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

March 31, 2015

Mr. William R. Gideon, Vice President
Brunswick Steam Electric Plant
Duke Energy Progress, Inc.
P. O. Box 10429
Southport, NC 28461

SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT, 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. MF0975, MF0976, MF0973 AND MF0974)

Dear Mr. Gideon:

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

By letter dated February 28, 2013 (ADAMS Accession No. ML13071A559) Duke Energy Progress, Inc.(Duke, the licensee), formerly known as Carolina Power and Light Company, submitted its OIP for Brunswick Steam Electric Plant, Units 1 and 2 (BSEP) in response to Order EA-12-049. By letters dated August 20, 2013, February 28, 2014, August 28, 2014 and February 27, 2015 (ADAMS Accession Nos. ML13248A447, ML14073A451, ML14254A176, and ML15084A156, respectively), Duke submitted its first four six-month updates to the OIP. By letter dated August 28, 2013 (ADAMS Accession No. ML13234A503), the NRC notified all licensees and construction permit holders that the staff is conducting audits of their responses to Order EA-12-049 in accordance with NRC Office of Nuclear Reactor Regulation (NRR) Office Instruction LIC-111, "Regulatory Audits" (ADAMS Accession No. ML082900195). This audit process led to the issuance of the BSEP interim staff evaluation (ISE) (ADAMS Accession No. ML13220A090) and continues with in-office and onsite portions of this audit.

By letter dated February 28, 2013 (ADAMS Accession No. ML13086A096), the licensee submitted its OIP for BSEP, in response to Order EA-12-051. By letter dated May 23, 2013 (ADAMS Accession No. ML13141A622), the NRC staff sent a request for additional information (RAI) to the licensee. By letters dated July 22, 2013, August 26, 2013, February 27, 2014, August 28, 2014, and February 27, 2015 (ADAMS Accession Nos. ML13219B117, ML13242A010, ML14073A063, ML14254A404, and ML15075A024, 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 BSEP ISE and RAI dated November 18, 2013 (ADAMS Accession No. ML13269A345). By letter dated March 26, 2014 (ADAMS Accession No. ML14083A620), the NRC notified all licensees and construction permit holders that the staff is conducting in-office and onsite audits of their responses to Order EA-12-051 in accordance with NRC NRR Office Instruction LIC-111, as discussed above.

The ongoing 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 ePortals, 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 BSEP from December 1-5, 2014, per the audit plan dated November 6, 2014 (ADAMS Accession No. ML14308A031). 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.: 50-325 and 50-324

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

DUKE ENERGY PROGRESS, INC.

BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2

DOCKET NOS. 50-325 AND 50-324

BACKGROUND AND AUDIT BASIS

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

By letter dated February 28, 2013 (ADAMS Accession No. ML13071A559) Duke Energy Progress, Inc.(Duke, the licensee), formerly known as Carolina Power and Light Company, submitted its OIP for Brunswick Steam Electric Plant, Units 1 and 2 (BSEP) in response to Order EA-12-049. By letters dated August 20, 2013, February 28, 2014, August 28, 2014 and February 27, 2015 (ADAMS Accession Nos. ML13248A447, ML14073A451, ML14254A176, and ML15084A156, respectively), Duke submitted its first four six-month updates to the OIP. By letter dated August 28, 2013 (ADAMS Accession No. ML13234A503), the NRC notified all licensees and construction permit holders that the staff is conducting audits of their responses to Order EA-12-049 in accordance with NRC Office of Nuclear Reactor Regulation (NRR) Office Instruction LIC-111, "Regulatory Audits" (ADAMS Accession No. ML082900195). This audit

process led to the issuance of the BSEP interim staff evaluation (ISE) (ADAMS Accession No. ML13220A090) and continues with in-office and onsite portions of this audit.

By letter dated February 28, 2013 (ADAMS Accession No. ML13086A096), the licensee submitted its OIP for BSEP, in response to Order EA-12-051. By letter dated May 23, 2013 (ADAMS Accession No. ML13141A622), the NRC staff sent a request for additional information (RAI) to the licensee. By letters dated July 22, 2013, August 26, 2013, February 27, 2014, August 28, 2014, and February 27, 2015 (ADAMS Accession Nos. ML13219B117, ML13242A010, ML14073A063, ML14254A404, and ML15075A024, 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 BSEP ISE and RAI dated November 18, 2013 (ADAMS Accession No. ML13269A345). By letter dated March 26, 2014 (ADAMS Accession No. ML14083A620), the NRC notified all licensees and construction permit holders that the staff is conducting in-office and onsite audits of their responses to Order EA-12-051 in accordance with NRC NRR Office Instruction LIC-111, as discussed above.

The ongoing 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 BSEP from December 1 - 5, 2014, per the audit plan dated November 6, 2014 (ADAMS Accession No. ML14308A031). 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 BSEP facility from December 1, 2014, through December 5, 2014. The NRC audit team staff was as follows:

Title	Team Member
Team Lead/Project Manager	Peter Bamford
Technical Support	Matthew Hardgrove
Technical Support	Brian Lee
Technical Support	Kerby Scales
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 6, 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 (December 1, 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 "Brunswick Nuclear Plant Fukushima FLEX Strategy, NRC Fukushima Audit, December 2014." 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 (NSRC), overview of the spent fuel pool level indication modification, and information regarding communications 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 Attachment 3, as discussed in the Conclusion section below.

3.1 Reactor Systems Technical Discussions and Walk-Downs

The staff reviewed the licensee'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 and input parameters assumed to generate the results of the analysis. The staff also reviewed the licensee's plan to supply nitrogen/air for Safety Relief Valve (SRV) actuation and walked down the licensees proposed connection points for implementation of FLEX strategies. No concerns were identified.

3.2 Electrical Technical Discussions and Walk-Downs

BSEP does not plan on performing a deep direct current (dc) load shed. Their FLEX strategy is to provide FLEX power to the plant dc supply systems within 2 hours of the ELAP event through the use of pre-staged FLEX diesel generators (DGs), which are to be stored in a newly constructed hardened enclosure. The NRC staff reviewed the calculations regarding projected dc bus voltage for the ELAP event. The staff walked down the partially completed FLEX DG building, which was under construction at the time of the audit, and the proposed cable routes. The staff also walked down the plant DG, control room, cable spread room, and battery room to fully understand the overall strategy, including strategies for hydrogen and temperature control in the battery rooms.

3.3 Balance of Plant Technical Discussions and Walk-Downs

The staff reviewed the licensee's hydraulic analysis modeling which indicated that the FLEX pumps have sufficient net positive suction head (NPSH) available and have the capability to pump the required flow for reactor pressure vessel (RPV) injection and SFP makeup. The staff also reviewed the licensee's plan for indefinite coping regarding diesel fuel supply and delivery for diesel-power equipment. The staff did not identify any discrepancies in these areas. The staff walked down the proposed FLEX connection locations, hose deployment routes, and areas where manual actions were credited. During the audit the staff questioned whether the plant off-gas stack could survive combined tornado wind and missile loadings. The licensee indicated that the existing analysis only included the tornado wind loading by itself and thus a new open item (Safety Evaluation (SE) item 9, or SE.9) was created to track a reanalysis that includes the combined loading. The staff also questioned whether the reactor water cleanup (RWCU) piping adjacent to the proposed reactor pressure vessel injection FLEX connection was seismically robust. Another open item (SE.10) was created to track the licensee's response to this question.

3.4 Containment Technical Discussions and Walk-Downs

The staff reviewed the licensee's modeling of an ELAP on the containment function which indicated adequate NPSH is available for the reactor core isolation cooling (RCIC) pump during its FLEX mission time and that adequate vent capability for the licensee's proposed venting strategy exists. The staff did not identify any discrepancies. During the onsite audit, the staff questioned the capability of the exposed portions of the hardened wetwell vent relative to tornado missiles. After the onsite audit was completed, the licensee provided an evaluation of this capability on the ePortal. The staff reviewed the evaluation and closed the applicable open item (SE.11).

3.5 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.

3.6 Other Technical Discussion Areas and Walk-Downs.

a. Regarding Open Item (OI) 3.1.1.C, and confirmatory items (CI) 3.1.1.2.A, 3.1.1.4.A, and 3.1.4.2.A, the staff reviewed the location of the new FLEX storage building (under construction), the equipment planned to be housed in the storage building, and the location for staging area B. Along with the licensee, the staff walked down the deployment pathways from these locations. The staff also reviewed the licensee's planned provisions for equipment tie-downs and the evaluation of the travel routes for soil liquefaction such that the necessary equipment could be deployed after a seismic event. The staff did not identify any concerns for these items.

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 April 4, 2013 (ADAMS Accession No. ML13093A341). No concerns were identified.

c. Regarding Programs/Training, CI 3.3.2.A, and licensee OIP items 2, 3, 4, 5, 6, 7 and 9, BSEP provided a draft program document, controlled under the engineering programs process, thus ensuring that the plan will be maintained up-to-date. The licensee will use the plant corrective action program to track completion, in addition to the controls inherent in the training program. The staff did not identify any concerns with this approach.

d. Human factors considerations were reviewed as part of the audit under item SE.7. 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.

e. During the onsite audit the NRC audit staff expressed concerns about the licensee's strategy for pre-staging/pre-installing the FLEX DGs, specifically their non-portability

and close proximity within an enclosed structure. The staff also indicated to the licensee that the proposed strategy should be considered an alternative to the guidance of NEI 12-06, since the FLEX equipment would not be portable. The staff was concerned about the reliability and flexibility of the alternative approach, specifically considering the potential for scenarios associated with the BDBEE, such as fires or equipment damage, which could disable both DGs. After the completion of the onsite review activities the staff pursued this issue further with the licensee. The licensee developed a rationale to address the staff's concerns in the form of a position paper and provided a version for NRC review on the ePortal. The licensee also acknowledged the pre-staged/pre-installed FLEX DGs as an alternative approach to the provisions of NEI 12-06 in the 6-month update dated February 27, 2015. Based on the staff's understanding of the FLEX DG configuration details, as described in the position paper, the associated audit items regarding the pre-staged/pre-installed FLEX DGs (OI 3.2.4.8.A, CI 3.1.3.2.A, and Audit Question (AQ) 21) have been closed. However, the licensee will need to provide to the NRC staff a docketed justification for the proposed alternative, at a level of detail comparable to the contents of the FLEX DG position paper, either prior to, or concurrent with, the BSEP final integrated plan submittal.

f. Regarding the SFPI audit items, 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. No issues requiring follow-up in these areas were identified. The staff also reviewed the licensee's sloshing calculation. No issues requiring follow-up in these areas were identified; however several SFPI open items remain, while licensee staff completes the calibration procedures, and compensatory actions for out-of-service equipment, as documented in Attachment 3.

4.0 Exit Meeting (December 5, 2014)

The NRC staff audit team conducted pre-exit and exit meetings with licensee staff following the completion of the onsite review activities. 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 6, 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 Mitigation Strategies and Spent Fuel Pool Level Instrumentation orders. Attachment 3 includes 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). Item SE.4 in Attachment 3 is the only open item

that was not reviewed onsite. 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 OIP Open Items

d. Spent Fuel Pool Instrumentation (SFPI) Requests for Additional Information (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 6, 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.

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 ePortal.

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

Onsite Audit Participants

NRC Staff:

Peter Bamford	NRR/JLD/JOMB
Matthew Hardgrove	NRR/JLD/JERB
Kerby Scales	NRR/JLD/JERB
Khoi Nguyen	NRR/JLD/JERB
Michael Levine	NRR/JLD/JCBB
Brian Lee	NRR/JLD/JCBB

BSEP Staff:

Bill Murray	Lead Engineer - Licensing
Mike Weber	Manager - Fukushima Response
John McIntyre	Lead Nuclear Engineer - Fukushima Response
Ed Asbury	Fukushima Response Site Project Manager
Tom Williamson	Project Director
Robert Ginsburg	Contractor - Fukushima Response
Lenny Beller	Contractor - Fukushima Response
Mike Potter	Contractor - Fukushima Response
Adam Saytanides	Sr. Nuclear Engineer - Design Engineering
Lee Grzeck	Manager - Regulatory Affairs
Leunis Van Eeden	Contractor - Fukushima Response
Ralph Mullis	Contractor - Fukushima Response
Tim Gubitz	Sr. Nuclear Engineer - Electrical Design
Jeff Padget	Contractor - Electrical Design
James Neville	Contractor - Project Management
Jeff Thomas	Manager Nuclear Programs - Fukushima Response
Paul Guill	Lead Nuclear Engineer - Fukushima Response

Documents Reviewed

FLEX Support Guidelines (FSGs)

0FSG-014, "FLEX Equipment and Inventory Control," Rev. Draft

0FSG-004, "FLEX Diesel Generator Alignment," Rev. Draft

0FSG-009, "FLEX Phase 3 Transition," Rev. Draft

Procedures

2OP-16, "Reactor Core Isolation Cooling System Operating Procedure," Rev. 117

0EOP-01-SBO-07, "480V E-Bus Crosstie," Rev. Draft

0EOP-01-SBO-02, "Blacked Out Unit Initial Actions," Rev. Draft

0PEP-04.2, "Emergency Facilities and Equipment," Rev. 40

0PEP-03.1.3, "Use of Communication Equipment," Rev. 19

0EOP-01-SBO-10, "Battery Load Stripping," Rev. Draft

0EOP-01-SBO-04, "Blacked Out Unit Local Actions," Rev. Draft

0EDMG-003, "Containment Venting Under Conditions of Extreme Damage," Rev. 6

Calculations/Analyses

PGENBN150-CALC-001_Draft, "Brunswick Nuclear Plant Containment Analysis of FLEX Strategies," Rev. 0

9527-8-E41-06F, "NPSH Requirements RCIC and HPCI," Rev. 1

0FLEX-0003, "Hydraulic Analysis for Fukushima FLEX Connection Modifications," Rev. Draft

BNP-MECH-FLEX-0002, "Brunswick Nuclear Plant Containment Analysis of FLEX Strategies," Rev. 0

0FP-0001, "Battery Room Hydrogen Generation," Rev. 2

BNP-MECH-B5B, "Extreme Damage Mitigation Guidelines: Engineering Hydraulic Basis," Rev. 1

Nexus Report No. RWA-L-1312-001, "Control Building FLEX Room Heat-up Analysis for the Brunswick Nuclear Plant," Rev. 1

BNP-PSA-046, "PSA Model Appendix J Containment Capability Analysis," Rev. 0

2G41-0023, "Forces Caused by Sloshing of the Brunswick Unit 2 Spent Fuel Pool on Horn End Assembly," Rev. 0

Nexus Report No. RWA-1312-001, "FLEX Reactor Building GOTHIC Heat Up Analysis," Rev. 1

DPC-1229.00-00-0012, "Brunswick Spent Fuel Pool Fukushima Response Level Transmitter Total Integrated Dose Calculation," Rev. 1

EC 95856, "Natural Phenomena Hazards Evaluation For Flex," Rev. 0

Nexus Calculation 14-4019.003, "Unit 1 and 2 Condensate Storage Tank Seismic Acceleration Time Histories," Rev. 0

Nexus Calculation 14-4019.004, "Unit 1 and 2 Seismic Soil Interaction," Rev. 0

Nexus Calculation 14-4019.005, "Evaluation of Wind-Driven Missile Impact Against Unit 1 and 2 Condensate Storage Tanks," Rev. 0

Nexus Calculation 14-4019.006, "CST Wind Load and Wind Driven Missile Combined Affects," Rev. 0

Nexus Calculation 14-4019.007, "CST Flood Static and Dynamic Affects," Rev. 0

Nexus Calculation 14-4019.008, "BNP CST Tornado Missile Barrier Support Design," Rev. 0

Nexus Calculation 14-4019.009, "Condensate Storage Tank Missile Protection Barrier Support Seismic Analysis," Rev. 0

Nexus Calculation 14-4019.010, "Finite Element Analysis of Condensate Storage Tanks for Units 1 & 2," Rev. 0

Nexus Calculation 14-4019.011, "CST Estimate of Seismic Fragility," Rev. 0

2MSS-0011, "Evaluation of the Plant Stack for Tornado Wind Forces and 2 x SSE Earthquake," Rev. 2

PGB024-CALC-002 (Enercon), "Evaluation of the Hardened Wetwell Vent for Beyond-Design-Basis External Events," Rev. 0

Attachment Z52, ("Control Building FLEX Room Heat-up Analysis") of EC 89578, "Fukushima Response Project – SFP Wide Range Level Indication – BNP," Rev. 13

Drawings

F-08741, "FLEX Diesel Generator Overall One-Line Diagram," Rev. 0

F-03004, "4160 Volt Emergency System Switchgear E1 & E2 Auxiliary One Line Diagram," Rev. 17

F-30005, "480 Volt System Unit Substation 1E, 1F, E5, E6 & Common C Auxiliary One Line Diagram," Rev. 32

F-30053, "480 Volt System MCC 1CA, 1CB, 1PA, 1PB, & 1SA Auxiliary One Line Diagram," Rev. 68

F-03003, "4160V Emergency System Switchgear E3 & E4 Auxiliary One Line Diagram," Rev. 17

F-30005, "480 Volt System Unit Substation 2E, 2F, E7, E8 & Common D Auxiliary One Line Diagram," Rev. 25

F-03053, "480 Volt System MCC 2CA, 2CB, 2PA, 2PB, & 2SA Auxiliary One Line Diagram," Rev. 71

F-03026, "Emergency Key One Line Diagram 4160V, 480V, 120/208V, 120/240V AC & 24/48V, 125/250V DC," Rev. 11

F-30008, "125/250V DC System MCC 1XDA, 1XDB, 1TDA, 1TDB, Three Line Diagram," Rev. 31

F-30007, "125 – 250 Volt DC System Distribution Switchboards 1A &1B, Three Line Diagram," Rev. 34

F-03007, "125 – 250 Volt DC System Distribution Switchboards 1A &1B, Three Line Diagram," Rev. 30

F-03008, "Three Line Diagram, 125 – 250 Volt DC System, MCC 2XDA, 2XDB, 2TDA, 2TD," Rev. 31

F-30005, "480 Volt System Unit Substation 1E, 1F, E5, E6 & Common C Auxiliary One Line Diagram," Rev. 32

F-30053, "480 Volt System MCC 1CA, 1CB, 1PA, 1PB, & 1SA Auxiliary One Line Diagram," Rev. 68

F-08741, "FLEX Diesel Generator Overall One-Line Diagram," Rev. 0

F-08745, "FLEX DG Switchboard 1 (0-FLEX-DGF1-SWB) Cable Diagram," Rev. 0

F-08745, "FLEX DG Switchboard 2 (0-FLEX-DGF2-SWB) Cable Diagram," Rev. 0

F-02505 SK-89578-M-2000, "Reactor Building Plan – EL. 117'-4" General Arrangement Non-Safety Related, Seismic," Rev. 19

F-02505 SK-89578-E-3001, "Unit 2 WR SFPLI (Ch. A or NE SFP Area) Instrument Location and Conduit Routing Plans," Rev. B

F-02505 SK-89578-E-3002, "Unit 2 WR SFPLI (Ch. B or NW SFP Area) Instrument Location and Conduit Routing Plans," Rev. A

F-02505 SK-89578-E-3003, "Unit 2 WR SFPLI (Ch. A & B) Control Room Instrument Location and Conduit Routing Plans," Rev. B

2-FP-87736, "Control Building SFPLI Electrical Equipment Wall Mounting Details," Rev. Draft

SK-89578-C-1002, "Brunswick Nuclear Plant Unit 2 Northeast VEGAPULS 62 ER Installation Dimension," Rev. B

SK-89578-C-1003, "Brunswick Nuclear Plant Unit 2 Northwest VEGAPULS 62 ER Installation Dimension," Rev. B

SK-89578-C-1010, "Brunswick Nuclear Plant VEGA Waveguide Horn End and Sensor End Support Anchorage Details," Rev. 0

SK-89578-C-1004, "Brunswick Nuclear Plant Unit 2 VEGA Waveguide Support Isometric Channel A (Div. II)," Rev. B

SK-89578-C-1005, "Brunswick Nuclear Plant Unit 2 VEGA Waveguide Support Isometric Channel A (Div. I)," Rev. B

SK-89578-C-1006, "VEGA Waveguide Engineered Support A Details," Rev. A

SK-89578-C-1009, "Unit 2 WR SFPLI Conduit Support Detail - Modified Support Mk. No. 21 of Spec 248-107," Rev. B

SK-89578-C-1007, "Brunswick Nuclear Plant SFPLI Electrical Equipment Wall Mounting Details," Rev. B

F-09331, "Unit No. 2 Emergency Power System 120/208 Volt Distribution Panels 3ϕ, 4 Wire," Rev. 13

SK-89578-Z-7012, "Spent Fuel Pool Level Indication Channel A and B Conduit Routing Block Diagram," Rev. A

Other Documents

EC 90400, "FLEX Permanent Flex Building," Rev. 1

EC 90388, "Flex Diesel Installation," Rev. 0

EC 92956, "Post Fukushima Flood Protection 'As Found' Assessment," Rev. 7

EC 90389, "Specification For Flex Diesel Generators," Rev. 1

EC 90387, "BSEP Unit# 2: Primary And Alternate Flex Connection for Pneumatic Supply to SRV's," Rev. 0

EC 90412, "Unit 2 - FLEX Primary Reactor Pressure Vessel and Spent Fuel Pool Makeup, FLEX Pump to RWCU and Fuel Pool Cooling Pipe Fukushima," Rev. 2

EC 90390, "Flex DG 480V Tie-Ins at Unit Substations E6 and E8," Rev. 0

EC 90398, "Evaluation of Flex Equip Fuel Oil Delivery Strategy," Rev. 2

EC 90414, "Unit 2 - Fukushima Flex Alternate Connections for RPV and SFP Coolant Makeup Fukushima," Rev. Draft

EC 90410, "Hardened Containment Vent System - Backup Nitrogen Bottles Unit 2," Rev. Draft

EC 89578, "Fukushima Response Project – SFP Wide Range Level Indication – BNP2," Rev. 0

EC 95856, "Natural Phenomena Hazards Evaluation for Flex Condensate Storage Tanks Unit 1 and 2 Fukushima," Rev. 0

Specification 005-011, "Specification for Seismic Design Criteria for BNP Unit 0," Rev. 6

Updated Final Safety Analysis Report (UFSAR) Brunswick Steam Electric Plant, Units 1 and 2, Revision 24

UFSAR Change 14FSAR-022, "Maximum Probable Hurricane Flood Profile Correction"

BSEP Position Paper for Permanently Pre-Staging of FLEX Diesel Generators

AREVA Test Report 174-9213558-006, "Seismic Test Report for VEGAPULS," Rev. 6

CSD-EG-BNP-888, "FLEX Program Document, Brunswick," Rev. Draft

Nexus Report 13-4085.001, "Unit 1 and 2 125/250 VDC Battery Capability Study for Extended Loss of AC Power (ELAP)," Rev. 0

AREVA Document No. 51-9202556-004, "Qualification Analysis of VEGAPULS 62 ER Through Air Radar," Rev. 4

BSEP

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 3.4.A	NSRC interface	Make available for audit the completed NSRC playbook.
OIP-3	Guidelines to manage and control unavailability of mitigating strategies equipment	Make available for audit a description of the process for mitigating strategies equipment unavailability controls and the associated procedure/guideline,
OIP-14	SFPI modification	Make available for audit the completed modification package.
SFP.10	SFPI maintenance and testing	Make available for audit the completed operating, calibration, test, maintenance, and inspection procedures.
SFP.13	SFPI out-of-service administrative controls	Make available for audit a completed response for compensatory actions for out-of-service SFPI.
SE.4	Confirm that administrative controls will be implemented in accordance with Rev. 3 of the Boiling Water Reactor Owners Group Emergency Procedure Guidelines/Severe Accident Guidelines to prevent negative pressure transients in containment as identified in the NRC letter dated January 9, 2014 (ADAMS Accession No.ML13358A206).	Make available for audit the necessary procedures and/or strategy that shows site-specific steps to prevent negative pressure transients during anticipatory venting.
SE.9	Plant stack vulnerability to seismic, tornado, and wind-driven missile hazards.	Make available for audit the completed plant stack evaluation.
SE.10	Robustness of connected RWCU piping credited in FLEX strategies	Make available for audit the strategy for addressing the seismic vulnerability.

The NRC staff's review to date led to the issuance of the BSEP ISE and RAI dated November 18, 2013 (ADAMS Accession No. ML13269A345). By letter dated March 26, 2014 (ADAMS Accession No. ML14083A620), the NRC notified all licensees and construction permit holders that the staff is conducting in-office and onsite audits of their responses to Order EA-12-051 in accordance with NRC NRR Office Instruction LIC-111, as discussed above.

The ongoing 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 BSEP from December 1-5, 2014, per the audit plan dated November 6, 2014 (ADAMS Accession No. ML14308A031). 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.: 50-325 and 50-324
Enclosure:
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