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BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2 – AUTHORIZATION AND SAFETY EVALUATION FOR ALTERNATIVE FROM CERTAIN REQUIREMENTS OF THE AMERICAN SOCIETY OF MECHNICAL ENGINEERS BOILER AND PRESSURE VESSEL CODE OF BURIED SERVICE WATER PIPING (EPID L-2021-LLR-0014)

LICENSEE INFORMATION

Recipient's Name and Address:	John A. Krakuszeski Site Vice President, Brunswick Steam Electric Plant Duke Energy Progress, LLC 8470 River Rd. SE (M/C BNP001) Southport, NC 28461
Licensee:	Duke Energy Progress (Duke, the licensee)
Plant Name and Unit:	Brunswick Steam Electric Plant (BSEP), Units 1 and 2
Docket Nos.:	50-324 and 50-325

APPLICATION INFORMATION

Submittal Letter (Relief Request No.) and Date: February 24, 2021

Submittal Agencywide Documents Access and Management System (ADAMS) Accession No.: ML21055A797

Supplement Dates: May 3, 2021, June 22, 2021, and October 4, 2021

Supplement ADAMS Accession Nos.: ML21123A293, ML21173A253, and ML21277A306

Applicable Inservice Inspection (ISI) Program Interval and Interval Start/End Dates:

BSEP, Units 1 and 2, are currently in the fifth 10-year inservice inspection (ISI) interval, which started on May 11, 2018, and is scheduled to end on May 10, 2028.

Alternative Provision: The applicant requested the alternatives for BSEP, Units 1 and 2, in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR), paragraph 50.55a(z)(1), on the basis that the alternatives provide an acceptable level of quality and safety.

ISI Requirement and Affected Components: The American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," Article IWA-4000, "Repair/Replacement Activities," subparagraph IWA-4221(b)(1) requires a repair/replacement of piping to meet the original Construction Code.

ASME Code Class 3 Service Water (SW) supply piping buried below grade in soil and classified as a safety-related cooling water source to the reactor and radwaste buildings is affected. The SW supply piping is fabricated from carbon steel American Society for Testing and Materials (ASTM) SA/A-672 material with ASTM SA/A-105 fittings, has a cement mortar lining on the interior surface and a bituminous wrap on the exterior surface to mitigate corrosion. Section 4 of Enclosure 1 and Enclosure 2 of the alternative request dated February 24, 2021, provide a detailed description of the SW supply piping sections that is as follows:

BSEP, Unit 1 conventional SW header

- o Approximately 320 linear feet of buried 30-inch diameter pipe identified as 1-SW-100-30-157 with pipe and fittings routed from the SW pump building to a pipe tee in 1-SW-199-30-157.
- o Approximately 95 linear feet of buried 30-inch diameter identified as 1-SW-199-30-157 with pipe and fittings routed from a pipe tee in 1-SW-100-30-157 to the reactor building (RB).
- o Personnel access points include the blind flange in the SW pump building and a 24-inch accessway in the radwaste building.

BSEP, Unit 1 nuclear SW header

- o Approximately 403 linear feet of buried 30-inch diameter pipe with welded joints identified as 1-SW-103-30-157 with pipe and fittings routed from the SW pump building to the RB.
- o Personnel access points include a blind flange located in the SW pump building and a 24-inch riser located in the yard at the diesel tap-off location.

BSEP, Unit 2 conventional SW header

- o Approximately 446 linear feet of buried 30-inch diameter pipe identified as 2-SW-100-30-157 with pipe and fittings routed from the SW pump building to the RB.
- o Personnel access points include the blind flange in the SW pump building and through a 24-inch accessway in the radwaste building.

BSEP, Unit 2 nuclear SW header

- o Approximately 650 linear feet of buried 30-inch diameter pipe with welded joints identified as 2-SW-103-30-157 with pipe and fittings routed from the SW pump building to the RB.

- Personnel access points include the blind flange located in the SW pump building.

Applicable Code Edition and Addenda: The code of record for the fifth 10-year ISI interval is the 2007 Edition and 2008 Addenda of the ASME Code, Section XI. The original and current design code is American National Standards Institute (ANSI) B31.1, "Power Piping Code," 1967 Edition with load combinations per the Updated Final Safety Analysis Report (UFSAR). The current code for Materials, Fabrication, Installation and Testing is American Society of Mechanical Engineers (ASME), Boiler & Pressure Vessel Code (B&PVC), Section III, "Rules for Construction of Nuclear Facility Components," Division 1, Subsection ND, "Class 3 Components," 1986 edition, no addenda.

Proposed Alternative and Basis for Use:

In accordance with the provisions of 10 CFR 50.55a(z)(1), the licensee requests approval to allow the use of the V-Wrap™ Carbon Fiber Reinforced Polymer (CFRP) Composite System for the internal repair of the buried SW System supply piping at BSEP, Units 1 and 2. The licensee stated that BSEP SW system piping is experiencing degradation of the cement mortar lining Material.

ASME Code, Section XI, IWA-4221(b), requires that repair/replacement piping meet the original construction code requirements for the piping. However, the applicable construction code for the BSEP units does not provide the requirements for the design, fabrication, installation, examination and testing of a CFRP composite system (also called "CFRP system"). Therefore, an alternative authorized by the U.S. Nuclear Regulatory Commission (NRC) is required for using a CFRP system for the internal repair of the SW supply piping.

The licensee stated that the repair of the existing SW supply piping will provide the pressure boundary safety function with improved long-term system reliability because CFRP is more resistant to degradation. Once fully implemented, the CFRP system will take the place of the host piping, assuming all design loading without reliance on the host piping structure except at the terminal ends.

The applicable 10-year ISI interval for the installation of the CFRP system is the fifth interval foreach of BSEP units, which is from May 11, 2018 to May 10, 2028. The licensee stated that the CFRP system is to remain in service for the life of the repair. Any future repair/replacement of the repaired piping will be conducted in accordance with the applicable edition of ASME Code, Section XI, or alternative thereto, at the time of the repair/replacement or inspection.

Additional details of the licensee's request are described in the documents located at the ADAMS accession numbers identified above.

NRC STAFF EVALUATION

Regulatory Evaluation:

The NRC regulations in 10 CFR 50.55a(g)(4), "Inservice inspection standards requirement foroperating plants," state, in part, that ASME Code Class 1, 2, and 3, components

including supports shall meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code Section XI.

The NRC regulations in 10 CFR 50.55a(z), “Alternative to codes and standards requirements,” state that “Alternatives to the requirements of paragraphs (b) through (h) of this section [10 CFR 50.55a] or portions thereof may be used when authorized by the Director, Office of Nuclear Reactor Regulation. A proposed alternative must be submitted and authorized prior to implementation.” The licensee must demonstrate that its request meets one of two criteria: (a) the proposed alternative would provide an acceptable level of quality and safety in accordance with paragraph (z)(1); or (b) compliance with the specified requirements of this section would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety in accordance with paragraph (z)(2).

The licensee has submitted the request on the basis that the proposed alternative would providean acceptable level of quality and safety in accordance with 10 CFR 50.55a(z)(1). Based on the above regulations, the NRC staff concludes that regulatory authority exists to authorize an alternative to ASME Code, Section XI, as requested by the licensee.

Technical Evaluation:

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In addition, the licensee described the inservice inspections of the repaired SW system supply piping. The licensee explained that any inspections or repair/replacement of the

CFRP composite will be conducted in accordance with the applicable edition of the ASME Code, Section XI, or alternative thereto, at the time of the repair/replacement or inspection.

The NRC staff noted that the licensee adequately identified the important technical areas for the application of the CFRP system and provided related information, as further evaluated below.

1.0 DESIGN BASIS

The design basis is described in Enclosure 5, Attachment A of the alternative request dated February 24, 2021, including the objectives, approach, methodologies, applicable standards, technical criteria, loads, load combinations, applicable design factors and effective safety factors of the design for the CFRP system design. The various aspects of the design criteria are grouped into strength, reliability, durability, and design approach, as discussed in this section. The design loads and limit states (LSs) are evaluated in Section 2.0 of this safety evaluation (SE).

1.1 Strength

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1.2 Reliability

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1.3 Durability

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1.4 Design Approach

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2.0 DESIGN LOADS AND LIMIT STATES

As noted in Attachment B of Enclosure 5 of the licensee's submittal dated February 24, 2021, the CFRP system is designed to resist the effects of internal pressure, transient pressure, vacuum pressure, external groundwater pressure, temperature differentials, and seismic loads encountered during the design life. The licensee also considered gravity loads such as earth load, surface live load, pipe self-weight, and water weight that tend to load the buried CFRP systems through pipe ovalization in the design of the CFRP system.

The CFRP Composite System design layup, for both 30-inch diameter at BSEP, Units 1 and 2, consists of **[[**

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Piping

Nominal diameter and wall thickness 30” x 0.375”

Ovality: 3 percent

Material: ASTM A-155 (EFW) Grade KC-70 Class 1

Pressure

Design pressure for SW piping: 150 pounds per square inch (psi)

Normal Operating Pressure for SW piping: 77 psi

Transient Pressure: 73 psi

Vacuum Pressure: -14.7 psi

Temperature

Normal operating temperature range of 40 °F to 90 °F

Maximum Design temperature: 105 °F

CFRP Installation temperature: 65 °F to 80 °F

Soil temperature: 50 °F to 70 °F

Ambient temperature: 70 °F to 110 °F

Temperature Differential: ΔT= ± 40 °F

Pressure-Induced Thrust

Bulkhead thrust force: P x A (where P is the internal pressure and A is the internal cross section area of the pipe) due to the presence of bends.

External Loads

Soil Cover Height:
For SW piping:
General areas: 12.25 feet (ft.)
Downstream sections of Pipes 1-SW-199-30-157 and 2-SW-100-30-157: 19.5 ft.
Downstream sections of Pipes 1-SW-103-30-157 and 2-SW-103-30-157: 6.75 ft.
One section of Pipe 1-SW-103-30-157: 9.55 ft.

Ground Water Height above top of the pipe
General Areas: 5.25 ft
Low Elevation sections: 12.5 ft
High Elevation sections: 0 ft

Surface Live Loads

Surcharge Loads
Surcharge Live Load of 500 psf (pounds per square foot) at the surface under concrete Missile Shield Blocks is also conservatively considered to be located along the length of pipeline where live load is not applicable, to account for the impact of the future installations of the tornado barriers.

Short term live load of 538 psf due to dry cask transporter is conservatively considered at the top of the pipe along the entire pipe.

Differential Settlement: Negligible

Seismic Accelerations

Design Basis Earthquake
(DBE) Horizontal: 0.20g

Seismic Anchor Movement: Negligible

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2.1 Load Combinations for Design Limit States

As discussed in Enclosure 5, Attachment C of the alternative request dated February 24, 2021, the licensee considered the following loads for the design LSs: internal working pressure, internal transient pressure, external groundwater pressure, internal negative pressure (vacuum), and temperature differential between CFRP system installation temperature and maximum/minimum operating temperature, gravity loads, soil loads, and seismic loading.

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2.2 Limit States

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Load Designation Symbols

Pw Internal working pressure, with thrust as applicable
Pt Internal transient pressure, with thrust as applicable
Pv Internal negative pressure (vacuum)
ΔT Temperature differential between CFRP average installation temperature and maximum/minimum operating temperature
We Earth load
We* Earth load in submerged condition when groundwater is present
Wp Pipe weight
Wp* Pipe weight in submerged condition when groundwater is present
Pgw External groundwater pressure
Wt Surface live load
Wf Fluid weight

Fpw Thrust effect from working pressure
Fpt Thrust effect from transient pressure
E Seismic load

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The NRC staff reviewed the loads, load combinations, and the design LSs used by the licensee in its design evaluation of the buried service water piping internally lined with CFRP. The NRC staff finds that the design methodology used by the licensee in CFRP design evaluations is sound and adequate. The licensee considered the applicable loads and load combinations appropriately per the plant design specifications.

2.3 <u>Design</u>

As noted in Enclosure 1 of the alternative request dated February 24, 2021, the design analysis code for BSEP is ANSI B31.1, "Power Piping Code," 1967 Edition with load combinations per UFSAR.

The current code for Materials, Fabrication, Installation and Testing is ASME B&PVC, Section III, "Rules for Construction of Nuclear Facility Components", Division 1, Subsection ND, "Class 3 Components," 1986 edition, no addenda.

The NRC staff reviewed the licensee's plant-specific stress calculation summaries for repairs proposed in the alternative request. **[[**

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In the request for additional information (RAI) response letter dated October 4, 2021, regarding glass transition temperature (Tg) affected by cure temperature, the licensee provided information that V-Wrap™ 770 epoxy remains in the glassy phase at BSEP using the criterion **[[** **]].** This ensures that the CFRP

repair will not become rubbery at the maximum operating temperature of 105 °F, and therefore, will maintain load carrying capability and structural integrity. **[[**

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The NRC staff finds that the licensee's calculations have considered the appropriate load combinations in analyzing the repaired 30-inch diameter piping. The NRC staff also notes that the licensee used results from the Water Research Foundation's research program, which is primarily developed for non-safety-related applications. These included full-scale field experiments of PCCP subjected to the combined effects of internal pressure and external loads to study modes and loads at failure; laboratory scale experiments to determine shear bond strength; and development of simplified and reliable design formulas.

The research program also included an investigation using finite element analysis of CFRP-lined buried PCCP to analyze the combined effects of gravity loads and pressures to validate the accuracy and conservatism of simplified design formulas for LSs including pressure, bending, and stability (buckling). In such analyses, stresses in the CFRP system and its buckling load resulting from interaction of the CFRP system, host pipe, and surrounding soil were calculated as the host pipe continues to degrade during its service life.

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]] Based on the additional layers provided at the discontinuities, the NRC staff concludes that there is additional margin of safety in the design.

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The NRC staff concludes that the licensee has performed an acceptable failure modes and effects analysis (FMEA) because the licensee has considered significant potential failure modes and demonstrated that the CFRP system is designed to mitigate or prevent the potential failures.

The NRC staff notes that CFRP has been used in aerospace, automotive, marine, and sports industries because of its advantage of high strength combined with low weight. The NRC staff also notes that the NRC regulations do not address the AWWA guidance. The NRC staff evaluated the proposed alternative based on the merits of its technical basis in lieu of the AWWA guidance or the proposed ASME Code Case N-871 under development.

Terminations

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2.4 Factor of Safety (Allowable Stress Design versus Load and Resistance Factor Design)

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Allowable Stress Design Methodology in ASME Code, Subsection NC/ND Classes 2 and 3

References used for the following discussion include the 2017 Editions of: (1) ASME Code, Section III, Subsection ND; (2) ASME Code, Section II, Part D, Mandatory Appendices 1 and 3; and (3) ASME Code, Section VIII, Division 1, Non-mandatory Appendix P.

In the ASME Code, the FS for ductile materials (metallic) was 4 until 1999, when it was reduced to 3.5. This is primarily used to determine the minimum required wall thickness, based on hoop-stress considerations under internal pressure. The FS is applied to the minimum tensile strength at temperature (Su) to obtain allowable stress (= Su/4 or Su/3.5). Further, there are k factors (1.0, 1.2, 1.8, and 2.4) applied to increase the allowable stress for other load combinations (design-normal, upset, emergency, and faulted, or service levels A, B, C, and D). In 1981, the k factors were changed to 1.5, 1.65, 2.25, and 3 (with other limitations). For secondary stresses such as thermal expansion, the k factor is approximately 1.5 (i.e., 1.25 applied to Sc + 0.25 applied to Sh, where Sc and Sh are allowable stresses at cold and hot conditions, respectively). Thus, k factors effectively lower the FS in the ASME ASD methodology. In the ASME Code, the FS for brittle metals (e.g., cast iron) is 10.

For buckling, the FS values are as follows: FS=3; k = 4/3. The FS_{eff} is the effective factor of safety for buckling value is calculated as follows: FS_{eff} = 3/(4/3) = 2.25.

The following table is a summary of the calculated ASD methodology values:

ASD Methodology Summary:
Computed/Allowable ≤ 1 or Allowable/Computed ≥ 1

Values Through 1981	**Codes Prior to 1999 With FS = 4 (Ductile)**	**Codes After 1999 With FS = 3.5 (Ductile)**	**With FS = 10 (Brittle)**
Longitudinal (Rows 3-7)	FS_{eff}	FS_{eff}	FS_{eff}
Normal (Level-A) k=1	4	3.5	10
Upset (Level-B) k=1.2	3.33	2.92	8.33

Values Through 1981	**Codes Prior to 1999 With FS = 4 (Ductile)**	**Codes After 1999 With FS = 3.5 (Ductile)**	**With FS = 10 (Brittle)**
Emergency (Level-C) k=1.8	2.22	1.94	5.56
Faulted (Level-D) k=2.4	1.67	1.46	4.17
Thermal Stresses (if 7000 cycles) 1.5 Sh approximately (1.25 Sc + 0.25 Sh)	2.67	2.33	6.67
Hoop Direction	4	3.5	10

Values After 1981	**With FS = 4 (Ductile)**	**With FS = 3.5 (Ductile)**	**With FS = 10 (Brittle)**
Longitudinal (Rows 3-7)	FS_{eff}	FS_{eff}	FS_{eff}
Normal (Level-A) k=1.5	2.67	2.33	6.67

Upset (Level-B) k=1.8	2.22	1.94	5.56
Emergency (Level-C) k=2.25	1.78	1.56	4.44
Faulted (Level-D) k=3	1.33	1.17	3.33
Thermal Stresses (if 7000 cycles) 1.5 Sh	2.67	2.33	6.67
Hoop Direction	4	3.5	10

2.5 LRFD Methodology Used for Repair of SW Piping Using CFRP

For the load and resistance factor design (LRFD) methodology acceptability, the load must be less than or equal to (≤) the resistance; (or) the demand ≤ the capacity; (or) the demand ≤ the strength.

The CFRP material is a non-isotropic, linearly elastic, high-strength composite with very low rupture strain of approximately 1 percent (brittle) compared to 15 to 20 percent for ductile metals like steel. An ASME Code Case currently under development for CFRP, as well as in a few published papers using CFRP, utilize a FS of 10 for the ASD methodology, while it varies for the LRFD methodology. The LRFD methodology applies four types of factors, namely: load factor (LF), resistance factor (Φ) for material strength variability, material adjustment factor (C) for environmental exposure, and a time effect factor (λ) that depends on short-term or long-term use.

The LF is greater than (>) 1 and is applied to the left-hand side of the LRFD evaluations (i.e., load or demand) to increase the load for uncertainties, while factors Φ, C, and λ < 1 are applied to the right-hand side of the LRFD evaluations (i.e., resistance or strength) to reduce allowable strength. The following table summarizes the load factors, resistance factors, material adjustment factor, and time effect factors used by the licensee in the BSEP evaluations.

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These correspond to the current ASME Code FS of 3.5 for stresses and 3.0 for buckling and are considered reasonable for BSEP conditions and water environments. It is also noted that those

portions of BSEP SW pipes to be repaired using CFRP are buried and experience gravity load, internal and external pressure and thermal loading, ground water load, soil overburden loads, and seismic loads. The following table shows the minimum acceptable FS_{eff} for the LRFD methodology for different load combinations or LSs:

Safety Factors for Load Combinations

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The licensee's evaluations are based on characteristic strength values corresponding to 80 percent confidence on the 5th percentile. It is noted that typically a 16 percent drop in characteristic tensile strength when A-Basis (95 percent confidence on 1st percentile) is used.

2.6 Results of Effective Factors of Safety for End Use and Their Acceptability

For degraded carbon steel piping, the SW system safety-related buried 30-inch diameter piping at BSEP will be repaired using CFRP composite. The following tables summarize the results of FS_{eff}. **[[**

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Index	Piping	Repair Location	Soil Cover (feet)	Groundwater Height (feet)
1	BSEP Units 1 & 2 Service Water -30" steel pipe	General Area	12.25	5.25
2	BSEP Units 1 & 2 Service Water -30" steel pipe	Downstream ends of 1-SW-199-30-157 and 2-SW-100-30-157	19.5	12.5
3	BSEP Units 1 & 2 Service Water -30" steel pipe	Downstream ends of 1-SW-103-30-157 and 2-SW-103-30-157	6.75	0

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In summary, all LSs are satisfied with a minimum cure temperature of 90 °F. Based on a review of licensee's design check, the results of FS_{eff} remain acceptable, even though there is a 21 percent drop in the FS for some LSs for the 30-inch diameter pipes when A-Basis allowable values are used, and when adjustment factors for cure temperature effect are also considered. A few deviations are acceptable as explained.

The NRC staff finds that the effective FS_{eff} for short-term use will be higher compared to long-term (end-use) because time effect factor λ is 1.0 for short term use. Therefore, effective FS_{eff} for short-term use are acceptable. This is because the time effect factor for short-term strength is 1.0, while it is a reduction factor of 0.6 for the long-term end use condition.

The NRC review of licensee's calculations, as described above, indicates that the CFRP system design provided in the alternative request satisfies the acceptance criteria for the applicable LSs. Therefore, the NRC finds that there is reasonable assurance that the proposed repair of degraded SW system using CFRP composite, including the terminations overlapping with the host carbon steel piping, will maintain structural integrity. The design evaluations are acceptable because the FS_{eff} meet the limiting values for all LSs, thus meeting the acceptance criteria. The NRC staff concludes that the CFRP design used for the repair of degraded SW supply piping at BSEP, Units 1 and 2, is acceptable.

2.7 Failure Modes and Effects Analysis

The NRC staff concludes that the licensee has performed an adequate FMEA, because the licensee has considered potential credible failure modes of the installed CFRP layers, discussed the basis of why the failure mode is not possible, and provided solutions to either prevent or minimize the failure modes. Therefore, the NRC finds that the licensee's FMEA is acceptable.

The NRC finds that the proposed CFRP composite satisfies the design criteria of the subject piping such that the CFRP layers will be able to support the existing pipe loads without considering the host pipe base metal, except at the terminations. The CFRP terminations act as interfaces to transfer loads from the repaired sections to the host pipe. The NRC staff concludes that the terminations are adequately designed to maintain their structural integrity.

3.0 MATERIAL CONTROLS

In Enclosure 4 of the alternative request dated February 24, 2021, the licensee provided the requirements for the CFRP composite material manufacturing, materials qualification testing, and watertightness testing.

3.1 Material Manufacturing

The licensee stated that the constituents of the CFRP composite system for repair of the SW supply piping include unidirectional high strength carbon fiber fabric, bidirectional glass fiber fabric, two-part epoxy, **[[**

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3.2 Material Qualification Testing

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Testing Prior to Installation in the Field

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Testing for CGI Dedication

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Testing after Installation

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Watertightness Testing

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<u>NRC Staff Evaluation</u>

The material components of the CFRP composite system for repair of Brunswick's safety-related SW supply piping are GFRP, CFRP, epoxy, and expansion ring assemblies. From review of the submittal, the NRC staff notes that the licensee has utilized its **[[**

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4.0 INSTALLATION CONTROLS

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4.1 Pre-Installation Preparation

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4.2 Installation

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4.3 In-Process Inspection

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4.4 In-Process Repair

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4.5 Fire Protection

The licensee stated that the SW supply piping that will be repaired by CFRP composite system is buried and not subject to 10 CFR 50.48, "Fire Protection," paragraph c, "National Fire Protection Association Standard NFPA 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," 2001 edition." However, as depicted in Attachments B, C, D, E, and F of Enclosure 2 of the alternative request, the piping that terminates inside the RB, pipe tunnel or SW pump house will terminate onto existing piping. These terminal end areas are accessible allowing for preservice inspection and ISI of the interior and exterior piping, and fire protection consideration is required. In its supplement letter dated October 4, 2021, the licensee clarified that an NFPA 805 assessment will be performed to determine **[[**

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The NRC staff notes that the installed CFRP composite system of Brunswick SW supply piping is buried and not subject to fire protection requirements, except the areas shown in Attachments B, C, D, E, and F of Enclosure 2 of the alternative request. The licensee confirmed that **[[**

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5.0 PRESERVICE AND INSERVICE INSPECTIONS

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6.0 QUALITY CONTROLS

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In summary, the NRC staff finds that the design controls, material controls, installation control, and QA/QC of the proposed CFRP composite system satisfy the requirements of 10 CFR Part 50, Appendix B, and are, therefore, acceptable.

CONCLUSION

As set forth above, the NRC staff concludes that the proposed alternative, as described in the licensee's letter dated February 24, 2021, as supplemented by letters dated May 3, 2021, June 22, 2021, and October 4, 2021, provides an acceptable level of quality and safety for the buried SW supply piping by providing reasonable assurance that the structural integrity of the subject piping will be maintained. Accordingly, the NRC staff concludes that the licensee has adequately addressed the regulatory requirements set forth in 10 CFR 50.55a(z)(1). Therefore, the NRC staff authorizes the use of the proposed alternative for remainder of the fifth 10-year ISI interval, which is scheduled to end on May 10, 2028, at BSEP, Units 1 and 2.

All other requirements in ASME Code, Section XI for which relief or an alternative was not specifically requested and approved as part of this subject request remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

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Date: December 20, 2021

/RA/

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Office of Nuclear Reactor Regulation

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