UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

October 19, 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, UNIT NOS. 1 AND 2, CLARIFICATION OF ISSUANCE OF AMENDMENTS RE: CHANGES TO EXPAND PRIMARY GRADE WATER LOCKOUT REQUIREMENTS IN TECHNICAL SPECIFICATION 3.2.E (CAC NOS. MF7716 AND MF7717)

Dear Mr. Stoddard,

On May 10, 2017 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17039A513), the U.S. Nuclear Regulatory Commission (NRC) issued Amendment No. 288 to Renewed Facility Operating License No. DPR-32 and Amendment No. 288 to Renewed Facility Operating License No. DPR-37 to the Virginia Electric and Power Company (Dominion, the licensee), for the Surry Power Station, Unit Nos. 1 and 2 (Surry Unit 1 and 2), respectively. The amendments changed the technical specifications (TSs) in response to your application dated May 10, 2016 (ADAMS Accession No. ML16134A069), as supplemented by letter dated October 18, 2016 (ADAMS Accession No. ML16295A335).

The amendments expanded primary grade (PG) water lockout requirements in TS 3.2.E from being applicable in refueling shutdown (RSD) and cold shutdown (CSD) modes to being applicable in RSD, CSD, intermediate shutdown (ISD) and hot shutdown (HSD) modes, except during the approach to critical and within 1 hour following reactor shutdown from reactor critical or power operation.

On June 19, 2017 (ADAMS Accession No. ML17206A044), Mr. Gary Miller of Dominion, sent an e-mail to Ms. Karen Cotton Gross of the NRC, providing comments on the safety evaluation (SE) for Amendment Nos. 288 and 288 and suggested six items that may require clarification:

<u>Item 1</u>

1. SE Introduction, bottom of page 1 through the top of page 2:

> In its letter dated May 10, 2016, the licensee discussed a May 2011, dilution event at Surry Unit 2. Based on its analysis of data from the event, Dominion determined that the change in the source range nuclear instrumentation (SRNI) display, *reflecting a significant reactivity change due to the boron dilution,* was less than previously expected. The licensee's analysis also determined that the dynamic response of the SRNI had not been considered appropriately during transition to low leakage core loading patterns and removal of secondary neutron sources. **When the operator relied on the under-predicted SRNI display for the**

reactivity increase rate to isolate the reactor coolant system (RCS) from the potential source of deborated PG makeup water, the reactivity increase could have resulted in a total loss of shutdown margin and lead to a core criticality before the boron dilution was terminated. Dominion indicated that the inadequate response of the SRNI had not been considered appropriately for the boron dilution analysis for certain cases in the Surry Updated Final Safety Analysis Report (UFSAR) Section 14.2.5, "Chemical and Volume Control System Malfunction." Specifically, the UFSAR boron dilution analysis for ISD and HSD conditions currently credited administrative boron concentration requirements and relied on the SRNI readings to support sufficient time for corrective operator action prior to complete loss of shutdown margin. In this license amendment request (LAR), Dominion proposed TS changes to extend the TS 3.2.E requirements of PG lockout from being applicable in RSD and CSD modes to being applicable in modes RSD, CSD, ISD and HSD and adding TS 3.2.F to allow modification of the PG lockout in HSD during the approach to criticality. The TS changes will allow Dominion to credit PG lockout and preclude boron dilution events for [ISD] and HSD conditions.

Dominion didn't make the **[bolded]** statement in our submittals. In fact, it is very likely that the slow dilution event would have been detected before loss of all shutdown margin.

The [*italicized*] statement is potentially misleading/unclear. More accurate wording would be "in response to a significant reactivity change due to the boron dilution".

NRC Staff Response to Item 1

In reference to the *italicized* portion of Item 1, above, the NRC staff revised the language in the SE from "reflecting" to "in response to" consistent with the request of the licensee.

In reference to the **bolded** portion of Item 1, above, the NRC staff deleted the bolded portion from the SE.

Item 2

2. In SE, Section 2.0, the list of regulations and guidance applicable to this LAR includes the SRP [Standard Review Plan (NUREG-0800)] (last bullet). Surry is not an SRP plant; however, if NUREG-0800 was simply used to inform the SER [safety evaluation report], its reference may be acceptable. That being said, NUREG-0800 requirements appear to be applied to Surry as noted in Item 3 below.

NRC Staff Response to Item 2

The NRC staff reviews proposed licensing actions against the plant-specific design bases as described in the UFSAR, but uses the SRP to inform its review. The NRC staff agrees that the current licensing basis (CLB) for the boron dilution at Surry is different from the SRP, Section 15.4.6, guidance.

Item 3

3. SE Section 3.0, first paragraph describes the SRP boron dilution acceptance criteria correctly: "In SRP 15.4.6 of the SRP, the guidance indicates that at least 15 minutes should be available from the time the operator is made aware of an unplanned boron dilution event to the time of a total loss of shutdown margin (criticality) occurring during power operation, ISD, HSD, and CSD modes. A warning time of 30 minutes is required during RSD". However, this is not Surry's CLB as described in UFSAR section 14.2.5.2.2: "Administratively controlled shutdown margin requirements have been implemented at Surry to ensure that at least 15 minutes are available from initiation of dilution to loss of shutdown margin for corrective operator action in response to an inadvertent boron dilution at intermediate shutdown and hot shutdown." Surry's CLB for RSD and CSD does not include a specific operator response time because the current TS 3.2.E precludes high flow rate dilutions in these modes.

NRC Staff Response to Item 3

The NRC staff changed SE Section 3.0, first paragraph, to read, in part, as follows:

> The NRC staff notes that the current licensing basis (CLB) for the boron dilution at Surry is in UFSAR Section 14.2.5.2.2 and states that "Administratively controlled shutdown margin requirements have been implemented at Surry to ensure that at least 15 minutes are available from initiation of dilution to loss of shutdown for corrective operator action in response to an inadvertent boron dilution at intermediate shutdown and hot shutdown."

Item 4

4. SE Section 3.3, first paragraph, last sentence: "The result met the SRP Section 15.4.6 guidance discussed in Section 3.0 of this SE." Our existing analysis does not satisfy the SRP acceptance criterion. As stated in item 3 above, the SPS [Surry Power Station] CLB is "to ensure that at least 15 minutes are available from initiation of dilution to loss of shutdown margin for corrective operator action."

NRC Staff Response to Item 4

The NRC staff will delete the last sentence of the first paragraph of the SE Section 3.3 referring to SRP Section 15.4.6.

Item 5:

5. SE, Section 3.3, 2nd paragraph. This discussion does not appear in our submittal. In particular, it is difficult to understand the reviewer's intention by the last sentence ("The use of the under-predicted SRNI readings in the analysis was non-conservative. . ."). We didn't use under-predicted SRNI readings in any analysis. If anything, our analysis implicitly assumed over-predicted SRNI response. Even in context of analyzing the event data and finding that SRNI underperformed, this is a confusing statement and should be removed or clarified.

NRC Staff Response to Item 5

The NRC staff changed the second paragraph of SE Section 3.3 to read as follows:

In its submittal dated May 10, 2016, the licensee concluded during the reassessment of the boron dilution safety analysis that the analysis for ISD and HSD should also require PG lockout to preclude high dilution flow rates.

Item 6

6. SE Section 3.3, 4th paragraph: ". . . boron dilution event is not a credible event with implementation of the proposed TS 3.2.E. . ." With the revised TSs, the ***high flow rate*** dilution event is not credible in ISD or HSD. However, the low flow rate boron dilution is still credible as described in SE section 3.4.

NRC Staff Response to Item 6

The NRC staff changed paragraph 4 of the SE Section 3.3 to read, in part, as follows:

> The revised Surry UFSAR would clarify that there would no longer be a safety analysis assumption for SRNI dynamic response since the high flow rate boron dilution event is not a credible event with implementation of the proposed TS 3.2.E requiring lockout of the PG makeup flow paths.

The NRC staff has evaluated the concerns raised by Mr. Miller and has determined that the above changes will be made to the SE pages of Amendment Nos. 288 and 288 for Surry, Units 1 and 2, respectively.

The revised SE is enclosed with this letter, containing margin lines indicating the areas of changes to reflect the above clarifications. Because the changes affect the beginning and end of other pages in the SE dated May 10, 2017, the enclosed SE replaces prior SE in its entirety. These changes are for clarification only and do not affect the conclusion of the SE as previously noticed in the *Federal Register*.

If you have any questions please contact Karen Cotton Gross at 301-415-1438 or via e-mail at Karen.Cotton@nrc.gov.

Sincerely,

Karen Cotton Gross

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

Enclosure:
Safety Evaluation

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ENCLOSURE

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO

AMENDMENT NO. 288 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-32

AND

AMENDMENT NO. 288 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-37

VIRGINIA ELECTRIC AND POWER COMPANY

SURRY POWER STATION, UNIT NOS. 1 AND 2

DOCKET NOS. 50-280 AND 50-281

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SURRY POWER STATION, UNIT NOS. 1 AND 2

DOCKET NOS. 50-280 AND 50-281

1.0 INTRODUCTION

By letter dated May 10, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16134A069), as supplemented by letter dated October 18, 2016 (ADAMS Accession No. ML16295A335), Virginia Electric and Power Company (Dominion, the licensee) submitted a request for changes to the Surry Power Station, Unit Nos. 1 and 2 (Surry Units 1 and 2) Technical Specifications (TSs).

The supplement dated October 18, 2016, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the U.S. Nuclear Regulatory Commission (NRC) staff's original proposed no significant hazards consideration determination, published in the *Federal Register* on October 11, 2016 (81 FR 70187).

The proposed changes would extend the Surry Units 1 and 2 TS 3.2.E requirements for primary grade (PG) water lockout from being applicable in refueling shutdown (RSD) and cold shutdown (CSD) modes to being applicable in RSD, CSD, intermediate shutdown (ISD) and hot shutdown (HSD) modes (except during the approach to critical and within one hour following reactor shutdown from reactor critical or power operation).

In its letter dated May 10, 2016, the licensee discussed a May 2011, dilution event at Surry Unit 2. Based on its analysis of data from the event, Dominion determined that the change in the source range nuclear instrumentation (SRNI) display, in response to a significant reactivity change due to the boron dilution, was less than previously expected. The licensee's analysis also determined that the dynamic response of the SRNI had not been considered appropriately during transition to low leakage core loading patterns and removal of secondary neutron sources. Dominion indicated that the inadequate response of the SRNI had not been considered appropriately for the boron dilution analysis for certain cases in the Surry Updated Final Safety Analysis Report (UFSAR) Section 14.2.5, "Chemical and Volume Control System Malfunction." Specifically, the UFSAR boron dilution analysis for ISD and HSD conditions

currently credited administrative boron concentration requirements and relied on the SRNI readings to support sufficient time for corrective operator action prior to complete loss of shutdown margin. In this license amendment request (LAR), Dominion proposed TS changes to extend the TS 3.2.E requirements of PG lockout from being applicable in RSD and CSD modes to being applicable in modes RSD, CSD, ISD and HSD and adding TS 3.2.F to allow modification of the PG lockout in HSD during the approach to criticality. The TS changes will allow Dominion to credit PG lockout and preclude boron dilution events for ISD and HSD conditions.

2.0 REGULATORY EVALUATION

The following regulations and guidance are applicable to this LAR:

- Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.36, "Technical Specifications." Section 50.36(c)(2) of 10 CFR provided the requirement for the establishment of TS limiting conditions for operation (LCO). Specifically, paragraph 50.36(c)(2)(ii) of 10 CFR requires that a TS LCO of a nuclear reactor be established for each item meeting one or more of the following criteria:

  (A) Criterion 1 - Installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary.

  (B) Criterion 2 - A process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

  (C) Criterion 3 - A structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

  (D) Criterion 4 - A structure, system, or component which operating experience or probabilistic risk assessment has shown to be significant to public health and safety.

- NUREG-0800, Standard Review Plan (SRP) for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR [Light-Water Reactor] Edition, (SRP), Section 15.4.6, "Inadvertent Decrease in Boron Concentration in the Reactor Coolant System (PWR [Pressurized-Water Reactor])," insofar as it is related to the acceptance criteria for the boron dilution analysis for PWRs.

3.0 TECHNICAL EVALUATION

The chemical and volume control system (CVCS) design allows the addition of a preselected quantity of reactor PG makeup water to the RCS. Failures of the reactor makeup control portion of the CVCS, because of control operator errors or mechanical failures, would cause an inadvertent boron dilution. The CVCS is designed to limit the dilution rate to values, which would allow sufficient time for automatic or operator actions to terminate the dilution before the

shutdown margin is lost. The NRC staff notes that the current licensing basis (CLB) for the boron dilution at Surry is in UFSAR Section 14.2.5.2.2 and states that "Administratively controlled shutdown margin requirements have been implemented at Surry to ensure at least 15 minutes are available from initiation of dilution to loss of shutdown for corrective operator action in response to an inadvertent boron dilution at intermediate shutdown and hot shutdown." The specific analyses related to this LAR are discussed for comparison as follows:

1. Section 3.1 addresses the analysis of modes RSD and CSD, which credits the current TS 3.2.E requirement of the PG lockout;

2. Section 3.2 addresses the analysis of modes ISD and HSD, which does not credit the PG lockout requirements as the PG lockout is not required in the current TS 3.2.E.

3.1 Changes to the TS:

In the LAR dated May, 10, 2016, the licensee proposed the following changes to the Surry Units 1 and 2 TS 3.2, "Chemical and Volume Control System,"

- Revise TS 3.2.E, 3.2.E.1, and 3.2.E.2 to change the modes of applicability from "Refueling Shutdown and Cold Shutdown" to "Refueling Shutdown, Cold Shutdown, Intermediate Shutdown, and Hot Shutdown."

- Add TS 3.2.F to allow modification of the PG lockout requirement in Hot Shutdown mode during the approach to critical and to allow one hour to perform the lockout upon entering Hot Shutdown from Power Operation or Reactor Critical.

The current TS 3.2.E states:

E. During REFUELING SHUTDOWN and COLD SHUTDOWN the following valves in the affected unit shall be locked, sealed, or otherwise secured in the closed position except during planned dilution or makeup activities:

1. During Unit 1 REFUELING SHUTDOWN and COLD SHUTDOWN:
   a. Valve 1-CH-223, or
   b. Valves 1-CH-212, 1-CH-215, and 1-CH-218.

2. During Unit 2 REFUELING SHUTDOWN and COLD SHUTDOWN:
   a. Valve 2-CH-223, or
   b. Valves 2-CH-212, 2-CH-215, and 2-CH-218.

3. Following a planned dilution or makeup activities, the valves listed in Specifications 3.2.E.1 and 3.2.E.2 above, for the affected unit, shall be locked, sealed, or otherwise secured in the closed position within 15 minutes.

The Revised TS 3.2.E would state:

E. During REFUELING SHUTDOWN, COLD SHUTDOWN, INTERMEDIATE SHUTDOWN, and HOT SHUTDOWN, the following valves in the affected unit shall be locked, sealed, or otherwise secured in the closed position except during planned dilution or makeup activities:

1. Unit 1:
   a. Valve 1-CH-223, or
   b. Valves 1-CH-212, 1-CH-215, and 1-CH-218.

2. Unit 2:
   a. Valve 2-CH-223, or
   b. Valves 2-CH-212, 2-CH-215, and 2-CH-218.

3. Following planned dilution or makeup activities, the valves listed in Specifications 3.2.E.1 and 3.2.E.2 above, for the affected unit, shall be locked, sealed, or otherwise secured in the closed position within 15 minutes.

New TS 3.2.F would state:

F. The requirements of Specification 3.2.E may be modified as follows:

1. During the approach to critical in HOT SHUTDOWN, closure of the valves in Specification 3.2.E.1 and 3.2.E.2, for the affected unit, is not required.

2. Upon entering HOT SHUTDOWN following reactor shutdown from POWER OPERATION or REACTOR CRITICAL, the valves listed in Specifications 3.2.E.1 and 3.2.E.2 above, for the affected unit, shall be locked, sealed, or otherwise secured in the closed position within 1 hour. If a planned dilution or makeup activity is in progress upon entry into HOT SHUTDOWN, the valves listed shall be locked, sealed, or otherwise secured in the closed position within 15 minutes following completion of the activity or within 1 hour of entry into HOT SHUTDOWN whichever is latest.

3.2 Boron Dilution during RSD and CSD for High Dilution Flow Rate Cases

The discussion of the boron dilution event, with high dilution flow rates during modes RSD and CSD, was included in the Surry UFSAR, Section 14.2.5.2.1, "Boron Dilution During Refueling and Cold Shutdown." Current Surry TS 3.2.E requires the manual valve, 1-CH-223 (for Unit 1) or 2-CH-223 (for Unit 2), the PG makeup water control valve, to be locked in the closed position within 15 minutes following a planned dilution during RSD and CSD. As an alternative, TS 3.2.E requires manual valves 1-CH-212, 1-CH-215 and 1-CH-218 (for Unit 1), or 2-CH-212, 2-CH-215 and 2-CH-218 (for Unit 2), be locked shut when 1-CH-223 or 2-CH-223 remains open. In accordance with the TS requirements, Dominion's administrative controls at Surry would isolate the RCS from the potential source of unborated water by locking closed specified valves, discussed within this section, in the CVCS to preclude dilutions that would cause a rapid, uncontrolled decrease in shutdown margin during these modes of operation. Therefore, the boron dilution event was not a credible event, and Dominion did not include an explicit calculation for the analysis of a boron dilution event in the Surry UFSAR, Section 14.2.5.2.1

during RSD and CSD modes. Since the TS requirements of lockout of the PG makeup water sources during RSD and CSD modes remain unchanged, precluding a boron dilution event to occur, the NRC staff determined that the Surry UFSAR, Section 14.2.5.2.1 without inclusion of an explicit analysis for the non-credible boron dilution event during RSD and CSD modes, remains valid and acceptable.

3.3 Boron Dilution During ISD and HSD Modes for High Dilution Flow Rate Cases

The analysis of a boron dilution event with high dilution flow rates during ISD and HSD modes is discussed in the Surry UFSAR, Section 14.2.5.2.2, "Boron Dilution During Intermediate Shutdown and Hot Shutdown Conditions." The analysis assumed that the dilution rate was 245 gallons per minute of unborated water, which is the maximum flow rate of unborated water that could be delivered by the PG transfer pumps. For the case in which no reactor coolant pumps (RCPs) were operating, a reduced RCS volume (consistent with mid-loop residual heat removal system operation) was assumed. For the case in which one or more RCPs were running, the analysis assumed the full RCS volume (less the upper head, pressurizer, and plugged tube volume) was undergoing dilution. The analysis showed that at least 15 minutes were available from initiation of dilution to loss of shutdown margin for corrective operator action in response to an inadvertent boron dilution at the ISD and HSD conditions.

In its submittal dated May 10, 2016, the licensee concluded during the reassessment of the boron dilution safety analysis that the analysis for ISD and HSD should also require PG lockout to preclude high dilution flow rates.

In addressing the concern arising from the under-predicted SRNI readings, Dominion proposed to extend TS 3.2.E from the current RSD and CSD modes PG lockout requirement to ISD and HSD modes. Similar to the RSD and CSD conditions, as discussed in Section 3.1 of this SE, the proposed TS changes would require the valves in the highest capacity dilution flow path be locked closed, thus, precluding a high flow rate boron dilution event from occurring during ISD and HSD modes. Since the proposed TS 3.2.E requires lockout of the PG makeup water sources during ISD and HSD modes, precluding a boron dilution event to occur, Dominion will revise the Surry UFSAR, Section 14.2.5.2 to reflect the new TS requirement for PG valve lockout that would preclude occurrence of high dilution flow rates, such that an explicit safety analysis to establish operator action times is not needed. The NRC staff concludes that the proposed UFSAR changes will correctly reflect the effect of the proposed TS 3.2.E requirements and is consistent with the current basis complying with the TS 3.2.E requirements for RSD and CSD modes documented in the Surry UFSAR, Section 14.2.5.2.1. Therefore, the changes are acceptable.

The revised Surry UFSAR would clarify that there would no longer be a safety analysis assumption for SRNI dynamic response since the high flow rate boron dilution event is not a credible event with implementation of the proposed TS 3.2.E requiring lockout of the PG makeup flow paths. The NRC staff concludes that the clarification will be consistent with the proposed TS 3.2.E requirements, and therefore, is acceptable.

Dominion also clarified that the revised Surry UFSAR analysis basis for boron dilution event would consolidate the licensing basis for all shutdown conditions. The NRC staff concludes that the UFSAR consolidation of the licensing basis is appropriate to reflect the effect of the proposed TS 3.2.E requiring lockout of the PG makeup flow paths for all shutdown conditions and, is therefore, acceptable.

3.4 Boron Dilution during RSD, CSD, ISD and HSD Modes for Lower Dilution Flow Rate Cases

Surry UFSAR, Section 14.2.5.2.1, indicates that there are many paths for dilution of water in the RCS. The discussion in Sections 3.1 and 3.2 of this SE, regarding isolation of the main primary water, addressed high flow rate boron dilution events. Following the proposed TS 3.2.E requirements, the high flow rate dilution paths would be secured in all shutdown modes, and the maximum dilution flow rate considered in the Surry UFSAR, Section 14.2.5 analysis, is limited to lower flow rate dilution through flow paths that bypassed the locked flow path.

For lower flow rate dilution events at Surry for RSD, CSD, ISD, and HSD conditions, Dominion would continue to credit diverse indications for protection against low flow rate dilutions in all shutdown modes. This approach is consistent with current Surry UFSAR methods. The diverse indications include: potential mismatch between charging and letdown, unexpected usage of PG as indicated in the main control room as indicated by PG flow rate, PG tank level, RCS letdown divert valve position, volume control tank level, and SRNI that would provide an indication of the reactivity condition of the core by audible count rate and high flux at shutdown alarm. As discussed in Section 1.0 of this SE, the SRNI readings did not increase as much as expected during the boron dilution event at Surry Unit 2 in May 2011. Based on its root cause evaluation, Dominion determined that the under-predicted SRNI dynamic response was caused, in part, by removal of secondary neutron sources from the reactor cores. Secondary neutron sources were fuel assembly insert components mechanically similar to discrete burnable poison. When exposed to the neutron field in the reactor core, the secondary neutron source material (antimony-beryllium) was activated and emitted neutrons after the neutron field stemming from the fuel diminished. The secondary neutron sources were used to produce an adequate neutron source for demonstrating SRNI operability during core on-load. Removal of secondary sources had been previously done at Surry in simplifying fuel handling activities. In addressing the concern of the under-predicted SRNI dynamic response, Dominion reintroduced secondary neutron sources into Surry Units 1 and 2 reload core designs in effort to improve SRNI dynamic response. Dominion's analyses and plant startup data supported that when secondary neutron sources were adequately located in the core, the SRNIs would provide an effective indication of changing core reactivity conditions, including indication of a boron dilution during shutdown conditions. Based on the above, the NRC staff concludes that credit of diverse indications, including SRNI count rate and high flux at shutdown alarm for protection against the boron dilution events with lower dilution flow rates remain valid.

3.5 NRC Staff Evaluation

The proposed TS 3.2.E would extend the Surry TS 3.2.E requirements for PG lockout from being applicable in RSD and CSD modes to being applicable in RSD, CSD, ISD and HSD modes. The NRC staff concludes that the changes are acceptable, because:

1. TS PG lockout requirements are initial conditions for the boron dilution event, and satisfy Criterion 2 of 10 CFR 50.36(c)(2)(ii), as discussed in Section 2.1 of this SE for inclusion of an LCO,

2. TS PG lockout requirements are also credited for mitigation of the boron dilution event, and satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii),

3. The proposed TS (extended to RSD, CSD, ISD and HSD mode conditions) is more restrictive than the current TS (PG lockout applicable to RSD and CSD modes), and

4. The boron dilution event analyses, discussed in Sections 3.1 through 3.3 of this SE, satisfactorily demonstrate the adequacy of the TS changes precluding occurrence of boron dilution events during all shutdown modes.

The proposed TS 3.2.F.1 would allow exceptions to the PG lockout requirements during the approach to critical in HSD mode. These exceptions are used to support reactor startup activities, in which intentional reactivity changes are made under procedural control and augmented scrutiny. During the approach to critical in HSD mode, core reactivity is carefully monitored accordingly and, therefore, any unexpected deviation would be immediately observed and addressed by Dominion. The NRC staff has determined that the exceptions to the PG lockout requirements are acceptable.

The proposed TS 3.2.F.2 would allow operators to lockout the valves in the primary PG flow paths within one hour following shutdown from power operation or reactor criticality. The NRC staff concludes that the proposed TS 3.2.F.2 would allow reasonable time for operator action so that PG lockout is implemented without placing an undue burden on the operators. The NRC staff also concludes that the proposed TS is consistent with the guidance in NUREG-1431, "Standard Technical Specifications [STS] - Westinghouse Plants," Revision 4.0, Volume 1, Specifications, Section 3.3.9, Boron Dilution Protection System (BDPS) (ADAMS Accession No. ML12100A222). In the Westinghouse reference plant, BDPS is the primary means of protection against boron dilution events in shutdown operating modes. The Westinghouse STS requires that when both trains of BDPS are inoperable, one hour is allowed to either restore a train of BDPS to service or "close unborated water source isolation valves." If makeup activities are in progress when the transition to HSD mode occurs, PG lockout would be required within 15 minutes of completing these activities or one hour, whichever is later. The TS requirements would ensure that PG lockout is implemented adequately without placing an undue burden on operating staff or interfering with makeup activities that could already be in progress. Since the proposed TS 3.2.F.2 allows a reasonable time for operator action to implement PG lockout, and is consistent with the intent of similar guidance in Section 3.3.9 of the Westinghouse STS, NUREG-1431, the NRC staff concludes that proposed TS 3.2.F.2 is acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Virginia State official was notified of the proposed issuance of the amendments. On February 24, 2017, the State official confirmed that the Commonwealth of Virginia had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendments change requirements with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendments involve no significant increase in the amounts and no significant change in the types of any effluents that may be released offsite and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, published in the *Federal Register* on October 11, 2016 (81 FR 70187), and there has been no public comment on such finding. Accordingly, the amendments meet the eligibility criteria for

categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: S. Sun, NRR

Date: May 10, 2017

SUBJECT: SURRY POWER STATION, UNIT NOS. 1 AND 2, CLARIFICATION OF ISSUANCE OF AMENDMENTS RE: CHANGES TO EXPAND PRIMARY GRADE WATER LOCKOUT REQUIREMENTS IN TECHNICAL SPECIFICATION 3.2.E (CAC NOS. MF7716 AND MF7717) DATED OCTOBER 19, 2017

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