~~PROPRIETARY INFORMATION – WITHHOLD UNDER 10 CFR 2.390~~

Dominion Energy Nuclear Connecticut, Inc.
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DominionEnergy.com

April 1, 2024

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Serial No. 23-105E
NRA/SS: R0
Docket No. 50-423
License No. NPF-49

DOMINION ENERGY NUCLEAR CONNECTICUT, INC.
MILLSTONE POWER STATION UNIT 3
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION REGARDING LICENSE AMENDMENT REQUEST TO USE FRAMATOME SMALL BREAK AND REALISTIC LARGE BREAK LOSS OF COOLANT ACCIDENT EVALUATION METHODOLOGIES FOR ESTABLISHING CORE OPERATING LIMITS

By letter dated May 2, 2023 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML23123A277 (proprietary version) and ML23123A279 (nonproprietary version)), Dominion Energy Nuclear Connecticut, Inc. (DENC) submitted a license amendment request (LAR) to the Nuclear Regulatory Commission (NRC) to revise the Technical Specifications (TS) for Millstone Power Station Unit 3 (MPS3). The proposed LAR would update the list of approved methodologies in MPS3 TS 6.9.1.6.b to establish the core operating limits included in the Core Operating Limits Report (COLR) for Framatome GAIA fuel with M5 cladding.

On February 22, 2024, the NRC sent a draft request for additional information (RAI) related to the proposed LAR. On February 29, 2024, the NRC staff conducted a conference call with DENC staff to clarify the request. On March 5, 2024, the NRC transmitted the final version of the RAI (ADAMS Accession No. ML24065A311). DENC agreed to respond to the RAI within 30 days of issuance, or no later than April 5, 2024.

Proprietary versions and non-proprietary versions of DENC's response to the RAI are provided in Attachment 1 and 2, respectively. Attachment 3 provides an application for withholding and affidavit from Framatome Inc.

Attachment 1 contains information proprietary to Framatome Inc. (Framatome) and is supported by an affidavit (Attachment 3) signed by Framatome, the owner of the information. The affidavit sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of Section 2.390 of the Commission's regulations. Accordingly, it is respectfully requested the proprietary information be withheld from public disclosure in accordance with 10 CFR 2.390.

Attachment 1 contains information that is being withheld from public disclosure under 10 CFR 2.390. Upon separation from Attachment 1, this letter is decontrolled.

If you have any questions or require additional information, please contact Mr. Shayan Sinha at (804) 273-4687.

Sincerely,

James E. Holloway
Vice President – Nuclear Engineering and Fleet Support

COMMONWEALTH OF VIRGINIA)
)
COUNTY OF HENRICO)

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by James E. Holloway who is Vice President – Nuclear Engineering and Fleet Support of Dominion Energy Nuclear Connecticut, Inc. He has affirmed before me that he is duly authorized to execute and file the foregoing document on behalf of that company, and that the statements in the document are true to the best of his knowledge and belief.

Acknowledged before me this 1st day of April, 2024.

My Commission Expires: January 31, 2028.

KATHRYN HILL BARRET
NOTARY PUBLIC
COMMONWEALTH OF VIRGINIA
MY COMMISSION EXPIRES JANUARY 31, 2028

Kathryn H. Barret
Notary Public

Attachments:

1. Response to Request for Additional Information Regarding License Amendment Request to Use Framatome Small Break and Realistic Large Break Loss of Coolant Accident Evaluation Methodologies for Establishing Core Operating Limits (Proprietary)
2. Response to Request for Additional Information Regarding License Amendment Request to Use Framatome Small Break and Realistic Large Break Loss of Coolant Accident Evaluation Methodologies for Establishing Core Operating Limits (Non-Proprietary)
3. Framatome Application for Withholding and Affidavit

Commitments made in this letter: None

cc: U.S. Nuclear Regulatory Commission
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Attachment 2

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION REGARDING LICENSE AMENDMENT REQUEST TO USE FRAMATOME SMALL BREAK AND REALISTIC LARGE BREAK LOSS OF COOLANT ACCIDENT EVALUATION METHODOLOGIES FOR ESTABLISHING CORE OPERATING LIMITS (NON-PROPRIETARY)

Dominion Energy Nuclear Connecticut, Inc.
Millstone Power Station Unit 3

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On February 22, 2024, the NRC sent a draft request for additional information (RAI) related to the proposed LAR. On February 29, 2024, the NRC staff conducted a conference call with DENC staff to clarify the request. On March 5, 2024, the NRC transmitted the final version of the RAI (ADAMS Accession No. ML24065A311). DENC agreed to respond to the RAI within 30 days of issuance, or no later than April 5, 2024.

This attachment provides the non-proprietary version of DENC's response to the RAI.

RAI 1 (Framatome SBLOCA Method)

As stated in Section 3.1 of Attachment 1 to the LAR, the FRM Small Break Loss-of-Coolant Accident (SBLOCA) analysis supporting the GAIA fuel at MPS3 is based on the previously NRC-approved methods, including the methods documents in FRM Topical Report (TR) EMF- 2328-P-A Revision 0, Supplement 1-P-A, Revision 0.

The NRC SE (ADAMS ML15210A257) for the FRM TR EMF-2328-P-A Revision 0, Supplement 1-P-A, Revision 0 imposed modelling requirements in the following area:

1. *Spectrum of break sizes*
2. *Breaks in the attached piping*
3. *Delayed RCP trip*
4. *Maximum safety injection tank/refueling water tank fluid temperature*
5. *Core bypass-flow path in the reactor vessel*

6. *Reactivity feedback*
7. *Loop seal clearing and cross-over leg modelling*
8. *Core nodalization*

Sections 4.1, 4.3, 4.4, and 4.5 of Attachment 3 (ANP-4031P) to the LAR have provided information addressing the modelling requirements in above items 1 through 4.
Provide information addressing compliance with the modelling requirements in above item 5 through 8 for the SBLOCA analysis.

DENC Response to RAI-1

The MPS3 SBLOCA model used for the transient analysis was developed in accordance with the Framatome SBLOCA methodology requirements approved in EMF-2328(P)(A), as supplemented by Supplement 1(P)(A) to EMF-2328(P)(A) and ANP-10349P-A. Additional details are provided below for the specific methodology modifications listed in the NRC RAI-1.

Core bypass flow paths in the reactor vessel: The core bypass flow paths in the MPS3 SBLOCA reactor vessel model were modeled in accordance with the methodology requirements in Section 3.0 in Supplement 1(P)(A) to EMF-2328(P)(A). Specifically, the total core bypass design value was established during the initialization of the model. **[[**

]]

Reactivity feedback: Moderator and Doppler reactivity feedback at beginning-of-cycle (BOC) conditions were included in the MPS3 SBLOCA model, in accordance with the methodology modifications described in Section 4.0 in Supplement 1(P)(A) to EMF-2328(P)(A). The moderator reactivity feedback covers the spectrum of core conditions

ranging from liquid (no voiding) to full steam. **[[**

]]

The simulated reactivity defects were biased to be representative of a core with a BOC hot full power (HFP) moderator temperature coefficient (MTC) at the MPS3 Technical Specification (TS) 3.1.1.3 limit. The inputs supplied to Framatome contain the most positive (least negative) reactivity feedback achievable as the moderator density decreases, which ensures that the negative reactivity feedback is minimized as the core voids. The calculations are performed at all rods out (ARO) conditions. This produces a more positive MTC than would be achieved by modeling the control rod insertion and results in less negative reactivity feedback as the core voids.

Loop seal clearing: Loop seal biasing was implemented in the MPS3 SBLOCA model **[[**

]], in accordance with the methodology requirements in Section 7.0 in Supplement 1(P)(A) to EMF-2328(P)(A). For MPS3, **[[**

]] as noted in Table 4-1 and 4-2 of ANP-4031P. Loop seal clearing times are provided in Table 4-2 of ANP-4031P. The loop seal clearing behavior in the MPS3 SBLOCA break spectrum results meets the expected behavior prescribed by the methodology.

Cross-over leg modelling: **[[**

]] MPS3 SBLOCA model, which is consistent with the changes described in Section 7.3.2 of Supplement 1(P)(A) to EMF-2328(P)(A). Figure 3-1 of ANP- 4031P illustrates the cross-over leg nodalization for Loop 1.

Core nodalization: **[[**

]], in accordance with the requirements in Section 9.0 of Supplement 1(P)(A) to EMF-2328(P)(A).

RAI 2 (Delayed Reactor Coolant Pump (RCP) Trip Study)

The SBLOCA analysis assumed that the RCP trip occurred at reactor trip. Section 4.4 of ANP- 4031P in the LAR indicates that a delayed RCP trip study was performed to identify the delayed effect of RCP trip on the SBLOCA analysis. The study assumed the delayed RCP trip time of 5- minute after the specified trip criteria were met for operators to trip all four RCPs.

Justify that the assumed 5-minute RCP trip delayed time is adequate to identify the delayed effect on the peak cladding temperature (PCT) for the SBLOCA analysis, considering that the PCT (Table 4-2 of ANP-4031P) for break sizes from 5.0 to 8.7 inches would occur within 5 minutes from initiation of the LOCA and that for those break size LOCA, the RCP may not trip at the time when the PCT occurs. Also, justify from the human engineering consideration that the available operator action time for operators to trip all four RCPs is adequate.

DENC Response to RAI-2

Framatome performed a delayed RCP trip study in accordance with Section 5.0 of EMF-2328(P)(A), Revision 0, Supplement 1 (P)(A), Revision 0. Framatome was directed to perform the study considering the Emergency Operating Procedures (EOPs) in place at MPS3. DENC provided Framatome the conditions from the MPS3 EOPs that would require the operators to trip the RCPs, along with the time-critical operator action times that the operators are required to meet. The 5-minute operator action time assumed within the analysis presented in Section 4.4 of ANP-4031P is consistent with the current MPS3 time critical operator action (TCA) program. Since the operators are trained to and tested against the TCA program, additional human engineering considerations are not required.

DENC also requested that Framatome perform a second RCP trip study assuming an earlier RCP trip time. The only change made in the second RCP trip study was the assumption that the RCPs were tripped at 1 minute instead of 5 minutes. Other assumptions and inputs to the analysis remained consistent with the requirements of 10 CFR 50 Appendix K. The use of a 1-minute RCP trip was based on an average of recent operator training results that confirms the time critical operator actions are accomplished within the time credited by the safety analyses. This approach is consistent with Dominion Energy's previous experience from Request for Additional Information (RAI) 6 documented in a letter dated May 28, 2020 (ADAMS Accession No. ML20149K694). The results of both the 5-minute and 1-minute RCP trip cases demonstrate compliance with the 10 CFR 50.46 acceptance criteria with respect to the PCT, MLO and CWO.

RAI 3 (LOCA Analyses for Mixed Core Configuration Including [[ ]])

*On page 3-8 of ANP-4032P in the LAR, it states that "**[[***

]]**". Also, it states that the realistic large break loss-of-coolant accident (RLBLOCA) analysis include considerations for the mixed core scenario and, that **[[

***]]**. In addition, Limitation 3 in Table 3-1 of ANP-4032P restricts that the RLBLOCA evaluation methodology (EM) in EMF-2103(P)(A), Revision 3 "is approved based on models that are specific to Framatome proprietary M5 fuel cladding. The application of the model to other cladding types has not been reviewed".*

*Address the compliance with Limitation 3 above for the RLBLOCA analysis with consideration of mixed core configurations including **[[***

***]]**. Discuss how **[[** **]]** is modeled in the RLBLOCA analyses for mixed core configurations and provide a diagram of core nodalization scheme used in the RLBLOCA analysis. Also, discuss the results of the*

*RLBLOCA analysis for the mixed core conditions to show that the applicable acceptance criteria in 10 CFR 50.46(b) are met and the analysis is applicable to any core design that includes **[[ ]]**.*

(a) *In regard to the FRM GAIA fuel with M5 cladding being calculated for PCT and MLO in the MPS3 RLBLOCA analysis, clarify whether an MPS3 RLBLOCA analysis simulating a mixed core, consisting of the **[[ ]]**, was performed. If the analysis was performed, confirm that the analysis results are included in ANP-4032P of the LAR. If the analysis was not performed, provide rationale supporting that the analysis is not needed.*

(b) *In regard to the modeling approach that allows flow diversion from the hot assembly to the surrounding assemblies (i.e., the **[[ ]]**, provide a diagram of core nodalization scheme showing the **[[ ]]** used in the RLBLOCA analysis. Reference the NRC document approving the core nodalization scheme.*

DENC Response to RAI-3

The application of the Framatome RLBLOCA method at MPS3 is in compliance with Limitation 3 of EMF-2103-P-A, Revision 3. The Framatome RLBLOCA methodology is not being used to demonstrate that the Westinghouse RFA-2 fuel complies with the requirements of 10 CFR 50.46 at MPS3. The MPS3 RLBLOCA analysis calculated Peak Cladding Temperature (PCT) and Maximum Local Oxidation (MLO) only for Framatome GAIA fuel with M5 cladding. The pre-transient burnup dependent characteristics were

determined with GALILEO using input and models for Framatome fuel. Similarly, the embedded fuel rod code models and cladding models in the S-RELAP5 calculation in ANP-4032P were specific to Framatome fuel properties and design. **[[**

]]

(a) The MPS3 RLBLOCA analysis presented in ANP-4032P **[[**

]] The pressure drop can impact the core flow due to the presence of different types of fuel assemblies. **[[**

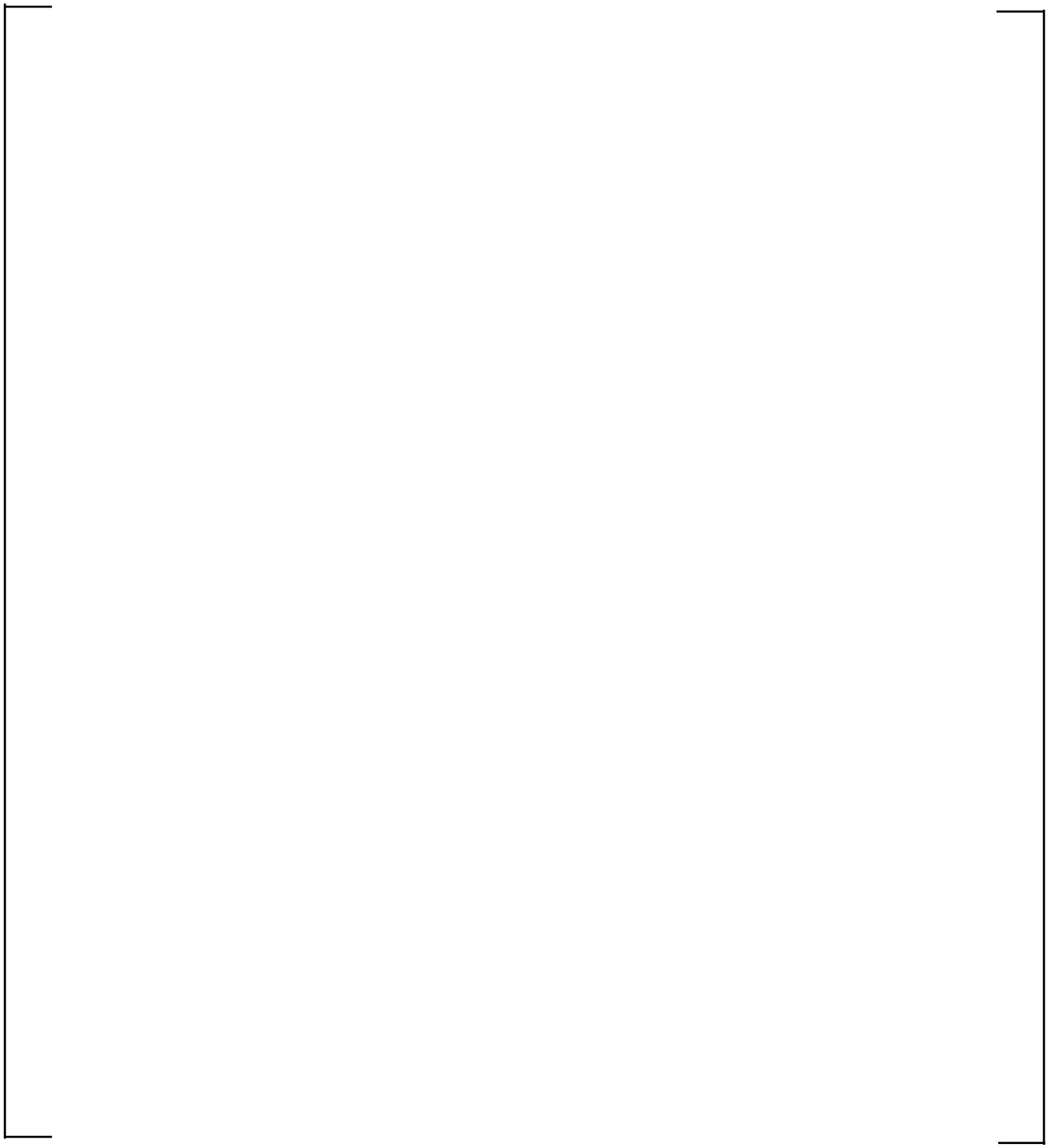
]] Consistent with the RLBLOCA EM hydrodynamic modeling features (Section A.1.3.6.2.4 of EMF-2103(P)(A) Revision 3), **[[**

]]

(b) **[[**

]]

Figure 1



RAI 4 (Initial Conditions for SBLOCA Analysis)

Table 3-1 of ANP-4031P in the LAR lists the values of plant parameters used as input for the SBLOCA analysis. Provide additional information to justify the acceptance of the following values used in the SBLOCA analysis:

1. *The SG secondary pressure is assumed at 937.4 psia.*
2. *The assumed auxiliary feedwater (AFW) temperature of 80°F is based on the average of the maximum and minimum operating temperatures.*
3. *The nominal main feedwater (MFW) temperature of 447.9°F is based on the measurement uncertainty recapture (MUR) conditions, and*
4. *The nominal pressurizer pressure of 2250 psia is assumed at the RCS operating pressure.*

DENC Response to RAI-4

The four input parameters identified in the RAI **[[**

]] These inputs are of secondary importance to the SBLOCA's sequence of events and its analysis results. However, they are directly correlated to other operational parameters that are of higher importance and **[[** **]]** During the audit close-out meeting conducted between Dominion Energy and the NRC on February 29, 2024, the NRC staff requested that an estimate of the impact on PCT be provided reflecting the use of a biased initial SG pressure and AFW temperature with the goal of maximizing the calculated 10 CFR 50.46 figures of merit, specifically the PCT. Each input is discussed as follows:

1. The steam generator secondary pressure **[[**
   ]] However, this input is related to the plant heat balance with initial inputs that are consequential. Namely, it is related to the initial RCS fluid temperature, **[[**
   ]] Initial steam generator pressure is of secondary importance. Following reactor/turbine trip, secondary pressure rises rapidly typically reaching

the main steam safety valve setpoint pressure, **[[**

]] Transient RCS fluid temperatures **[[**]], particularly at the time of PCT.

The use of a biased initial steam generator pressure with the goal of maximizing the calculated 10 CFR 50.46 figures of merit is estimated to have a 0°F impact on the PCT result of the MPS3 SBLOCA break spectrum. There is not a clear direction (i.e., high or low) in which initial SG pressure should be biased to achieve the goal of maximizing the calculated 10 CFR 50.46 figures of merit. The initial SG pressure is highly integrated with other SG parameters and the progression of the event. The trend would not be consistent across all break sizes, nor would it be easy to identify as the sole cause should the results change. As such, identification of a conservative prescription for bias relative to PCT across all SBLOCA events, even within a range, is not clear.

Further, Table 4-1 of ANP-4031P demonstrates that the larger small breaks are limiting with respect to establishing the limiting PCT. These breaks do not pressurize the secondary side high enough to reach the MSSV setpoint, as shown in Figures 4-3 and 4-11 of ANP-4031P. For these larger small breaks that do not cause the MSSVs to lift, the initial steam generator pressure has a negligible impact on the maximum pressure achieved by the secondary side. The maximum post-trip pressure reached by the secondary side is governed by the time at which the energy lost through the break cools the primary side below the secondary side. Therefore, PCT is not impacted by the initial SG pressure.

The smaller small breaks for which the MSSVs are predicted to open would be negligibly affected if a biased initial SG pressure had been assumed. The impact to these smaller small breaks would be limited to a negligible time shift in the sequence of events that would not be sufficient for these breaks to become more limiting than the larger small breaks. Thus, the PCT estimate from assuming a

biased initial SG pressure with the goal of maximizing the calculated 10 CFR 50.46 figures of merit is 0°F.

2. The AFW temperature is also of secondary importance to the SBLOCA transient. AFW is initiated to maintain liquid level and mass in the operable SGs. However, the heat sink temperature is a function of secondary pressure and temperature, both of which change rapidly as pressure increases to the main steam safety valve setpoint. **[[**

]] Only one motor-driven AFW pump is modeled, which is consistent with assuming the single failure of an emergency train.

Motor-driven AFW injection begins at a conservatively low steam generator level (0% Narrow range), hindering primary-to-secondary cooling. **[[**

]]

The use of a conservatively biased AFW temperature is estimated to have a 0°F impact on the PCT result of the MPS3 SBLOCA break spectrum. The general expectation is the use of warmer AFW temperature would result in more of a challenge to the 10 CFR 50.46 figures of merit as it will remove the SGs as a heat sink for the primary slightly sooner during the event progression. However, the use of warmer AFW would result in a negligible change in the pressurization rate of the SGs, as the heat addition from the primary side is the dominant parameter controlling the secondary side pressurization rate. Further, Table 4-1 of ANP-4031P demonstrates that the larger small breaks are limiting with respect to establishing the limiting PCT. These breaks do not pressurize the secondary side

enough to reach the MSSV setpoint, as shown in Figures 4-3 and 4-11 of ANP-4031P.

For the larger small breaks that do not cause the MSSVs to lift, the use of a conservatively biased AFW temperature is expected to cause the SGs to achieve a higher steam generator pressure before they lose their effectiveness as a heat sink for the primary system. The higher steam generator pressure would lead to a different heat transfer coefficient associated with the change in the secondary side thermal hydraulic conditions. However, the amount of energy transferred between the secondary system and the primary system remains limited based on the primary side conditions, which are controlled by the energy released through the break. Therefore, the use of a conservatively biased AFW temperature has a negligible impact on the larger small breaks.

The smaller small breaks for which the MSSVs are predicted to open would be negligibly impacted. The impact to these smaller small breaks would be limited to a negligible time shift in the sequence associated with the change in time at which the SGs no longer act as a heat sink for the primary system. The negligible change in the smaller small breaks is not sufficient for them to become more limiting than the larger small breaks. Thus, the PCT estimate from assuming a conservatively biased AFW temperature is 0°F.

3. Like the steam generator pressure, **[[**

]] Note that in the analysis, MFW is tripped at the time of the break and has no function besides setting plant model initial conditions.

4. A nominal RCS pressure input is acceptable for SBLOCA analysis. This is primarily because the SBLOCA analysis is a spectrum study. **[[**

]]

In conclusion, some of the operational inputs in Table 3-1, used in the MPS3 SBLOCA analysis **[[**

]] to the 10 CFR 50.46(b) criteria. The requirements of 10 CFR 50, Appendix K are met, and compliance with the requirements of the NRC-approved Framatome SBLOCA EM is assured with the use of these inputs.

Attachment 3

FRAMATOME APPLICATION FOR WITHHOLDING AND AFFIDAVIT

Dominion Energy Nuclear Connecticut, Inc.
Millstone Power Station Unit 3

A F F I D A V I T

1. My name is Morris Byram. I am Product Manager, Licensing & Regulatory Affairs for Framatome Inc. (Framatome) and as such I am authorized to execute this Affidavit.

2. I am familiar with the criteria applied by Framatome to determine whether certain Framatome information is proprietary. I am familiar with the policies established by Framatome to ensure the proper application of these criteria.

3. I am familiar with the Framatome information contained in the RAI responses enclosed in the Dominion Energy letter with Serial No. 23-105E, title “Dominion Energy Nuclear Connecticut, Inc. Millstone Power Station Unit 3 Response to Request for Additional Information Regarding License Amendment Request to Use Framatome Small Break and Realistic Large Break Loss of Coolant Accident Evaluation Methodologies for Establishing Core Operating Limits,” and referred to herein as “Document.” Information contained in this Document has been classified by Framatome as proprietary in accordance with the policies established by Framatome for the control and protection of proprietary and confidential information.

4. This Document contains information of a proprietary and confidential nature and is of the type customarily held in confidence by Framatome and not made available to the public. Based on my experience, I am aware that other companies regard information of the kind contained in this Document as proprietary and confidential.

5. This Document has been made available to the U.S. Nuclear Regulatory Commission in confidence with the request that the information contained in this Document be withheld from public disclosure. The request for withholding of proprietary information is made in

accordance with 10 CFR 2.390. The information for which withholding from disclosure is requested qualifies under 10 CFR 2.390(a)(4) “Trade secrets and commercial or financial information.”

6. The following criteria are customarily applied by Framatome to determine whether information should be classified as proprietary:

(a) The information reveals details of Framatome’s research and development plans and programs or their results.

(b) Use of the information by a competitor would permit the competitor to significantly reduce its expenditures, in time or resources, to design, produce, or market a similar product or service.

(c) The information includes test data or analytical techniques concerning a process, methodology, or component, the application of which results in a competitive advantage for Framatome.

(d) The information reveals certain distinguishing aspects of a process, methodology, or component, the exclusive use of which provides a competitive advantage for Framatome in product optimization or marketability.

(e) The information is vital to a competitive advantage held by Framatome, would be helpful to competitors to Framatome, and would likely cause substantial harm to the competitive position of Framatome.

The information in this Document is considered proprietary for the reasons set forth in paragraph 6(c), 6(d), and 6(e) above.

7. In accordance with Framatome’s policies governing the protection and control of information, proprietary information contained in this Document has been made available, on a limited basis, to others outside Framatome only as required and under suitable agreement providing for nondisclosure and limited use of the information.

8. Framatome policy requires that proprietary information be kept in a secured file or area and distributed on a need-to-know basis.

9. The foregoing statements are true and correct to the best of my knowledge, information, and belief.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on: (3/22/2024)

BYRAM Morris Digitally signed by BYRAM Morris
Date: 2024.03.22 08:52:49 -07'00'

(NAME)
morris.byram@framatome.com