

**From:** [Sayoc, Emmanuel](#)  
**To:** ["Daniel.g.stoddard@dominionenergy.com"](mailto:Daniel.g.stoddard@dominionenergy.com)  
**Cc:** [Wu, Angela](#); [Tony Banks](#); ["Paul Aitken"](#); [Oesterle, Eric](#); [Eric A Blocher](#)  
**Subject:** FINAL REQUESTS FOR ADDITIONAL INFORMATION FOR THE SAFETY REVIEW OF THE SURRY POWER STATION, UNITS 1 AND 2 SUBSEQUENT LICENSE RENEWAL APPLICATION (L-2018-RNW-0023/000951) – SET 4  
**Date:** Wednesday, August 14, 2019 7:51:36 AM  
**Attachments:** [Attachment 1 - Surry SLRA Final RAI Summary Index - Set 4.pdf](#)  
[Attachment 2 - Surry SLRA Final RAIs Package Set 4.pdf](#)  
**Importance:** High

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Docket No. 50-280 and 50-281

Dear Mr. Stoddard,

By letter dated October 15, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18291A842), as supplemented by letters dated January 29, 2019 (ADAMS Accession No. ML19042A137), and April 2, 2019 (ADAMS Accession No. ML19095A666), Virginia Electric and Power Company (Dominion Energy Virginia or Dominion) submitted to the U.S. Nuclear Regulatory Commission (NRC or staff) an application to renew the Renewed Facility Operating License Nos. DPR-32 and DPR-37 for the Surry Power Station, Unit Nos. 1 and 2. Dominion submitted the application pursuant to Title 10 of the *Code of Federal Regulations* Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants," for subsequent license renewal.

From August 6, 2019 through August 8, 2019, the U.S Nuclear Regulatory Commission (NRC) staff sent Dominion the draft Requests for Additional Information (RAIs) for various technical review packages (TRP). Dominion subsequently informed the NRC staff that clarification calls were needed to discuss the information requested. Between August 8, 2019 through August 12, 2019, clarification calls were completed for all the draft RAIs unless Dominion declined having a call. The specific dates of the draft RAI transmittals and the RAIs clarification calls are summarized in Attachment 1. The final RAIs resulting from these calls are enclosed in Attachment 2.

Paul Aitken of your staff agreed to provide a response to these RAIs within 30 days of the date of this email. The NRC staff will be placing a copy of this email and attachments in the NRC's ADAMS.

Sincerely,

Emmanuel Sayoc, Project Manager  
License Renewal Projects Branch (MRPB)  
Division of Materials and License Renewal  
Office of Nuclear Reactor Regulation

Docket No. 50-280 and 50-281

Attachments:  
As stated

OFFICE	PM:MRPB:DMLR	BC: MRPB:DMLR	PM: MRPB:DMLR

NAME	ESayoc	EOesterle	ESayoc
DATE	08/13/2019	08/14/2019	08/14/2019

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### Surry SLRA RAI Set 4 Index

Item No	RAI Set	TRP	RAI Number	Issue	Date - Draft RAI Sent To Applicant	Date - Clarification Call	Clarification Call Attendees - Applicant	Clarification Call Attendees - NRC	Issue Date
1	4	30	B.2.1.28-5a	Fuel Oil Chemistry	08/06/2019	08/08/2019	Paul Aitken, Eric Blocher, Tony Banks, James Johnson,	Bill Rogers, Steve Bloom, Brian Wittick, Jua Lopez, Goerge	08/14/2016
2	4	46	B.2.1.34-1a	Structures Monitoring - Wooden Poles	08/06/2019	08/08/2019	Paul Aitken, Eric Blocher, Tony Banks, James Johnson, Ron Burner, Rick Eagan	Bill Rogers, Steve Bloom, Brian Wittick, Jua Lopez, Goerge Wang, Emmanuel Sayoc	08/14/2016
3	4	17	B.2.1.8-1a	Flow-Accelerated Corrosion	08/08/2019	08/12/2019	Paul Aitken, Tom Snow, Eric Blocher, Bryan McCarter, James Zaborowski	Alex Chereskin, Jim Gavula, Emmanuel Sayoc	08/14/2016
4	4	17	B.2.1.8-3a	Flow-Accelerated Corrosion	08/08/2019	08/12/2019	Paul Aitken, Tom Snow, Eric Blocher, Bryan McCarter, James Zaborowski	Alex Chereskin, Jim Gavula, Emmanuel Sayoc	08/14/2016

**SURRY POWER STATION, UNITS 1 AND 2**  
**Subsequent License Renewal Application (SLRA)**  
**Request for Additional Information**  
(Set 4)

Regulatory Basis:

10 CFR 54.21(a)(3) requires an applicant to demonstrate that the effects of aging for structures and components will be adequately managed so that the intended function(s) will be maintained consistent with the current licensing basis for the period of extended operation. One of the findings that the staff must make to issue a renewed license (10 CFR 54.29(a)) is that actions have been identified and have been or will be taken with respect to managing the effects of aging during the period of extended operation on the functionality of structures and components that have been identified to require review under 10 CFR 54.21, such that there is reasonable assurance that the activities authorized by the renewed license will continue to be conducted in accordance with the current licensing basis. In order to complete its review and enable making a finding under 10 CFR 54.29(a), the staff requires additional information in regard to the matters described below.

**TRP 15: Internal Coatings, TRP 30: Fuel Oil Chemistry**

**RAI B2.1.28-5a**

Background:

As amended by letter dated April 2, 2019, SLRA Section B2.1.28, Enhancement No. 1 provides a list of components, including tanks, which will be inspected as part of the program. This list did not include the security diesel fuel oil tank, which is within the scope of the Fuel Oil Chemistry program.

As amended by letter dated April 2, 2019, SLRA Section B2.1.18, "Fuel Oil Chemistry," Exception No. 1 states the following regarding the security diesel fuel oil tank: "[t]he wall of the interior tank is provided with a solvent-based rust preventive film (not considered a coating)."

The "scope of program" program element of GALL-SLR Report XI.M42, "Internal Coatings/Linings For In-Scope Piping, Piping Components, Heat Exchangers, and Tanks," recommends that internally coated tanks exposed to fuel oil, where loss of coating or lining integrity could prevent satisfactory accomplishment of any of the component's or downstream component's current licensing basis intended functions, are included within the scope of the program.

The response to RAI B2.1.28-5 dated June 27, 2019 (ADAMS Accession No. ML19183A440), states the following:

As required by the Fuel Oil Chemistry program (B2.1.18), the security diesel generator fuel oil tank is sampled quarterly and the samples are analyzed for particulates consistent with ASTM D6217-98, "Standard Test Method for Particulate Contamination in Middle Distillate Fuels by Laboratory Filtration." Since the security diesel generator fuel oil tank was originally installed in 2011, quarterly test results noted below demonstrate fuel oil particulate levels have remained below the 10 mg/L acceptance limit over the installed life of the tank.

Issue:

1. The response to RAI B2.1.28-5 did not provide any information regarding the specific type of film used on the internal surfaces of the security diesel fuel oil tank, or information regarding potential age-related failure modes outside of particulate generation (e.g. failure into sheets). The staff notes that all coatings (e.g., epoxy) are either water-based or solvent-based.
2. An adequate basis was not provided for why particulate testing would be an effective indicator of film degradation. It is unclear how a coating, or film, which could potentially degrade into large sheets (i.e., as opposed to small particles) would be detected through particulate testing. Additionally, it isn't clear where the fuel oil filter is located.

Request:

1. State the specific type of film used on the internal surfaces of the security diesel fuel oil tank (e.g., product data sheet), and potential age-related failure modes that might impact the intended function of the security diesel fuel oil tank, or downstream components.
2. State the basis for why any potential age-related failure modes (e.g., accumulated particulate in the bottom of the tank) would not lead to flow blockage in the fuel oil filter or injectors sufficient to impact the intended function of the diesel.

**TRP 17: Flow-Accelerated Corrosion**

**RAI B2.1.8-1a**

Background:

In SLRA, Section B2.1.8, "Flow-Accelerated Corrosion," the applicant claimed consistency with the GALL-SLR Report AMP XI.M17, "Flow-Accelerated Corrosion." SLRA Section B2.1.8 states that the erosion activity implements the recommendation of EPRI 3002005530, "Recommendations for an Effective Program Against Erosive Attack." The "parameters monitored or inspected," "detection of aging effects," and "monitoring and trending" program elements for GALL-SLR Report AMP XI.M17 discuss recommendations to monitor, detect, and trend degradation due to erosion mechanisms (e.g. cavitation, flashing, etc.).

During the In-Office audit, the staff reviewed the program basis document ETE-SLR-2018-1311, "Surry Subsequent License Renewal Project – Aging Management Program Evaluation Report – Flow-Accelerated Corrosion," Revision 1, to evaluate whether the applicant is consistent with the GALL-SLR Report AMP XI.M17 recommendations for the flow-accelerated corrosion (FAC) program. In the document, the applicant stated that the FAC erosion module in CHECWORKS will be used to assist in the development of the inspection plan for the Erosion Control program.

Issue:

In its response to RAI B2.1.8-1, dated July 17, 2019 (ADAMS Accession No. ML19204A357), the applicant stated that EPRI 3002005530 is referenced in its Erosion Control Program implementing procedure, and provides the basis used in the erosion module for component inspection, inspection techniques, determination of wear rate and service life, and determination of component replacement. However, the applicant's RAI response does not appear to discuss specifically how the erosion module in CHECWORKS is used to plan inspections, determine wear rate, etc.

Additionally, the erosion module in CHECWORKS appears to have different predictive capabilities for different erosion mechanisms. It is unclear to the staff how the outputs from this software are used in the applicant's erosion program.

Request:

Provide a justification for how the FAC erosion module in the CHECWORKS software is used to model erosion, how the results will be used in planning erosion inspections, and how this meets the recommendations of the GALL-SLR with respect to monitoring effects of wall thinning due to erosive mechanisms, its use in planning inspections for erosive degradation, as well as for monitoring and trending potential degradation due to erosive mechanisms. Additionally, given that the FAC erosion module in CHECWORKS has different capabilities for different erosion mechanisms, the justification should include a discussion that describes what outputs from the erosion module are used in the applicant's program and how the results from the erosion module are validated by applicant inspections.

**RAI B2.1.8-3a**

Background:

As supplemented by letter dated April 2, 2019, SLRA Table 3.3.2-6 "Bearing Cooling," was modified to address the potential for erosion in valve bodies constructed of several different materials. The supplement also states that cavitation in this system could be caused by valve throttling. Additionally, condition report CR1031398, "BC Valve – Indication of Cavitation," describes cavitation in a Unit 1 bearing cooling valve and notes that the valve was previously replaced in 2013 due to a pin hole leak in the valve body. This CR also notes that the current non-destructive examination strategy doesn't evaluate the valve body for wall thinning. The staff notes that condition report CR1026621, "2-BC-505 Has a Through-Wall Leak," describes a through-wall leak for the corresponding Unit 2 valve; however, the cause of the leak was not included in the summary documentation.

The applicant's erosion susceptibility evaluation (ESE) (ETE-CME-2018-1002, Revision 1, "Transmittal of True North Consulting Technical Report BP-2017-0045-TR-01, Erosion Susceptibility Evaluation – Surry," September 2018) designated the bearing cooling system as

not being susceptible to cavitation because the cavitation index is greater than 2.5. The ESE states that the bearing cooling system is a closed-loop system which does not have large enough pressure drops for cavitation to occur. The staff notes that comments for other systems in the ESE identify the potential for cavitation and flashing downstream of throttle valves and orifices. The ESE indicates that the criteria for the cavitation index greater than 2.5 is "a rule of thumb" and cites a reference to a valve manufacturer publication. The associated implementing procedure, ER-AA-FAC-105, "Erosion Control Program," Section 3.1.1 states that the ESE is to be periodically updated based on relevant operating experience.

The response to RAI B2.1.8-3 dated July 17, 2019 (ADAMS Accession No. ML19204A357), states that the input for the erosion susceptibility evaluation included a review of plant operating experience to determine locations with a history of erosion failure, and that the bearing cooling system was determined to not be susceptible based on the absence of erosion failures.

Issue:

In its initial request the NRC staff requested information regarding whether other systems (i.e. in addition to the bearing cooling system) determined to not be susceptible to erosive mechanisms could be affected in a similar manner as the bearing cooling system (i.e. change of operating conditions lead to higher erosion susceptibility). In its response to RAI B2.1.8-3 the applicant stated that plant information has not indicated other systems that may have higher erosion susceptibility than was stated in the ESEs.

Although the response to RAI B2.1.8-3 states that the bearing cooling system was determined to not be susceptible based on the absence of erosion failures, the two CRs referenced above (CR1031398 and CR1026621) describe erosive failures (i.e. cavitation) in the bearing cooling system.

The staff noted the residual heat removal and chemical and volume control (CVCS) systems are identified in the current ESE as not susceptible to cavitation although NRC Information Notices 89-01 and 98-45 describe these systems as potentially susceptible. Additionally, EPRI 3002005530, which is referenced by the applicant's Erosion Control Program, states that the CVCS system is potentially susceptible to erosion. These are some examples of instances where the exclusion criteria as noted in the applicant's ESE may not apply and where the staff may need additional explanation for why these criteria are applied. These examples are used to demonstrate that systems not frequently in service may be susceptible to erosion, and plant operations (IN 98-45 cites an incorrectly adjusted blowdown setting of a pressure relief valve) can impact susceptibility to erosion. Additionally, EPRI Report TR-112657, "Revised Risk-Informed Inservice Inspection Evaluation Procedure," Revision B-A, December 1999, discusses a lower threshold for erosion susceptibility than the 2% cited in the applicant's ESE.

Request:

1. Provide a description of what plant information was reviewed and how it was determined that no other systems may have higher erosion susceptibility than was initially stated in the ESEs.

2. Also, justify use of the exclusion criteria for susceptibility to cavitation related to pressure drops as well as the service time exclusion criterion given the discussion in the 'Issue' section above.
3. Additionally, describe how the initial ESE included and performed a review of site-specific operating experience as part of the susceptible evaluation, given that the bearing cooling system had experienced erosion

## **TRP 46: Structures Monitoring**

### **RAI B2.1.34-1a**

#### Background:

Dominion addressed the age-related degradation of loss of material and change in material properties for wooden power poles by including a plant-specific enhancement to the "detection of aging effects" program element of the Structures Monitoring Program (SLRA Section B2.1.34). This enhancement specifies that wooden power poles will be inspected on a 10-year frequency. However, the staff needed additional information to evaluate the adequacy of the proposed 10-year inspection frequency for wooden poles which resulted in the issuance of RAI B2.1.34-1.

In its response to RAI B2.1.34-1, dated July 17, 2019 (ADAMS Accession No. ML19204A357), Dominion stated that the 10-year inspection period was appropriate for the chromate copper arsenate (CCA) treated southern pine poles at Surry by considering the fifty-year durability evaluation from the USDA Forest Products Laboratory. Dominion also stated that there are 14 CCA wooden poles installed at Surry that were manufactured in 1981 or later.

SRP-SLR Section A.1.2.3.4 recommends that the discussion for the "detection of aging effects" program element should provide, in part, justification, including codes and standards referenced, to demonstrate that the technique and frequency are adequate to detect the aging effects before a loss of intended function.

#### Issue:

Dominion's response to RAI B2.1.34-1 does not provide adequate justification for the proposed 10-year inspection frequency of wooden poles, because the service life of at least some of the poles would exceed 50 years prior to entering the subsequent period of extended operation and no previous inspections would have been performed. The staff notes that the durability study referenced by Dominion for the CCA-treated southern pine poles specifically establishes the basis for the fifty-year durability of treated wood products; however, it does not establish inspection frequency criteria for use with treated wood poles after the fifty years of service. Furthermore, the response did not clearly provide the criteria, based on the expected decay at the site's location (deterioration zone), to establish the 10-year inspection frequency, and when the initial inspection that would establish the baseline condition will be performed at the site. Treated poles are expected to eventually lose resistance to decay (e.g., after the treatment service life) and their vulnerability and inspection criteria should be proportioned to the level of



decay that is expected at the site's location (deterioration zone) to ensure that the aging effects can be detected before a loss of intended function.

Request:

Provide justification that would demonstrate, pursuant to 10 CFR 54.21(a)(3), that the proposed inspection frequency for wooden poles will be adequate to detect the associated aging effects before a loss of intended function considering the site's location. Also, clarify when the initial baseline inspection will occur, the type of inspection that will be performed to assess the poles' current condition, and its role, if any, in determining subsequent inspection frequency.