From: Thomas, Vaughn
Sent: Thursday, February 11, 2021 3:51 PM
To: gary.d.miller@dominionenergy.com
Subject: Surry, Units 1 & 2 - Draft RAI for the LBB LAR
Attachments: Draft RAI for the Surry Branch Line LBB LAR Application_Feb 11 2021.docx

Good Afternoon Gary,

Attached is the draft RAI regarding the review of the LBB LAR. The question is being transmitted to you to determine 1) if the questions clearly convey the NRC informational needs, 2) whether the regulatory basis for the questions are clear, and 3) If the information has already been provided in existing docketed correspondence. Additionally, review of the draft questions **(within 5 days – COB 02/16/2021**) will allow you to determine whether you are able to support a 30 day response time. If the licensee needs a clarification call within that timeframe, the staff will be available to participate on the call.

Thank you,

Vaughn Thomas, Project Manager
Plant Licensing Branch II-1
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Hearing Identifier: NRR_DRMA
Email Number: 1023

Mail Envelope Properties (BLAPR09MB69007EDE697152E94757BD5BF48C9)

Subject: Surry, Units 1 & 2 - Draft RAI for the LBB LAR
Sent Date: 2/11/2021 3:50:51 PM
Received Date: 2/11/2021 3:50:51 PM
From: Thomas, Vaughn

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Tracking Status: None

Post Office: BLAPR09MB6900.namprd09.prod.outlook.com

Files	**Size**	**Date & Time**	
MESSAGE	875	2/11/2021 3:50:51 PM	
Draft RAI for the Surry Branch Line LBB LAR Application_Feb 11 2021.docx			37920

Options
Priority: Normal
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:

REQUEST FOR ADDITIONAL INFORMATION

LICENSE AMENDMENT REQUEST REGARDING APPLICATION OF LEAK-BEFORE-BREAK FOR AUXILIARY PIPING LINES ATTAHED TO THE REACTOR COOLANT SYSTEM

VIRGINIA ELECTRIC AND POWER COMPANY

SURRY POWER STATION UNITS 1 AND 2

DOCKET NOS. 50-280 AND 50-281

EPID: L-2020-LLA-0255

Regulatory Basis

For Surry Units 1 and 2, the Nuclear Regulatory Commission (NRC) issued the construction permits before May 21, 1971; consequently, Surry Units 1 and 2 were not subject to the requirements in Title 10 of the Code of Federal Regulations (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," Appendix A, "General Design Criteria [GDC] for Nuclear Power Plants" (see SECY-92-223, "Resolution of Deviations Identified during the Systematic Evaluation Program," dated September 18, 1992 (Reference 13). Surry Units 1 and 2 meet the intent of the GDC published in 1967 (draft GDC).

The NRC staff considered the following regulatory requirements and guidance during its review of the proposed changes the Surry application: 10 CFR 50, Appendix A, General Design Criterion (GDC) 4, "Environmental and dynamic effects design bases," and the regulatory guidance provided in NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," Section 3.6.3, "Leak-Before-Break [LBB] Evaluation Procedures."

10 CFR 50, Appendix A, GDC 4 stipulates that structures, systems, and components important to safety shall be designed to accommodate the effects and to be compatible with the environmental conditions associated with normal operation. It also states, in part, that dynamic effects associated with postulated pipe ruptures in nuclear power units may be excluded from the design basis when analyses reviewed and approved by the Commission demonstrate that the probability of fluid system piping rupture is extremely low under conditions consistent with the design basis for the piping.

Acceptance criteria set forth in 10 CFR 50, Appendix A, GDC 4 and the results of the LBB evaluation must show that the acceptance criteria are met.

Background

By latter dated October 22, 2020, Virginia Electric and Power Company (Dominion Energy Virginia or licensee) requests an amendment to the Surry Power Station (Surry) Units 1 and 2 operating licenses in accordance with 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit." Specifically, NRC approval is requested to permit the application of the leak-before-break (LBB) methodology to auxiliary piping systems attached to the reactor coolant system (RCS) for Surry Units 1 and 2 to eliminate the dynamic effects of postulated pipe ruptures. The licensee also submitted the non-proprietary and proprietary versions of WCAP-18491, Revision 0, "Technical Justification for Eliminating Auxiliary Piping

Ruptures as the Structural Design Basis for Surry Units 1 and 2, Using Leak-Before-Break Methodology."

Requests

The NRC staff requests the following information to complete its review of the proposed change to revise the Surry Units 1 and 2 licensing and design bases to expand the LBB scope to eliminate the dynamic effects of postulated ruptures of specific portions of the auxiliary piping systems attached to the reactor coolant system (RCS).

a. Table 7-2, "Flaw Stability Results for the Surry Units 1 and 2 RHR, Accumulator, Loop Bypass, and SI Lines Based on Limit Load and EPFM," of WCAP-18491, Revision 0 lists the piping segments that are analyzed in the WCAP report. Please describe which segments are within the scope of the amendment and identify which portions of the table address the subject piping .

b. Table 7-2 of WCAP-18491, Revision 0, indicates elastic-plastic fracture mechanics analysis is performed for piping segments SI-CL-II and SI-HL-I. Please clarify where in the WCAP report details of the fracture mechanics analysis and its results can be found or provide separate details supporting justification. If these segments are within the scope of the licensee's request, provide the elastic-plastic J-integral evaluation results for the segments (e.g., applied J integral and tearing modulus). Also, please describe the details of the critical crack size calculation using the J-integral method such as the Ramberg-Osgood parameters and the combination of axial tension and bending components, as appropriate.

c. Please clarify where in WCAP-18491, Revision 0, how the base materials are limiting materials as compared to the weld materials or provide separate justification. Please discuss the test data or references that support the position that tensile and fracture toughness properties of the base stainless steel materials are more limiting than those of the stainless steel welds in the subject piping. Please provide the J-integral fracture toughness parameters C and n used in $J = C(\Delta a)^n$ for the base stainless steels (or equivalent fracture toughness data), as appropriate.

d. WCAP-18491, Revision 0, addresses fatigue crack growth (FCG) analyses. Please identify where in the report that the FCG rate equation is used in the analyses or describe the fatigue FCG rate equation that is used in the FCG analyses.