July 3, 2017

Mr. Daniel G. Stoddard
President and Chief Nuclear Officer
Virginia Electric and Power Company
Innsbrook Technical Center
5000 Dominion Blvd.
Glenn Allen, VA 23060-6711

Subject: SURRY POWER STATION UNITS 1 AND 2 - REQUEST FOR ADDITIONAL INFORMATION REGARDING PROPOSED ALTERNATIVE TO ASME SECTION XI REQUIREMENTS FOR REPAIR/REPLACEMENT OF CIRCULATING AND SERVICE WATER CLASS 3 BURIED PIPING IN ACCORDANCE WITH 10 CFR 50.55A(z)(1) (CAC NOS. MF8987 AND MF8988)

By letter dated December 14, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16355A337), as supplemented by letter dated February 23, 2017 (ADAMS Accession No. ML17055C360), Virginia Electric and Power Company (the licensee) proposed an alternative to the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI, IWA-4000.

The licensee proposes to apply a carbon fiber reinforced polymer system for the internal repair of buried circulating water (CW) and service water (SW) piping at Surry Power Station Units 1 and 2.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the information provided in your application and determined that additional information is required in order to complete its review. A draft copy of the enclosed request for additional information (RAI) was provided to Mr. Gary Miller of your staff via e-mail on May 10, 2017. The licensee agreed to provide the RAI response within 60 days from the date of this letter. Enclosures 1 and 2 to this letter are the proprietary and non-proprietary versions of the RAIs, respectively.

Enclosure 1 transmitted herewith contains Proprietary information. When separated from Enclosure 1, this document is decontrolled.

If you have any questions, please contact me at 301-415-1438 or Karen.Cotton@nrc.gov.

Sincerely,

/RA MMahoney for/

Karen Cotton Gross, Project Manager
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-280 and 50-281

Enclosures:
1. RAI (Proprietary)
2. RAI (Non-proprietary)

cc w/Encl 2: Distribution via Listserv

ENCLOSURE 2 (NON-PROPRIETARY)

REQUEST FOR ADDITIONAL INFORMATION

PROPOSED ALTERNATIVE TO ASME SECTION XI REQUIREMENTS FOR

REPAIR/REPLACEMENT OF CIRCULATING AND

SERVICE WATER CLASS 3 BURIED PIPING

VIRGINIA ELECTRIC AND POWER COMPANY (DOMINION)

SURRY POWER STATION, UNITS 1 AND 2

DOCKET NOS. 50-280 AND 50-281

CAC NOS. MF8987 AND MF8988

By letter dated December 14, 2016 (Agencywide Documents Access and Management System Accession No. ML16355A337), with a supplement dated February 23, 2017 (ADAMS Accession No. ML17055C360), Virginia Electric and Power Company (the licensee) proposed alternative to the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI, IWA-4000. The licensee proposed to apply a carbon fiber reinforced polymer system for the internal repair of buried circulating water (CW) and service water (SW) piping at Surry Power Station Units 1 and 2.

To complete its review, the Nuclear Regulatory Commission (NRC) staff requests the following additional information. The Enclosures referred to in the request for additional information (RAI) are from the licensee's proposed alternative.

3.1 Affected Components

RAI 3.1-1 Section 4 of Enclosure 1 specifies that Carbon Fiber Reinforced Polymer (CFRP) will be applied to 24, 30, 36, 43 and 48-inch SW pipes and 96-inch CW pipes. **[[** [redacted] **]]** (a) Will small bore piping be repaired as part of this project or does the inclusion of the branch line only refer to repair of the Tee of which the branch line is a part? (b) If long sections of small bore piping are to be repaired, it is not apparent that the process for making this type of repair has been described sufficiently in the request. Please describe this process, and (c) Identify all branch lines and associated diameter that will be covered under the proposed alternative.

3.2 Applicable Code

RAI 3.2-1 (a) As stated in Section 5 of Enclosure 1, the proposed alternative has not yet determined the edition for the ASME Code, Section XI, for the Surry Unit 1 sixth 10-year inservice inspection (ISI) interval. Section 10 of Enclosure 1 states that the CFRP repair system alternative will be implemented during the fifth 10-year ISI internal that began December 14, 2013, and ends on October 13, 2023, except for a common Unit 1 and Unit 2 SW line will be completed during the Unit 1 sixth 10-year ISI interval. The NRC notes that the request is for multiple 10 year ISI intervals. The NRC staff also notes that the inspection of the repaired pipe is not a part of this request. Please confirm that this authorization request is to permit the repaired piping remain in service for the life of the repair and that any repair/replacement and/or inspections 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.

3.5.1 General Requirements

RAI 3.5.1-1 **[[** [redacted] **]]**

RAI 3.5.1-2 Discuss whether any locations in the proposed repair where the expected mode of degradation is other than loss of material, e.g., cracking or cavitation. If so, please explain how/why the proposed repair will be effective in mitigating the potential forms of degradation.

RAI 3.5.1-3 Discuss whether this repair will include pumps, valves, expansion joints, flange joints, small bore piping, and threaded connections If so, please clarify how the repair will be made and the basis for determining whether it will be effective. Please provide additional details concerning such repairs and success criteria.

RAI 3.5.1-4 **[[** [redacted] **]]**

RAI 3.5.1-5 **[[** [redacted] **]]**

3.5.2 Material Specification

RAI 3.5.2-1 Various sections of the proposed alternative provide temperature and pressures of interest to the design and application of the CFRP repair. Please identify

where in the submittal that the NRC may find the design temperature and pressure, maximum and minimum operating pressures (as defined by the ASME Code, Section XI) for the subject piping. Please provide (a) Design pressure and temperature of the CW piping and SW piping, (b) Maximum and minimum operating pressure and temperature of the CW piping and SW piping, (c) Maximum pressure and temperature that were used to qualify and analyze the CFRP system, excluding host pipe. (d) Clarify if **[[** **]]** discussed in the proposed alternative are the same as the operating pressure in the ASME Code, Sections III and XI.

RAI 3.5.2-2 **[[** **]]**

3.5.3 Testing

Quality Check for Fiber Fabrics

RAI 3.5.3-1 **[[** **]]**

Adhesion Test

RAI 3.5.3-2 **[[** **]]**

RAI 3.5.3-3 **[[** **]]**

Density Test

RAI 3.5.3-4 [[ ]]

Tensile Testing

RAI 3.5.3-5 [[ ]]

RAI 3.5.3-6 [[ ]]

RAI 3.5.3-7 [[ ]]

Durability testing

RAI 3.5.3-8 [[ ]]

RAI 3.5.3-9 [[ ]]

Curing Testing

RAI 3.5.3-10 [[ ]]

[redacted]

RAI 3.5.3-11 [redacted]

Heat Transfer Test

RAI 3.5.3-12 [redacted]

Weight Test

RAI 3.5.3-13 [redacted]

Pressure Testing

RAI 3.5.3-14 Please discuss (a) Whether a pressure test will be performed on the CFRP-repaired piping prior to the plant startup. If yes, discuss the test pressure that will be used and hold time. (b) Whether VT-2 inspection will be performed as part of pressure testing and (c) Whether the pressure test will be performed in accordance with the ASME Code, Section IWA-5000 and IWD-5000, and, if a pressure test will not be performed, provide justification.

3.5.4 Design

EMCB-RAI-1 Section 11 of Enclosure 1 mentions repair using CFRP for non-safety-related piping of diameter as low as 30 inches. [redacted] Provide a discussion describing the accessibility for repair of the [redacted] and if the repair can be performed satisfactorily to maintain adequate structural integrity.

EMCB-RAI-2 Enclosure 2 states that CFRP repairs include 90 degree vertical elbows, 45 degree vertical bends, tie-ins and other discontinuities in addition to straight pipe segments. [[ ]]

EMCB RAI-3 [[ ]]

EMCB-RAI-4 [[ ]]

[redacted]

EMCB-RAI-5 [redacted]

EMCB-RAI-6 [redacted]

EMCB-RAI-7 [redacted]

[redacted]

]]

EMCB-RAI-8 [[[redacted]

]]

EMCB-RAI-9 [[[redacted]

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EMCB-RAI-10 [[[redacted]

]]

EMCB-RAI-11 [[ ]]

RAI 3.5.4-2 [[ ]]

RAI 3.5.4-3 [[ ]]

RAI 3.5.4-4 [[ ]]

3.5.5 Failure Modes and Effects Analysis

RAI 3.5.5-1 [[ ]]

RAI 3.5.5-2 [[ ]]

RAI 3.5.5-3 [[ ]]

RAI 3.5.5-4 [[ ]]

RAI 3.5.5-5 [[ ]]

3.5.6 Pre-Installation Evaluation

RAI 3.5.6-1 [[ ]]

RAI 3.5.6-2 [[ ]]

RAI 3.5.6-3 [[ ]]

RAI 3.5.6-4 [[ ]]

RAI 3.5.6-5 [[ ]]

RAI 3.5.6-6 [[ ]]

3.5.7 Installation

RAI 3.5.7-1 [[ ]]

RAI 3.5.7-2 [[ ]]

RAI 3.5.7-3 [[ ]]

RAI 3.5.7-4 [[ ]]

RAI 3.5.7-5 [[ ]]

[redacted]

RAI 3.5.7-6 [redacted]

RAI 3.5.7-7 [redacted]

RAI 3.5.7-8 [redacted]

RAI 3.5.7-9 [redacted]

[redacted]

RAI 3.5.7-10 [redacted]

RAI 3.5.7-11 [redacted]

3.5.8 Examinations

Acceptance Examination

RAI 3.5.8-1 [redacted]

RAI 3.5.8-2 [redacted]

RAI 3.5.8-3 [redacted]

Inservice Examination

RAI 3.5.8-4 [redacted] (a) Please discuss how the inservice inspections of the CFRP-repaired CW and SW piping satisfy the requirements of Section XI of the ASME Code for buried pipe. (b) Will periodic inspections of the inside diameter surface of the repaired CW and SW piping be conducted, if so, at what interval and by what method? (c) Confirm that after the SW piping is repaired with the CFRP system, the SW pipe will still be inspected in accordance with NRC Generic Letter 89-13.

RAI 3.5.8-5 **[[** [redacted] **]]** (a) Discuss the acceptance criteria for visual inspections. (b) If the CFRP layers are found to be damaged or degraded, discuss the corrective actions.

Miscellaneous RAIs

RAI M-1 Please (a) Submit detailed and legible drawings and sketches, including dimensions, of the pipe terminal ends. The drawings should include where the expansion rings are installed, the end of the CFRP layers, and the area of the pipe that does not have the CFRP layers. (b) Submit drawings or sketches showing a typical cross section of the repaired pipe, including the concrete encasement, and soil above and below the buried piping. Provide dimensions if available. (c) **[[** [redacted] **]]**

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