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June 3, 2015

Serial: BSEP 15-0033

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

Subject: Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2
Renewed Facility Operating License Nos. DPR-71 and DPR-62
Docket Nos. 50-325 and 50-324
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 Order EA-12-051, "Order to Modify Licenses With Regard To Reliable Spent Fuel Pool Instrumentation" for BSEP, Unit 2

References:

1. Nuclear Regulatory Commission (NRC) Order Number EA-12-049, *Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events*, dated March 12, 2012, Agencywide Documents Access and Management System (ADAMS) Accession Number ML12054A735.
2. Duke Energy Letter, *Overall Integrated Plan in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)*, dated February 28, 2013, ADAMS Accession Number ML13071A559.
3. NRC Order Number EA-12-051, *Issuance of Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation*, dated March 12, 2012, ADAMS Accession Number ML12054A679.
4. Duke Energy Letter, *Carolina Power and Light Company's Overall Integrated Plan 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 Number ML13086A096.
5. NRC Letter, *Brunswick Steam Electric Plant, Units 1 and 2 - Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Order EA-12-049 (Mitigation Strategies) (TAC Nos. MF0975 and MF0976)*, dated November 22, 2013, ADAMS Accession Number ML13220A090.
6. NRC Letter, *Brunswick Steam Electric Plant, 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 (TAC Nos. MF0973 and MF0974)*, dated November 18, 2013, ADAMS Accession Number ML13269A345.
7. NRC Letter, *Brunswick Steam Electric Plant, Units 1 and 2 - Report for the Audit Regarding Implementation of Mitigating Strategies and Reliable Spent Fuel Pool Instrumentation*

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Related to Orders EA-12-049 and EA-12-051 (TAC Nos. MF0975, MF0976, MF0973 and MF0974), dated March 31, 2015, ADAMS Accession Number ML15082A155.

8. Duke Energy Letter, *First Six-Month Status Report in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)*, dated August 20, 2013, ADAMS Accession Number ML13248A447.
9. Duke Energy Letter, *Second Six-Month Status Report in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)*, dated February 28, 2014, ADAMS Accession Number ML14073A451.
10. Duke Energy Letter, *Third Six-Month Status Report in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)*, dated August 28, 2014, ADAMS Accession Number ML14254A176.
11. Duke Energy Letter, *Fourth Six-Month Status Report in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)*, dated February 27, 2015, ADAMS Accession Number ML15084A156.
12. Duke Energy Letter, *First Six-Month Status Reports in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)*, dated August 26, 2013, ADAMS Accession Number ML13242A010.
13. Duke Energy Letter, *Second Six-Month Status Report in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)*, dated February 27, 2014, ADAMS Accession Number ML14073A063.
14. Duke Energy Letter, *Third Six-Month Status Report in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)*, dated August 28, 2014, ADAMS Accession Number ML14254A404.
15. Duke Energy Letter, *Fourth Six-Month Status Report in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)*, dated February 27, 2015, ADAMS Accession Number ML15075A024.

Ladies and Gentlemen:

On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued Order EA-12-049, *Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events,* and Order EA-12-051, *Issuance of Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation,* (Reference 1 and Reference 3, 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 Brunswick Steam Electric Plant (BSEP), Units 1 and 2, in response to Order EA-12-049 was submitted. In a separate correspondence, the OIP for BSEP, Units 1 and 2, in response to Order EA-12-051 was submitted by letter dated February 28, 2013 (Reference 4).

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 (2) 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 requires that Licensees and Construction Permit holders report to the NRC when full compliance is achieved. For BSEP Unit 2, the requirement for full implementation of NRC Orders EA-12-049 and EA-12-051 was prior to restart from the BSEP, Unit 2, Spring 2015 refueling outage (i.e., B222R1). For BSEP Unit 1, the requirement for full implementation of NRC Orders EA-12-049 and EA-12-051 is prior to restart from the BSEP, Unit 1, Spring 2016 refueling outage (i.e., B121R1).

On April 4, 2015, BSEP, Unit 2, entered Mode 2 (Startup) following the B222R1 refueling outage. As such, April 4, 2015, is the compliance date for BSEP, Unit 2, and BSEP, 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. This determination is based on the best available information and analyses that have been completed as of the date of this letter.

Enclosure 1 provides a brief summary of the key elements associated with compliance to Orders EA-12-049 and EA-12-051 for BSEP, Unit 2. Enclosure 2 provides the Open and Pending Items from the Audit Report (Reference 7). For each Open and Pending Item identified in Enclosure 2, a brief summary response in support of closure is provided. As such, Duke Energy considers these items complete pending NRC closure.

BSEP has permanently pre-staged two FLEX Diesel Generators. This strategy is considered an alternative approach to the provisions of NEI 12-06. Enclosure 3 provides the justification for this alternative approach.

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

This letter contains no new regulatory commitments.

If you have any questions regarding this submittal, please contact Mr. Lee Grzeck, Manager - Regulatory Affairs, at (910) 457-2487.

I declare under penalty of perjury that the foregoing is true and correct.
Executed on June 3, 2015.

Sincerely,

William R. Gideon

Enclosures:

1. BSEP, Unit 2, Summary of Compliance Elements for Orders EA-12-049 and EA-12-051
2. BSEP, Units 1 and 2, NRC Audit Report Open and Pending Items
3. BSEP, Units 1 and 2, Permanently Pre-Staged FLEX Diesel Generators Justification for Alternative Approach to NEI 12-06

cc (with enclosures):

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ENCLOSURE 1

BSEP, Unit 2, Summary of Compliance Elements for Orders EA-12-049 and EA-12-051

The elements identified below for BSEP, Unit 2, as well as the Overall Integrated Plans (OIP) for Orders EA-12-049 and EA-12-051 (References 2 and 4, respectively), the 6-Month Status Reports for Orders EA-12-049 and EA-12-051 (References 8 through 11 and 12 through 15, respectively), and any additional docketed correspondence, demonstrate compliance with Orders EA-12-049 and EA-12-051. (Note: References noted in this enclosure refer to the references on page 3 and 4 of this enclosure.)

Strategies – Complete

BSEP, 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.

Identification of Levels of Required Monitoring - Complete

BSEP, Unit 2, has identified the three required levels for monitoring Spent Fuel Pool (SFP) level in compliance with Order EA-12-051. These levels have been integrated into the site processes for monitoring level during beyond-design-basis external events, including responding to loss of SFP inventory.

Modifications - Complete

The modifications required to support the FLEX strategies for BSEP, Unit 2, have been fully implemented in accordance with the station design control process. The design of the Spent Fuel Pool Level Instrumentation installed at BSEP, Unit 2, complies with the requirements specified in the Order and described in NEI 12-02, Revision 1, "Industry Guidance for Compliance with NRC Order EA-12-051." The instruments have been installed in accordance with the station design control process.

Equipment – Procured and Maintenance & Testing - Complete

The equipment required to implement the Mitigation Strategies and Reliable Spent Fuel Pool Level Instrumentation is ready for use at BSEP, Unit 2. Testing and Maintenance processes have been established through the use of Industry endorsed Electric Power Research Institute (EPRI) Guideline and the BNP Preventative Maintenance program such that FLEX equipment reliability is achieved. Operating and maintenance procedures for the Spent Fuel Pool Instruments for BSEP, Unit 2, have been developed, and integrated with existing procedures. These procedures have been verified and are available for use in accordance with the site procedure control program. Site processes have been established to ensure the Spent Fuel Pool Instruments are maintained at their design accuracy.

Protected Storage - Complete

The storage facilities required to implement the FLEX strategies for BSEP, Unit 2, have been completed and provide protection from the applicable site hazards. The equipment required to implement the FLEX strategies for BSEP, Unit 2, is stored in its protected configuration and is ready for use.

Procedures - Complete

FLEX Support Guidelines (FSG) and procedures for the maintenance and use of the Spent Fuel Pool Level Instrumentation for BSEP, 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 BSEP, Unit 2, has been completed using the BSEP Systematic Approach to Training (SAT) as recommended in NEI 12-06, Revision 0, Section 11.6 and in NEI 12-02, Revision 1, Section 4.1.

Staffing - Complete

The staffing study for BSEP has been completed in accordance with NEI 12-01, Revision 0 and 10 CFR 50.54(f), *Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) 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 letter dated October 13, 2014 (Reference 17), and April 16, 2015 (Reference 18). The staffing study confirmed that BSEP has adequate staffing to perform the actions to mitigate beyond-design-basis external 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. It has been confirmed that PEICo is ready to support BSEP 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 Overall Integrated Plans (OIP) for Order EA-12-049.

FLEX Program Document - Established

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

References

1. Nuclear Regulatory Commission (NRC) Order Number EA-12-049, *Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events*, dated March 12, 2012, Agencywide Documents Access and Management System (ADAMS) Accession Number ML12054A735.
2. Duke Energy Letter, *Overall Integrated Plan in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)*, dated February 28, 2013, ADAMS Accession Number ML13071A559.
3. NRC Order Number EA-12-051, *Issuance of Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation*, dated March 12, 2012, ADAMS Accession Number ML12054A679.
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6. NRC Letter, *Brunswick Steam Electric Plant, 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 (TAC Nos. MF0973 and MF0974)*, dated November 18, 2013, ADAMS Accession Number ML13269A345.
7. NRC Letter, *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)*, dated March 31, 2015, ADAMS Accession Number ML15082A155.
8. Duke Energy Letter, *First Six-Month Status Report in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)*, dated August 20, 2013, , ADAMS Accession Number ML13248A447.
9. Duke Energy Letter, *Second Six-Month Status Report in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)*, dated February 28, 2014, ADAMS Accession Number ML14073A451.
10. Duke Energy Letter, *Third Six-Month Status Report in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)*, dated August 28, 2014, ADAMS Accession Number ML14254A176.
11. Duke Energy Letter, *Fourth Six-Month Status Report in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)*, dated February 27, 2015, ADAMS Accession Number ML15084A156.

12. Duke Energy Letter, *First Six-Month Status Reports in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)*, dated August 26, 2013, ADAMS Accession Number ML13242A010.
13. Duke Energy Letter, *Second Six-Month Status Report in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)*, dated February 27, 2014, ADAMS Accession Number ML14073A063.
14. Duke Energy Letter, *Third Six-Month Status Report in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)*, dated August 28, 2014, ADAMS Accession Number ML14254A404.
15. Duke Energy Letter, *Fourth Six-Month Status Report in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)*, dated February 27, 2015, ADAMS Accession Number ML15075A024.
16. NRC Letter, *Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) 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, ADAMS Accession No. ML12053A340.
17. Duke Energy Letter, *Response to March 12, 2012, Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.45(f) Regarding Recommendations of the NearTerm Task Force Review of Insights from the Fukushima Dai-Ichi Accident, Enclosure 5, Recommendation 9.3, Emergency Preparedness- Staffing, Requested Information Items 1, 2, and 6 - Phase 2 Staffing Assessment*, dated October 13, 2014, ADAMS Accession Number ML14296A474.
18. NRC Letter, *Brunswick Steam Electric Plant Units 1 and 2 – Response Regarding Phase 2 Staffing Submittals Associated With Near-Term Task Force Recommendation 9.3 Related to the Fukushima Dal-ichi Nuclear Power Plant Accident (TAC Nos. MF5141 and MF5142)*, dated April 16, 2015, ADAMS Accession Number ML15082A441.
19. NEI 12-06, Revision 0, *Diverse and Flexible Coping Strategies (FLEX) Implementation Guide.*
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.*
21. NEI 12-01, Revision 0, *Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities.*

ENCLOSURE 2
BSEP, Units 1 and 2, NRC Audit Report Open and Pending Items

Duke Energy contends that Brunswick Steam Electric Plant (BSEP), Unit 2, is in full compliance with Orders EA-12-049 and EA-12-051 as demonstrated by the docketed correspondence concerning these Orders. Briefly, BSEP, Units 1 and 2, FLEX Interim Staff Evaluation (ISE) Open and Confirmatory Items are complete pending NRC closure; BSEP, Units 1 and 2, FLEX OIP Open Items are complete pending NRC closure; BSEP, Units 1 and 2, FLEX Audit Questions are complete pending NRC closure; BSEP, Units 1 and 2, FLEX NRC Audit Report Open Items are complete pending NRC closure; and the BSEP, Units 1 and 2, Request for Additional Information (RAI) provided in the Spent Fuel Pool Level Instrumentation (SFPLI) ISE are complete pending NRC closure.

Duke Energy provides the following response for the Audit Report Open and Pending Items and considers them to be complete pending NRC closure for BSEP, Units 1 and 2:

Description	Summary and Response
CI 3.4.A, NSRC interface.	*Make available for audit the completed NSRC playbook.* NSRC playbook is available on e-portal for NRC review.
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.* Procedure 0PLP-01.4, *Fukushima FLEX System Availability, Action, and Surveillance Requirements*, is available on e-portal for NRC review.
OIP-14, SFPI modification.	*Make available for audit the completed modification package.* EC 89578, FUKUSHIMA Response Project - SFP Wide Range Level Indication - BNP2, is available on e-portal for NRC review.
SFP.10, SFPI maintenance and testing.	*Make available for audit the completed operating, calibration, test, maintenance, and inspection procedures.* Requested procedures are available on e-portal for NRC review.
SFP.13, SFPI out-of-service administrative controls.	*Make available for audit a completed response for compensatory actions for out-of-service SFPI.* Procedure 0PLP-01.4, *Fukushima FLEX System Availability, Action, and Surveillance Requirements*, is available on e-portal for NRC review. This procedure is revised to include the 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.* Procedures 0EOP-02-PCCP, *Primary Containment Control*, and 0OI-37.8, *Primary Containment Control Procedure Basis Document*, are available on e-portal for NRC review. In 0EOP-02-PCCP flowchart, refer to Step PC/P-4 Fourth and Fifth Overrides. In 0OI-37.8. refer to Section 5.18 for Step PC/P-4 Fourth and Fifth Overrides basis.
SE.9, Plant stack vulnerability to seismic, tornado, and wind-driven missile hazards.	*Make available for audit the completed plant stack evaluation.* 2MSS-0011, *Evaluation of the Plant Stack for Tornado Wind Forces and 2XSSE Earthquake*, is available on e-portal for NRC review.
SE.10, Robustness of connected RWCU piping credited in FLEX strategies.	*Make available for audit the strategy for addressing the seismic vulnerability.* Engineering Change (EC) 90412, *Unit 2 - FLEX Primary RPV and Spent Fuel Pool Makeup*, information applicable to robustness of connected RWCU piping credited in FLEX strategies is available on e-portal for NRC review.

ENCLOSURE 3
BSEP, Units 1 and 2, Permanently Pre-Staged FLEX Diesel Generators
Justification for Alternative Approach to NEI 12-06

SUMMARY

The Brunswick Steam Electric Plant (BSEP), Units 1 and 2, has permanently pre-staged two 480V, 500 kW FLEX Diesel Generators (DGs) on the roof of the Diesel Fuel Oil Tank Vault (DFOTV) in a single building that is robust with respect to seismic events, flood, high winds, and associated missiles, and is in close proximity to the FLEX DG connection points, as an acceptable alternative to NEI 12-06, *"Diverse and Flexible Coping Strategies (FLEX) Implementation Guide"*.

An evaluation of the potential causes of a failure of both FLEX DGs has determined that such a failure is highly unlikely given the design and layout of the FLEX DG installation and the quality of the installed components. Therefore, the evaluation of the FLEX DG installation against the applicable requirements demonstrates that the installation constitutes an acceptable alternative approach to the NRC endorsed guidance provided in NEI 12-06.

BACKGROUND

The Offsite Power Distribution System and/or the Emergency Diesel Generators (EDGs) normally provide power to the 480 VAC Emergency Busses for both units (i.e., E5, E6, E7, and E8). These E-busses provide power to critical loads for achieving and maintaining safe shutdown. During an Extended Loss of All AC Power (ELAP) event, these AC loads will be de-energized and the Division II Batteries and Battery Chargers will be relied upon to power critical functions including, but not limited to, Reactor Core Isolation Cooling (RCIC), Safety Relief Valves (SRVs), and vital instrumentation.

The Division II Batteries will be depleted and fail to provide their function in about two hours on a loss of high voltage AC power. Therefore, BSEP has permanently pre-staged the FLEX DGs to minimize the time that electrical power is lost in the event of a beyond-design-basis-external event (BDBEE).

REVIEW AGAINST APPLICABLE GUIDANCE

BSEP reviewed its proposed alternate strategy of using the two permanently pre-staged FLEX DGs against applicable regulatory guidance to demonstrate acceptability. Provided below are selected excerpts from applicable guidance documents and responses demonstrating how that guidance is satisfied:

1. NEI 12-06, Section 3.2.1.3(2) -- All installed sources of emergency on-site ac power and Station Blackout (SBO) Alternate AC power sources are assumed to be not available and not imminently recoverable.

   Response: The FLEX DGs do not meet the definition of an installed source of emergency on-site power nor do they meet the definition of 10 CFR 50.2 SBO alternate power. The FLEX DGs are provided solely to address an ELAP event. They are disconnected from the normal/emergency electrical distribution system during normal operation. Furthermore, procedures and interlocks ensure that they are only energized and aligned when needed.

2. NEI 12-06, Section 3.2.1.3(7) - Other equipment, such as portable ac power sources,.....may be used provided it is reasonably protected from the applicable external hazards per Sections 5 through 9 and Section 11.3 of this guidance and has predetermined hookup

strategies with appropriate procedures/guidance and the equipment is stored in a relative close vicinity of the site.

Response: The FLEX DGs are housed within a robust structure on the roof of the DFOTV that provides adequate protection from all applicable external hazards. The applicable extreme external hazards for BSEP are seismic events; external flooding; storms with high winds, including hurricanes and tornadoes; ice; and extreme heat. The connection points of both FLEX DGs are accessed through seismically robust structures.

3. NEI 12-06, Section 3.2.1.3(9) -- No additional events or failures are assumed to occur immediately prior to or during the event, including security events.

Response: Failure of the FLEX DGs due to an independent or common cause event is not within the scope of the mitigating strategies order EA-12-049, JLD-ISG-2012-01, nor NEI 12-06. Although, NEI 12-06, Section 3.2.1.3(9) states that no further events or failures are assumed to occur immediately prior to or during an ELAP initiation event described above, BSEP has evaluated specific potential common cause failure modes that would result in a failure of both FLEX DGs to perform when required:

(1) Catastrophic mechanical failure of one DG potentially impacting the other,
(2) Inadvertent fire suppression system discharge in the FLEX DG building, and
(3) Fire in the FLEX DG building affecting both FLEX DGs.

The sequence of unlikely scenarios that would necessitate the need for using the FLEX DGs would include complete loss of all offsite power for both units and failure of all four safety-related EDGs to auto start and load or failure of all four safety-related EDGs to be manually started and loaded. For the purpose of establishing the reliability of the FLEX DGs, additional failures are postulated with their likelihood and potential effects discussed.

Catastrophic Engine Failure

The FLEX DGs, in addition to being protected from all pertinent external events, are designed, constructed, and installed in a manner that ensures a high degree of reliability. They have been procured as high-quality commercial-grade items with comprehensive Factory Acceptance Testing completed at the vendor's facility. The Engineering Change package also specifies extensive site acceptance and pre-service functional testing. In addition, the FLEX DGs will be periodically tested and maintained in accordance with the preventive maintenance and test program designed to ensure their reliability. This includes daily checks and monthly tests similar to other diesel generators onsite including the safety-related EDGs.

An extensive search of operating experience was conducted to further examine the historical reliability of DGs of this size.

Event Operational Experience – Fire and Catastrophic Failure

A search of the Institute of Nuclear Power Operations (INPO) operating experience (OE) database was conducted with the following search terms used individually or in various combinations: Diesel, Diesel Generator, Fire, Fire Damage, Damage.

This effort produced in excess of 1000 records for review; however, it only resulted in the identification of two events involving smaller (i.e., non-1E or temporary) diesel engines driving generators or pumps, that appeared to be applicable.

One of the events occurred at Turkey Point on February 28, 2005, when a field splice in a cable associated with a temporary security diesel generator transfer switch failed. Specifically, improper termination materials resulted in heating over a six-week period that degraded associated cable insulation to the point of fault (i.e., phase-to-phase). The fault resulted in a small fire, diesel generator trip, and declaration of an Unusual Event. There was no report of damage to other components.

The second event occurred at Byron on March 21, 2008, when the 1B Auxiliary Feedwater Pump diesel engine experienced ignition of lube oil that had been absorbed by the insulation blankets surrounding hot exhaust components. The resultant fire was small and quickly extinguished by an operator with a dry-chemical extinguisher.

This search also identified several related events that have occurred on 1E EDGs. These events are not directly applicable due to significant design and configuration differences between the small (e.g., approximately 500 kW) FLEX DGs and typical EDGs (e.g., approximately 2500-6000 kW).

This effort also identified a significant number of inadvertent or unnecessary discharges of fire protection systems in diesel related systems, structures, or components (SSCs). These events occurred in a variety of system designs (i.e., water, Halon, Cardox, etc.) and for various reasons (i.e., human error, equipment failure, excessive dust, steam, excessive smoke from engine surfaces).

Additionally, documented instances of catastrophic failure of diesel engines with the potential to disable adjacent equipment are exceedingly rare and limited to much larger limited-production engines (i.e., Cooper Bessemer, Fairbanks-Morse, Transamerica Delaval). In these cases, the ejected components (i.e., connecting rods and crankshaft counterweights) are of considerable mass (i.e., 500 to 1000 lbm) and consequently have significant potential energy to unleash on adjacent equipment. By comparison, the potential energy available in reciprocating components of the smaller diesel engines is sufficiently small that it is considered extremely unlikely that ejected parts could adversely affect adjacent equipment.

Catastrophic mechanical failure of one FLEX DG that would impact an adjacent FLEX DG was determined by the vendor (i.e., Cummins) as being not credible. Failures associated with being "catastrophic" and "mechanical" are related to either the pistons or the turbocharger; sudden and unintended crankcase ventilation by means of piston and/or connecting rod would result in low oil pressure and cause the affected engine to shut down. Likewise, the turbocharger has a few unique failure modes; however, each of which is expected to be captured by the engine's controls and a shutdown should ensue. Due to the extremely rare occurrences of catastrophic engine failures, especially by smaller engines, as supported by controllers that are designed to shut engines down prior the engines coming apart and no known occurrences by the OE search and vendor history, this failure is not considered credible.

<u>Inadvertent Failure Due to the Fire Suppression System</u>

The fire suppression system provided in the FLEX DG building is Aqueous Film Forming Foam (AFFF). The fire detection system is comprised of robust mechanical and digital components, both of which are considered reliable and resistant to spurious actuation due to

mechanical agitation such as bumping or shaking during a seismic event. The Fire Protection System piping and supports are considered seismically rugged as they have been seismically designed. This will minimize movement that could break the sprinkler head bulbs, and therefore, the system is resistant to inadvertent AFFF System actuation.

Activation of the AFFF System installed in the FLEX DG Enclosure is a two-step actuation. The Fire Detection System activates the foam system, but the sprinklers are of a closed head design. Therefore, activation of the foam system will not allow suppression to flow unless there is an actual temperature source sufficient to activate the sprinkler head (break the glass bulb) and NFPA 16 requires a temperature rating of sprinklers between 250°F and 300°F where they are located at the roof or ceiling. Each individual sprinkler will require the glass bulb to break upon reaching the sufficient temperature; therefore, only a sprinkler head with a sufficient temperature source will provide flow which is limited to the immediate area at that sprinkler head. Based on the design of the system and seismic installation, inadvertent actuation of this fire suppression system is considered highly unlikely.

If the AFFF System were to actuate, the foam will spray in the building and fall to the floor as this is not a system that creates an inert atmosphere. The foam is designed to float on any flammable liquid and extinguish the fire at the fuel/air interface. In this case, if one engine were to have some type of leak leading to a fire, the AFFF would be able to suppress the fire and keep it from spreading. The other FLEX DG would still be available to serve its FLEX function because the FLEX DG Enclosure has ventilation louvers at the top of the north and south walls, so that there would still be a source of combustion air as well as fuel oil to the unaffected FLEX DG. In addition, during the ELAP event in which the FLEX DGs are used to supply backup power, they will be operated and monitored by operators who would be able to stop and re-start the unaffected FLEX DG, if necessary.

<u>Probabilistic Risk Evaluation of Co-Located FLEX DGs at BSEP</u>

The potential failure mode created by locating the FLEX DGs in close proximity to each other is for a fire in one of the DGs to fail both components. This would present a potential risk to the safe shutdown of the plant as it would decrease the defense-in-depth of the FLEX strategy. However, an approximation of the frequency of this scenario is evaluated by considering the necessary conditions to reach such a state and their associated likelihoods.

The FLEX DGs would only be required during an extended SBO where the off-site power supply and the on-site emergency AC power were unavailable. Such conditions could be experienced either due to an extreme external event (i.e., seismic, high winds, external flooding) which concurrently failed the off-site power supply as well as on-site emergency power, or a loss of off-site power followed by a failure of the on-site emergency AC power. Approved PRA calculations were reviewed to obtain frequencies for these events. The references, as well as the associated frequencies for the most bounding event in each calculation are captured in the table below:

Reference	Calculation Number	Failure of Off-site Power and EDGs (1/yr)
External Flooding	BNP-PSA-094	5E-05
High Winds	BNP-PSA-088	< 1E-08
Seismic	BNP-PSA-088	< 1E-06
Initiating Events	BNP-PSA-032	7.96E-03*

*- This is the frequency of a site-wide weather related loss of off-site power.

Note that the "Initiating Events" value for frequency is the most limiting. However, to cause the event described above, this event must be followed by a loss of the EDGs. It is conservatively estimated that the EDGs are 95% reliable to start and run for the required mission time (assumed to be 72 hours for this evaluation). This results in a 5% (0.05) value for unreliability and a resulting initiating event frequency for the event being considered in this evaluation of:

Frequency of Event Causing SBO = (7.96E-03)*(0.05) = 3.98E-04/yr

Note that the 5% unreliability used in this calculation is for a single EDG. In reality, each of the four EDGs at BSEP is capable of supplying sufficient power to both units to avoid either unit being in an SBO. Therefore, using 5% as the overall unreliability represents a significantly higher probability of an SBO that would require use of the FLEX DGs than would otherwise be calculated. Nevertheless, the 5% unreliability is retained in this evaluation.

If the SBO evaluated above were to occur, a fire would also be necessary to match the scenario initially postulated. Referencing the data provided in NUREG-2169, Table 4-4, Bin 8, for diesel generators, (i.e., assumed to be most applicable to the FLEX DGs), the fire ignition frequency is 7.81E-03. This value represents the ignition frequency for all components in that bin at the site. In total, there are nine (9) diesel generators at BSEP that can be used to mitigate the event; four (4) EDGs, one (1) supplemental DG, two (2) Severe Accident Mitigation Alternative (SAMA) DGs, and the two (2) FLEX DGs which are the subject of this evaluation. As BSEP is a dual unit site, a location weighting factor of 2 will be utilized. As such, the fire ignition frequency for a single DG at BSEP may be calculated as:

Fire Ignition Frequency = (NUREG Frequency)*(Weighting Factor)/(Number of Components)

Fire Ignition Frequency = (7.81E-03/yr)*(2)/(9) = 1.74E-03

Finally, the FLEX DGs are assumed to be needed for 72 hours following the start of the event, which is considered the mission time of these components for this evaluation. After 72 hours, it is assumed that additional mitigating equipment will have been procured from the FLEX National Safer Response Center.

The frequency of the postulated event, an SBO requiring the FLEX DGs, accompanied by a fire in one of the DGs failing both of the components due to close proximity, may be calculated as follows:

Event Frequency = (SBO Frequency)*(Fire Ignition Frequency)*(Number of DGs)*(Mission Time)*(yr/8760 hr)

Event Frequency = (3.98E-04/yr)*(1.74E-03/yr)*(2)*(72 hr)*(yr/8760 hr) = 1.14E-08/yr

The frequency evaluated above represents a conservative estimate of the evaluated scenario. Major conservatisms include the use of an unreliability value of 5% for the site's EDGs and neglect for any potential recoveries or mitigation of fire or loss of off-site power.

4. NEI 12-06, Section 3.2.2 -- In order to assure reliability and availability of the FLEX equipment required to meet these capabilities (NEI 12-06, Section 3.2.2, Guidelines 1-15), the site should have sufficient equipment to address all functions at all units on-site, plus one additional spare, i.e., an N+1 capability, where "N" is the number of units on-site. ...It is also acceptable to have a single resource that is sized to support the required functions for multiple units at a site (e.g., a single pump capable of all water supply functions for a dual unit site). In this case, the N+1 could simply involve a second pump of equivalent capability.

...The N+1 capability applies to the portable FLEX equipment described in Tables 3-1 and 3-2 (i.e., that equipment that directly supports maintenance of the key safety functions). Other FLEX support equipment only requires an N capability.

Response: During detailed analysis, it was determined that a single 500 kW generator can repower the key equipment and instruments needed for both BSEP units. Each 500 kW generator has sufficient margin and is installed with the necessary modifications to supply either or both units' Division II Battery Chargers and other Division II Equipment deemed necessary, thereby maintaining power to the key equipment. One 500kW generator will satisfy the N requirement for both BSEP units and the second 500 kW generator will satisfy the N+1 requirement for BSEP.

5. NEI 12-06, Section 5.3.1 -- Large portable FLEX equipment such as pumps and power supplies should be secured as appropriate to protect them during a seismic event (i.e., Safe Shutdown Earthquake (SSE) level). Stored equipment and structures should be evaluated and protected from seismic interactions to ensure that unsecured and/or non-seismic components do not damage the equipment.

   Response:

   Both FLEX DGs are anchored in a structure that provides adequate protection during a SSE. Anchorage of the FLEX DGs baseplate frame is designed for 2XSSE in accordance with the BSEP Design Basis. The FLEX DGs meet the equipment qualification in accordance with the Seismic Qualification Utility Group Generic Implementation Procedure (SQUG GIP) criteria for 2XSSE. The anchorage securing the FLEX DGs to the DFOTV is designed to meet the seismic requirement of 2XSSE per the BSEP Design Basis. Exhaust and vent piping for the diesel are designed for SSE loading and evaluated for 2XSSE loading. Raceways and miscellaneous fire protection piping are designed for SSE loading.

6. NEI 12-06, Section 6.2.3.1 -- The equipment should be stored in one or more of the following configurations: (a) Stored above the flood elevation from the most recent site flood analysis. The evaluation to determine the elevation for storage should be informed by flood analysis applicable to the site from early site permits, combined license applications, and/or contiguous licensed sites. (b) Stored in a structure designed to protect the equipment from the flood.

   Response:

   The FLEX DG Enclosure is protected against flooding up to a minimum elevation of 28.4 ft. (i.e., 28.4'). The exterior of the FLEX DG Enclosure below this elevation is designed against hydrostatic and hydrodynamic loads that are anticipated during a major flooding event, and is sealed against water intrusion. Sealing of the entire FLEX DG Enclosure exterior is achieved using a combination of welded seams / connections, and sealant (e.g., caulking). The enclosure is sealed; however, the enclosure is not impenetrable with respect to wind driven rain. On the North and South ends of the FLEX DG Enclosure above elevation 28.4', perforated plates are used instead of solid plating to allow for ventilation.

   To protect against moisture intrusion in these areas, the perforated plates are backed by louvers, designed to resist 99.9% of wind driven rain up to wind speeds of 230 mph. The louvers are qualified to resist wind pressures up to 230 mph.

7. NEI 12-06, Section 5.3.2 -- At least one connection point of FLEX equipment will only require access through seismically robust structures. This includes both the connection

point and any areas that plant operators will have to access to deploy or control the capability.

Response: Connection points of both FLEX DGs are accessed through seismically robust structures. The FLEX DG Enclosure is sized and designed to house and protect the FLEX DGs and their associated electrical and mechanical components from external events. The FLEX DG Enclosure provides the necessary access to the equipment housed therein to allow for inspection, testing, operation, and maintenance of the FLEX DGs.

8. NEI 12-06, Section 6.2.3.2 -- Portable pumps and power supplies will require fuel that would normally be obtained from fuel oil storage tanks that could be inundated by the flood or above ground tanks that could be damaged by the flood. Steps should be considered to protect or provide alternate sources of fuel oil for flood conditions. Potential flooding impacts on access and egress should also be considered.

   Response: FLEX DGs are staged with an integral, protected, fuel storage tank to provide a minimum of 12 hours at full load. Refueling strategy is included in the design. The two FLEX DGs are each mounted to a separate individual integrated fuel oil tank containing 526 gallons of fuel. The fuel oil tanks are double walled tanks constructed to meet the requirements of UL-142 in accordance with BSEP Specification 0BNP-E-022. The FLEX DGs and fuel oil tanks are protected from BDBEE conditions by the FLEX DG Enclosure. The FLEX DG Enclosure is designed to preclude any wave run-up / surge from entering the enclosure by providing water tight barriers at a minimum elevation of 28.4' as compared to floor elevation of 23'-0" on the roof of the DFOTV.

9. NEI 12-06, Section 7.2.2 -- The characterization of hurricanes includes the fact that significant notice will be available in the event a severe hurricane will impact a site. This can allow plants to pre-stage FLEX equipment for the most severe storms. Hurricanes can also have a significant impact on local infrastructure, e.g., downed trees and flooding, that should be considered in the interface with off-site resources.

   Response: FLEX DGs are staged with consideration for the fact that significant notice of hurricanes will be available. A severe hurricane with hurricane storm surge is considered the most severe storm for BSEP with the potential for introducing debris across the site. Permanently pre-staging the FLEX diesels on the roof of the DFOTV, above the expected flooding level from a hurricane storm surge, ensures that they are available in the shortest time possible while eliminating the possibility of having to deploy during high winds, flooding, and subsequent debris conditions.

10. NEI 12-06, Section 7.3.1 -- For plants exposed to high wind hazards, FLEX equipment should be stored in one of the following configurations: (a) In a structure that meets the plant's design basis for high wind hazards (e.g., existing safety-related structure), (b) In storage locations designed to or evaluated equivalent to ASCE 7-10, *Minimum Design Loads for Buildings and Other Structures,* given the limiting tornado wind speeds from Regulatory Guide 1.76 or design basis hurricane wind speeds for the site.

    Response: The FLEX DGs are stored in a structure that meets ASCE 7-10, *Minimum Design Loads for Buildings and Other Structures*, for hurricane wind loads, and protection from tornado wind speeds meeting Regulatory Guide 1.76, Rev. 1, *Design-Basis Tornado and Tornado Missiles for Nuclear Power Plants.* The FLEX DG Enclosure is designed to protect the FLEX DGs for loads due to severe (i.e., hurricane) wind speeds of 130 mph and for loads due to extreme (i.e., tornado) wind speeds of 230 mph. In addition, the DG

Enclosure is designed to protect the FLEX DGs against the following tornado missiles per the BSEP Updated Final Safety Analysis Report (UFSAR):

- corrugated sheet of siding, 4' x 8', 100 lbs., travelling at 225 mph
- bolted wood decking, 12' x 4', 450 lbs., travelling at 200 mph
- vehicle, 25 ^{ft} frontal area, 4000 lbs., travelling on ground at 50 mph
- cedar fence post, 6" x 6", 33 lbs., travelling end-on at 150 mph

11. NEI 12-06, Section 7.3.2 -- Deployment of FLEX following a hurricane or tornado may involve the need to remove debris. Consequently, the capability to remove debris caused by these extreme wind storms should be included.

    Response: Permanently pre-staging the FLEX DGs significantly reduces the time required to deploy and to start the FLEX DGs, thus minimizing time delay due to removal of debris.

12. NEI 12-06, Section 8.3.1(b) -- For sites subject to significant snowfall and ice storms, portable FLEX equipment should be stored in one of two configurations: In a structure designed to or evaluated equivalent to ASCE 7-10, *Minimum Design Loads for Buildings and Other Structures,* for the snow, ice, and cold conditions from the site's design basis

    Response: The FLEX DGs are stored in a structure that meets ASCE 7-10, *Minimum Design Loads for Buildings and Other Structures.* The FLEX DG Enclosure roof is designed with a roof live load of 30 psf, which envelopes the applicable roof loads for BSEP.

13. NEI 12-06, Section 8.3.2(1) -- The FLEX equipment should be procured to function in the extreme conditions applicable to the site. Normal safety-related design limits for outside conditions may be used, but consideration should also be made for any manual operations required by plant personnel in such conditions

    Response: The FLEX DGs were procured with internal heaters and battery chargers to maintain DG readiness continuously. No enclosure heaters are required to maintain FLEX DG availability. The FLEX DGs are designed to operate at a maximum temperature of 104°F. To ensure that the FLEX DGs can operate in the BDBEE defined extreme high temperature ranges, the input temperature is determined using BDBEE conditions using total heat input, operating intake air flow rate, and the 122°F rated set-mounted radiator. As a result of this assessment, the FLEX DGs are qualified for operation in elevated ambient temperatures representing what might be generally expected as well as BDBEE extreme high temperatures.

14. NEI 12-06, Section 9.3.1 -- The equipment should be maintained at a temperature within a range to ensure its likely to function when called upon.

    Response: FLEX DG were designed and analyzed to be able to start and deliver reliable power in temperatures meeting or exceeding site design basis temperatures. For the FLEX DGs, providing heated equipment in lieu of a heated enclosure is a practical approach for DGs routinely installed outdoors.

    The FLEX DG is equipped with a four-stage battery charger to charge two (2) 12V batteries on each FLEX DG. The four-stage battery chargers are capable of operation in ambient temperatures of -22°F to 122°F. The FLEX DG is equipped with a coolant heater used to maintain the FLEX DG engine in an optimal uniform temperature range while in standby. The FLEX DG coolant heater actuates on low temperature. The FLEX DG fuel oil tank is equipped with a thermostatically controlled immersion tank heater to ensure that the fuel is maintained above the cloud point of 23°F. The thermostatically controlled heater is selected to maintain fuel oil temperatures between 30°F and 120°F (-1.1°C to 48.9°C). The FLEX

DG Electrical components are designed to operate in the environmental conditions to which they are exposed. All cables are sized based on a maximum ambient temperature of 104°F. The FLEX switchboards are rated for ambient conditions up to 104°F.

15. NEI 12-06, Section 9.3.2 -- The FLEX equipment should be procured to function, including the need to move the equipment, in the extreme conditions applicable to the site. The potential impact of high temperatures on the storage of equipment should also be considered, e.g., expansion of sheet metal, swollen door seals, etc. Normal safety-related design limits for outside conditions may be used, but consideration should also be made for any manual operations required by plant personnel in such conditions.

    Response: The FLEX DGs were designed and analyzed to be able to start and deliver reliable power in temperatures meeting or exceeding site design basis temperatures. The FLEX DGs are designed to operate at a maximum temperature of 104°F. To ensure that the FLEX DGs can operate in the BDBEE defined extreme high temperature ranges the input temperature is determined using BDBEE conditions including total heat input, operating intake air flow rate, and the 122°F rated set-mounted radiator. As a result of this assessment, the FLEX DGs are qualified for operation in elevated ambient temperatures representing what might be generally expected as well as BDBEE extreme high temperatures.

16. NEI 12-06, Section 11.3(2) - A technical basis should be developed for equipment storage for portable equipment that directly performs a FLEX mitigation strategy for core, containment, and spent fuel pool (SFP) that provides the inputs, assumptions, and documented basis that the mitigation strategy and support equipment will be reasonably protected from applicable external events such that the equipment could be operated in place, if applicable, or moved to its deployment locations.

    Response: In lieu of being deployed as portable Phase 2 FLEX equipment from the FLEX Storage Building, the FLEX DGs are housed within a robust structure that provides adequate protection from all applicable external hazards. The applicable extreme external hazards for BSEP are seismic events; external flooding; storms with high winds, including hurricanes and tornadoes; ice; and extreme heat. FLEX DGs were procured with internal heaters and battery chargers to maintain readiness continuously. The FLEX DGs are designed to operate at a maximum temperature of 104°F and analyzed to be able to start and deliver reliable power in temperatures meeting or exceeding site design basis temperatures.

17. NEI 12-06, Section 11.3(6) -- If portable FLEX equipment is pre-staged such that it minimizes the time delay and burden of hook-up following an external event, then the equipment should be evaluated to not have an adverse effect on existing SSCs and the primary connection point should be as close to the intended point of supply as possible, e.g., a staged power supply to recharge batteries should be connected as close to the battery charger as practicable to maintain diversity and minimize the reliance on other installed equipment.

    Response: The FLEX DGs meet the intent of NEI 12-06, Section 11.3, and can be credited as pre-staged Phase 2 equipment. The FLEX DG Enclosure is mounted on top of the DFOTV and is rated for the loads seen in that location such that the FLEX DGs and the enclosure do not have an adverse effect on any existing SSC. The primary and alternate connection criteria and N+1 criteria of Section 3.2.2 still apply and are satisfied in that the output cables from the FLEX DGs are pre-routed to their associated busses, with only

alignment (i.e., racking in and closing) of the permanently pre-staged output breaker being required to allow the FLEX DG to power the applicable busses.

18. NEI 12-06, Section 11.3(7) - FLEX equipment should be stored and maintained in a manner that is consistent with assuring that it does not degrade over long periods of storage and that it is accessible for periodic maintenance and testing.

    Response: The FLEX DGs were designed and analyzed to be able to start and deliver reliable power in temperatures meeting or exceeding site design basis temperatures. The FLEX DGs are provided with heated equipment in lieu of a heated enclosure. This method is a practical approach for FLEX DGs routinely installed outdoors. See Item 13 for measures taken to assure reliability during long periods of storage. The FLEX DG Enclosure provides the necessary access to the equipment housed therein to allow for inspection, testing, operation, and maintenance of the FLEX DGs. In addition, the FLEX DG Enclosure provides protection from outside elements for long term storage.

19. July 1, 2014 NRC Memo from Jack Davis, Supplemental Staff Guidance for the Safety Evaluations for Orders EA-12-049 and EA-12-051, *Topic 6 - Use of pre-staged equipment versus the portable equipment described in NEI 12-06*. Several licensees have decided that their strategy works better if they permanently pre-stage some of their FLEX equipment. This is an alternative to NEI 12-06, which describes the use of portable equipment. NEI 12-06 does allow moving equipment as needed in anticipation of hurricanes or predicted flooding, so that is not an issue here. The reviewer should evaluate if the permanently pre-staged equipment is located in a robust facility that is designed to survive the event, and if there is ready access for operators using routes that would not be blocked by a seismic event or a flooding event.

    Response: For BSEP, the two 480V, 500 kW FLEX DGs to be used in response to an ELAP are permanently pre-staged within a robust structure on the roof of the DFOTV that provides adequate protection from all applicable external hazards. This is an acceptable alternative to NEI 12-06 with respect to the portability of the FLEX equipment. The applicable extreme external hazards for BSEP are seismic events; external flooding; storms with high winds, including hurricanes and tornadoes; ice; and extreme heat. The connection points of both FLEX DGs are accessed through seismically robust structures. The access pathways, from the north and the south, to the FLEX DGs by operators following a BDBEE are not blocked. The FLEX DG Enclosure provides access to the equipment housed therein as necessary to allow for operation of FLEX DGs.

20. Plant Response in the Event of Multiple FLEX DG Failures - In the unlikely event that both FLEX DGs fail to supply the emergency bus loads, during an ELAP and coincident with the failure of the SAMA DGs, the plant has local/manual actions that can be taken to maintain core cooling, containment integrity, and SFP cooling until actions can be taken to restore electrical power. Some of these actions are not credited in the FLEX strategy; however, they are available. All the actions are directed by the EOP/SAMG network so that no further procedural guidance is required.

    Reactor pressure vessel (RPV) injection, in the BSEP FLEX strategy, is maintained by RCIC taking suction from the suppression pool and the Condensate Storage Tank. With FLEX DG power maintaining the station batteries in service, this can be done using normal operation. However, if power is lost to the RCIC control system, RCIC can still be run manually in accordance with operating procedure OP-16, RCIC Operation. As a backup to manual operation of RCIC, the FLEX pumps and EDMG pump are available for alternate coolant

injection if required, are part of the FLEX strategy, and do not require the FLEX DGs to be in service.

In the BSEP FLEX strategy, the SRVs are operated using solenoids and pneumatics as long as the FLEX DGs maintain the station batteries in service. The safety-related backup nitrogen system has a capacity for a minimum of 20 hours without makeup; however, the station batteries will deplete without the FLEX DGs. In this case, the RPV can be depressurized using portable DC power supplies, portable generators, and associated tools to locally power the SRVs. This is performed per 0EDMG-004 using pre-staged equipment.

As part of the FLEX strategy, and in order to protect containment integrity, the Hardened Containment Vent System (HCVS) valves can be opened to vent containment to the atmosphere. These valves are operated by the same safety-related pneumatic nitrogen backup system as the SRVs. In the event there is no solenoid power, due to the failure of both FLEX DGs, the HCVS valves can be opened using portable air tanks and pre-staged associated equipment per 0EDMG-003 or 0EOP-01-SEP-01. 0EOP-01-SEP-01 additionally has provision to rupture the HCVS 55 psig rupture disk at containment pressures below 55 psig, if this is required or desired.

In the FLEX strategy, SFP makeup is performed using a portable FLEX pump and CST connection. This is unaffected by the loss of the FLEX DGs. The new Spent Fuel Pool Level Indication system has its own power supply installed to meet Order EA-12-051 and thus is not reliant on the FLEX DGs.

In order to monitor the critical plant parameters of RPV pressure, RPV level, Drywell pressure, Wetwell pressure, Wetwell level, and Wetwell temperature, the FLEX strategy includes a new procedure, 0EOP-01-FSG-008. The required portable instruments are stored in the main FLEX storage building or another robust storage location. Using this procedure and equipment, these critical plant parameters can be monitored without the FLEX DGs in service.

CONCLUSION

The use of pre-staged FLEX DGs allows re-energizing the critical plant electrical loads more quickly and efficiently than the use of portable DGs that would have to be transferred from the FLEX storage building. This mitigation strategy constitutes an alternative approach to NEI 12-06 guidance and is acceptable because the FLEX DGs are stored in a robust structure designed to adequately withstand all applicable external events and has an access path that is expected to be clear after the initiating event. The specific sections of NEI 12-06 that are impacted by this alternative strategy are those sections describing the use of portable equipment such as section 1.3, Table 1-1, 3.2.2 (13), 11.2, and 11.3.6. Consistent with the July 1, 2014 memorandum from Jack Davis (NRC), the FLEX DGs are located in a robust facility that is designed to survive a BDBEE and can be accessed by operators using routes that would not be blocked by a seismic event or a flooding event, as discussed.

Although the pre-staged FLEX DGs are not portable, as discussed in NEI 12-06, the overall strategy has advantages that outweigh the lack of portability of the FLEX DGs. The FLEX DGs have been pre-staged to provide a significant reduction in the amount of large portable equipment required to be transported and setup in the first hours following a BDBEE over other strategies that were evaluated. The strategy also minimizes risk by utilizing robust equipment that is located within a robust structure that is adequately protected from all applicable external events. The opportunity to improve response times, simplify required manual actions, and utilize robust equipment in robust locations justifies this alternative strategy.

BSEP has reviewed its proposed alternate approach against applicable regulatory guidance and determined that the alternate approach is acceptable. The use of pre-staged FLEX DGs is a defense-in-depth approach that does not credit either SBO or 10 CFR 50.54(hh)(2) equipment and meets all of the protection requirements of Order EA-12-049 and NEI 12-06. The strategy improves the time for transiting from installed plant equipment (i.e., Phase 1) to the onsite FLEX equipment (i.e., Phase 2). Furthermore, it minimizes the amount of equipment required to be deployed, improves human factors, and facilitates timely restoration of lighting and vital control and instrumentation power. The strategy also minimizes risk by pre-staging Phase 2 equipment within a robust structure that is adequately protected from all applicable external events. The strategy of using pre-staged AC power sources, as described above, is capable of mitigating a simultaneous loss of all AC power and loss of normal access to the ultimate heat sink. This strategy has adequate capacity to address challenges to core cooling, containment, and spent fuel pool cooling capabilities.

In the unlikely event that both FLEX DGs are unavailable, there are 10 CFR 50.54(hh)(2) strategies and equipment that can supplement the FLEX strategies that do not rely on the FLEX DGs for availability.