



## NON-CONCURRENCE PROCESS COVER PAGE

The U.S. Nuclear Regulatory Commission (NRC) strives to establish and maintain an environment that encourages all employees to promptly raise concerns and differing views without fear of reprisal and to promote methods for raising concerns that will enhance a strong safety culture and support the agency's mission.

Employees are expected to discuss their views and concerns with their immediate supervisors on a regular, ongoing basis. If informal discussions do not resolve concerns, employees have various mechanisms for expressing and having their concerns and differing views heard and considered by management.

Management Directive, MD 10.158, "NRC Non-Concurrence Process," describes the Non-Concurrence Process (NCP).

The NCP allows employees to document their differing views and concerns early in the decisionmaking process, have them responded to (if requested), and include them with proposed documents moving through the management approval chain to support the decisionmaking process.

NRC Form 757, "Non-Concurrence Process," is used to document the process.

Section A of the form includes the personal opinions, views, and concerns of a non-concurring NRC employee.

Section B of the form includes the personal opinions and views of the non-concurring employee's immediate supervisor.

Section C of the form includes the agency's evaluation of the concerns and the agency's final position and outcome.

NOTE: Content in Sections A and B reflects personal opinions and views and does not represent the official agency's position of the issues, nor official rationale for the agency decision. Section C includes the agency's official position on the facts, issues, and rationale for the final decision.

1. If the process was discontinued, please indicate the reason (and skip to #3):

- ☐ Non-concurring employee(s) requested that the process be discontinued
- ☐ Subject document was withdrawn

2. At the completion of the process, the non-concurring employee(s):

- ☐ Concurred
- ☒ Continued to non-concur
- ☐ Agreed with some of the changes to the subject document, but continued to non-concur

3. For record keeping purposes:

- ☐ This record is non-public and for official use only
- ☒ This record has been reviewed and approved for public dissemination

<b>NRC FORM 757</b> (06-2019) NRC MD 10.156	<b>U.S. NUCLEAR REGULATORY COMMISSION</b>  <b>NON-CONCURRENCE PROCESS (Continued)</b>	<b>1. NCP Tracking Number</b> NCP-2020-001  <b>Date</b> 1/10/2020
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**Section A - To Be Completed By Non-Concurring Employee**

<b>2. Title of Subject Document</b> Safety Evaluation Report Related to the Subsequent License Renewal of Surry Power Station, Units 1 and 2		<b>3. ADAMS Accession Number</b>  ML19360A020
<b>4. Document Signer</b> Anna Bradford	<b>5. Document Signer's Phone Number</b> (Enter 10 numeric digits) (301) 415-1560	
<b>6. Title of Document Signer</b> Division Director	<b>7. Office</b> (Choose from the drop down list or fill in) NRR	
<b>8. Name of Non-Concurring Employee(s)</b> Brian Allik	<b>9. Employee's Telephone Number</b> (Enter 10 numeric digits) (610) 337-5376	
<b>10. Title of Non-Concurring Employee</b> Materials Engineer	<b>11. Office</b> (Choose from the drop down list or fill in) NRR	
<b>12.</b> <input type="checkbox"/> Document Author <input checked="" type="checkbox"/> Document Contributor <input type="checkbox"/> Document Reviewer <input type="checkbox"/> On Concurrence		
<b>13. Name of Non-Concurring Employee's Supervisor</b> Steven Bloom	<b>14. Office</b> (Choose from the drop down list or fill in) NRR	
<b>15. Title of Non-Concurring Employee's Supervisor</b> Branch Chief	<b>16. Supervisor's Telephone Number</b> (Enter 10 numeric digits) (301) 415-2431	
<b>17.</b> <input checked="" type="checkbox"/> I would like my non-concurrence considered and would like a written evaluation in Section B and C. <input type="checkbox"/> I would like my non-concurrence considered, but a written evaluation in Sections B and C is not necessary.		
<b>18. When the process is complete, I would like management to determine whether public release of the NCP Form (with or without redactions) is appropriate (Select "No" if you would like the NCP Form to be non-public):</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
<b>19. Reasons for the Non-Concurrence, Potential Impact on Mission, and the Proposed Alternatives</b>  <p>Background: On October 14, 2019 (ADAMS Accession No. ML19294A044), Dominion submitted an annual update associated with the Surry Subsequent License Renewal Application (SLRA). In the annual update, Dominion revised SLRA Section B2.1.16, "Fire Water System," to include operating experience from July 2019 associated with buried gray cast iron fire protection system piping. Dominion stated the following regarding the newly identified operating experience:</p> <ul style="list-style-type: none"> <li>• Two buried Fire Protection system piping ruptures occurred at the west end of the Old Administration Building and below the road leading to the Turbine Building track bay.</li> <li>• Long standing exposure to moist or wet soil resulted in external corrosion and the subsequent reduction in wall thickness at these locations.</li> </ul> <p>For context, the Fire Water System program manages the effects of aging on the internal surfaces of buried fire protection system piping. The effects of aging on the external surfaces of buried gray cast iron fire protection system piping are managed by the following: (a) the Buried and Underground Piping and Tanks program when the aging mechanism is general corrosion; and (b) the Selective Leaching program when the aging mechanism is selective leaching, which is commonly referred to as dealloying or graphitic corrosion.</p>		



NRC FORM 757

(06-2019)\*

NRC MD 10.156

U.S. NUCLEAR REGULATORY COMMISSION

**NON-CONCURRENCE PROCESS (Continued)**

1. NCP Tracking Number  
NCP-2020-001

Date  
1/10/2020

Based on questions from the NRC staff, by letter dated October 31, 2019 (ADAMS Accession No. ML19310E716), Dominion provided additional details regarding the operating experience identified in the October 14, 2019, letter as follows:

- The analysis determined that the identified graphitic corrosion was a result of groundwater exposure of the cast iron fire protection piping between roughly the 5 o'clock to 7 o'clock positions.
- Because graphitic corrosion is a long-term corrosion mechanism, it is believed the corrosion resulted from extended contact with groundwater and was not due to the packing leak identified 1 year prior.

In response to the operating experience, Dominion modified SLRA Section B2.1.21, "Selective Leaching," to include a requirement to dig exploratory holes to confirm the presence of groundwater around the buried fire water main loop piping. Dominion also stated: (a) fire protection loop piping will be excavated and inspected at each hole where groundwater has been confirmed; and (b) each excavation will also include a soil sample, in accordance with the Buried and Underground Piping and Tanks program.

**Issue:** Dominion is relying on a singular criterion (i.e., the presence of groundwater) to conduct follow-up excavations and soil testing; however, it is well established that moist soil (i.e., soil without standing water) with adverse soil properties (e.g., low soil resistivity, low pH, low or negative redox potential, presence of sulfides) can cause significant graphitic corrosion of cast iron. Specifically, the staff notes the following:

- AWWA C105, "Polyethylene Encasement for Ductile-Iron Pipe Systems," Table A.1, "Soil-Test Evaluation," (the soil corrosivity standard cited in GALL-SLR Report AMP XI.M41, "Buried and Underground Piping and Tanks") assigns point values for the soil parameters of soil resistivity, pH, redox potential, sulfides, and to soil moisture to determine an overall soil corrosivity index for ductile iron.
- The "cast iron" column in Table 9-4, "Soil Corrosivity Index from BPWORKS," of EPRI Report 3002005294, "Soil Sampling and Testing Methods to Evaluate the Corrosivity of the Environment for Buried Piping and Tanks at Nuclear Power Plants," assigns point values for the soil parameters of soil resistivity, pH, redox potential, sulfides, and to soil moisture to determine an overall soil corrosivity index for cast iron.
- *Corrosion Failures - Theory, Case Studies, and Solutions* states that soils of low pH cause high graphitic corrosion.
- *Corrosion - Understanding the Basics* states that moist soils, especially those containing sulfates, will frequently produce graphitic corrosion of unprotected gray and nodular cast iron.

In addition, the soil analysis provided by Dominion in the October 31, 2019, letter documents low pH and low soil resistivity, indicating that soil parameters other than standing water may have contributed to the ruptures. During a call with Dominion on November 7, 2019, the staff questioned why relying on a singular criterion (i.e., the presence of groundwater) is technically adequate. This was comment No. 1 (of six comments) discussed during the call. By letter dated November 19, 2019 (ADAMS Accession No. ML19329A287), Dominion stated the following:

On November 7, 2019, in an email from Angela Wu (NRC) to Paul Aitken (Dominion), the NRC provided six comments on Dominion's October 31, 2019 submittal. During a follow-up telecom between Dominion and NRC that same day, it was determined that no action was required on behalf of Dominion for comments 1, 3, and 4.

In lieu of having Dominion address comment No. 1, the "operating experience" section of SER Section 3.0.3.1.6, "Selective Leaching," states that changes to the AMP to address possible issues (e.g., long-standing exposure to moist corrosive soil), if necessary, will be identified as Dominion completes its development of corrective actions. I disagree with the characterization in SER Section 3.0.3.1.6 that this concern only rises to the level of a "possible

NRC FORM 757

(06-2019)

NRC MD 10.156

U.S. NUCLEAR REGULATORY COMMISSION

**NON-CONCURRENCE PROCESS (Continued)**

1. NCP Tracking Number

NCP-2020-001

Date

1/10/2020

issue." Relying on a singular criterion (i.e., the presence of groundwater), while ignoring the impact of other soil parameters (i.e., soil resistivity, pH, redox potential, sulfides), is a significant technical deficiency in the current AMP. Without a basis for relying on a singular criterion (or a specific commitment to conduct soil corrosivity testing in the vicinity of buried gray cast iron fire water system piping if a basis cannot be provided), it is unclear how the staff can conclude that Dominion has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the subsequent period of extended operation, as required by 10 CFR 54.21(a)(3).

References:

1. AWWA. C105, "Polyethylene Encasement for Ductile-Iron Pipe Systems." Denver, Colorado: American Water Works Association. 2010.
2. EPRI 3002005294, "Soil Sampling and Testing Methods to Evaluate the Corrosivity of the Environment for Buried Piping and Tanks at Nuclear Power Plants." Palo Alto, California: Electric Power Research Institute. November 6, 2015.
3. Elayaperumal, K. Raja, V. S.. (2015). Corrosion Failures - Theory, Case Studies, and Solutions. John Wiley & Sons.
4. J.R. Davis. (2000). Corrosion - Understanding the Basics. ASM International.

**20. Signature and Date of Non-Concurring Employee**

Brian D. Allik

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NRC FORM 757

(06-2019)

NRC MD 10.156

U.S. NUCLEAR REGULATORY COMMISSION

1. NCP Tracking Number  
NCP-2020-001

## NON-CONCURRENCE PROCESS (Continued)

Date

1/10/2020

## Section B - To Be Completed By Non-Concurring Employee's Supervisor

## 2. Title of Subject Document

Safety Evaluation Report Related to the Subsequent License Renewal of Surry Power Station, Units 1 and 2

## 3. ADAMS Accession Number

ML19360A020

## 4. Name of Non-Concurring Employee's Supervisor

Steven Bloom

## 5. Office (Choose from the drop down list or fill in)

NRR

## 6. Title of Non-Concurring Employee's Supervisor

Branch Chief

## 7. Supervisor's Telephone Number (Enter 10 numeric digits)

(301) 415-2431

## 8. Comments for the NCP Reviewer to Consider

I support my staff's use of the non-concurrence process and agree with the technical merits of this non-concurrence with respect to Surry not revising the Selective Leaching (SL) Aging Management Program (AMP), as well as other AMPs due to the fire water piping ruptures to account for moist corrosive soil and soil parameter consistency across the site. However, Dominion has made specific changes to specific AMPs to address the potential cause for the aging mechanisms, specifically groundwater. In addition, they have entered these ruptures and aging effects into their corrective action program and following their causal analysis will take any additional corrective actions and will make the necessary revisions to their current and SLR-related AMPs. For license renewal, the NRC established two fundamental safety principles during the development of 10 CFR Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants." First, with the exception of the detrimental effects of aging, the existing regulatory process is adequate for safe plant operations. This process includes the continued implementation of licensing and oversight activities by the NRC and ensures potential safety, security, and emergency preparedness issues are addressed when identified. Second, each plant's licensing basis must be maintained during the renewal term. After the licensee's evaluation is complete, the Region will be following up on this issue within the ROP and will be letting us be involved in that inspection effort to ensure we find Dominion's actions appropriate.

## 9. Signature and Date of Non-Concurring Employee's Supervisor

Steven D. Bloom

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<b>NRC FORM 757</b> (06-2019) NRC MD 10.156	<b>U.S. NUCLEAR REGULATORY COMMISSION</b>	<b>1. NCP Tracking Number</b> NCP-2020-001
		<b>Date</b> 1/10/2020

**NON-CONCURRENCE PROCESS (Continued)**

**Section C - To Be Completed By NCP Coordinator**

<b>2. Title of Subject Document</b> Safety Evaluation Report Related to the Subsequent License Renewal of Surry Power Station, Units 1 and 2		<b>3. ADAMS Accession Number</b> ML19360A020
<b>4. Name of NCP Coordinator</b> Allen L. Hiser, Jr.	<b>5. Office</b> (Choose from the drop down list or fill in) NRR	
<b>6. Title of NCP Coordinator</b> Senior Technical Advisor for License Renewal Aging Management	<b>7. Coordinator's Telephone Number</b> (Enter 10 numeric digits) (301) 415-5650	

**8. Agreed Upon Summary of Issues**

The non-concurring employee contends that a significant technical deficiency in the "Selective Leaching" aging management program (AMP) makes it unclear as to how the staff can conclude that Dominion has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the subsequent period of extended operation, as required by 10 CFR 54.21(a)(3).

Summary of Issues

- Two ruptures of buried gray cast iron fire protection system piping occurred in July 2019 at Surry Power Station.
- Long standing exposure to moist or wet soil resulted in the reduction in wall thickness at several locations due to graphitic corrosion (i.e., selective leaching).
- In response to the fire water system ruptures, the applicant modified its Selective Leaching program to include a requirement to dig exploratory holes to confirm the presence of groundwater around the buried fire water system piping.
- Although it is well established that moist soil (i.e., soil without standing water) with adverse soil properties (e.g., low soil resistivity, low pH, low or negative redox potential, presence of sulfides) can cause significant graphitic corrosion of cast iron, Dominion is relying on a singular criterion (i.e., the presence of groundwater in the exploratory holes) to conduct follow-up excavations and soil testing.
- The soil analysis provided by Dominion in the October 31, 2019, letter documents low pH and low soil resistivity, indicating that soil parameters other than standing water may have contributed to the ruptures.
- Without a basis for relying on a singular criterion (or a specific commitment to conduct soil corrosivity testing in the vicinity of buried gray cast iron fire water system piping if a basis cannot be provided), it is unclear how the staff can conclude that Dominion has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the subsequent period of extended operation, as required by 10 CFR 54.21(a)(3).

**9. Evaluation of Non-Concurrence and Rationale for Decision**

The non-concurring staff member's use of the non-concurrence process is appreciated as an appropriate mechanism to raise concerns and differing views. I also appreciate the comments provided by the non-concurring employee's supervisor in Section B and find them to be consistent with my evaluation discussed below.

The technical issues identified in the non-concurrence are legitimate technical issues related to aging management of buried gray cast iron piping. However, the issues identified in the non-concurrence will be appropriately evaluated and addressed within the context of the principles of license renewal, the applicant's on-going corrective actions to



NRC FORM 757

(06-2019)

NRC MD 10.156

U.S. NUCLEAR REGULATORY COMMISSION

1. NCP Tracking Number  
NCP-2020-001

**NON-CONCURRENCE PROCESS (Continued)**

Date  
1/10/2020

evaluate the buried piping ruptures and modify its related aging management activities, the NRC's reactor oversight activities, and the standard of "reasonable assurance" in approving renewed licenses.

The process outlined in 10 CFR Part 54 for license renewal (which includes subsequent license renewal) is founded on these principles as stated in the Statements of Consideration for the 1995 license renewal rule (60 Federal Register 22464):

- The ongoing regulatory process is adequate to ensure the safety of currently operating plants
- The plant-specific licensing basis must be maintained in the same manner and to the same extent as during the original licensing term, in part through a program of age-related degradation management for plant structures and components that meet the scoping and screening requirements of the rule

The basis for approval of subsequent license renewal applications is the concept of "reasonable assurance," as stated in 10 CFR 54.29 (with emphasis added):

A renewed license may be issued by the Commission up to the full term authorized by § 54.31 if the Commission finds that:

(a) Actions have been identified and have been or will be taken with respect to the matters identified in Paragraphs (a)(1) and (a)(2) of this section, such that there is **reasonable assurance** that the activities authorized by the renewed license will continue to be conducted in accordance with the CLB, and that any changes made to the plant's CLB in order to comply with this paragraph are in accord with the Act and the Commission's regulations. These matters are:

- (1) 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 § 54.21(a)(1); and
- (2) time-limited aging analyses that have been identified to require review under § 54.21(c).

In addition to the requirements for subsequent license renewal, the agency's overall regulatory process involves numerous NRC activities related to operating plants, including the reactor oversight process to verify operation in compliance with the CLB. In particular, the process involves oversight of licensee performance relative to regulatory requirements, such as conformance to the quality assurance requirements of Appendix B to 10 CFR Part 50. As an example, Criterion XVI of Appendix B, "Corrective Actions," describes the need to determine the cause of the condition and to take corrective action to preclude repetition for significant conditions adverse to quality. Although the applicability of Appendix B is limited to license renewal SSCs that are in scope in accordance with 54.4(a)(1), Appendix A1 of the SLRA states:

The scope of the existing QA Program is expanded to also include safety-related and non safety-related structures and components (SCs) subject to AMPs.

The applicant has entered the ruptures of the buried fire water piping into the Corrective Action Program via Condition Reports. Therefore, corrective actions related to the ruptures of the fire water piping would be covered by the provisions of Appendix B, and would be subject to NRC review under the reactor oversight process.

In the time since the pipe ruptures discussed in the non-concurrence occurred, the plant has put in place compensatory measures, as stated in Dominion's October 31, 2019, letter, "to isolate sections of the yard loop which are known to have been exposed to groundwater and to start a pre-staged high flow capacity pump if needed. The high flow capacity pump is staged, but not running, with administrative controls to provide the required backup fire suppression supply." With these compensatory measures in place, the plant continues to operate safely.

As discussed in the non-concurrence, the applicant has modified its Selective Leaching program in response to the pipe ruptures, principally through the use of exploratory holes to identify the presence/absence of groundwater. The presence of groundwater would trigger specific follow-on actions identified by the applicant in the program.

NRC FORM 757

(06-2019)

NRC MD 10.156

U.S. NUCLEAR REGULATORY COMMISSION

1. NCP Tracking Number

NCP-2020-001

**NON-CONCURRENCE PROCESS (Continued)**

Date

1/10/2020

In its October 31, 2019, letter, the applicant identifies the following corrective action in its modification to the Selective Leaching program:

If water in an exploratory hole is identified to be a result of fire protection system leakage or other plant system leakage and not due to elevated groundwater, then corrective actions consistent with the *Selective Leaching* program (B2.1.21) will be initiated.

The reliance on the corrective action program is consistent with the guidance described in the GALL-SLR selective leaching program, which identifies the Appendix B corrective action program as the initial response to results that do not meet acceptance criteria.

I understand that the applicant is working to complete its corrective actions to review the pipe ruptures and will consider the possible role of corrosive soil in the absence of standing water (as discussed during teleconferences.) The applicant will identify and implement additional necessary changes to the program in accordance with its corrective action program, once the assessment is completed. NRR has coordinated with the appropriate management in Region II to ensure that this corrective action will be reviewed upon completion, and the review will include discussions with NRR staff. This approach of relying on the plant's corrective action program with regional oversight is consistent with the license renewal principle that "the ongoing regulatory process is adequate."

Based on the on-going corrective actions by the plant, effective regional oversight of these actions, and the agency's overall regulatory framework and oversight, I am confident that this issue of the piping ruptures will be addressed in a manner that is protective of public health and safety, that the plant will appropriately amend its aging management program, if needed, and that the effects of selective leaching on gray cast iron piping will be appropriately managed during the subsequent period of extended operation. Therefore, there is reasonable assurance that the activities authorized by the renewed license will continue to be conducted in accordance with the CLB and the renewed license can be issued.

**10. Signature and Date of NCP Coordinator**

Allen Hiser

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Date: 2020.03.02 16:50:03 -05'00'

**11. Signature and Date of NCP Approver**

Anna H. Bradford

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Date: 2020.03.05 16:10:44 -05'00'