNC -1211.00-00-0146 - Gothic Analysis For Extended Loss Of All AC Power (ELAP/FLEX). Procedural guidance has been developed to implement the mitigation recommendations in the Zachry analyses. In addition, per Table 7-1 in the SAFER Response Plan and Table 9-1 in the National SAFER Response Center Equipment Technical Requirements Document (51-9199717-012), Catawba will receive one 3000 cfm ventilation fan and associated ducting per Unit from the NSRC. This ventilation equipment from the NSRC will be used on an as needed/as desired basis to provide additional air flow to any area in the plant. Calculation CNC-1211.00-00-0146 Gothic Analysis For Extended Loss Of All AC Power (ELAP/FLEX) has been placed on the e-portal for review. Information has been provided to support NRC closure of this item.

ISE CI 3.2.4.3.A	Freeze Protection	Evaluations to address the needs for freeze protection are in progress. Confirm completion of evaluations and appropriate actions. Response: There is no FLEX related instrumentation located in the yard, therefore, no freeze protection for instrumentation exposed to the outside is required. The FWST level instrumentation is exposed and is normally freeze protected, but is not required for FLEX response. Some credited instrumentation components are located in the Doghouses, but they will not require freeze protection. During cold weather conditions the window sections of the Doghouses are covered by curtains. This, combined with heat by steam piping used in the Phase 1 and 2 response, eliminates freezing of instruments or impact to supporting equipment. Flex piping connections were reviewed and none were found to be affected by outside freezing conditions. Auxiliary Feedwater and Steam Generator Wet Layup (BW) connections in the Doghouse are "protected" in the same manner as the instrumentation discussed above. Most Flex piping connections are located in the Auxiliary Building where freezing is not credible. One train of RN connection is located outside, but within a below grade bunker. Inventory used from the FWST enters the plant through the normal system piping. Based on initial conditions and the design of the piping system, freezing is not projected to be a problem. Only the piping in the trench leaving the FWST is considered for use in FLEX response. This piping along with the FWST is judged to be weather protected to the extent that freezing will not occur before FLEX strategies are implemented. The Fuel Building will remain above freezing due to the constant heat source of the spent fuel in the pool. As a contingency, Catawba has a roll of heating cable stored in the protected storage building. This self-regulating heat tracing cable is provided along with the accessories for assembling multiple freeze protection circuits. These heating cables could be powered from any portable D/G supplying 120 VAC power. This equipment could be deployed if an unanticipated freeze protection need developed. Information has been provided to support NRC closure of this item.

ATTACHMENT 2
CATAWBA NUCLEAR STATION, UNIT 2 NRC AUDIT REPORT OPEN AND PENDING ITEMS

ISE CI 3.2.4.4.A	Lighting Analyses	Confirm evaluations for additional lighting have been completed and appropriate actions taken. Response: Lighting assessment has been completed and is available on the e-portal for review. Information has been provided to support NRC closure of this item.
ISE CI 3.4.A	Offsite Resources - Confirm NEI 12-06 Section 12.2, Guidelines 2 through 10, are addressed with SAFER.	Complete SAFER site specific plan. Response: Approved CNS SAFER Plan, CN-1612.03-01, has been posted to the e-portal for review. Information has been provided to support NRC closure of this item.
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. Response: Westinghouse Electric Company submitted letter LTR-RES-13-153 ("Documentation of 7228C O-Rings at ELAP Conditions") on October 31, 2013. The letter documents a Westinghouse evaluation of compound 7228C RCP O-rings at ELAP conditions up to 582°F (the same O-rings in use at Catawba), and concludes that they will not fail during an 8-hour ELAP event w/o seal cooling. The O-rings survived for an average of 18 hours, with the first failure occurring at 13 hours. The Catawba FLEX strategy for RCS make-up post-ELAP is to cooldown well below 582°F and align a FLEX portable RCS make up pump within about 12 hours. Therefore, the Catawba RCP O-ring integrity will be maintained and the assumption of a 21 gpm/pump leak rate remains valid. Information has been provided to support NRC closure of this item.
AQ.47	FLEX diesel generator sizing	Sizing calculations need to be completed and placed on e-portal.

		Response: Diesel generator evaluation, CN-1612.03 Diesel Generator Sizing Evaluation for Catawba Unit 2, has been completed and posted to the e-portal. Information has been provided to support NRC closure of this item.
AQ.49	Battery Room Ventilation - Temperature	Provide information on the adequacy of the ventilation provided in the battery room to protect the batteries from the effects of extreme high and low temperatures. Response: Catawba has purchased sufficient fans and spot coolers to perform Phase 1, 2, and 3 strategies, provide sufficient cooling for equipment operation/personnel habitability, and Hydrogen gas control based on a GOTHIC analysis performed by Zachry (Reference CNC -1211.00-00-0146 - Gothic Analysis For Extended Loss Of All AC Power (ELAP/FLEX). Procedural guidance has been developed to implement the mitigation recommendations in the Zachry analyses. In addition, per Table 7-1 in the SAFER Response Plan and Table 9-1 in the National SAFER Response Center Equipment Technical Requirements Document (51-9199717-012), Catawba will receive one 3000 cfm ventilation fan and associated ducting per Unit from the NSRC. This ventilation equipment from the NSRC will be used on an as needed/as desired basis to provide additional air flow to any area in the plant. Calculation CNC-1211.00-00-0146 Gothic Analysis For Extended Loss Of All AC Power (ELAP/FLEX) has been placed on the e-portal for review. Information has been provided to support NRC closure of this item.
AQ.50	Diesel Fuel Oil Supply and Quality	Describe plans for supplying fuel oil to FLEX equipment (i.e., fuel oil storage tank volume, supply pathway, etc.). Also, explain how fuel quality will be assured if stored for extended periods of time. Response: Fuel oil consumption, stored volume, quality, and the need for refueling have been addressed in calculation CNC-1612.03-00-0001, FLEX Fuel Consumption Calculation. The calculation been posted to the e-portal.

ATTACHMENT 2
CATAWBA NUCLEAR STATION, UNIT 2 NRC AUDIT REPORT OPEN AND PENDING ITEMS

		Information has been provided to support NRC closure of this item,
AQ.51	Battery Room Ventilation - Hydrogen Accumulation Potential	Provide a discussion of battery room ventilation to prevent hydrogen accumulation while recharging the batteries in phase 2 or 3. In your response, include a description of the exhaust path if it is different from the design basis. Response: Catawba has purchased sufficient fans and spot coolers to perform Phase 1, 2, and 3 strategies, provide sufficient cooling for equipment operation/personnel habitability, and Hydrogen gas control based on a GOTHIC analysis performed by Zachry (Reference CNC -1211.00-00-0146 - Gothic Analysis For Extended Loss Of All AC Power (ELAP/FLEX). Procedural guidance has been developed to implement the mitigation recommendations in the Zachry analyses. In addition, per Table 7-1 in the SAFER Response Plan and Table 9-1 in the National SAFER Response Center Equipment Technical Requirements Document (51-9199717-012), Catawba will receive one 3000 cfm ventilation fan and associated ducting per Unit from the NSRC. This ventilation equipment from the NSRC will be used on an as needed/as desired basis to provide additional air flow to any area in the plant. Calculation CNC-1211.00-00-0146, Gothic Analysis For Extended Loss Of All AC Power (ELAP/FLEX), has been placed on the e-portal for review. Information has been provided to support NRC closure of this item.
OIP.32	Cooling Water Flow Model	Develop flow model calculations to support the various FLEX strategies and document the available static water volume in the RN/CA piping. <u>Response:</u> The following flow model calculations have been posted to the e-portal; CNS-1223.02-00-0025, Flow Model of SNSWP to CA Connections For Phase 2 FLEX Strategies, CNS-1223.02-00-0026, Flow Model of SNSWP to RN Connections and CA for Phase 2 FLEX Strategies, CNS-1223.02-00-0027, Flow Model of RN to KC Hxs to Support RHR For Phase 3 FLEX Strategies,

		and CNS-1223.02-00-0028, Flow Model For U2 NI Portable Pump Injection to RCS Phase 2 & 3 FLEX Strategies. During seismic robustness evaluations documented in ARES Report No. 030321.13.01-001 Revision 1 (Seismic Robustness Review Of Catawba Unit 1 Non-Safety Piping and Components For Diverse and Flexible Mitigation Strategies (FLEX), Appendix L, RN and RC System Analyses, it was determined that at least 48 hours of static Condenser Cooling Water System (RC) water is available (per unit) to provide the suction supply requirements for the Turbine Driven Auxiliary Feedwater pump. This amount of static RC water volume provides enough time to install portable equipment that can be used to fill and pressurize the Nuclear Service Water System (RN) using water from the Standby Nuclear Service Water Pond (SNSWP). The RN system will then provide any longer term Turbine Driven Auxiliary Feedwater pump suction water requirements. As such, no credit has been taken for any static RN/CA water volume (Reference Change No. 2 in Catawba's Third 6 Month OIP update submittal). ARES Report No. 030321.13.01-001 Revision 1, Appendix L (Rev. 0), has been added to the e-portal. Information has been provided to support NRC closure of this item.
OIP.42	Determine need for Containment Spray	An analysis is needed to determine if containment spray for temperature/pressure control is not required over the long term. <u>Response:</u> Calculation DPC-1552.08-00-0280, Extended Loss of AC Power (ELAP) - Ice Condenser Containment Response with FLEX Mitigation Strategies, has determined containment spray is not needed for long term temperature/pressure control. Calculation has been posted to the e-portal. Information has been provided to support NRC closure of this item.
OIP.43	SFP Level Instruments	Provide redundant SFP Level Instruments. <u>Response:</u> Engineering change EC109413 and EC110935 were

		completed on 3/26/15 and 3/30/15, respectively. EC109413 installed the primary spent fuel pool level indication and EC110935 installed the backup spent fuel pool level indication. Information has been provided to support NRC closure of this item.
SFPI.4	SFP Level Instrument Mounting	Complete the "Intermediate Waveguide Mounting Support" calculation and place on e-portal for review. <u>Response:</u> Calculation CNC-1139.14-08-0001, Waveguide Antenna Support, has been added to the e-portal. Information has been provided to support NRC closure of this item.
SFPI.6	SFP Level Instrument Mounting	Complete the "Intermediate Waveguide Mounting Support" calculation and place on e-portal for review. <u>Response:</u> Calculation CNC-1139.14-08-0001, Waveguide Antenna Support, has been added to the e-portal. Information has been provided to support NRC closure of this item.
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 <u>Response:</u> Areva Document 51-9202556-005 (Qualification Analysis of VEGAPULS 62 ER Through Air Radar) scope includes the following equipment utilized at Catawba: VEGAPULS 62ER sensor, PLICSCOM indicating and adjustment module, power control panel and waveguide related components, as identified in the document. The sensor, display, and power control panel have been tested and/or analyzed for shock and vibration. The test parameter values provided in IEC Standards, IEC 60068-2-6 (vibration) and IEC 60068-2-27 (shock),

		tables are recommendations and not mandatory testing levels. The test parameter values were selected to be consistent with previous shock and vibration testing performed on the VEGA supplied equipment. The test parameter values specified envelope the expected levels for the equipment installed location due to the fact that the equipment is mounted to seismic structures within the plant. This approach is consistent with similar technology used in the same application at other installations. The vibration testing deviated from the IEC 60068-2-6 recommended frequency range and displacement magnitude for large power plant equipment (TABLE C.2). In-lieu of the 10-55 Hz and minimum displacement of 0.15 mm recommended in TABLE C.2, the power and control panel vibration testing utilized a narrower frequency band (5-25 Hz) and a more limiting displacement magnitude (1.6 mm). These values were deemed to be acceptable and enveloping for equipment rigidly mounted to a Seismic Category I structure, based on engineering judgment. The shock testing deviated from the IEC 60068-2-27 recommended peak acceleration and duration for land-based permanently installed equipment. In-lieu of the 15 g's peak acceleration and duration of 11 m-sec recommended in TABLE A.1, the power and control panel vibration testing utilized an acceleration of 10g with a 6 m-sec duration. These values were deemed to be acceptable and enveloping for equipment rigidly mounted to a seismic Category I structure, based on engineering judgment. Testing and analyses of the horn cover and adhesive support the components can tolerate horizontal and vertical accelerations up to 100g and SFP sloshing loads up to 3.37 psi. EMI/RFI The Qualification Analysis of VEGAPULS 62 ER Through Air Radar (Areva Document # 51-9202556-005) covers EMI/RFI testing of the VEGAPULS 62ER. During this testing non-shielded wire was used for conservatism. No deficiencies were noted from this testing.

		During the Catawba FLEX Audit the week of September 29, 2014 a Fukushima Response Team Engineer and one of the NRC Consultants performed a walkdown of the Unit 1 and Unit 2 plant areas where the VEGAPULS 62 ER systems were to be installed. The walkdown included a location survey for other equipment that could potentially be sources of EMI/RFI. No FLEX related equipment was located in this survey area and the equipment that was observed would be without power during an ELAP event. No mitigation of EMI/RFI susceptibilities is required. PROCEDURE The calibration procedure for the Spent Fuel Pool Level Back Up instrument (IP/2/A/3120/031, Backup Spent Fuel Pool Level) has been completed and a copy has been posted on e-portal. AREVA Document # 51-9202556-005, Qualification Analysis of VEGAPULS 62 ER Through Air Radar, has been posted to the e-portal as well. Information has been provided to support NRC closure of this item.
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. Response: IP/2/A/3120/031, Backup Spent Fuel Pool Level has been completed and posted to the e-portal. Information has been provided to support NRC closure of this item.
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. Response: IP/2/A/3120/031, Backup Spent Fuel Pool Level has been completed and posted to the e-portal. Information has been provided to support NRC closure of this item.
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. Response: IP/2/A/3120/031, Backup Spent Fuel Pool Level has been completed and posted to the e-portal. Information has been provided to support NRC closure of this item.
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. Response: IP/2/A/3120/031, Backup Spent Fuel Pool Level has been completed and posted to the e-portal. Information has been provided to support NRC closure of this item.
SE.3	RCP Seal Leakage	Please provide adequate justification for the seal leakage rates calculated according to the Westinghouse seal leakage model that was revised following the issuance of NSAL-14-1. The justification should include a discussion of the following factors: a) benchmarking of the seal leakage model against relevant data from tests or operating events, b) discussion of the impact on the seal leakage rate due to fluid temperatures greater than 550°F resulting in increased deflection at the seal interface, c) clarification whether the second-stage reactor coolant pump seal would remain closed under ELAP conditions predicted by the revised seal leakage model and a technical basis to support the determination, and, d) justification that the interpolation scheme used to compute the integrated leakage from the reactor coolant pump seals from a limited number of computer simulations (e.g., three) is realistic or conservative. Response: Westinghouse Electric Company issued NSAL-14-1 Revision 0 (Impact of Reactor Coolant Pump No. 1 Seal Leak off Piping on Reactor Coolant Pump Seal Leakage

		During a Loss of All Seal Cooling) on 2/10/2014 to address the fact that the nominal RCP seal leak rate of 21 gallons per minute (gpm) for each RCP, as documented in WCAP-10541, Revision 2, may not be applicable for all plants with Westinghouse RCPs because of the various thermal-hydraulic conditions set up by plant specific Seal Leak Off (SLO) piping designs. Westinghouse Electric Company issued NSAL-14-1 Revision 1 (Impact of Reactor Coolant Pump No. 1 Seal Leak off Piping on Reactor Coolant Pump Seal Leakage During a Loss of All Seal Cooling) on 9/8/2014 to address the following: 1. Westinghouse became aware of additional plant-specific seal leak-off (SLO) line configuration detail and other input that results in slightly higher calculated seal leak rates than first presented. 2. The second issue pertains to the way that reactor coolant pump (RCP) No. 1 seal leakage has been calculated in the transient modeling of various loss of seal cooling events. The RCP No. 1 seal leakage calculations corresponding to reactor coolant system (RCS) cooldown and depressurization used a simplified orifice break flow correlation approach, versus accounting for the specific pressure and temperature dependent leakage characteristics of the seals. 3. This revision augments the prior probabilistic risk assessment discussion with more detailed information. To further address NSAL-14-1, a PWROG Project Authorization (PA-SEE-1196, Rev. 0, - No. 1 Seal Flow Rate for Westinghouse Reactor Coolant Pumps following Loss of All AC Power) was established to provide support to the affected plants in the evaluation of the potential impact of this issue. Revision 3 of PA-SEE-1196 was issued in February 2015 to address additional concerns presented by the regulators with a scheduled completion date of late April 2015. As part of PA-SEE-1196, the following reports have been issued: 1. PWROG-14008-P Revision 0 - No. 1 Seal Flow Rate for Westinghouse Reactor Coolant Pumps Following Loss of All AC Power Task 1: Documentation of Plant Configurations dated May 2014. This report placed Catawba in the Category 1 classification based on the

		RCP No. 1 seal leak off piping configuration. 2. PWROG-14015-P Revision 1 - No. 1 Seal Flow Rate for Westinghouse Reactor Coolant Pumps Following Loss of All AC Power Task 2: Determine Seal Flow Rates dated September 2014. This report determined that the maximum RCP No. 1 seal leak off piping flow rate for Category 1 plants was 17.5 gpm. Westinghouse also began to investigate the presence of a transient pressure spike observed in the hot shock test at the Montereau facility (Appendix B of WCAP-10541). The magnitude of this peak was 2044.7 psia (Figure 7-3 of WCAP-10541). The maximum pressure results calculated using ITCHSEAL and reported in PWROG-14015 are static results, meaning they do not include transient pressure effects which occur during the loss of seal cooling event. As such, it was concluded during discussions with the PWROG that rather than revise the static maximum pressure results reported in PWROG-14015-P, the plants should analyze leak-off line piping and components to ensure they can survive a pressure that represents the transient peak. Since the final Westinghouse PWROG analysis and reports will not be available until after Catawba Nuclear Stations Unit 2 implementation time frame of March 2015, MPR Associates, Inc. was contracted to perform site specific analyses related to the issues of RCP No. 1 seal leakage during a loss of all seal cooling event which would occur during an Extended Loss of All AC Power (ELAP) scenario. Note that both of the MPR reports/calculations will be converted into a Catawba vendor calculation - CNC-1223.04-00-0117 titled MPR RCP Seal Leak Off ELAP/FLEX Analysis. One of the MPR reports/calculations completed the transient analysis of the Catawba RCP seal leak-off for an Extended Loss of AC Power (ELAP) condition. This analysis determined the transient seal leak-off flow rates, the seal leak-off temperatures, and the seal leak-off pressures considering constant Reactor Coolant System (RCS) pressure and temperature conditions of 2250 psig and 568°F, respectively (Reference MPR Calculation No. 2079-0030-01 - RCPLOSI Analysis for Catawba (ELAP Conditions)). This calculation determined that the

		maximum SLO flow rate 2 hours after initiation of the event would be 14.28 gpm. Peak seal exit pressures and temperatures were 1231 psia and 503 degrees F. The maximum differential pressure across the flow measuring orifice plates was 981 psid with a corresponding orifice downstream temperature of 394 degrees F. This maximum orifice delta P occurs at the same time as a pressure spike approximately 20 minutes into the transient. To evaluate the 2045 psia pressure spike observed during the Montereau hot shock test, MPR also performed Calculation No. 2079-0031-01 - Leak Off Piping Pressures and Temperatures with Modified Orifices following an Extended Loss of AC Power (ELAP) Event contained in a report attached to MPR Letter 2079-1501-LTR-01, Rev. 0 Dated March 13, 2015. This report completed the thermal hydraulic analysis of the Reactor Coolant Pump (RCP) No. 1 seal leak off piping at Catawba. The analysis was performed to determine the limiting differential pressure and temperature across the flow element orifice plates installed in the SLO piping and the limiting pressures and temperatures in the piping from the RCP to the Volume Control Tank (VCT) after an Extended Loss of AC Power (ELAP) that results in loss of all seal cooling. The analysis was performed using a seal exit pressure of 2045 psia at two different temperatures, one to maximize the delta P across the orifice plate and one to maximize pressures and temperatures in the piping system. This report also discusses the results of the thermal hydraulic analysis and the evaluation of the No.2 seal. A discussion of a hydraulic shock that can occur in the piping after a loss of seal cooling was also included. The maximum delta P across the orifice plate under these bounding conditions was found to be 1933 psid. Because of this extreme delta P, it was determined that the existing 0.125 inch thick orifice plates would likely deform and invalidate the expected seal flow rates. Therefore, an Engineering Change (EC114658) was initiated for Unit 2 to replace the 0.125 inch thick orifice plates with 0.250 inch thick plates having the same orifice bore size and functionality (a similar EC will be performed for Unit 1 in the Fall of 2015). Additional calculations to support the Engineering change were also performed by Duke and vendor personnel to verify the acceptable performance of the orifice plates and associated flange set (Reference CNC-1206.02-83-0093, Rev. 0 (Qualification of NV Leak-off

		Line Piping, Flange and Orifice Plate Size), CNC-1399.03-00-0035, Rev. 0 (Comparison of 0.125 inch and 0.250 inch Orifice Plates). The SLO piping and supports were also analyzed for the worst case pressures and temperatures associated with the 2045 psia seal exit pressure. This analysis was captured in CNC-2206.02-83-0001, Rev. 0 (Evaluation of Loads on Supports for RCP Seal #1 Leakoff Piping During ELAP Event). Based on the discussion above and supporting reports/calculations/Engineering Change, the bounding Reactor Coolant Pump No. 1 seal leak off line flow rate of 21 gpm is still applicable to Catawba and all of the piping/components associated with the seal leak off lines will adequately perform such that this 21 gpm leak rate will not be challenged. Calculations CNC-1223.04-00-0117 MPR RCP Seal Leak Off ELAP/FLEX Analysis, CNC-1399.03-00-0035 Comparison of 1/8" and 1/4" Orifice Plates (Computational Fluid Dynamics Analysis of Orifice Plate), CNC-1206.02-83-0093, Qualification of NV RCP Seal Leak-Off Piping, Flanges and Orifice Plates For Loss Of All Seal Cooling Accident, and CNC-2206.02-83-0001, Evaluation of Loads on Supports for RCP Seal #1 Leakoff Piping During ELAP Event, have been added to the e-portal. Information has been provided to support NRC closure of this item.
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. <u>Response:</u> Westinghouse investigated the presence of a transient pressure spike observed in the hot shock test at the Montereau facility (Appendix B of WCAP-10541). The magnitude of this peak was 2044.7 psia (Figure 7-3 of WCAP-10541). The maximum pressure results calculated using ITCHSEAL and reported in PWROG-14015-P are static results, meaning they do not include transient pressure effects which occur during the loss of seal cooling event.

		Discussions with the PWROG concluded that rather than revise the static maximum pressure results reported in PWROG-14015-P, the plants should analyze leak-off line piping and components to ensure they can survive a pressure that represents the transient peak of the Montereau hot shock test. MPR Associates, Inc. was contracted to perform site specific analyses related to the issues of RCP No. 1 seal leakage during a loss of all seal cooling event which would occur during an Extended Loss of All AC Power (ELAP) scenario. The MPR reports/calculations have been converted into a Catawba vendor calculation - CNC-1223.04-00-0117 titled MPR RCP Seal Leak Off ELAP/FLEX Analysis. To evaluate the 2045 psia pressure spike observed during the Montereau hot shock test, MPR performed Calculation No. 2079-0031-01 - Leak Off Piping Pressures and Temperatures with Modified Orifices following an Extended Loss of AC Power (ELAP) Event contained in a report attached to MPR Letter 2079-1501-LTR-01, Rev. 0 Dated March 13, 2015. This report completed the thermal hydraulic analysis of the Reactor Coolant Pump (RCP) No. 1 Seal Leak Off (SLO) piping at Catawba. The analysis was performed to determine the limiting differential pressure and temperature across the flow element orifice plates installed in the SLO piping and the limiting pressures and temperatures in the piping from the RCP to the Volume Control Tank (VCT) after an Extended Loss of AC Power (ELAP) that results in loss of all seal cooling. The analysis was performed using a seal exit pressure of 2045 psia at two different temperatures, one to maximize the delta P across the orifice plate and one to maximize pressures and temperatures in the piping system. This report also discusses the results of the thermal hydraulic analysis and the evaluation of the No.2 seal. A discussion of a hydraulic shock that can occur in the piping after a loss of seal cooling was also included. The maximum delta P across the orifice plate under these bounding conditions was found to be 1933 psid. Because of this extreme delta P, it was determined that the existing 0.125 inch thick orifice plates would likely deform and invalidate the expected seal flow rates. Therefore, an Engineering Change (EC114658) was initiated for Unit 2 to replace the 0.125 inch thick orifice plates with 0.250 inch thick

		plates having the same orifice bore size and functionality (a similar EC will be performed for Unit 1 in the Fall of 2015). Additional calculations to support the Engineering change were also performed by Duke and vendor personnel to verify the acceptable performance of the orifice plates and associated flange set (Reference CNC-1206.02-83-0093, Rev. 0 (Qualification of NV Leak-off Line Piping, Flange and Orifice Plate Size), CNC-1399.03-00-0035, Rev. 0 (Comparison of 0.125 inch and 0.250 inch Orifice Plates). The SLO piping and supports were also analyzed for the worst case pressures and temperatures associated with the 2045 psia seal exit pressure. This analysis was captured in CNC-2206.02-83-0001, Rev. 0 (Evaluation of Loads on Supports for RCP Seal #1 Leakoff Piping During ELAP Event). Based on the discussion above and supporting reports/calculations/Engineering Change, the bounding Reactor Coolant Pump No. 1 seal leak off line flow rate of 21 gpm is still applicable to Catawba and all of the piping/components associated with the seal leak off lines will adequately perform such that this 21 gpm leak rate will not be challenged. The Westinghouse/PWROG work being performed for the industry will be the official documentation for Catawba and provide the bases for our ELAP responses and in house analyses. The Catawba specific MPR analysis work referenced above will substantiate that the Westinghouse/PWROG analyses, once complete, should be bounding. No further work is required at this time to validate that Catawba Unit 2 is in compliance with NRC Order EA-12-049 relative to RCP seal behavior and Westinghouse ELAP analyses. Catawba will continue to track the Westinghouse/PWROG work related to ELAP and RCP seal leakage to ensure final evaluations. Calculations CNC-1223.04-00-0117, MPR RCP Seal Leak Off ELAP/FLEX Analysis, CNC-1399.03-00-0035, Comparison of 1/8" and 1/4" Orifice Plates (Computational Fluid Dynamics Analysis of Orifice Plate), CNC-1206.02-83-0093, Qualification of NV RCP Seal Leak-Off Piping, Flanges and Orifice Plates For Loss Of All Seal Cooling Accident, and CNC-2206.02-83-0001, Evaluation of Loads on Supports for RCP Seal #1 Leakoff Piping During ELAP Event, have been added to

		the e-portal. Information has been provided to support NRC closure of this item.
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. Response: The generic 4-loop NSSS model used in WCAP-17601 is representative of Catawba Unit 2 on all parameters except the plant initial liquid volume and the plant total volume. CNS Unit 2 has D5 Steam Generators which have a shorter tube height and smaller tube flow area which yields a smaller total SG volume. As such, the time to reflux cooling provided in PWROG-14027-P should be adjusted to accommodate this difference. CNC-1552.08-00-0516, Catawba Unit 2 - Time to Reflux Cooling During an Extended Loss of AC Power (ELAP) Event (Appendix A), contains this adjustment to the PWROG time to reflux cooling and is available on the e-portal for review. Information has been provided to support NRC closure of this item.
SE.9	RCS Cooldown and Prevention of Nitrogen Injection from Safety Injection Accumulators	Specify whether CNS is using EOP 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. Response: CNS uses setpoint O.08 (setpoint O.11 was calculated for CNS, but resulted in the same value, therefore no benefit in using the substitute). FSG-10 (Cold Leg Accumulator Isolation) is invoked as part of ECA-0.0 and isolates CLAs prior to reaching EP setpoint O.13. Cooldown will be initiated only when the CLAs are isolated or vented. ECA-0.0 has been added to the e-portal. CNS uses footnotes O.08 and O.13 for target SG pressures during ELAP recovery.

		Excerpts from the Catawba Unit 1&2 EP setpoint calculation CNC-1552.08-00-0195, Emergency Procedure Setpoints, has been added to the e-portal. Calculations for F.05 and O.07 were included as they provide input into the evaluation of Footnote O.08. Information has been provided to support NRC closure of this item.
These Audit Items are classified as pending. No licensee action required.		
AQ.37 (pending)	Direct Current (dc) load profile, load shedding, and dc bus voltage.	NRC generic review of battery life beyond 8 hours.
OIP.56 (pending)	Staffing	NRC review of CNS Phase 2 staffing assessment.
SE.5 (pending)	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.

[1]**Interim staff Evaluation (ISE); Confirmatory Items (CI); Audit Questions (AQ); Overall Integrated Plan (OIP); Safety Evaluation (SE); Spent Fuel Pool Instrumentation Requests for Additional Information (SFPI)**